SOCIAL FORESTRY

EXTENSION MANUAL

KENYA/JAPAN
SOCIAL FORESTRY TRAINING PROJECT

MARCH, 1994

BY:

C.N. ONGW'EYA - (FORESTER KEFRI)
K. YAMAUCHI - (EXTENSION EXPERT)

KENYA FORESTRY RESEARCH INSTITUTE
P.O. BOX 20412
NAIROBI.

SOCIAL FORESTRY

EXTENSION MANUAL

KENYA/JAPAN
SOCIAL FORESTRY TRAINING PROJECT

MARCH, 1994

BY:

C.N. ONGW'EYA - (FORESTER KEFRI)
K. YAMAUCHI - (EXTENSION EXPERT)

KENYA FORESTRY RESEARCH INSTITUTE
P.O. BOX 20412
NAIROBI.

PREFACE

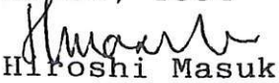
The Kenya-Japan Social Forestry Training Project was established in 1987 for the purpose of the development and improvement of social forestry techniques, and the dissemination of these techniques through training and extension activities at the national and regional levels. Since then, the extension activities have been implemented as key activities of the Project, which have been mainly developed through the implementation of the Pilot Forest Scheme in Kitui District.

Needless to say, the extension is indispensable for the promotion of social forestry since afforestation activities in arid and semi-arid areas could be promoted only by means of local people's planting activities which would be of benefit to them. Even this means , however, has a lot of difficulties and obstacles as none of them have ever had experience, techniques, extra land and fund for the afforestation. It is therefore much expected to develop not only planting techniques in arid and semi-arid areas but also extension techniques which can be helpful for the planting activities by the local people.

Through the technical cooperation of the Project for five yeas, various kinds of activities on extension carried out, which were needs surveys, extension trials, monitoring and evaluations. In the second Phase of the Project, which was followed after the first phase, the extension activities have also been continued, emphasizing more agroforestry techniques and women's role, and expanding acting areas.

It is my great pleasure that the Extension Manual on social forestry has just been published by Mr. C. N. Ongweya, Forester KEFRI and Mr. K. Yamauchi, Extension Expert in cooperation with many persons concerned. I am sure that this can be a significant report of the project implementation and a helpful handbook particularly for the person who are engaging in extension activities for social forestry nationwide.

March, 1994



Hiroshi Masuko
Chief Advisor of the Project

TABLE OF CONTENTS: Page

ACKNOWLEDGMENT:

We wish to extend our sincere thanks and gratitude to all those individuals who contributed in the preparation of this manual. While the list is long, we are particularly indebted to Mr. Hiroji Okabe (the former Chief Advisor to the Project), Dr. Jerf Odera (the Director KEFRI) for initiating the idea of writing this Manual. Appreciations also go to Mr. Nobuo Ishibashi (former extension expert) and Mr. Gabriel Muturi (the Pilot Forest Manager) for their contributions.

We would also like to record our greatest appreciations to the technicians attached to the Extension section who assisted in collecting some important information on the Extension activities. These are Messrs. Ali Atanas, Nathan Omambia, Jeremiah Nguniko and Miss Damaris M. Munyao. We wish to extend special thanks to Mrs. Catherine Kang'alikya for willingly typing this report.

Preparation of this Manual has been made possible by the financial and moral support from the Kenya/Japan Social Forestry Training Project (SFTP) and Kenya Forestry Research Institute (KEFRI).

SUMMARY

This manual has been prepared on request by the Kenya/Japan Social Forestry Training Project (SFTP). The need was to document information and expriences that have been gathered by the Project since its start in 1987.

This manual activities carried out by the Extension section of the Pilot forest Project. These include the extension demonstration plots, community planting by groups and schools, small scale nursery activities, selection and assistance to model farmers and seedlings distribution to the institutions and farmers in the locations.

Most of the technical aspects of Social Forestry Extension services by the Project though enough to Tiva Pilot Forest Project may also be applicable to other forestry extenison projects alsewhere in ASALs with similar climatic and socio-economic conditions.

This manual is also written to expose the extension activities that have been undertaken from 1987 to 1993.

1:0 INTRODUCTION

Social Forestry Extension services is one of the three sections of the Pilot Forest Project of the Kenya/Japan Social Forestry Training Project at Kitui. This section has been operational since 1987. The Social Forestry Training Project is within a semi arid area that receives a biomodal annual rianfall of 500mm - 900mm. The short rains fall in March - April and the long ones in November - December. The potential evaporation is 2000 mm per annum. The temperatures are normally high ranging from 22°C to 33°C. The soils are generally shallow and poor mainly sandy to murram.

Most of the activities were based at Kwavonza location that was chosen as a model location at the begining of the Project in 1987. The Social Forestry activities are aimed at developing methods which are cost effective, easily adaptable and socially acceptable. However, other locations like **Matinyani, Kathivo, Kyangwithya West** and **Nzambani** have been included since 1993 to increase the extent of our coverage in Forestry Extension. The above factors and reason that very little has been done on the systematic social forestry and afforestation in ASALs, it was necessary that a Social Forestry Extension Manual be developed for use in the Project area and regions with similar conditions.

1:1 The Objectives Of The Social Forestry Extension Section.

The Social Forestry Extension section was set up to:

(i) Find out how best tree planting activities could be spread to farmers at grassroot level.
(ii) Develop tree planting techniques for the farmers in semi arid areas which are cost effective, socially acceptable and easily adaptable by the society.
(iii) Help voluntary groups to start tree planting on the Pilot Forest site by providing high quality seedlings, technical advice and material support for their activities.
(iv) Offer seedlings and technical help to farmers and other interested parties.

2:0 SOCIAL FORESTRY APPROACHES BY THE PILOT FOREST PROJECT.

The Forestry Extension in conjunction with the training programme aims at promoting grassroots participation in tree planting activities and enhancing environmental stability. To achieve these objectives, the forest extension program was developed after extensive socio-ecomonic preliminary surveys that were carried between 1986 and 1988.

The program recognized the importance of self-help groups (Mwethya groups) as an important tool for effective transfer of tree planting technology and support. The project involved women groups in two areas namely village nursery activities and community planting. The schools were also involved in small scale nursery establishment and the establishment of compound planting in the schools. The following is, therefore, a brief summary of the various approaches of Social Forestry Extension used by the Pilot forest Project.

2:1: Community planting (Peoples plantation).

Community planting was started in 1987 with two pioneer groups namely Muli and Top groups. In 1988, the project entered into a ten year agreement with the groups. This encouraged sixteen more groups to join to make a total of eighteen groups to date. The objective of the peoples plantation is to provide an opportunity for the group members to derive some benefits through sale of tree products and provision of forest products and by acquiring in depth knowledge in tree planting, management and maintenance. The operations here involve site preparation by strip clearing, fencing, staking, pitting, soil refilling and the actual planting.

Site preparation involves strip clearing, a method where bushes and shrubs are cleared leaving all the big trees intact. In our Project, strip width are normally 3.3m planting holes of 45cm (width and depth) are then prepared in stripped areas at espacement of 3m by 3m. Seedlings are then planted after adequate moisture build-up during the rainy season and maintained by spot-weeding. This approach is called enrichment planting that aims at introducing more valuable species to existing vegetation.

The tools the group members use for these activities includes: Pangas, Jembes, Shovels, Mattocks and Slashers. In total, the Project leased an area of about 70 hectares for this particular activity and up to 1993/94, a total of 22.3 hectares has so far been enriched with much more valuable tree species.

Because of the other various commitments the group members have back at home, they are only able to spare two days per week for this activity (Tuesdays and Fridays). The tree species recommended for the community planting site include the following:

(i) *Terminalia brownii,*
(ii) *Acacia polyacantha*
(iii) *Azadirachta indica*
(iv) *Cassia siamea*
(v) *Croton megalocarpus*
(vi) *Grevillea robusta*
(vii) *Prosopis juliflora*
(viii) *Tamarindus indica*
(ix) *Dalbergia melanoxylon*
(x) *Mellia volkensii*

The problems that have been identified to be affecting the performance of peoples plantation activities include:

(a) Distance to the project site: This was revealed during the 1989 follow-up survey carried out by the extension staff. A short term solution to this was the provision of transport to the group members from Central positions to the peoples plantation site. The Project has provided the vehicle since 1989.

(b) Impracticability of Agroforestry component: Initially Agroforestry practice was recommended to be carried out within their plots at the plantation sites. This proved impossible because of the presence of wild animals such as Dick-dick, Monkeys and Baboons which destroy the crops and trees.

(c) Shortage of labour: This is very common especially during the rainy seasons when the farmers' priority is to prepare their farms and plant i.e. agricultural crops.

(d) Soil factors: The soils are very poor and have murram pan which has contributed to high seedlings mortality.

To boost up the morale of the members, the Project has been offering incentives to the participating groups, such as provision of tools and ceramic stoves. This has been very effective as demonstrated by their competitive approach to afforestation.

6:0: DISTRIBUTION OF SEEDLINGS TO THE LOCATIONS AND INDIVIDUAL FARMERS.

Introduction.

To promote local farmers who are interested in tree planting, the Project started to distribute seedlings to the farmers in six locations free of charge. The seedlings are those which the farmers have indicated that they prefer. The activity started in 1987/88. The distribution now covers seventeen (17) locations.

6:1: Objective.

The objective of free seedlings distribution to the farmers is to make them readily available to the interested farmers freely at minimal or no costs at all. In this way, this promotes the farmers interests in the tree planting activities and it acts as an incentive.

6:2: Method of distribution.

Because most of the road network in the ASALs are usually not very good, it is important that proper planning is done in October when the rains are expected as from 25th October every year onwards.

It is a good idea to distribute seedlings during the early rains when all the roads are still accessible. This is because if you are to carry out late distribution, then you may not be able to reach places which are far away. Another important point is that this is a very expensive exercise as it involves labour for loading and off-loading vehicles for ferrying the seedlings, and therefore a successful return is expected. This still calls for proper planning and implementation.

How The Days Are Organized.

As is common in everyday life that advance and proper planning leads to successful execution or implementation, the seedlings distribution days to various locations within various divisions are actually organized very much in advance. It is also a collective responsibility between the Social Forestry Project Extension officers, the provincial administration, the District forest office and other related departments i.e. Agriculture, Energy and non-governmental organizations like KENGO.

The Project officials in collaboration with the DFO's office provincial administration, i.e. the D.O. environment, the District officers of the concerned divisions, and the chiefs of the locations arrange for a meeting to plan the most convenient days and dates for the exercise in every location and then a distribution time table is compiled. It is important to note that this is done in the month of October or late September to facilitate planting of seedlings in November.

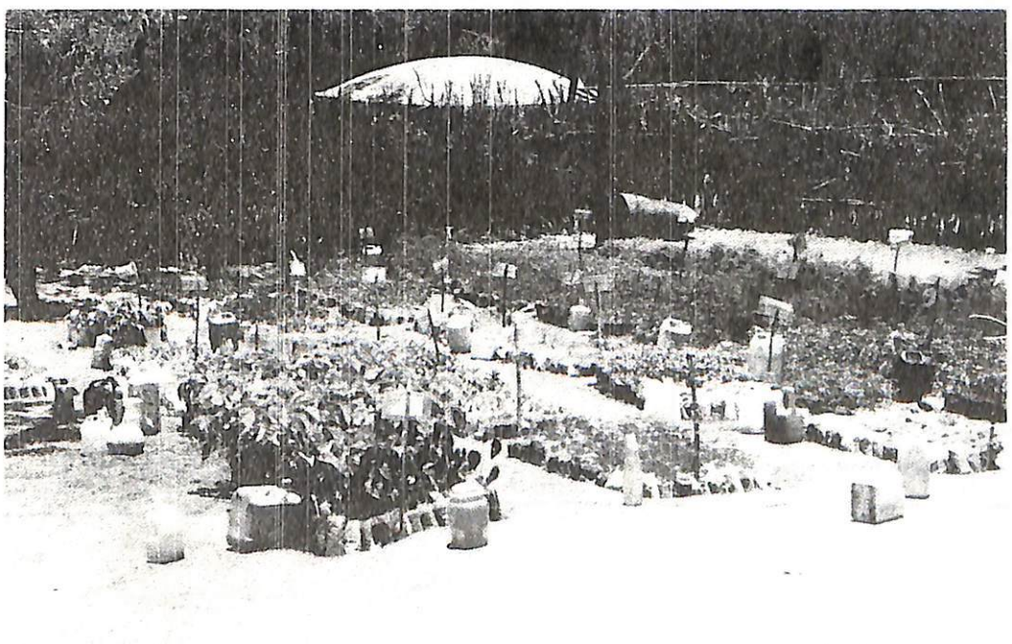
The locational chiefs are expected to organize a chief's Baraza where the local Wananchi are invited. The planting demonstration area is also supposed to be prepared ready for demonstration exercises. All the other Government officers from other related departments in the location are also invited to attend such meetings and talk to the Wananchi.

The section has also developed an "ON-FARM NURSERY TECHNICAL GUIDE" which also assists the groups and schools on their day to day nursery operations. At the end of each year an evaluation exercise is conducted during the month of October to assess the performance of every school and group and rank them. During the evaluation some of the points looked into are:

1) Whether the set targets have been met or not.
2) Improvisation by any local seed collection.
3) The health of the seedling.
4) Proper nursery fencing to ensure maximum protection from external interference.
5) Improvisation by the use of the local available.
6) Potting quality so as to enhance germination and survival .
7) Overall germination percentage.
8) Tending in general.
9) Any others i.e. participatory ratio etc.

After the evaluation exercise the seedlings are ready for planting during the rainy seasons in November. The seedlings from the group nurseries are shared amongst the group members. Other seedlings are planted within the Church compounds. The schools give first priority to the school compound planting and the remaining seedlings are given out freely to the pupils and teachers to plant in their homes.

The idea of women groups deriving some economic benefits from selling some seedlings is not yet achieved. Some farmers have also started their own nurseries and have requested for some technical and material support from the Project. These come from the neighbouring locations to the model locations of Kwavonza. Since the Project realizes the importance of encouraging farmers to start their own private nurseries to enhance local seedlings production, we provide technical guidance to interested farmers and offer limited material support. Currently, the project is assisting 40 women groups and 7 primary schools in nursery seedlings production in Kwavonza location.



2:3: Selection And Assistance To Model Farmers.

Role of model farmers approach in extending new farming practices has been used successfully in Kenya in the past and is still one of the most popular packages for technology transfer and demonstration. The Social Forestry Training Project through its extension programmes decided to select and assist progressive farmers in model location of Kwavonza. The method of selection used was that of "farmers centred approach", based on how much interest the farmers have in tree planting, social activities and innovations. So in 1988, the project selected the first pioneer model farmers and in 1989, five more farmers were selected raising the number to six (6). In 1993, the project selected another sixteen (16) model farmers in the new locations of Matinyani, Kathivo, Kyangwithya West and Nzambani. Each model farmer was selected from each sub-location of the new locations.

These farmers are located next to the road where majority of people can visit the plots. The roads leading to these demonstrations are very accessible and the farmers are ready to welcome as many visitors at any one given time.

The type of assistance rendered to the model farmers is in the form of technical packages of using most easily adaptable and cost effective methodologies and free seedlings supply for farm establishment. The farmers are able to observe and evaluate the technology and how it meets their respective objectives.

The species which have been used for the establishment of these plots include the following:

Acacia polyacantha
Azadirachta indica
Cassia siamea
Croton megalocarpus
Eucalyptus camaldulensis
Eucalyptus teriticornis
Grevillea robusta

Below is the summary of various establishment methods used by the farmers.

Model farmer	No. of block represented	Year of establishment	Methodologies tried
A	I	1989	Trench microcatchment
B	II	1988/89	Microcatchment arms of 1.5m and Agroforestry
C	II	1989	Furrow and pit planting
D	IV	1989	Patch planting and pit clear planting
E	V	1989	Furrow and pit planting
F	VI	1989	Pit planting and Agroforestry

2:4: Seedlings Distribution To Farmers In Various Locations.

The main objective of distributing seedlings to farmers from 1987 has been to encourage the farmers to start tree planting and be able to transfer the technical package on tree planting techniques. This is a very important exercise as it readily avails the seedlings to the farmers at the right time for planting with very minimal or no costs by the farmers.

The short term promotion of tree planting in the neighbouring locations is through free seedlings distribution at the various centrally selected points. The exercise was started in 1987 with only six locations in two divisions but now covers seventeen (17) locations in four divisions of Kitui District. The four divisions are **Kabati, Central, Chuluni** and **Yatta.**

2:5: The Demonstration Plots.

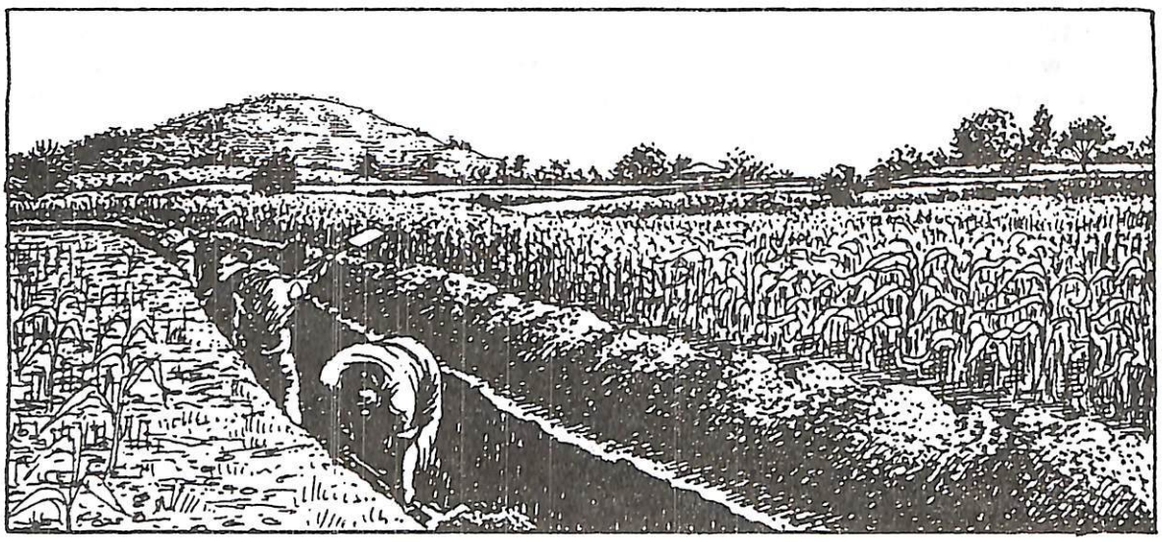
In order to promote tree planting by the demonstration of various appropriate techniques of tree establishment, protection, tending and tree seedlings raising, the Social Forestry Training Project has managed to establish two plots (demonstration plot I and Demonstration plot II). The demonstration plot I has an area of approximately 2.0 hectares and was established in 1988/89, while demonstration plot II commonly known as Agroforestry demonstration plot has an area of 0.52 hectares and was established in 1993/94. Both plots are situated in the Pilot Forest Project Tiva site in Kwavonza location.

Small Scale Nursery Model.

This is one of the main demonstration activities in Demo I plot and emphasizes on the use of locally available materials for example the use of milk tetra packs and tins as seedlings containers, the use of live fences as hedges, and the use of locally collected seeds by the farmers and schools themselves. On the termite control both in the nursery stage and field, the demonstration stresses on the use of ash, chicken droplets, used diesel engine oil. The reduction of evapotranspiration in Asals is ensured by the preparation of sunken beds. Highlighted also, is the proper watering and shading intensities to ensure better germination and survival of the seedlings.

Agroforestry Demonstration Plot.

This technology emphasizes on the alternative and most appropriate Agroforestry tree species for inter cropping, and checking the soil and water conservation measures by the construction of "Fanya juu" and "Fanya chini" structures. Citrus fruits have been planted within the trenches where the moisture accumulates.



Construction of a !Fanya juu! terrace

Species Trial Demonstration.

This was set up in 1989 to monitor the performance of several tree species raised at the Pilot Forest nursery and can enable the farmers to select the species they would prefer after seeing their performances. This also helps to demonstrate trees that are adaptable to the area.

The Turkana Method.

This was established to demonstrate water harvesting technique for enhancing the survival and growth of trees. The bigger water collecting surface of 5m x 5m acts as a water catchment area and the small slope helps in directing the water into a collection ditch next to the ridge where the tree is planted. The accumulated water is utilized by outplanted seedlings for growth and survival. Except for the cost, this method has been successful in seedlings established in arid and semi arid areas.

Orchard Demonstration.

This was established with an aim of exposing the local farmers to the various fruit varieties, their methods of establishment, maintenance and protection. The fruit trees are planted in the trenches and the trenches should be maintained and the embankments stabilized with grass or so. The trenches have higher moisture accumulation which improves the survival and growth of the Citrus trees.

Individual Seedlings Protection.

Majority of the farmers in ASALs keep a good number of livestock and because of lack of feeds, they easily destroy the trees the farmers have planted within their compounds.

This type of demonstration was therefore set up with an aim of showing a simpler way a farmer can protect trees using dry twigs, thorny branches to keep off these animals. Once a tree has reached a reasonable size that animals cannot reach and destroy, the twigs or branches can be used as firewood and the animals can be allowed to graze under the trees. The use of the twigs and branches ensures less wastages as that is an economic use of it. Such measures are only temporary as they are important during the seedling establishment phase.

Live Fence Demonstration.

This was set up with an objective of introducing the alternative fence species which can form good hedges as most of the *Euphorbia tirucali* they use has shown a lot of side effects ie. it deteriorates soil conditions, associated with the green snake which is poisonous. The *Cupressus lusitanica* has been affected by the aphids and the twigs or branches have been constantly destroyed by the termites.

The live fence species that can be tried which have shown at least good performances include:

- *Caesalpinea decapitalata*
- *Prosopis juliflora*
- *Thevetia peruviana*
- *Parkinsonia aculeata*
- *Dovyalis caffra*
- *Acacia melifera* etc.

2.6 Social Forestry Project Days.

This is an open day organized for showing various categories of farmers what activities are carried out by the Project. During such days the farmers are exposed to various method of tree establishment, tending and protection techniques which suits ASALs. It is an important day as many farmers and school pupils are enlightened on the various Project activities and the attendants are actually expected to go back and try some of these technologies which suits them accordingly.

The people also become to know the existence of the Social Forestry Project and its mandates. It is important that such functions are organized periodically and the possible categories of farmers and schools invited to attend. Other possibilities are men and women groups the local administration ie. D.O.s, Chiefs, Asst. Chiefs and technical officers from related departments. The first such day was held in 1988 and the second is to be held on 30th March 1994 as Regional Social Forestry Prize Day. During such occasions, demonstrations are made on appropriate tree planting, tending and protection methods in ASALs.

3:0: SOCIAL FORESTRY EXTENSION SURVEYS.

Proper formulation and planning of project activities require access to adequate levels of information. Such information may be obtained from secondary data sources and may therefore only require desk studies to be carried out. However, most secondary data sources are rich in basic agricultural information and demographic data, but rather deficient in socio-economic, socio-cultural and environmental information and particularly so with regard to tree management.

To this end some form of survey, direct or indirect interaction with the target community on formal or informal basis for the purpose of information gathering is important in planning for farm based tree planting activities. Within the participatory concept, surveys provide a forum for involving the Project beneficiaries right from the start in the identification of problems as perceived by the community and helping them deal with identified problems. The community is thus involved in formulating and implementing solutions right from the beginning.

Where cultural constraints are encountered, it is important that full respect be given to the prevailing socio- cultural practices of the people to be involved. This ensures that the programme activities are not viewed as disruptive to those traditions. It may be necessary also to stimulate the people through extension services for example to identify those activities that may appear detrimental to a desirable development trend.

Through surveys the following informations can be harnessed.

(i) Key variables that influence forestry activities in the Project area, including farm sizes, family size, labour and financial constraints.

(ii) Sociological aspects i.e. cultural beliefs and practices that affect tree planting, with special reference to the role of women.

(iii) Supply and demand of tree products including fuelwood, charcoal, poles etc.

(iv) Effects of land tenure on and or rural afforestation incentives.

(v) Examine the economic impact of trees on farms and identify the importance.

(vi) Assessment of the physical resources, geology, soils, slopes etc.

(vii) The present land use systems i.e. by assessing crops, livestock, pastures, forests etc.

(viii) Assessment of the woody biomass, Crop land and species preferences.

(ix) Infrastructure roads, buildings, industries etc.

(x) Assessment of the soil erosion factors.

Experience gained from this Project shows that some preliminary baseline surveys should be carried out first before the implementation of a given project. It is necessary therefore to note that several initial preliminary baseline field surveys were carried out through questionnaires.

The following surveys have been carried out using simple questionaires.

(i) Socio-economic baseline surveys: To determine the socio-economic variables influencing forestry activities in the location including farm sizes, family size, labour availability and capital stocks (see appendix I).

(ii) Survey of Mwethya groups in a location, the reasons for their formation, the activities they are involved in, and whether they could be interested in tree planting activities. The membership numbers, the nature of the members, whether working or non-working. (see appendix II, III).

(iii) Survey of the most preferred tree species and its utility.

(iv) Survey on the socio-cultural beliefs that affects tree planting. Such information should ensure that there is no conflict between the trees planted and the beliefs of a given society.

(v) Survey of the schools in a location and whether they could be interested in tree planting. (see appendix IV).

4:0: CO-OPERATION WITH COMMUNITY LEADERS AND RELATED DEPARTMENTS and NON-GOVERNMENTAL ORGANIZATIONS:

For effective participation and involvement in tree planting activities, it is important for a community project to collaborate with the local leaders like the District officers, Chiefs, Assistant Chiefs, and even the related government department and non-Governmental organizations like Kengo, World vision, World neighbours etc.

The Kenya/Japan Social Forestry Training Project has always been collaborating with the local leaders, the related departments, churches, women groups, institutions like schools and non governmental organization in its areas of operation so as to improve efficiency.

For the women groups planting at the Project site and the model farms were used as demonstrations within the villages. The Project has also managed to fix signboards for ease of identification and publicity.

The collaboration is effected in the training activity where the resource persons are drawn from the related ministries in the district and during the seedlings distribution exercise when related government officers and those from NGO's are invited to attend. Such officers talk to the farmers on several subjects related to trees and their use. Another important area for collaboration is the organization and running of a field day jointly where facilitating officers are drawn from deverse backgrounds. Such field days have proved to be very effective and economical.

During the seedlings distribution exercises, the project has developed a pamphlet explaining the basic principles of tree planting, tree tending, and even protection. For ease of communication the pamphlet has been written in three different languages namely Kikamba, Kiswahili and English. The attendants are therefore allowed to choose a pamphlet written in a language that he/she understands well.

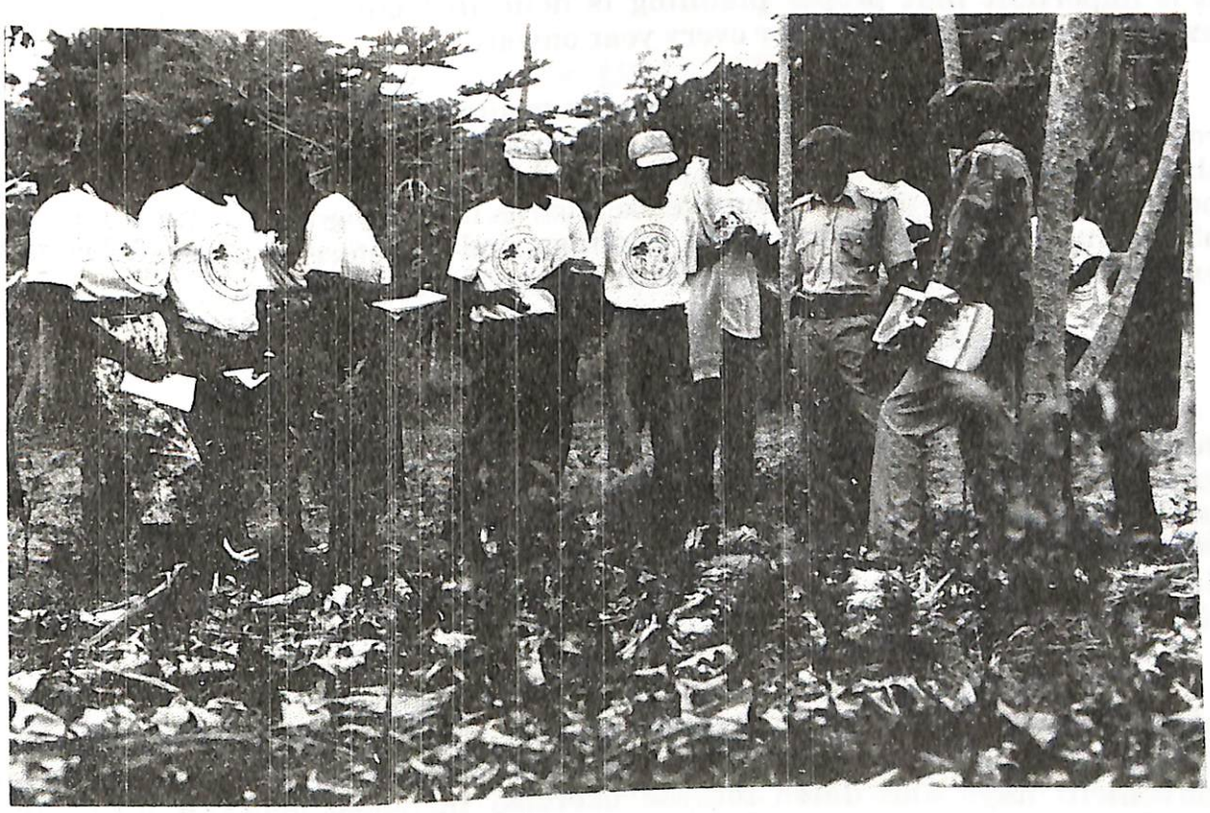
Also it is very important to have regular meetings with the officials, group leaders, administrative leaders and even your own staff so that issues related to work are discussed in harmony and highlights given. This helps to solve small problems which could lower productivity.

As for extension work, it is necessary to have a strong line up of extension officers for effective operation. This therefore calls for a clearly drawn staff establishment chart.

5:0: TRAINING OF EXTENSION STAFF AND TARGET GROUPS.

For maximum output from staff, it is always advisable to ensure that the staff under you get enough technical training on the subjects they are dealing with. This is important also where the community leaders are involved. They should as well get training so as to know what is expected of them.

For this reason, the Social Forestry Training project has been conducting various courses/trainings for all the categories of staff under them, the farmers, group officials, community leaders and even the administration officers. The school teachers and the church leaders are no exception as the project also collaborates with the schools and churches for Tree nursery establishment and compound planting respectively.



6:0: DISTRIBUTION OF SEEDLINGS TO THE LOCATIONS AND INDIVIDUAL FARMERS.

Introduction.

To promote local farmers who are interested in tree planting, the Project started to distribute seedlings to the farmers in six locations free of charge. The seedlings are those which the farmers have indicated that they prefer. The activity started in 1987/88. The distribution now covers seventeen (17) locations.

6:1: Objective.

The objective of free seedlings distribution to the farmers is to make them readily available to the interested farmers freely at minimal or no costs at all. In this way, this promotes the farmers interests in the tree planting activities and it acts as an incentive.

6:2: Method of distribution.

Because most of the road network in the ASALs are usually not very good, it is important that proper planning is done in October when the rains are expected as from 25th October every year onwards.

It is a good idea to distribute seedlings during the early rains when all the roads are still accessible. This is because if you are to carry out late distribution, then you may not be able to reach places which are far away. Another important point is that this is a very expensive exercise as it involves labour for loading and off-loading vehicles for ferrying the seedlings, and therefore a successful return is expected. This still calls for proper planning and implementation.

How The Days Are Organized.

As is common in everyday life that advance and proper planning leads to successful execution or implementation, the seedlings distribution days to various locations within various divisions are actually organized very much in advance. It is also a collective responsibility between the Social Forestry Project Extension officers, the provincial administration, the District forest office and other related departments i.e. Agriculture, Energy and non-governmental organizations like KENGO.

The Project officials in collaboration with the DFO's office provincial administration, i.e. the D.O. environment, the District officers of the concerned divisions, and the chiefs of the locations arrange for a meeting to plan the most convenient days and dates for the exercise in every location and then a distribution time table is compiled. It is important to note that this is done in the month of October or late September to facilitate planting of seedlings in November.

The locational chiefs are expected to organize a chief's Baraza where the local Wananchi are invited. The planting demonstration area is also supposed to be prepared ready for demonstration exercises. All the other Government officers from other related departments in the location are also invited to attend such meetings and talk to the Wananchi.

6:0: DISTRIBUTION OF SEEDLINGS TO THE LOCATIONS AND INDIVIDUAL FARMERS.

Introduction.

To promote local farmers who are interested in tree planting, the Project started to distribute seedlings to the farmers in six locations free of charge. The seedlings are those which the farmers have indicated that they prefer. The activity started in 1987/88. The distribution now covers seventeen (17) locations.

6:1: Objective.

The objective of free seedlings distribution to the farmers is to make them readily available to the interested farmers freely at minimal or no costs at all. In this way, this promotes the farmers interests in the tree planting activities and it acts as an incentive.

6:2: Method of distribution.

Because most of the road network in the ASALs are usually not very good, it is important that proper planning is done in October when the rains are expected as from 25th October every year onwards.

It is a good idea to distribute seedlings during the early rains when all the roads are still accessible. This is because if you are to carry out late distribution, then you may not be able to reach places which are far away. Another important point is that this is a very expensive exercise as it involves labour for loading and off-loading vehicles for ferrying the seedlings, and therefore a successful return is expected. This still calls for proper planning and implementation.

How The Days Are Organized.

As is common in everyday life that advance and proper planning leads to successful execution or implementation, the seedlings distribution days to various locations within various divisions are actually organized very much in advance. It is also a collective responsibility between the Social Forestry Project Extension officers, the provincial administration, the District forest office and other related departments i.e. Agriculture, Energy and non-governmental organizations like KENGO.

The Project officials in collaboration with the DFO's office provincial administration, i.e. the D.O. environment, the District officers of the concerned divisions, and the chiefs of the locations arrange for a meeting to plan the most convenient days and dates for the exercise in every location and then a distribution time table is compiled. It is important to note that this is done in the month of October or late September to facilitate planting of seedlings in November.

The locational chiefs are expected to organize a chief's Baraza where the local Wananchi are invited. The planting demonstration area is also supposed to be prepared ready for demonstration exercises. All the other Government officers from other related departments in the location are also invited to attend such meetings and talk to the Wananchi.

The Social Forestry Project officers transport seedlings ranging between 2000 to 4000 of various species depending on the population of a given location. The officers will talk to the people on the importance of tree planting, how to plant, tend, and protect the seedlings by fencing etc.

At the end of the demonstration planting by the Social Forestry officials, all attendants are issued with free seedlings and the names of the farmers and seedlings issued recorded in designed forms. This is meant to ease the subsequent task of carrying out follow-up after a period of between 3 - 6 months.

At the same time, the Project also provides each and every farmer who attends the meeting with a pamphlet emphasizing on the simple and most convenient ways or methods of tree planting, tending, protection and handling right from the time the seedlings have been issued to them. These pamphlets have been developed by the Project and are written in three languages namely Kikamba, Kiswahili and English.

Kikamba Kiswahili English

The mode of distribution is therefore planned in such a way that the project in conjunction with the forest department and the district administration organizes a locational or divisional tree planting day in every location covered and during such times, the chief of the location is expected to arrange for a chief's 'Baraza".

The officers from various departments who are working within the location i.e. department of Agriculture, Social services, Kengo, Forestry etc. are all invited to attend and address the farmers on the issues regarding tree planting.

On such days the Project transports various species of seedlings to such gatherings. Planting demonstrations are carried out at an area which the Chief had prepared before.

Pamphlets written in English, Kiswahili, Kikamba languages stressing on appropriate tree planting techniques, maintenance and protection are issued out to the farmers who attended the Barazas.

Seedlings are then given out freely after the planting demonstrations and all the details are properly recorded in a specially defined form for distribution. The details recorded include the name of farmer, the number of seedlings collected, the nature of the trees collected, the location, sub-location, village etc. These details are very important and are meant to facilitate follow-up survey programme after three to six months later.

6:3 Follow - up.

Three to six months later after distribution of the seedlings to the farmers and institutions in various locations it is always important to carry out a follow-up survey to assess seedlings perfomance, the problems experienced by the farmers and approaches to those problems.

As it is rather impossible to carry out total enumeration, it is therefore necessary to sample a few farmers and schools that are interviewed during the follow-up. The Project selects randomly ten farmers from every location and two schools to serve as the contact farmers and schools.

During the follow-up surveys, questionnaires are used systematically designed to acquire all the necessary information. These should be designed in such a way that the following questions are satisfactorily answered .

(i) How is the survival rates?

(ii) What problems have the farmers encountered with tree planting and what they have done to solve them.

(iii) Which tree species are preferred and why?

(iv) What kind of requests do the farmers and schools have?

The random sampling is recommended to avoid bias. The exercise is not an easy task and therefore if there is enough resources then the survey teams can be two or more in order to complete the exercise within a reasonable duration. See appendix V.

7:0: ON-FARM TREE NURSERIES MANAGEMENT AND TECHNIQUES.

To make the farmers in the model location self sufficient in tree seedlings, the project started a program of assisting Mwethya groups and Primary schools to establish small scale nurseries in 1988. Additional advantage of such nurseries is that the farmers and schools can raise species of their choice.

The nurseries have been raising seedlings ranging from fruit trees, ornamentals and shade, Agroforestry spp, timber and fuelwood and sometimes fodder species. The production capacities have been between 1500 to 3000 seedlings for each group and school respectively.

The success of seedlings production in the nursery does not only depend on efficient management of resources but also availability of the resources in good quantities and qualities in time. These nurseries are encouraged to use locally available materials e.g. Tin containers, Plastic containers, Milk tetra packs, Ash, Chicken droplets for termite control. These approaches are meant to facilitate or lead to long term sustainability.

7:1 Nursery Operations.

Guiding On Siting A Nursery.

When selecting a tree nursery site, two main factors have to be given adequate care:

(a) Factors important for seedlings growth (water availability).

(i) Good soil availability next to the nursery site.

(ii) Topography to be good so as to allow for proper drainage and keep off strong winds damage on the seedlings. Not in valley bottoms but flat areas.

(iii) Nursery materials to be available in time so as not to delay the work.

(b) Factors important for nursery management:

(i) The nursery to be centrally located to facilitate sharing of seedlings close to planting site to reduce transport costs.

(ii) Accessibility - The nursery should be located where it is easier to reach on foot and by vehicles.

(iii) Ownership - It is necessary that the nursery be on public land owned by the Government or community so that the management may be free to make any decisions.

(iv) Size - The size of the nursery depends on factors like: the number of seedlings to be produced; the time taken to produce the seedlings of desired size and the size of the containers used. Generally, a size of $10m^2$ is minimum space for producing 1,000 seedlings.

(v) Security - The nursery should be located in a secured place as to minimize loss of seedlings and tools.

Setting Up A Tree Nursery

A nursery should be laid out in such a way that the following are ensured.

(a) It should be in E - W direction for better illumination.

(b) Access road and paths so as to minimize the need for transport of materials and seedlings with vehicle.

(c) Fencing - Protection is needed against browsing and trampling by animals. Initially thorny branches, poles and twigs should be used. If the nursery is to be used for a longer time then live fence or hedges are recommended to protect seedlings against wind, animals, and to intercept weed seeds. Recommended species for this are:

Lantana camara
Caesalpinea decapitalata
Dovyalis caffra
Acacia mellifera
Thevetia peruviana

(d) A shelter for tools, materials and workers: A simple small hut is recommended to be constructed from locally available materials such as poles, mud etc.

(e) A soil dump: The production of potted seedlings requires large amount of soil, sand and manure. Space is needed to store the materials separately next to a place where they can be mixed and pots filled.

(f) Shading and shelter for plants: All seedlings require shade when they are young and delicate. Shades could be made from locally available materials such as small pieces of wood, grasses, millet stales etc.

(g) Windbreaks: Where strong and/or desiccating winds prevail, a windbreak consisting of at least two rows of shrubs and one row of trees should be planted along the nursery facing the main wind direction. The recommended tree species for this are:

Cassia species
Casuarina equisetifolia
Grevillea robusta

The trees should be fast growing and strong stemed in order to overcome wind effects.

Time To Start Nursery Work.

The time to start the nursery operations depends on the time the seedlings are to be planted in the field. There must always be enough time for the seedlings to grow and attain the recommended plantable sizes. It is generally important that work starts in February or March for the slow growing species to reach plantable sizes of 30-50 cm height with the onset of the long rains in November. The sowing schedule for various tree species can be obtained from the "SIMPLE GUIDE (HANDBOOK) TO ON-FARM TREE NURSERIES IN ASALS KITUI DISTRICT" (By Ongw'eya C.N. and Yamauchi Koji 1993).

7:2 Nursery Tools.

The simple nursery tools required in the case of small scale nursery are:

Water jerrycans	- for collecting water from the rivers.
Watering cans	- for watering the seedlings.
Wheelbarrows	- for collecting nursery soil and compost manure.
Jembes	- for preparing the nursery site and constructing
the	sunken beds.
Rakes	- for clearing off rubbish from the nursery.
Shovel	- for collecting soil.
Pruning knife	- for root pruning.
Soil sieve	- for sieving the soil and also manure.
Panga	- for cutting fencing materials.
Slashers	- for slashing around the nursery site.

7:3: Nursery Techniques.

Collection and Treatment Of Seeds.

For the participating schools and groups, the project assists in several ways including the provision of seeds for the tree species that are not readily available in the area. However, the Project guides the groups and schools that the seeds for the species which are popular and readily available within the areas should be locally collected and used for seedlings production. This has been very possible because the members of the groups and school teachers incharge of tree planting activities have received enough training from the Social Forestry Training Project on the seed collection and extraction techniques.

To assist farmers in seedlings collection, they have been exposed to the seed flowering patterns of several species. Large seeded species or those with pods are easiest to collect. Small seeded species can be more difficult to collect from the tree when ripe before they dry. Once collected cones and other fruits can then be dried in a clean sheltered place and the seed separated. Many tree species of the arid and semi arid lands have seeds with thick coats. *Acacia* species are an example. These seeds need their coats softened before they can germinate. The best way of doing this for nearly all such species is to bring a pot of water to boil, put the seeds in the water and immediately remove the pot from the fire. The seeds are then left in the water overnight after which time they should be sown. (more on seeds pretreatments could be found from TIVA NURSERY MANUAL by Nyambati R.O. and Hirao S. 1991).

Nursery Soil.

Where possible, a nursery should have a nearby source of soil to reduce soil collection costs. Since the soils of arid areas are infertile and of poor physical properties, it is necessary to mix the soils with manure to improve both fertility and structure. Where manure is available, a mixture of 4:1 (soil, manure) on volume basis has been found to provide good structured mixture that meets nursery soil mixture requirements such includes:

- Ability to stay in the seedlings containers.

- Good porosity for adequate aeration and water infiltration.

Soil for the groups could be brought by members and in case of schools, the same can be collected and brought by pupils.

Seedling Containers.

As the emphasis is mainly on the use of locally available materials , the farmers and schools participating in small scale nursery activities are encouraged to use the following:

(a) Cooking fat containers
(b) Plastic oil containers
(c) Milk tetra packs
(d) Polythene tubes
(e) Banana barks etc.

Note that its very important to wash cooking fat containers with Omo soap solution to remove fat stains that attract termites. Alternatively pesticides such as Aldrin solution can as well be used.

Potting Operation.

This is the filling of the containers with soil mixture. The pot size used in the model location for raising seedlings is of 4" x 7" clear or black in colour. It is important that the tubes are open on both ends for ensuring proper root development and water movement. The milk packets are also to be open on both ends for the assurance of good root development and drainage. The tins have to posses several fine holes on the bottom for drainage.

The containers should be filled in such a way that 3/4 of the lower bottom of the pot is compacted to ensure that the pot does not bend and spill the contents when it is being carried. The top 1/4 should be slightly compacted so as to make seed sowing easier.

Seed Sowing and Sowing Schedule

The time for sowing any species depends on the duration it takes to attain plantable size. It is important that the seeds are sown in time so as to attain plantable size of 30cm to 50cm by November every year. The following sowing schedule should, therefore, be adhered to and it only deals with preferred species by the farmers.

No. of months before planting out	Species names
11 months before	*Azadirachta indica, Terminalia brownii*
10 months before	*Cassia spectabilis*
9 months before	*Acacia gerardii, Mellia azadirach Acrocarpus fraxinifolia, Terminalia mentalis, Delonix regia, Grevillea robusta*
8 months before	*Caesalpinea decapitala, Cassia siamea, Parkinsonia aculeata*
7 months before	*Acacia albida, Prosopis juliflora, Acacia polyacantha, Sesbania grandiflora, Cassuarina equisetifolia, Mellia volkensii*
6 months before	*Dovyalis caffra, Eucalyptus paniculata*
5 months before	*Eucalyptus camuldulensis, Eucalyptus tereticornis, Leucaena leucocephala, Passion fruits, Carica papaya*
4 months before	*Sesbania sesban*

Direct Sowing.

The majority of the species outlined here are raised through direct sowing as most of the seeds are bigger in sizes. For those species having small seeds like *Eucalyptus* species, it is recommended that they should be raised in the seed beds and pricked out into the tubes and other containers later.

Some of the species that are raised in seed beds then pricked out into pots include:

Acacia polyacantha
Acrocarpus fraxinifolia
Azadirachta indica
Caesalpinea decapitala
Cassia siamea
Cassia spectabilis
Carica papaya
Croton megalocarpus
Grevillea robusta
Mellia azadirach
Parkinsonia aculeata
Sesbania sesbans
Sesbania grandiflora
Tamarindus indica
Terminalia brownii
Terminalia mentalis etc.

The following are raised from seed bed and then pricked out in pots. *Prosopis juliflora, Dovyalis caffra, Jacaranda mimosifolia, Leucaena leucocephala, Schinus molle, Sesbania sesban, Terminalia mentalis,* the Eucalyptus species, *Casuarina equisetifolia* and *Melia volkensii.*

Sowing depth is an important factor because if seeds are sown too deep in the soil, they may germinate and exhaust food reserves before emerging above the soil. The seedling cannot manufacture its own food before appearing above the soil, so it dies and rots. Uniform sowing is also important for getting uniform sized seedlings. The recommended sowing depth is approximately equivalent to the diameter of the seed. The number of directly sown seeds should be 2-3 per pot so as to take care of mortality. In case all the seeds germinate, germinants can be pricked out into one seedling per pot. The one to be left in original container should be healthier seedling.

Pricking Out.

Once seeds are sown in the seed beds germinants have to be transferred into the pots, a process known as pricking out. Seedlings will normally suffer less shock if pricked out when having three leaflets. Immediately before the seedlings are pricked out, they must be watered well. The same should be done after pricking out. Pricking out should be done early in the morning or late in the afternoon to avoid excessive loss of water by the tender seedlings. Only healthy seedlings which have been uprooted from the seed bed awaiting pricking out into the pots should be kept in tins or any other vessels containing water to avoid water loss by evapotranspiration which may lead to wilting.

Seedling Care And Maintenance.

a) **Shading.**

After sowing the seeds and pricking out from the seed bed there should be partial shading to protect the seedlings from direct sun rays which may cause high evapotranspiration. The materials used for shading should be locally available materials such as grass, millet stalks, and small pieces of wood. Once the seeds in the seed bed start to germinate then the shade should be raised to 50 cm above the surface to allow sufficient room for weeding, watering and light.

b) **Watering.**

Seedlings should be watered twice daily i.e. early in the morning and late in the afternoon when the sun is not hot. The quantity of water or watering intensity should be 30 litres per 1000 seedlings. During the rainy season never water twice, you can water once or not at all depending on the rainfall. Note however that over watering or under watering may be harmful to seedlings. Over watering may lead to root rot as a result of water logging and may also encourage proliferation of damping off fungi while under watering leads to poor root development since the water will only moisten the surface layer of the soil.

c) **Weeding.**

Weeds compete for water and nutrients and can reduce seedling vigour if not controlled. Hand weeding ie. the gentle removal by pulling out unwanted vegetation is usually an appropriate method of weed control. Watering before weeding makes it easier.

d) **Cultivation.**

Cultivation aims at controlling the weeds, improving aeration and water percolation. Roots can penetrate easily into the soil which facilitates absorption of nutrients. Experience has shown that repeated watering of seedlings in pots compacts the soil and deteriorates the physical properties of the soil i.e. reduces porosity which lowers the rate of water infiltration. This therefore makes cultivation an indispensable exercise. Convenient tools for the operation to prevent surface compaction are spatulas, dibble etc.

e) **Root pruning.**

When seedlings have reached a certain size, their roots become longer than the depth of the pots or containers. If the roots are left without being pruned they penetrate into the ground and develop a strong root system. It is important that strong roots are not allowed to develop because once they are cut the seedlings are likely to be weakened. Therefore periodical root pruning is required before the root system establishes itself into the ground. This is done once every 2 weeks. It is advisable that the nursery stock is watered before and after root pruning to enable the seedlings recover quickly from the shock.

Seedling Care And Maintenance.

a) Shading.

After sowing the seeds and pricking out from the seed bed there should be partial shading to protect the seedlings from direct sun rays which may cause high evapotranspiration. The materials used for shading should be locally available materials such as grass, millet stalks, and small pieces of wood. Once the seeds in the seed bed start to germinate then the shade should be raised to 50 cm above the surface to allow sufficient room for weeding, watering and light.

b) Watering.

Seedlings should be watered twice daily i.e. early in the morning and late in the afternoon when the sun is not hot. The quantity of water or watering intensity should be 30 litres per 1000 seedlings. During the rainy season never water twice, you can water once or not at all depending on the rainfall. Note however that over watering or under watering may be harmful to seedlings. Over watering may lead to root rot as a result of water logging and may also encourage proliferation of damping off fungi while under watering leads to poor root development since the water will only moisten the surface layer of the soil.

c) Weeding.

Weeds compete for water and nutrients and can reduce seedling vigour if not controlled. Hand weeding ie. the gentle removal by pulling out unwanted vegetation is usually an appropriate method of weed control. Watering before weeding makes it easier.

d) Cultivation.

Cultivation aims at controlling the weeds, improving aeration and water percolation. Roots can penetrate easily into the soil which facilitates absorption of nutrients. Experience has shown that repeated watering of seedlings in pots compacts the soil and deteriorates the physical properties of the soil i.e. reduces porosity which lowers the rate of water infiltration. This therefore makes cultivation an indispensable exercise. Convenient tools for the operation to prevent surface compaction are spatulas, dibble etc.

e) Root pruning.

When seedlings have reached a certain size, their roots become longer than the depth of the pots or containers. If the roots are left without being pruned they penetrate into the ground and develop a strong root system. It is important that strong roots are not allowed to develop because once they are cut the seedlings are likely to be weakened. Therefore periodical root pruning is required before the root system establishes itself into the ground. This is done once every 2 weeks. It is advisable that the nursery stock is watered before and after root pruning to enable the seedlings recover quickly from the shock.

f) Cleaning around the beds.

Weeds come up not only in the pots but also around the beds. These weeds harbour crickets, caterpillars and other insects which feed on seedlings, and also give them a place to hide. It is therefore advisable to remove all the weeds around the beds with jembes and clear the rubbish as well.

g) Hardening Up.

Seedlings must be prepared for the harsher conditions that they will meet in the field. To prepare the seedlings to those conditions, seedlings are removed from the shade, watering frequency and intensity reduced and root pruned frequently. Hardening up is recommended to start 1-2 months before planting during which seedlings should also be spread out to immitate out planting espacement in the field.

7:4 Seedlings Distribution.

When all the points already outlined are carefully considered, at the end of the year, good healthy seedlings will have been raised ready for planting out at the onset of the long rains in November of each year. The women groups usually distribute the seedlings raised in their nurseries amongst the group members for planting in their respective areas. The groups also have the option of selling their seedlings but this option has been constrained by the unavailability of market.

The whole exercise is planned in such away that most of the seedlings will have been given out by the end of the long rains. The seedlings that remain in the nurseries are well taken care of until the following short rains in March - April. To facilitate the follow-up process, the number, and nature of the seedlings given out are properly recorded.

7:5 Follow-Up Of Seedlings Raised By Groups And Schools.

Only good quality planting stock should be used because planting and replacements (beating up) is much more expensive than seedling production. Even with careful nursery work, some plants are not good enough for planting. They may be too small, or have deformations. Once plants unsuitable for planting have been eliminated further grading may be useful to separate two or three quality classes. It is therefore an important idea that when disposing the seedlings, proper data should be kept so as to enable a successful and easier follow-up survey to be done. The data expected to be properly kept should include the total number of seedlings produced by either group or school nursery, and the status of seedlings raised.

7:6 Nursery Production Calendar.

For successful tree planting, seedlings of the right species, size, quality and adaptable to a particular environment is important. Otherwise survival rates will be low. Nursery work is therefore one of the forestry activities requiring careful planning. It has a fixed deadline, the best time for planting. Even during the production of plants in the nursery, good timing is very important as mistakes are difficult or impossible to correct. (eg. pricking out or pruning roots too late). To make sure that all operations are carried out on time, one needs the following:

(1) A production calendar, showing when the nursery operations have to be carried out for the species to be produced.
(2) A schedule for the supply of materials, tools, and equipment's.
(3) The right kind and number of workers organized in a suitable way.
(4) Nursery records on total production, timing labour and other imputs used.
(5) The persons to whom the seedlings are distributed.
(6) The number distributed eg. to the members or pupils in the case of schools.
(7) The number planted within the school compounds and the dates of planting.
(8) The names of the pupils who receive the seedlings to take to their homes and the numbers they planted.

Since the planting season is the dead-line, the planning for nursery activities has to be calculated backwards. You must know how long it takes a particular tree species from sowing to germination to pricking out to attaining plantable sizes which are recommended in the ASALs silviculture in conjunction with the local experience. A calendar showing the duration of these stages for all important species is very helpful for good timing. In warm lowland areas, the production time is considerably shorter. In some regions there are two rainy seasons during which tree planting is possible. In this case there are also two nursery seasons per year. Note also that different species need different times so, they need not to be sown at the same time. If the right time for a species has been missed by more than one month it should not be sown at all because seedlings would be too small at planting time. However if such a situation cannot be avoided by good planning, it may be possible to select an alternative species also suitable for the planting purpose which germinates and develops faster. This is preferable to delivering seedlings much too small for planting.

Records should be kept about the development of species in each nursery (Date of sowing, germination, pricking and size at planting) so that a calendar for the local conditions can be developed. Below therefore find a nursery calendar adhered to by the groups and schools participating in small scale nurseries, in the model location

NURSERY CALENDAR FOR GROUPS AND SCHOOLS IN THE MODEL LOCATION

Time of year	Activities to be undertaken
January/ February	Watering, pruning, and other general maintenance of the few seedlings left in the small nurseries. Local seed collection. Preparation of nursery sites. Preparation of polythene tubes, collection of milk packets, tins, etc. Seeds sorting for distribution to the schools and groups participating. Repair of old nursery tools.
March	Distribution of seeds, polythene and tubes. Preparation of nursery soil, compost manure and soil mixing in the ratio of 4:1 (soil, manure). Potting starts and the following seeds are sown: *Cassia siamea, Cassia spectabilis, Grevillea robusta, Parkinsonia aculeata, Tamarindus indica, Caesalpinea decapitalata, Cassuarina equisetifolia, Delonix regia, Melia azadirach, Terminalia brownii and Schinus molle.*
April	Complete potting work. Continue sowing the following seeds for the species shown: *Prosopis juliflora, Terminalia mentalis, Croton megalocarpus, Acacia* species. Planting of seedlings previously left in the nurseries like: *Carica papaya, Psidium guajava, Passion fruit, Citrus sinesis, Citrus lemon.*
May	Sowing of the following species: *Acacia polyacantha, Dovyalis caffra, Eucalyptus camaldulensis, Leucaena leucocephala, Sesbania sesbans, Sesbani grandiflora.* Pricking out of *Eucalyptus* species from seed beds.
June	Nursery routine activities i.e. watering, general maintenance and may include root pruning.
July	Normal nursery routine activities.
August	Nursery routine activities.
September	Nursery routine activities.
October	Evaluation of the small scale nurseries performance. Hardening up process by less watering, frequent root pruning, creating space in lining up the seedlings. Pitting by group members, schools within their respective planting places.
November	With the onset of rains, seedlings are distributed for planting.
December	Follow-up survey exercise for the seedlings planted by the schools and group members is done. Determination of the seedlings left in the small scale nurseries and taking care of same.

Nb: - Slow growing tree species are to be sown first. - Fast growing species are sown later.
- The recommended plantable size is 30cm - 50cm.

8:0: PLANTING SITES BY GROUPS AND SCHOOLS.

Seedlings are best planted out at the beginning of the long rains after adequate soil moisture building has been achieved. The recommended method of determining the adequate soil moisture build up in the planting area is to make random holes of 30cm depth to see if the soil is moist up to that depth.

This is the right time for planting as the length of the dry season between November/December long rains and the March/April short rains is shorter. Many nurseries therefore plan for single planting season. The seedlings raised by the groups are usually distributed to the group members and planted in one of the following places.

(1) Home compounds as ornamentals and shade.
(2) Fence as hedge and windbreaks.
(3) Shambas or agricultural gardens for agroforestry.
(4) Grazing lands or field for soil and water conservation and woodlots.
(5) Others like church compounds for shade provision.

For the schools, priority is given to:

(1) Compound planting as shade or ornamental.
(2) Fence as hedge to keep off the animals and windbreak

The seedlings which are collected by the pupils and teachers to plant in their respective homes are planted in more or less same sites as the members of the small nursery groups. There can be cases where trees are planted within the school gardens as woodlots. Those planted along the fence can also serve as windbreaks.

9:0 DEMONSTRATION OF APPROPRIATE TECHNIQUES FOR LOCAL FARMERS.

The establishment of a demonstration plot, selection and assistance to the progressive farmers are two of the most popular methods of technology dissemination as they have produced positive results. During the time of deciding on where to site the demonstration plot and the model farms, it is important to ensure that majority of the local community can see and learn from them. The technologies should be simple, acceptable, economical and easily adaptable by the local community to facilitate a quick multiplier effects.

9:1 Purpose Of Demonstration Plot and Model Farms.

Both the demonstration plot and the model farms are mainly used as demonstration apparatus during training and social forestry open days that are commonly known as field days. Within the demonstration plots and model farms are various tree planting, tending and protection methods simply demonstrated for easy adoption by the local farmers. The technologies practiced should be those which are socially accepted, and economically feasible. Through these a lot of time can be saved.

9:2 Siting Of Demonstration Plot and Model Farms.

It is very important to do proper siting of demonstration plots and model farms so as to achieve the intended objectives. They should be of reasonable sizes to show clearly the technologies stressed on. The siting should be more or less in a central position to attract the majority. The accessibility factor to the sites should also be strongly considered. As much as possible the plots/farms should be placed by the roadsides.

The six model farms are situated within the model farmers' compounds or shambas in each of the six blocks of Kwavonza location and one model farmer in every sub-location in Matinyani, Nzambani, Kathivo and Kyangwithya West locatons. This means therefore that every block and sub-location is represented. The farmers chosen as model are those who have shown much interest in tree planting and are ready to explain their activities tirelessly. The method of selection is the "farmers centred approach".

9:3 Technologies In The Demonstration Plot.

(1) <u>Small Scale Model Nursery.</u>

This was set up to disseminate simple nursery techniques to the farmers which are easily adaptable to farmers with emphasis on the use of locally available materials to reduce costs. The recommended locally available materials for use include the containers e.g. kimbo tins, milk packets, plastic containers and Ash, Chicken droppings, seeds and leaves of *Melia azaderach* or *Azadirachta indica* dried, crashed and mixed with the potting soil for the control of termites in the nursery stage. Used diesel oil when poured into a termite mound can also be used to suppress the activities of termites.

Instead of using the twigs or branches of the trees for fencing the nursery sites, we have also recommended the use of live fence from the various termite and drought resistant species like *Dovyalis caffra, Caesalpinea decapitalata, Prosopis juliflora,* and *Parkinsonia aculeata.* To reduce the high rate of evapotranspiration, the small scale nursery is to have sunken beds approximately 3 inches deep and the seedlings aligned inside.

(2) Cost effectiveness for use of Ash for termite control.

This was demonstrated in 1989 to compare effectiveness of burnt bricks and sand. There was also the control where only normal nursery soil was used in the seedlings bed. The materials used for raising the seedlings was milk packets which have the tendency of attracting termites. Direct sowing was done for all the species used for this demonstration. In the case of burnt bricks, the seedling beds were having burnt bricks both on the bottom and the sides. The sand used was placed in the seedlings bed 3 - 7 cm thickness and burned bricks on the sides.

The availability and the cost of the materials used were also put into consideration. The whole thing was monitored for about one year and then analyzed. The analysis revealed that ash as compared to the other materials is cost effective, readily available and effective in controlling the termites in the nursery stage but periodic additions are necessary. The other methods proved very expensive and ineffective in some instances.

(3) Agroforestry demonstration.

This is demonstrated within the Pilot Forest demonstration plot and also in another plot of new 0.52 hact. that was established in 1993. Emphasis is laid on choice of the right agroforestry species and systems. The agricultural crops like maize, beans and peas were planted together with the agroforestry species such as *Leucaena leucocephala, Cassuarina equisetifolia, Prosopis juliflora, Grevillea robusta,* and *Sesbania sesbans* in the alleys. Fruits like bananas, pawpaw, guavas, etc. were also incorporated within the trenches.

(4) Species trial demonstration.

It was felt necessary to establish a species demonstration plot where both new and old species could be planted and their performances monitored. The farmers were exposed to the seedlings, where they have been planted and the performances and growth behaviours. These included both exotics and indigenous. As it is usually the feeling of many people that "seeing is believing" this plot has really served an important function. During open days, training, etc. many farmers have been exposed to the same and have chosen the species they would like to try without much problems.

(5) The Turkana water harvesting technique.

This is one of the most important but costly method of tree establishment which has shown better results in very dry areas like Turkana Districts where the average annual rainfall lies between 250 mm - 400 mm. The structure is square of a measurement 5m x 5m with an embankment all round the perimeter. Its water collection surface area is $25m^2$ with a collection ditch next to the point where the tree is planted. The tree is then planted on the ridge not inside the collection ditch so as to avoid water logging in case of more rain. Through capillarity action, the tree is able to use the water in the form of moisture through its roots. This enhances survival and growth. The sizes of the microcatchment may vary depending on amount of rainfall and soil type.

(6) Different watering methods.

Several preliminary surveys that were carried out during the early stages of project implementation revealed that soil moisture scarcity and termites attack are the two major constraints hindering afforestation programmes in Kitui District. Farmers in the model location of Kwavonza have shown a lot of interests in tree planting especially in ornamental, shade, and windbreak trees. Where necessary some little watering is important during the dry seasons to enhance survival. It was therefore necessary to identify simple and economical ways which the farmers could easily adapt to improve survival of highly demanded species.

Two watering methods were tried i.e. bottle and pipe feeding. Various frequencies were adapted and data on growth characteristics and survival percentages collected for a period of two years. The cost factor, availability of materials used, versus the survival percentages, diameter and height growth were also keenly considered.

The three species used for the demonstration were: *Cassia siamea, Tamarindus indica* and *Eucalyptus paniculata.* The volumes of the two items the bottle and the pipe were similar. To reduce heating effect from the bottle, only a very small surface area of the bottle was left exposed.

(7) Live fence demonstration.

In most cases farmers in ASALs like those in Kitui use *Euphorbia tirucalii* and dead branches or twigs for fencing. To identify the right hedge species for this ecological zone, indegenous and exotic species were tried based on branching habits, intertwinings and tolerance to both termites and drought. The ones tested in the demonstration plot were: *Parkinsonia aculeata, Dovyalis caffra, Caesalpinea decapitalata, and Prosopis juliflora.* However, only *Dovyalis caffra, Prosopis juliflora* and *Parkinsonia aculeata* have shown good performance for use as live fence species. The other species which could also be tried include: *Thevetia peruviana, Lantana camara, Acacia melifera, Terminalia spinosa* etc. All these with good management can be able to make very good live fences.

(8) Orchard demonstration.

Fruit production for both local consumption and cash generation is one of the main activities by the farmers in the ASALs. It is therefore important that a good variety of fruit tree species is encouraged for higher yield production. The management of a fruit orchard should also include the soil and water conservation measures, to reduce deterioration of soils.

Orchard for the demonstration includes the various fruit trees like *Mangifera indica, Citrus sinensis, Citrus lemon, Psidium guajava, Carica papaya* and the right ways for establishing them. In the plot the fruits are planted within the trenches where there is more moisture accumulation.

Improved varieties of these fruit trees should be encouraged for higher yields within shorter rotations. The structures should also be maintained regularly and when drought is too much then some watering is recommended.

(9) Individual seedling protection.

In addition to water and termites, follow-up surveys revealed that livestock is the next problem associated with tree planting. It is a known fact that farmer in ASALs keep a lot of livestock for milk, meat and cash generation. Once trees are planted within the compounds and no protection is assured, the trees will be eaten up especially by goats, cows donkey and sheep. It is therefore important to teach the local farmers on the simple use of tree twigs and thorn branches for fencing individual trees so as to ensure survival. Once the trees reach a safer size where there may be no or very little damage from the animals, then the dry twigs can be used for firewood.

9:4 Methodologies On The Model Farms.

The climatic conditions in arid and semi arid areas are very harsh with unreliable rainfall. This means it is rather very difficult to get good tree survival without incorporating some establishment techniques such as water harvesting which will ensure moisture accumulation to enhance survival and growth. The water harvesting techniques tried in the various model farms include the microcatchments, bigger hole sizes of 45cm x 45cm and 65cm x 65cm, trench planting, etc. All these assist in manipulating the environment to enhance moisture conservation and root penetration. Various methods have been tried at the different farm levels and these include the following:

(1) Trench planting.

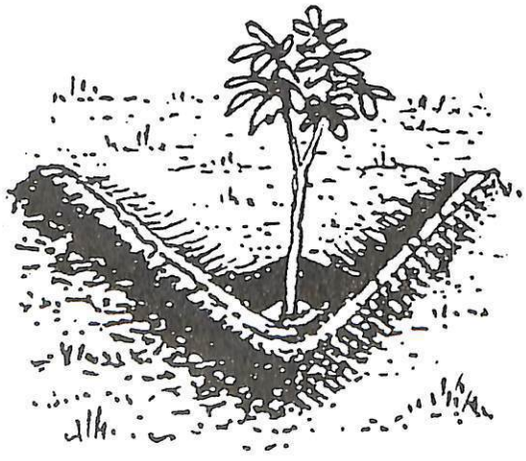
This is a water harvesting technique for tree crop establishment which ensures better survival and growth. It involves the digging of trenches at 6m interval to a depth of 30cm. The trees are then planted in the trenches, on the ridges, and within the pits between every two adjacent trenches.

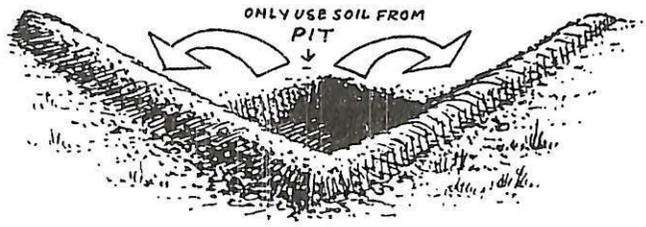
The moisture accumulation is highest inside the trenches and hence the trees planted in the trenches show better survival and growth. This is followed by the trees planted on the ridges because of the good volume of soil, good soil disturbance that leads to improved water percolation, aeration and root penetrability. Such a methodology is very expensive as it requires a lot of labour but this is compensated by the good returns in terms of survival and growth. It is important also to note here that compost manure should also be added to the planting pits so as to improve growth.

(2) V-shaped microcatchment.

This is a simple modified water harvesting method that aims at improving survival and tree growth by concentrating moisture into a pit for seedlings use.

A hole of 45 cm x 45cm is dug and the top soil is kept aside for first refilling. Two microcatchment arms as shown in the diagram below are prepared facing the slope. When it rains, the arms will be directing water down to the planting pit. The trees exploit the moisture for survival and growth. This method is cheaper and easier to maintain and if well managed it gives better results. It should therefore be encouraged in the ASALs.





(3) Furrow planting.

This is another method on trial. The shamba was first ox-ploughed to depth of 30 cm. The trees are then planted within the furrow lines at 2m interval. It is simple method which any farmer can try in order to establish a woodlot as the method has been found to produce good establishment.

(4) Enrichment planting for grazing land (patch planting).

This is another method on trial. In the bush, patches were identified and pits of 45cm x 45cm dug. Trees are then planted with the onset of the rains. However, this method has not been successful and is not recommendable.

(5) Agroforestry method.

This is a situation where agroforestry species such as *Leucaena leucocephala* and *Sesbania sesbans*, are planted together with agricultural crops like maize and beans in alleys. The pits are made at closer intervals and dug to depths of 30 cm and diameter. The trees were planted at 0.5 x 0.5m interval. This method is worth being encouraged to the local farmers, as it has been found to produce good results.

10:0 LIST OF SOME SPECIES UTILITY PREFERRED BY FARMERS AND THEIR PURPOSES.

No.	Botanical names	Local names	Uses
1	*Acacia albida*	Olasiti	Agroforestry/fodder
2	*Acacia melifera*	Muthiia	Hedge/fuelwood
3	*Acacia nilotica*	Musemei	Medicinal /firewood
5	*Açacia gerardii*	Muthii	Firewood/Fodder/water catchment
6	*Azadirachta indica*	Mwaluvaini	Medicinal
7	*Cassia siamea*	Ikengeka	Poles/firewood/shade
8	*Cassia spectabilis*	Ikengeka	Ornamental/shade
9	*Croton megalocarpus*	Muthulu	Shade/timber
10	*Casuariana equisetifolia*	Mvinji	Poles/windbreak and agroforestry
11	*Dalbergia melanoxylon*	Mvingo	Woodcarving/timber
12	*Delonix regia*	Mjohoro	Shade/ornamental
13	*Dovyalis caffra*	Kayava	Hedge/fence
14	*Eucalyptus Camaldulensis*	Musanduku	Poles/timber
15	*Fruit trees*	Mitunda	Fruit production
16	*Grevillea robusta*	Mkima	Agroforestry/poles and firewood
17	*Leucaena leucocephala*	Lusina	Agroforestry/fodder and firewood
18	*Melia volkensii*	Mukau	Timber products
19	*Melia azaderach*	Mukau	Medicinal/shade
20	*Parkinsonia aculeata*	Musoka	Hedge/fence
21	*Sesbania sesbans*	-	Agroforestry/fodder
22	*Terminalia brownii*	Muuku	Medicinal/timber/shade/ornamental
23	*Tamarindus indica*	Muthumula	Fruits/shade
24	*Terminalia mentalis*	Mwavuli	Ornamental/shade
25	*Thevetia peruviana*	-	Hedge/fence

11:0 THE ROLE OF FOREST EXTENSION .

11:1 Introduction.

It is important that the extension forester should have a good understanding of what extension is before examining his or her role in promoting farm forestry. It is equally important that extensionist should also understand what extension is all about.

11:2 The Nature Of Extension.

Extension is an educational process that facilitates desirable changes. Such may include:

- increased knowledge
- new or improved attitudes
- new skills

In our case extension forestry is, therefore, an educational process where people are able to meet their needs for wood and other tree products by planting trees. On the contrary, extension forestry is not entirely a technical task of helping people to plant trees. It is rather a combined technical, psychological, sociological, institutional and a political task.

11:3 The Role Of Extension Foresters.

It is important to note that the roles of extension forester are diverse. Their specific roles may vary from place to place. On overall, the extension forester will be expected to perform all, or a combination of the following functions:

a) Help the people to express and communicate their problems and needs as they themselves perceive them.

b) To explore how natural, human and institutional resources in the community can be developed to bring about rural development through tree planting.

c) Assist the people to come up with their own solutions to the problems that have been identified or the extensionist should act as a motivator. The people should be given a chance to participate actively in different aspects of planning and implementation of rural afforestation activities.

d) Assemble and transmit existing knowledge and to add to the knowledge.

e) To build on what already works well and also to prevent farm forestry in all its aspects from remaining static. Extension agent should introduce new knowledge, skills and points of view. The introduction of new ideas and ways should be done cautiously and after consultation with the people affected by the potential change.

f) The extension forester has the important role of organizing meetings. The aim of the meetings could be to explain:

- objectives and benefits of rural afforestation
- role of rural afforestation in rural development
- role of trees in agriculture
- specific objectives and benefits of rural afforestation programmes set for a particular area or community.

g) Initiating projects which demonstrate the impact of rural afforestation eg. self-sufficiency in the supply of firewood at household level.

h) Organizer of visits to project sites. These should include:

- neighbouring communities
- particular groups
- individuals
- political leaders
- local community leaders
- extension foresters from other areas.

i) To develop satisfactory working relationships with many other organizations which are involved in promotion of rural afforestation in Kenya today e.g. Self-help groups, Schools, Non-governmental organizations and Government departments.

j) Act as a link between research and the practical needs of the people.

k) Make information available in suitable form. Should be able to prepare information for different categories of people and groups that plant trees.

Attributes of an extension forester.

Having looked at the different roles that one of the extension forester is expected to play, it is necessary to consider what it takes for extension foresters to perform effectively. Some of the personal attributes that an extension agent should posses to be effective are:

i) Leadership qualities.

The extension forester is a leader and he/she should act as such. This means essentially inspiring people to achieve certain objectives through example, skill and dedication. As a leader the forester should spot and develop other community leaders.

ii) Original and flexible in thinking.

This is important to avoid applying what can be referred as standard solutions to problems. Because of the variations one finds in extension forestry, it is therefore necessary that the extension forester should think of new and suitable solutions to different problems that may be encountered.

iii) Initiative.

The extension forester should show a lot of initiative. The forester should aim at achieving desirable results even in the face of many handicaps.

iv) Ability to organize.

The extension forester should have ability to plan and organize rural afforestation activities. This ability can be developed through practice. It is a matter of identifying targeted goals, the inputs for achieving them and mobilising the community towards their achievements.

v) Logical judgement.

Logical judgement means the ability to weigh a situation take appropriate action within the limitations of available resources. Logical judgement is developed through experience.

vi) Reliability.

In extension work, credibility and confidence are very important. The extension forester works at creating an atmosphere of confidence and credibility. This can be done by simply keeping promises that he or she makes; it also means not promising what cannot be delivered. In addition all reports written by extension forester should be reliable.

vii) Respect for people.

The extension forester should be friendly and respectful. People will sense this and they will respond accordingly.

12:0 COMMUNICATION TECHNIQUES IN EXTENSION WORK.

12:1 Introduction.

Communication can be defined as the process by which human beings share information, knowledge, experiences, ideas and motivations. For communication to be complete, the following are necessary:

(1) A sender (2) A message (3) A channel
(4) Receiver and (5) Response (feedback).

The sender or communicator initiates the communication process by "thought" or idea and passes it over in away that can be understood by both the sender and the receiver. The information is transmitted over a "channel" that links the sender with the receiver. The channel could be a mass media eg. Newspapers, Magazines, Films, radio and T.V, or interpersonal channel which involves a face to face exchange or through use of the five senses ie. sight, sound, smell, touch and taste.

The receiver or the audience is the most important single element in the communication process. Response or effect is the change in the behaviour of the receiver that takes place as a result of the transmitted message. This enables the sender to get a feedback from the receiver. In general communication that provides feedback is more effective.

12:2 Why Do We Communicate.

Extension staff normally communicate regularly at three different levels. These levels include:

(1) The community they serve
(2) Other colleagues in other organizations or departments involved in development.
(3) Higher level staff who determine policy or control budget allocation.

However, communication has the following main purposes at all the three levels:

(a) To bring about interpersonal understanding (avoid misinformation).
(b) To motivate people.
(c) To reduce ill feeling and tension.
(d) To reduce communication breakdown.
(e) To facilitate personal and group evaluation.
(f) To implement new concepts and technologies.
(g) To accomplish organizational tasks or goals.
(h) To create conducive interactions.
(i) To build trust.
(j) To understand human and group behaviour.
(k) To understand typical problems between people and what causes them.
(l) To facilitate creation of awareness.
(m) For people to express their needs in an acceptable form and to relate their needs to available resources and techniques.

12:3 Methods Of Communication.

There are three main methods of communication.

(1) Oral/interpersonal/spoken.

Oral communication can be face to face meeting of two people or a manager addressing a large audience. It involves telephone conversations, interviews, casual conversations, informal and formal meetings.

Advantages.

(a) Can provide for speedy exchange with immediate feedback.
(b) People can ask questions and points are clarified.
(c) Effect can be noted.
(d) Clearly planned meetings can greatly contribute to understanding of the issues.

Disadvantages.

(a) Does not always save time.
(b) Meetings can be costly in terms of money and time
(c) Oral communication is much more immediate and personal but lacks permanence as there is no reference.

(2) Written communication.

This usually includes letters, memos, reports, noticeboards, books etc.

Advantages.

(a) Provides records and references.
(b) Messages can be carefully prepared and directed to a large audience through mass mailing.
(c) It may in some cases reduce costs.

Disadvantages.

(a) There is no guarantee that it has reached the right destination.
(b) No guarantee that it has been read.
(c) It creates mountains of paper work, and may be poorly expressed by ineffective writers.
(d) It may provide no immediate feedback.
(e) It takes longer time to know whether a message has been received and properly understood.
(f) Many people fall in the habit of using technical jargons that can be understood only by experts in the same level.

(3) Visual/non-verbal communication.

"Seeing is believing". Visual communication involves use of pictures, charts, posters, diagrams, exhibits, displays, films etc. Visual communication is expected to support verbal or spoken communication especially when serving people with a limited level of literacy.

Advantages.

(a) Draws a quick attention to the message being communicated.
(b) Easy to understand the illustrations used.
(c) The impact of the message remains in a person's mind for a longer period.

Disadvantages.

(a) Messages can easily be misinterpreted if not well illustrated.
(b) Differences in understanding what symbols mean to people of different backgrounds.
(c) Films if too sophisticated can be dismissed as magic.

12:4 How Can We Therefore Communicate Effectively.

A communicator (extension agent) establishes communication links with the community he serves and keeps this functioning. Most of the information materials is written in technical language understandable only by a limited group in different disciplines, hence the extension agent has the task of transplanting the scientific text into common terms and present it in a form their target groups can understand and accept. For example naming tree species in the local language e.g. *Croton megalocarpus* to be called "Muthulu" (Kikamba) and other simpler terms e.g. growing trees and crops together, energy conservation and soil conservation.

To communicate effectively an extension agent should be:

(a) Competent.

Capable, qualified, and suitable because the agent should have the right attitudes and feelings. This includes applying the technical skills to do what is needed e.g. in nursery establishment, soil conservation etc.

(b) Confident.

Should be confident, self reliant, trustworthy and enthuasiatic.

(c) Courageous.

Pursue tasks eagerly with vigour, adventurous and can face challeges.

(d) Consistent.

Has good public relations, coherence and harmony in approach to attitudes, advice and assistance.

(e) Compassionate.

Sympathetic, merciful, patient, and in fellowship feelings with others.

(f) Dependable.

Worthy of being relied on hence can follow-up the work, fulfills promises and presents to the people honestly and fairly.

For effective communication to be achieved, an extension agent has to know the following points:

(1) Know the expectations of your audience, for example, are they teachers, students, local community, administrators etc.

(2) Know your message and how to present it to that particular audience for example is it on soil conservation, tree planting or nutrition.

(3) Know the most effective channels of communication to deliver the message to your audience.

(4) Know your own abilities and limitations both in technical knowledge and as a communicator, for example, are you a health technician or forester, a nutritionist etc.

(5) Be interested in your audience, its welfare and how your message can help them.

(6) Be interested in improving your skills in communication. This can be achieved by assessing yourself whether you have communicated effectively or not.

(7) Prepare your message carefully using appropriate materials and aids to arouse interest and ensure a successful reception of its context.

(8) Speak clearly and use terms and expressions the audience can easily understand. For example say tree planting in association with agricultural crops instead of "Agri-silviculture" etc.

(9) Be very conscious of the limitations of time and the span of attention of listeners.

(10) Do not try to cover the whole of a major topic at any one time, also select only those parts which are most appropriate to a particular situation.

(11) Do not involve the audience too long at any one time. By observing all the points and following them clearly, you may achieve some success in communicating effectively.

12:5 Barriers To Effective Communication.

Most of the rural communities are used to demonstrations or barazas where they are told by the Government officials what the Government wants to be done. In most cases such message fall on deaf ears because of:

(a) Age-difference.

Older generations often look at young extension agents as in-experienced in all the new ideas that they are taught. This happens when an agent appears too aggressive and authoritative to a community that expects respect and persuasion. Under such circumstances, the message may reach a fraction of the targeted audience.

(b) Socio-economic gap.

This occurs when the community and the extension agent have very little in common hence the new ideas can be considered as non-practical and irrelevant. Thus the people may receive the message but they may not understand it.

(c) Language.

The choice of language and or vocabularies used depends on the level of literary of the audiece. A common language eg. Kiswahili or a local language is desirable when dealing with semi-illiterates. Do not appear as if you are forcing or commanding the community to accept your ideas. Otherwise the message may reach only a fraction of the targeted groups/audience because too few or the wrong communication channels are being used.

(d) Socio - cultural values.

Value systems of a community influences the rate at which they accept and adopt new ideas and skills. Avoid making decisions which are highly influenced by your pre-conceived ideas/bias towards the community you are working with. Otherwise the people may receive and understand the information but new knowledge may conflict with the existing beliefs and attitudes and may not serve the intended purpose.

(e) Poverty.

The people may receive and understand the information but may be unable to act because of lack of basic tools and services. If community members are poor they may not afford simple tools e.g. those for soil conservation.

(f) Inappropriate technology.

The people may receive the information and learn the new ideas but change their behaviour only temporarily because of disappointment with immediate results especially in environmental action. This arises when the technical aspects of the new technology are incorrect. For example when introducing Agroforestry techniques emphasize the use of suitable multi-purpose trees and the correct spacing.

12:6 How To Overcome The Barriers/Breakdowns.

Communication breakdowns such as these can be avoided if the senders try to understand and take into account the attitudes, beliefs, and social factors that determine peoples behaviour. Some of the ways communication breakdowns can be avoided are:

(1) Define clearly which activity you are trying to promote and your role as an extension agent. For example is it tree planting, soil erosion or agroforestry.

(2) Decide exactly who in the population you are trying to influence.

(3) Learn about the present knowledge, beliefs and behaviour of target population.

(4) Enquire whether the new innovations you are trying to promote have already been introduced.

(5) Investigate the target audience's present sources of information about the surrounding.

(6) Do not rely on a single means of communication. Use several methods.

(7) Design environmental messages which are:

- Practical
- Brief
- Technically correct and
- Positive.

(8) Evaluate whether the intended new perception is present.

(9) Repeat and adjust the messages at regular intervals.

In conclusion, always remember that communication is a two-way process. Seek for peoples problems, their opinions and views. Listen carefully to the answers. These answers are most important for helping you to decide what you want to communicate.

ACTIVITIES	Janurary	February	March	April	May	June	July	August	September	October	November	December	Remarks
PEOPLES PLANTATION (Pilot Forest)	Gates construction and boundary clearing.		Prize day	Strip clearing for pitting	Signing of memorandum		Pitting by group members		Survey of survival count	Physical count of no. of holes	Fresh planting and beating up		Maintenance by bottle feeding to continue during dry seasons. Memorandum of understanding as an annual event
	Maintenance by slashing, spot weeding and watering												
SMALL SCALE (Kwavonza)	Local seed collection by groups, farmers etc. Repair of old tools. Preparation of nursery sites. Preparation of seedlings containers and seed for distribution.	Replace tools	Prize day – Distribution of seeds & tubes Potting and sowing		Pricking out Euc.spp.	Routine work includes watering and root prunning				Evaluation Hardening up, pitting by members of group.	Seedling disposal by group and Schools	Follow-up survey of seedling disposal by farmers.	Repair of broken tools and replacement of worn-out tools is an important exercise
DEMONSTRATION PLOTS	Maintain Agroforestry plots.	Harvesting Agro. plots	Sowing crop seeds for Agroforestry	Demonstrate watering techniques by use of bottle				Harvesting of seed crops.		Preparing Agroforestry land by cultivation	Sowing Agroforestry plot		
	General maintenance by slashing, spot weeding and watering												
	Maintain both Demo I & II nurseries												

ACTIVITIES	Janurary	February	March	April	May	June	July	August	September	October	November	December	Remarks
SEEDLINGS DISTRIBUTION						Follow-up survey for'93 '94 seedlings				Arrangements for 1994 seedlings distribution	Seedlings distribution to individual farmers & institutions		Follow-up survey for seedlings distributed in '93 /94 to be done early.
PEOPLES PLANTATION PRIVATE LAND (Matinyani Loc.)	Maintenance by spot weeding, slashing and bottle watering								Follow up survey				Next year '94 prize day can get same prize.
MODEL FARMERS (Kwavonza)	Maintenance by spot - weeding and slashing			Model farmers open day.			Maintenance by slight watering				Fresh planting & beating up		Model farmers open days were never carried out last year therefore it is important to be
MODEL FARMERS (New location)				Selection of model plot		Design of model plot			Pitting model plot.	Planting the model plot. Maintenance for the model plot.			Advice on how to establish the model plot should be done by technician.
SMALL SCALE NURSERIES (New locations)	Local seed collection. Selection and preparation of nursery sites. Purchase and issue of working tools.		Routine nusery work by watering and root pruning. Issue of seeds and tubes. Potting and sowing		Pricking out				Evaluation. Hardening up. Pitting	Seedlings disposal for planting	Followup survey of disposal seedlings & planted by foremen		Purchase of the new tools to be done in time to fascilitate the work.
REGIONAL SOCIAL FORESTRY PRIZE DAY	Preparation of regional prize day		Prize day 30th										
EXTENSION PRIZE DAY (KWAVONZA)		Purchase of prizes for schools, groups in Kwavonza loc.	Prize day										Prizes to be prepared in time such that the day does not coincide with that of the regional day.
PUBLICATIONS		Extension manual		Extension work paper 1992 - 1994									

14:0 APPENDIX I, II, III and IV

APPENDIX I

Socio-economic survey of the Pilot Forest Area (Kitui).

Part II: Mwethya group survey

NO:

Date and Time:

Interviewer:

Respondent:

1. Name of group:.....

2. Date of establishment:.....

3. Number of members:.....

(1) Working members: Female:..... Person

Male:..... Person

Others: Female:..... Person

Male:..... Person

Total: ..... Person

(2) Trend of participating members (1984 - 88)

Year	1984	1985	1986	1987	1988
No. of members					

(3) What is the ratio of your relatives in your group?

(i) less than 30%
(ii) 30 - 60%
(iii) more than 60%

4 Purpose of group formation:

.....

.....

.....

5. Adminstration of group:

(1) Does your group have written rule?

(i) Yes (ii) No

(2) If "Yes", can we see and borrow it?

(3) What are the established managerial positions of your group?

(i) Chair person (ii) Secretary
(iii) Treasurer (iv) Committees

(4) Can anybody become a member of your group?

(i) Yes (ii) No

(a) If "Yes", what are the conditions?
(b) If "No", what are the reasons?

(5) Can any member resign from your group?

(i) Yes (ii) No

(a) If "Yes", what are the conditions?
(b) If "No", why?

(6) So far how many members resigned from your group?

.....person

(7) Does your group hold periodical general meetings every year?

(i) Yes (ii) No

(a) If "Yes", indicate frequency per year

.....times

6. History of group

(1) Who spearheaded to form your group?

(2) Was there any help from Chief or other Government officials?

(i) Yes (ii) No

If "Yes", who were they?

(3) Has your group's purposes changed in the past?

(i) Yes (ii) No

If "Yes", what were the changes?

(4) Has your group activities expanded in the last five year?

(i) Yes (ii) No

If "Yes", how?

(5) Do managerial positions change over time?

(i) every year
(ii) rarely
(iii) not at all

7. Activities (last one year)

Activities nature No. of work man days income expenditure balance remark.

1. (Public work)

(a) School building
(b)
(c)

2.....

3.....

4.....

5.....

6.....

7.....

8.....

8. Group tree planting on the project site

(1) Did you discusss group tree planting in your group?

(i) Yes (ii) No

(2) If "Yes"

(a) Did your members want tree planting

(i) all are yes
(ii) many of them are yes
(iii) many of them are no
(iv) all are no
(v) unknown

(b) What purpose did they have on group tree planting?

(i) to learn the techniques of tree planting
(ii) to use trees which are standing in the area
(iii) to plant trees for future use
(iv) other purposes (specify)

(c) If your group carried out the group tree planting, what were the problems, if any?

9. Tree planting by your members

(1) Are you prepared to survey requirements of your members for seedlings by species and members?

(i) Yes (ii) No

(2) Can you organize your members to collect seedlings from specified spots (help to specify)?

(i) Yes (ii) No

(3) If your members want to plant 20, 30 or any number of seedlings, can you help deliver and monitor them?

(i) Yes (ii) No

APPENDIX II

A QUESTIONNAIRE
FOR THE MWETHYA GROUP SELECTION

Date:.....

Interviewer:.....

1. Name of interviewee and official:.....

2. Name of group:.....

3. Date of establishment:.....

4. Name of location and sub-location of the group:.....

5. Distance and walking time to the Chief's office:.....Km .....Hours

6. Number of members in total:.....

   Working member: Males..... Females:.....

   Others: Males..... Females:.....

7. Average of ages.....years.

8. Name of: Chairperson:.....

   Secretary:.....

   Treasurer:.....

9. Purpose and motto of group:.....

10. Group activities: 1.....2.....3.....4.....

11. Do you have any relationship with any other organization? (a) Yes (b) No.

12. Do you have any rule on your group activities?(a) Yes. (b) No.

13. How many days did you work in the year 1992 as a group?.....

14. Have you ever carried out any tree planting related activities?(a) Yes (b) No.

15. Where is the water source of your group and how far is it?.....

16. Can you give us the members list later?

17. Remarks (Accessibility etc.)

APPENDIX III

CHARACTERISTICS SURVEY SHEET FOR A MODEL FARMER CANDIDATE.

Date:.....

Surveyor:.....

1. Name of location and sub-location:.....

2. Name and identity number of the candidate:.....

3. Date of birth:..... Sex:.....

4. Occupation of the candidate:.....

5. Educational level:.....

6. Official:.....

7. Family (except for the candidate):.....

8. Annual income (Kshs.):.....

9. Animals owned: Cattle:..... Goats:.....Sheep:..... Donkeys:.....

10. Land owned (ha).

Compound.....Shamba/Agri.....Grazing land Woodlot.....Others.....

11. Mwethya group member:.....

12. Participation in any activity.....

13. Tree planting activity done by candidate:.....

14. Distinctive feature of his/her Agroforestry species and method etc.....

15. Is the candidate's model plot located in an appropriate place?

    In relation to his/her neighbours?

16. Accessibility of the people concerned by vehicle (Motorbike/Pajero/Bus).

17. Sketch of the area tree planted in relation to the Agroforestry/Woodlot method.

18. Remarks.

APPENDIX IV

A QUESTIONNAIRE

OF SCHOOLS SELECTION FOR THE SMALL SCALE NURSERY ACTIVITY.

Date:.....

Interviewer:.....

1. Name of interviewee and official:.....

2. Name of location and sub-location of the school:.....

3. Distance to the Chief's office:.....Km.

4. Name of School.....

5. Name of Headmaster/Mistress:.....

6. Tell us the motto of this school:

7. Number of pupils in total (a) Boys:..... (b) Girls:.....

8. Do you have water tank or water point near hear? (a) Yes. (b) No.

9. Do you have 4K club? (a) Yes. (b) No.

10. If yes tell us the activities of the 4K club.

11. Have you ever carried out any tree planting or related activities?

(a) Yes. (b) No.

12. Do you have any teacher who was trained in our Project at Kitui Training Centre? (a) Yes. (b) No.

APPENDIX V

Follow-Up Survey For Seedling Distributed In 1992/1993

Date:.....

Time: From:.....To:.....

Interviewer:.....

Interviewee (School):.....

Location:.....Sub location:.....

1. Seedling distribution

(1) When distributed:.....

(2) How many seedling distributed?

:

(3) Where did you keep and manage them?

(4) How many seedlings died

:

2. Holes

(1) When did you dig holes?.....

(2) What size? how large:.....

how deep:.....

(3) Did you separate the top soil from sub soil Yes/No

3. Planting

(1) When did you plant?.....

(2) Where did you plant?.....

(3) Who planted?:.....

(4) How many seedling did you plant?

4. Caring

(1) Watering: Yes/No

2) Fencing: Yes/No

(3) Water catchment Yes/No

(5) How is the survival

No.	Species	Number
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
	Total	

Surviving number

How difficult is tree planting and what are the problems?.....

.....

6. Preferred species:

(i) What species do you recommend most and why?

(a) Exotic spp. 1.....
2.....
3.....
4.....
5.....

(b) Indigenous spp. 1.....
2.....
3.....
4.....
5.....

7. (a) Remarks:

(b) Problems:

(c) Requests:

(d) Others:

15:0 REFERENCES OR SOURCES OF INFORMATION.

(1) Noda N. Jica Expert (Editor) 1991.
Social forestry techniques part one. A text book for the training courses at Kitui Regional Training Centre: Published by Kenya/Japan Social Forestry Training Project in collaboration with Japan International Co-operation Agency - Kenya.

(2) Barrow, E. (Editor) 1989.
Forestry Handbook for Primary School Teachers in Turkana District. Forestry Department Turkana and the Turkana Teaching Resource Centre, Turkana District, Kenya 100 pp.

(3) Special Public Works Programmes 1989.
An Illustrated Technical Guide and Training Manual Booklet No. 6 on Tree Nurseries published by the International Labour Organization.

(4) Communication Guide for Extension Workers 1984.
Published by Rural Services Co-ordination and Training Unit. Ministry of Finance and Planning Box 59426, Nairobi.

(5) Evans HBL (Author).
Forestry Extension Manual published by the Embu Meru, Isiolo afforestation Project.

(6) Kenya/Japan Social Forestry Project Working Paper No. 7- 2 (1990).
Unprinted report prepared by the Extension Section of the Pilot Forest Project.

(7) R. Nyambati and S. Hirao (Asakawa Editor) 1991. Tiva nursery Manual.

(8) Frida W. Mugo Field Survey Methods.
A paper presented at the Social Forestry Extension Officers course at Muguga National Headquarters held during the period 13th January, 1992 to 22nd January, 1992.

(9) Kumazaki M. (1986).
The Socio-economic pre-survey in Kwa-vonza location of Kitui District.

(10) Takahashi M. and Gathura M. (1991).
The fifth experimental plots report established in 1988, at the Pilot Forest Project in Kwa-vonza location.

(11) Chavangi A. Noel (1992)
Appropriate extension techniques in Social Forestry. A paper presented at the Social Forestry Extension Officers course in Muguga from 13th -22nd January 1992.

(12) Ecoforum. Volume 15:2 July, 1991.

(13) James A.O. Ndisi.
Technical paper on Management communities.

(14) D.Sin and H.A. Hilmi
Forestry Extension Methods.

(15) Wayne Teel (1984) apocket directory of trees and seeds in Kenya.