

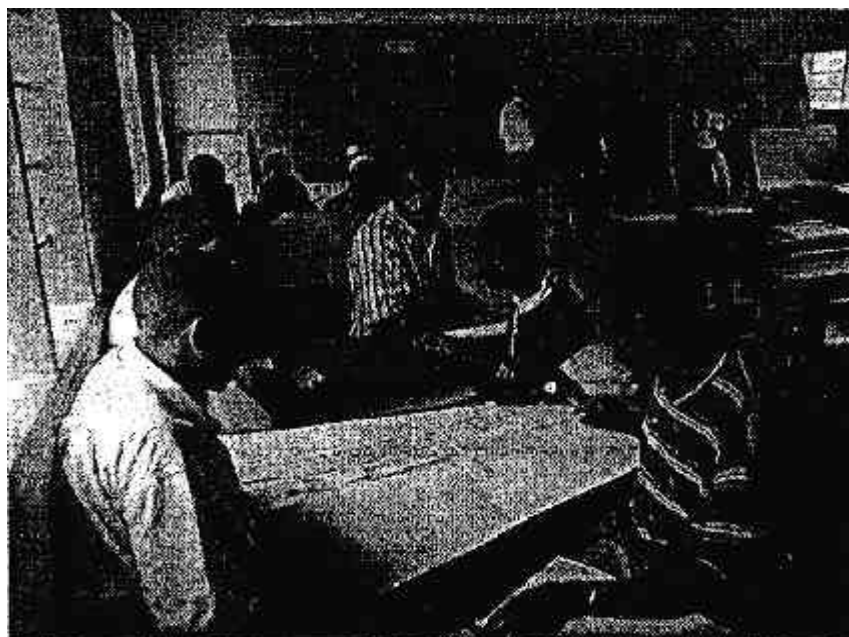
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Forestry and Beekeeping Division



Japan International Cooperation Agency



PROJECT ACTIVITIES WITH PARTICIPATORY APPROACH

Paper Presented During End of Phase Seminar

J.M. Butuyuyu (Project Manager)

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1. Introduction

Village forestry can be explained as tree planting as well as conservation activities in rural areas so as to meet the needs of forest products and by products for rural people. Another related terminology is "Community forestry" which also deals with similar activities in both rural and urban areas. Where as the former emphasises 'rural' (village) the latter has key word "Community". The two are sometimes loosely used synonymously. However, in order to be specific one has to understand the differences that exist in the key words. Currently we are also using the phrase "Social forestry" which encapsulates all forms of forestry activities that have social benefits to people. The key word here is "social". Social forestry terminology is mostly used in the place of community forestry nowadays.

About 90% of energy source for Tanzanians comes from the forest. This means that many people depend on woodfuel for household energy requirements. In rural Tanzania dependence on forests for energy source can almost be 100%. Other energy sources such as electricity, fossil fuel and solar are mainly used in cities and towns. With the economic hardship that many people are facing in cities and towns, the trend in using these other sources of energy is not rising. Instead, many urban people are turning to use the traditional source in form of charcoal and/or firewood. Many vehicles can be seen nowadays transporting fuelwood materials from public forests to cities and towns. The demand is proportionally increasing with increase in population. Apart from fuelwood, there are other forms of uses of forest products which lead to malicious harvest of our forest resources. Demand and supply of forest produce are now out of proportions. This leads to deforestation.

In Tanzania, deforestation is estimated at 400,000ha. annually. This is a big problem. In order to contain it, Tanzanians are supposed to plant tree seedlings between 150-200 million per year coupled with conservation of natural young forests.

Tanzania has about 33.5 million hectares of forests and woodlands. Out of this total area, almost two thirds consists of woodlands on public lands that lack proper management. Public lands are under enormous pressure from expansion of agricultural activities, livestock grazing, fires and other human activities. About 13 million hectares of this total forest area have been gazetted as forest reserves. Over 80,000 hectares of the gazetted area is under plantation forestry and about 1.6 million hectares are under water catchment management. The forests offer habitat for wildlife, beekeeping, unique natural ecosystems and genetic resources. They are also important economic base for country's development. The total forested area is distributed by type, use and legal status as follows;

<u>Forest type</u>	<u>000ha</u>
Forests(other than mangrove forests)	1,141
Mangrove forests	115
Woodlands	32,299
Total	33,555
<u>Use of Forest Land</u>	
Production forest area	23,810
Protection forest area (mostly catchment areas)	9,745
Total	33,555
<u>Legal status</u>	
Forest reserves	12,517
Forest/Woodlands within national parks, etc	2,000
Non-reserved forest land	19,038
Total	33,555

Source: National Forest Policy, Ministry of Natural Resources and Tourism, Dar Es Salaam, March 1999.

Kilimanjaro Village Forestry project (KVFP) was officially launched on 15 January 1991. Initially the project struggled to develop and improve various tree-planting technologies along with extension methodology suitable for Same lowland. It was anticipated that these activities would contribute significantly to the development of village forestry in Tanzania. Project implementation has undergone three phases namely Phase I, Phase II and Follow-up Phase. Follow-up phase is due to end 14 January 2000.

This paper is focusing more on the activities implemented in the follow-up phase.

2. Background Information

KVFP implementation started in 1991 with a two years phase. Project objective during phase I stated as "To develop and improve techniques for production of tree seedlings and to train personnel concerned in order to contribute to the introduction of village forestry in Tanzania".

Activities done during this phase included;

- (i) Development of nursery technique and production of tree seedlings for village forestry.
- (ii) Training of Tanzanian counterparts in Japan. These were mainly short courses.
- (iii) Formulation of village forestry programme.
- (iv) Collection of data and survey for implementing village forestry programme.
- (v) Construction of nursery.

This was mainly a preparatory period for putting together the infrastructure, personnel and other logistics required. This was in January 1991 to January 1993.

Five years implementation phase followed immediately after the first phase. Project objective was revised this time and stated as "To develop and improve techniques in seedling production, reforestation and extension methodologies suitable for semi-arid areas so as to contribute to village forestry in the United Republic of Tanzania".

Many activities were done in this phase (see annex 1). It was during this phase that we learnt many interesting lessons. Implementation of community development programmes has many challenges. Many issues that seemed crucial were coming up during implementation of various activities.

2.1. Adaptive or Flexible Project Management.

Situations in rural communities are not static. They keep on changing. An adaptive project management is required in order to cope with the changing situations. The project had to adopt this mechanism so as to cope with the circumstances. Many factors prompted the project to adopt this mechanism, but two of them are worthwhile to mention.

2.1.1. Revised Overall Project Objective

Phase I overall project objective was revised in phase II to enable the project deliver the anticipated output. Set of activities was broader than before.

2.1.2. Mid-Term Evaluation Team Recommendation

Mid-term evaluation team for phase II recommended to the project to involve the community as much as possible in many of its activities. For instance on-farm trials were to be

encouraged instead of designing trials within the project area. It was also recommended that a gender officer should be recruited by the project to enhance gender participation. Tree planting target in project area was reduced from 300ha, initially planned to 220ha, due to harsh weather condition which affected planting activities at the beginning of project implementation.

2.2. People's Participation

Participation is a rich concept that means different things to different people in different settings. Community participation has become a pattern and parcel in implementation of community development projects. People's involvement in project activities became a crucial issue during mid of phase II. There were many reasons for this but the important one was the assurance of sustainability of project activities when external assistance ceases. Success in improvement of extension methodologies would be questionable if people's participation was not given proper attention.

Because of this, project management started to plan activities that would involve people of all levels in the community. Initially there was a ready-made plan for the five years. Activities had defined targets and anticipated outputs. With community involvement outlook, the whole plan had to be revised.

To start with a survey on situation analysis was conducted in Same district to five sample villages namely Meserani, Njoro, Bendera, Bombo and Papa. This was called "Socio-economic Base-line Survey". Data of this survey were analysed and compiled into a report. The report was made available in July 1996. Minako Sato, the author of the report recommended the following (I quote a portion of it).

"The KVFP recently decided to shift, its extension approach from a sporadic approach to an 'intensive approach'. In sporadic approach, extension section of the project has been distributing seedlings and assisted the establishment of tree nurseries in response to requests of village people. However, as the project itself admits, there have been many shortcomings in this approach. Firstly, even though the project has taken people's needs for seedlings into account, it has failed to provide the target people with technical assistance which is appropriate to the natural and social conditions of the target villages. Secondly, the project has not been successful in promoting sustainable tree planting activities in target villages, by involving people in the project designing and implementing".

Recommendations made to the project from this report necessitated management to make thorough overhaul of its plan of activities. This process took sometime to accomplish. Project staff also needed some time for changing their attitudes and the way of doing their activities to conform with the suggested pattern of doing things.

Actual implementation of project activities based on participatory approach started during phase two but at a time when end of the phase was almost due. By January 1998, the date at which phase two was supposed to end, not much was done in accordance with the new approach. Because of this, the final evaluation team made a request to the governments of Japan and United Republic of Tanzania, to give the project a two years follow-up phase. This could enable the project management fulfil its program of activities based on the new approach and to build enough capacity to local authorities to sustain project activities. The two governments granted a two years follow-up phase, which started 15th January 1998.

3. Activities with Participatory Approach

KVFP participatory approach started in phase two. Follow-up phase was just a continuation of the process which had started in 1996. The process started with training workshops of project staff on tools useful in facilitating people's participation. Emphasis was also put on involving district forest office as working partners. This was the beginning of collaboration with key players which was later expanded to other departments such as planning, community development and agriculture and livestock.

3.1. Training Workshops of Project Staff and Others

Several training workshops were conducted to project staff and other district officials on useful tools that could be used in facilitating people's participation. KVFP in collaboration with Mikochei Agricultural Research Institute organised two workshops on Participatory Rural Appraisal (PRA). The first took place from 22nd September – 1st October 1997 and the second from 24th November – 2nd December 1998. For details of contents see one of the timetables attached as annex 2.

3.2. Situation Analysis Surveys, Planning and Implementation

Before planning activities in model villages situation analysis was done followed by planning and implementation. All stages of the process had to be done on participatory bases. After training the staff (project and district extension workers) on PRA, participatory surveys were conducted in five model villages/sub-villages listed below;

- (i) Njoro village
- (ii) Masandare sub-village
- (iii) Kirinjiko Chini sub-village
- (iv) Meserani sub-village
- (v) Bendera village

Five facilitation committees were formed, one for each village or sub-village. Each committee was made up of both KVFP and district council staff. The role of a committee was to facilitate villagers in the processes of situation analysis, planning and implementation of village/sub-village programmes.

Several activities were initiated in model villages as a result of the participatory process.

Table 1: Activities in model villages.

No	Name of village or sub-village	Activities	Remarks
1	Njoro	(i) Formation of village environmental conservation committee (VECC). (ii) Starting of school nursery (iii) Starting of village woodlot (iv) Setting test plots on direct seed sowing of <i>Cassia siamea</i> . (v) Homestead tree planting.	<ul style="list-style-type: none"> • Formed but not very active. • Implemented • Not very successful • Indigenous knowledge on direct seed sowing of <i>C. Siamea</i> • Implemented.
2	Masandare	(i) Formation of VECC (ii) Construction of water reservoir at village health clinic to support trees planting. (iii) Starting of school nursery (iv) Homestead tree planting	<ul style="list-style-type: none"> • Formed but not very active • Done • Done • Implemented
3	Kirinjiko Chini	(i) Formation of VECC (ii) Construction of school (iii) Homestead tree planting	<ul style="list-style-type: none"> • Formed. Active of Mlimbiko conservation • Still under implementation • Implemented

4	Meserani	(i)	Formation of VECC	• Formed. Not very active
		(ii)	Construction of School	• Implemented. Assistance on corrugated iron sheets
		(iii)	Homestead tree planting	• Implemented.
5	Bendera	(i)	Formation of VECC	• Formed
		(ii)	Starting of group nursery	• Started but not successful
		(iii)	Homestead tree planting	• Implemented.

3.3. Other Related Surveys

Several other related surveys were conducted. Information collected and analyzed would enhance implementation of participatory approach. These were facilitated in most case by short-term consultants (see table below).

Table 2: Surveys in villages on selected issues.

No	Name of Consultant	Subject Surveyed	Period
1	Rehema L. Mwateba (Independent Consultant)	• Analysis of selected gender aspects for Kirinjiko Chini	March 1997
2	Yoko Suzuki	• Analysis Gender participation in community forestry (Pare and Maasai)	April – May 1997
3	Satoko Kurata	• Analysis of gender sensitive (women empowerment) • Review of extension activities by gender	October, 1998
4	Megumi Hirayama	• Participatory learning and Action (PLA)	August, 1999

3.4. Other Training Workshops/Courses

Training courses were organised and conducted to equip key players with relevant knowledge. Involved project and district council workers, school teachers and villagers. Some project staff and district forest officer (DFO) attended short courses in Japan.

3.4.1. Training Workshops

Several training workshops were organised and conducted by KVFP in collaboration with the district forest officer. Training involved different groups of people with different education background. The table below shows some of the training workshops.

Table 3: Training workshops.

No	Title of Course	Target group	Time conducted
1	Field Extension Workers training on Forestry Related Issues.	Workers from Departments of Natural Resources (forester), community Development, Agriculture and Livestock.	3 rd – 7 th November 1997
2	Training Workshop on Tree Growing Techniques in Same Lowland	Primary School Teachers	November, 1998.
3	Training for Forestry Agents on Promotion of Forestry in Villages	Selected villagers from sub-village levels.	August, September and October 1998. February and March 1999.

4	Training Workshops for Promotion of Tree Planting	Primary School Teachers	October, 1999.
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3.4.2. Training in Japan and Kenya

KVFP and district forest staff attended courses in Japan and Kenya as indicated in table below;

Table 4: Courses attended.

No	Name of Fellow and Organisation	Title of Course Attended	Duration
1	J.M. Butuyuyu – KVFP	Forest Management and Planning	11/8 – 8/11/1997
2	John C. Mboya – DFO Same District Council	Natural Forest Management and Regional Forestry by Community Participation.	
3	David P. Mkomwa – KVFP	Reforestation Techniques Promotion Leaders Course.	
4	Mtama B. Siuhi – KVFP	Natural Forest Management and Regional Forestry by Community Participation.	15/8 – 26/10/999
5	Leonard O. Chegere – KVFP	Regional training Course for the Promotion of Social Forestry in Africa	27 th September – 30 th October, 1999.

3.5. Silvicultural Activities

Nursery and tree planting activities were done at project site as well as in villages. There was a sporadic establishment of small- scale nurseries in villages after conducting training workshops for villager and schoolteachers. Number of small- scale nurseries raised from about forty (40) to more than 140 nurseries of individuals, groups and schools.

Tree planting picked momentum in villages despite the introduction of sale of seedlings and trial plots of tree planting were established in Njoro and Meserani.

4. Rationale of Participatory Approach

It is logically acceptable that bottom-up approach is the ideal way of planning and implementing community programmes. Top-down or rather programme oriented approach apparently proved failure in meeting people's expectations and the question of sustainability seems difficult if not impossible. People in their respective areas know better their situations as regards problems hindering development. If properly involved community people can initiate good intervention programmes which can be sustainable. People know well how to go about problems that interfere with implementation of such programmes by using their traditional problem solving mechanisms. In view of this, technicians or specialists can better play the role of facilitation.

4.1. Project Experience

KVFP has been conducting workshops on participatory learning and action in villages. Four villages were at first involved namely Ruvu Muungano, Vumari, Kimunyu and Kamorei. The whole process involves situation analysis, action planning and responsibility. It was interesting to learn that villagers are potentially good planners if properly facilitated. People were very much interested and happy with the whole process.

After introduction of participatory approach people in villages especially model villages have developed more consciousness of environment conservation. Formation VECC and increase of tree planting despite of sale of tree seedlings is a result of the approach. Surveys and training conducted for schools on environmental education have enhanced consciousness on environment conservation among pupils and teachers.

4.2. The National Forest Policy

The new national forest policy of 1998 underscores the importance of community involvement in forest conservation issues. It puts more emphasis in involving people in developing and managing public forests. For example the objective of Forest Land Management reads as;

“ Ensured sustainable supply of forest products and services by maintaining sufficient forest area under effective management”.

This is possible only with involvement of the communities as policy statement number five (5) reads,

“To enable sustainable management of forests on public lands, clear ownership for all forests and trees on those lands will be defined. The allocation of forests and their management responsibility to villages, private individuals or to government will be promoted. Central, local and village governments may demarcate and establish new forest reserves”.

Also statement policy number seven (7) reads,

“ Private and community forestry activities will be supported through harmonised extension service and financial incentives. The extension package and incentives will be designed in a gender sensitive manner”.

These statements show that the community people have a big role in conserving out forests. More than 50% of forest-land lies outside forest reserves and depend on community people's consciousness for their existence. Enhancing people's awareness on environmental degradation and conservation measures consequently enhances people's responsibilities over forest resources.

KVFP's participatory approach conforms with the new forest policy. People in the working areas of KVFP can easily understand the new policy as they have already started implementing some of the policy directions.

5. Problems Encountered

There has been some logistical problems in the initial stage of PRA practices. These problems were mostly originated from facilitator's side. The main causes might be the lack of proper training of PRA methods, still dominant top-down attitudes and the lack of confidence in the way how to facilitate villagers.

5.1. Lack of Proper Training

This was reflected in doing of the following activities;

- (i) Poor record keeping and reporting
- (ii) Lack of proper methodologies

- (iii) Asking of general questions.

5.2. Facilitators' Attitudes and Behaviour

This was also reflected in each facilitating team, the way of doing facilitation process. They unnecessarily maintained some irrelevant attitudes and behaviours which include:

- (i) Hierarchy in each facilitating team
- (ii) Lack of respect to indigenous technologies
- (iii) Facilitators confusion of technical superiority with adaptability
- (iv) Facilitator's team suggests what villagers should do.

5.3. Lack of Confidence

This was reflected in the way messages were transferred between villages and KVFP. For instance, facilitators for Kirinjiko Chini reported that villagers were requesting a bicycle for better communications between the sub-village and the project. The facilitators gave no additional comment or recommendation.

Although these problems were observed in the initial stage most facilitators now seem to have improved their understanding and attitude through the progress of works. Another training on PRA was organised by the project in collaboration with Mikocheni Agricultural Research Centre to improve the understanding of facilitators and others.

6. Monitoring Mechanism

The project used a participatory system of monitoring its activities. All those who were involved in planning of activities were also involved in monitoring process. Village environment conservation committees were communication partners with their corresponding facilitation teams. There are two types of meetings in which reports of different activities are presented and discussed.

6.1. Joint technical Meeting

This is a monthly meeting which takes place on every second Wednesday. It involves both all Tanzanian staff and Japanese staff. The project manager is the chairperson. Other members in this meeting are from district council departments of natural resources (DFO), Community development and planning; also representative from projects dealing with tree planting programmes in the district such as TIP (Traditional Irrigation Improvement Programme), SAIPRO (Same Agriculture Improvement Programme), TCRS (Tanzania Christian Refugee Services) and District forest Catchment Office. Project management gets a lot of advisory inputs from other programmes.

6.2. Facilitation Committee Meeting

This meeting takes place on request by the chairperson who is the DFO. Members of this meeting are all members of the facilitation teams of model villages. Reports of different facilitation teams are presented and discussed. Other important issues are also included in the list of agenda for discussion.

7. Future Extension Activities in Same

KVFP-Follow-up phase is ending on 14th January 2000. All forest extension activities will be

handed over to the district council). The implementers will be the district forest officer (DFO) and his staff. This office has been working hand in hand with the project for the whole of this phase. We believe the office conversant with the methodologies of participatory approach.

Capacity building of DFO's office was one of the crucial tasks during this phase. This was necessary for smooth handing over of extension activities. Apart from involving the office in activities of participatory approach, KVFP was supporting DFO on another programme known as DFO/KVFP programme with activities outside the model villages.

Other capacity building activities include;

- (i) Building of new DFO office
- (ii) Provision of nursery inputs to be sold to people at affordable prices. The district council has opened a separate forest account to which money from sale of nursery inputs can be deposited and re-used for the same purpose.
- (iii) Transport assistance to field forest extension staff. The project purchased bicycles to facilitate mobility of field workers.
- (iv) Provision of office equipment such computer and printer, photocopying machine, furniture and office stationery. They will supplied after completion of new office.
- (v) Provision of vehicles and motorcycles after JICA officially hands over project vehicles and equipment to the government of the United Republic of Tanzania.

It is my hope that forest extension activities will continue sustainably through the DFO's office. Important thing to remark is that the district council authority should make sure that all facilities provided should be utilised for the intended purpose. Diversion of resources can affect sustainability. All staff have received basic training and have accumulated enough field experience.

KVFP Mkongu facility is going to be transformed into a training centre for social forestry. It will soon start to conduct the following short courses, according to the future plan;

	Course	Target	Duration	Frequency
A.	Refresher Course	Diploma or Certificate holders	4 Weeks	1/year
B.	Short Course	Extension and Forest Officers	2Weeks	2/year
C.	Extension Course	Leading Farmers and Villagers	1Week	2/year

NB: Participants for these courses will come from semi-arid places as the program aims at fostering social forestry in these areas.

8. REFERENCES

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Annex I

Activities, results and future: Nursery Section

Subjects	Activities	Results	Problems and possible measures to be taken
<p>Development and improvement of nursery technologies</p>	<p>1) Production of seedlings for plantation and distribution</p> <ul style="list-style-type: none"> • Enough seedlings have been produced for plantation and distribution 	<p>On average, production of 300,000 seedlings per year has been achieved.</p>	<p>(Problems) (Measures to be taken)</p>
<p>2) Development of appropriate nursery techniques in semi-arid areas</p> <ul style="list-style-type: none"> • Experiments on pot soil mixture, seed treatment, watering intensity, hardening, etc. have been conducted. 	<p>Based on the results of the experiments, a guideline was developed and, in 1985, a nursery manual was prepared.</p>	<p>(Problems) (Measures to be taken)</p> <ul style="list-style-type: none"> • Although the nursery techniques suitable for large scale nurseries have been developed, development of the techniques for small-scale nurseries has some delay. • Introduction of participatory extension approaches revealed previously unknown needs on species. • Experiments to be taken • Development of nursery techniques on the species newly found should start as soon as possible. 	<p>(Problems) (Measures to be taken)</p> <ul style="list-style-type: none"> • Although the nursery techniques suitable for large scale nurseries have been developed, development of the techniques for small-scale nurseries has some delay. • Introduction of participatory extension approaches revealed previously unknown needs on species. • Experiments to be taken • Development of nursery techniques on the species newly found should start as soon as possible.
<p>3) Other experiments</p> <ul style="list-style-type: none"> • Following experiments were conducted: <p>a) Cutting of <i>Acyrtalis casta</i></p> <p>Propagation by cutting was tested because of the short supply of seeds</p> <p>b) Cutting trial with closed shelter cover.</p> <p>c) Production of compost</p> <p>It was observed that the decomposition of cow manure has not been enough in pots, and a trial to make compost was carried out.</p> <p>d) Comparison of bed types</p> <p>Raised bed and sunken bed have been compared to find the possibility to reduce water use in Mkonza nursery.</p>	<p>a) It was confirmed that the propagation by cutting is possible.</p> <p>b) No positive results were observed.</p> <p>c) Water problem in Mkonza nursery affected the test and the test failed.</p> <p>d) Since this experiment has started in the last year of phase 2, no concrete results have been obtained.</p>	<p>(Problems) (Measures to be taken)</p> <ul style="list-style-type: none"> a) Nothing particular. b) May be caused by extremely low temperature. c) Lack of water. d) This should have been done before the construction of Mkonza nursery. <p>(Measures to be taken)</p> <ul style="list-style-type: none"> a) Direct cutting should be examined. b) It is necessary to try in other seasons. c) It is necessary to try it in smaller scale. d) If raised bed is found better, nursery design should be changed. 	<p>(Problems) (Measures to be taken)</p> <ul style="list-style-type: none"> • Cost for water supply is still a problem. • Physical design of Mkonza nursery should be changed to reduce the water use. Production of seedlings should be shifted to small-scale nurseries and Mkonza nursery should be used for specified objectives.
<p>4) Cutting production costs</p> <ul style="list-style-type: none"> • Mkonza nursery was constructed to produce a large number of seedlings and, therefore, imported materials have been used for mass production. Since the sustainability of such operation has been questioned, alternative materials have been tested. 	<p>Some locally-available alternatives were found as shading materials.</p>	<p>(Problems) (Measures to be taken)</p> <ul style="list-style-type: none"> • Cost for water supply is still a problem. • Physical design of Mkonza nursery should be changed to reduce the water use. Production of seedlings should be shifted to small-scale nurseries and Mkonza nursery should be used for specified objectives. 	<p>(Problems) (Measures to be taken)</p> <ul style="list-style-type: none"> • Cost for water supply is still a problem. • Physical design of Mkonza nursery should be changed to reduce the water use. Production of seedlings should be shifted to small-scale nurseries and Mkonza nursery should be used for specified objectives.

<p>Preparation of nursery manual for village forestry</p>	<p>5) Preparation of nursery manual • A nursery manual was prepared based on the observation in Mionga nursery.</p>	<p>• Manual for the operation of Mionga nursery was prepared in 1995 and is now under revision. • Manual for rural people is now under preparation.</p>	<p>[Problems] [Measures to be taken]</p> <p>• The selection of mother trees should not be an independent activity. It should be considered in a extension strategy involving local people.</p>
	<p>6) Selection of mother trees • To promote local collection of seeds, some trees were selected as mother trees.</p>	<p>Trees of some species for timber production were identified in Same District.</p>	<p>[Problems] [Measures to be taken]</p> <p>• Species are limited for timber production and also areas are limited in rural areas. Local people do not recognise the importance of selected trees because of the lack of communication. • The selection of mother trees should not be an independent activity. It should be considered in a extension strategy involving local people.</p>
	<p>6) Establishment of a seed garden • Aiming at financial self-sustainability of nurseries in future, a seed garden for highly valued fruit species has been established.</p>	<p>High quality varieties of citrus species have been collected and planted in a section of Mionga nursery.</p>	<p>[Problems] [Measures to be taken]</p> <p>• Since the land is limited, fruit trees other than citrus have not been collected. Market has not been analysed. • Potential markets should be identified and transport and other costs should be assessed.</p>

Activities, results and future: Silviculture Section

Subjects	Activities	Results	Problems and possible measures to be taken
<p>Development and improvement of reforestation technologies</p>	<p>1) Species selection for semi-arid areas</p> <ul style="list-style-type: none"> Survival rates and the growth of the trees planted in the demonstration forests were measured and compared. Species which have shown good performance have been selected as suitable species for semi-arid areas. 	<p>Reliable data on the survival rates and the growth are periodically available in Mkomazi Arboretum where the tending operation has been relatively good. At this moment <i>Acacia senegal</i> and <i>Acacia drepanolobium</i> representing indigenous and exotic species respectively, were found promising.</p>	<p>[Problems]</p> <ul style="list-style-type: none"> Although the establishment of demonstration forests started in 1961, the lack of consistent tending operation (especially watering) and the lack of continuous data collection has made it difficult to collect reliable data for demonstration forests with the exception of Mkomazi Arboretum. It is necessary to continue observation for a long period and, therefore, is difficult to finally conclude in KVFP phase 2. Through the adoption and model implementation of participatory extension methods, some species, which had not been in KVFP's list of species trial has become to be known. Measures to be taken Data should be collected continuously in the Mkomazi Arboretum. Species selection should be conducted in the model plots established in model extension villages. Trial on newly added species should be done urgently.
<p>2) Watering</p> <ul style="list-style-type: none"> Plantation operation had initially started without watering. Consequently most trees have died under the harsh climate with less than 500 mm of annual rainfall. Since the short rainy season in 1963, all trees have received water at least for one year after planting. 	<p>It was observed that the so-called drought-tolerant species can resist with the watering intensity of three litres per week during dry seasons. More than 50% survival can be expected.</p>	<p>[Problems]</p> <ul style="list-style-type: none"> Many residents in semi-arid areas have difficulty to get enough water for their daily life. Under such circumstances, it is questionable that reforestation techniques relying on watering become accepted except the cases of planting a few trees around houses. Measures to be taken Techniques to grow trees without watering should be tested. Observation in model plots should be done through the implementation of participatory extension approaches. 	<p>[Problems]</p> <ul style="list-style-type: none"> Currently, tractor ploughing is the option available only for KVFP. It is still questionable that tractor ploughing becomes an adequate technique. Measures to be taken Since tractors have been introduced for tending in Same District, tractor ploughing trial should be continued as an option in future. The real cause of difference between tractor ploughing and manual digging should be studied to develop and improve technical options available for resource-poor farmers.
<p>3) Land preparation by tractors</p> <ul style="list-style-type: none"> In some plantations, tractor ploughing was introduced to reduce labour requirement and to enhance survival rates by improving water holding capacity of soil. 	<p>Tractor ploughing advances the survival rates comparing to digging by hand. For example, in fuelwood plantation one year after planting, the survival rate of areas ploughed by tractor and one of manual digging are 43% and 2% respectively. Though, these are different areas planted in different periods and, therefore, direct comparison is not relevant.</p>	<p>[Problems]</p> <ul style="list-style-type: none"> Since the data became available in the last year of the cooperation period, it was impossible to test it in real practice. Measures to be taken Practical experiment should be carried out to test the viability of the technique. 	<p>[Problems]</p> <ul style="list-style-type: none"> Since the data became available in the last year of the cooperation period, it was impossible to test it in real practice. Measures to be taken Practical experiment should be carried out to test the viability of the technique.
<p>4) Experimental plots</p> <ul style="list-style-type: none"> Following trials have been carried out to enhance survival rates. a) Planting hole size <p>This trial was initially started in May 1965. However, the technical advisory team visited in August 1965 pointed out some problems on the design of experiment and new trial was set in February 1966. Data collection has continued since then.</p> <p>b) watering same as above</p>	<p>Data are shown in afforestation record attached.</p>	<p>Same as above.</p>	<p>Same as above.</p>

	<p>Activities</p> <p>c) Soil improvement Initially this trial had been carried out in the road side tree planting site. However, the Technical Consultancy Team suggested that the road side was not suitable for experiment, because it lacks uniformity in conditions. Therefore, new trial plots were established in February 1986 and data have been collected since then.</p> <p>d) Others</p>	<p>Results</p> <p>- Same as above.</p>	<p>Problems and possible measures to be taken [Problems] and [Measures to be taken]</p> <p>- Same as above.</p>
	<p>a) It was found that the complete weeding and microcatchment enhanced the survival rates.</p> <p>b) Considering the costs of reforestation and observing villagers' forest use, necessity to develop a sustainable way to manage existing natural forests has been acknowledged.</p>	<p>[Problems]</p> <p>a) This is still to be proved by using reliable data.</p> <p>b) Basic information is missing about natural forests and the trial on natural forest management has been delayed.</p> <p>[Measures to be taken]</p> <p>a) It is necessary to establish experimental plots under better management.</p> <p>b) It is necessary to collect information on natural forests, villagers' use patterns, existing management systems and to develop techniques for their sustainable management.</p>	<p>[Problems]</p> <p>[Measures to be taken]</p>
<p>Preparation of reforestation manual for village forestry</p>	<p>The first issue of the Afforestation Manual was prepared in August 1985 and now is under revision.</p> <p>Manual for villagers' use was jointly designed with other sections and is under preparation process.</p>	<p>Afforestation Manual</p> <p>Tree-growing manual for villagers</p>	<p>[Problems]</p> <p>[Measures to be taken]</p>
<p>Establishment of demonstration forests</p>	<p>See other documents for detail</p>	<p>[Problems]</p> <p>At the time of design in general, it seems that the data collection on the natural environment and socio-economic conditions in semi-arid areas was insufficient. Before demonstrating some techniques, their applicability and suitability to both environment and local needs should have been thoroughly examined.</p> <p>Border planting and windbreaks: Survival rates are low and seem unsuccessful. Windbreaks so far have no effect.</p> <p>Road side planting: Damages are sporadically caused by trespassers and livestock.</p> <p>Fuelwood forests: It is necessary to assess economical viability by comparing with natural forests.</p> <p>Agroforestry: Alley cropping, which is usually considered to be irrelevant in semi-arid areas was introduced in most plots.</p> <p>Fodder tree plantation: Except some parts, they were unsuccessful because of the damage caused by wildlife.</p> <p>Improvement of natural forests: Enrichment planting has been practised with some indigenous species but most of them have died because of drought.</p> <p>Arboreum, seed orchard: It needs long time to become functional.</p> <p>Extension model plots: Initially extension section was responsible. However due to the delay in the assignment of expert and counterpart as well as the lack of labour force in this section caused the delay of the establishment of model plots.</p> <p>[Measures to be taken]</p> <p>Tending should be continued only in the demonstration forests which show good performance.</p> <p>The establishment of model plots in the model extension villages should be promoted.</p>	<p>[Problems]</p> <p>[Measures to be taken]</p>

Improvement and development of extension materials	<p>1) Manual for small-scale nurseries</p> <ul style="list-style-type: none"> Some technical leaflets were prepared for rural implementation. 	<ul style="list-style-type: none"> Technical leaflets on important aspects such as planting and nursery techniques were prepared. 	<p>[Problems]</p> <ul style="list-style-type: none"> Since the Extension section prepared them alone, some technical contents were not necessarily agreed upon by all project staff. Some issues were not covered. <p>[Measures to be taken]</p> <ul style="list-style-type: none"> Consulting to Silviculture and nursery sections are necessary. These sections will prepare a manual incorporating the ones developed by Extension section.
	<p>2) Development of extension materials for schools</p> <ul style="list-style-type: none"> Recognising the importance of environmental education, some teaching materials were developed. 	<ul style="list-style-type: none"> Teaching materials such as picture-stories were prepared. 	<p>[Problems]</p> <ul style="list-style-type: none"> Relation between these materials and existing school curriculum is not clear. Training of school teachers to use these materials is not enough. <p>[Measures to be taken]</p> <ul style="list-style-type: none"> By promoting the participation of active teachers in the development of materials, teaching materials should be improved to be used in school curriculum.
	<p>3) Other extension materials</p> <ul style="list-style-type: none"> Some other extension materials were developed to enhance participation 	<ul style="list-style-type: none"> T-shirts and caps printed with messages were prepared and distributed. 	<p>[Problems]</p> <ul style="list-style-type: none"> Its effectiveness to transfer messages is doubtful. <p>[Measures to be taken]</p> <ul style="list-style-type: none"> Reconsider the objective to prepare such materials. These material are not relevant to convey the messages. On the other hand, they are useful to enhance participation in particular activities.
	<p>4) Preparation of project working papers</p> <ul style="list-style-type: none"> To publicise the results of this project, the Extension section has played a major role in the preparation and publication. 	<ul style="list-style-type: none"> Each working paper is devoted to one particular issue. Up to No. 12 have so far been prepared. 	<p>[Problems]</p> <ul style="list-style-type: none"> Measures to be taken
Model implementation of extension plan	<p>1) Promotion of small-scale nurseries</p> <ul style="list-style-type: none"> Extension section assisted the establishment of small-scale nurseries owned by villagers. 	<ul style="list-style-type: none"> About 40 small-scale nurseries have been established in Same District. Through the evaluation works, many information have been gathered. 	<p>[Problems]</p> <ul style="list-style-type: none"> Since nurseries are scattered around in Same District, support works have become difficult. Some conflicts between nursery owners and neighbours have been reported. Supports have had tendency to be monopolised by powerful groups. Material supports has enhanced the reliance on outside. Work has mainly been done in the mountain but not in semi-urban areas, which are the primary target of the project. <p>[Measures to be taken]</p> <ul style="list-style-type: none"> Support to the nurseries without sustainability should be stopped. Numbers should be limited so as to enable DPO to continue support works. Extension works should not target particular groups. It is necessary that all villagers are informed and have chance to participate.

Activities, results and future: Extension Section

Subjects	Activities	Results	Problems and possible measures to be taken
<p>Development and improvement of extension methods</p>	<p>1) Improvement of existing extension methods • Commonly used extension methods, such as the support to establish small-scale nurseries, transfer of nursery techniques and publicity activities have been improved through mobile implementation and its review.</p>	<p>• Pros and cons of these methods have become identified. These methods are practical if used in limited groups (such as schools). On the other hand, it was found difficult to incorporate various conditions and needs when communities are targeted.</p>	<p>{Problems} • It was sometimes difficult to carry out evaluation works of each extension implementation, because the evaluation works were not incorporated in the initial planning. • These methods are resource demanding if practised in a large scale. Deployment of extension workers, their ability, extension materials or financial aspects to support these should be considered. {Measures to be taken} • It is necessary to review planning stage of project activities to incorporate how monitoring and evaluation will take place. • In addition to strengthen the extension capability of Same District responsibility should be shared with other organisations including NGOs</p>
<p>2) Development and improvement of participatory extension methods</p>	<p>• Corresponding to the employment of Participatory Rural Appraisal (PRA) by the Forestry and Beekeeping Division, its applicability to semi-arid areas has been tested.</p>	<p>• It was confirmed that the participatory approaches are effective to promote tree-growing activities among villagers by themselves.</p>	<p>{Problems} • Because of the delay to introduce participatory approaches, but remaining for this phase may not enough to complete a cycle including participatory monitoring and evaluation. • Although necessary inputs can be minimal to conduct participatory methods, participatory methods require trained staff. {Measures to be taken} • It is necessary to build a system to ensure the conduct of participatory monitoring and evaluation. • It is necessary to organise training courses or send staff to some course organised by other institutions</p>
<p>3) Preparation of extension manual</p>	<p>• As the results of extension activities, an extension manual is being prepared.</p>	<p>• An extension manual is being prepared for the use in semi-arid areas of Same District.</p>	<p>{Problems} • As mentioned above, participatory monitoring and evaluation process has not been completed. Therefore, these issues are mentioned rather generally in the manual. • Since the objective of extension activities was the development of extension planning methods, this manual targets the officers responsible for planning rather than implementation. {Measures to be taken} • By accumulating experiences, the manual will be revised in future. • A practical manual that targets extension staff may be necessary.</p>
<p>4) Various surveys</p>	<p>• Various surveys have been conducted to collect basic data to design extension works.</p>	<p>• Surveys such as socio-economic baseline survey and gender analysis have been conducted.</p>	<p>{Problems} • Implementation of these surveys have delayed. {Measures to be taken} • Surveys should be conducted regularly to test the validity of assumptions.</p>

<p>2) Free distribution of seedlings</p> <ul style="list-style-type: none"> Seedlings have been distributed to semi-arid lowlands where the production of seedling is difficult because of the lack of water. 	<ul style="list-style-type: none"> Initially the project determined the species, number, timing and the place of distribution. After evaluation of initial activities, rural people were organised and a better distribution procedure was introduced to suit people's needs. 	<p>{Problems}</p> <ul style="list-style-type: none"> Initial distribution procedure excluded people's view and consequently people were not very much interested in the programme. Organising people is a time consuming work. Measures to be taken Although it is time consuming, organising people greatly enhance people's acceptance and survival of trees. So, this method should be selected.
<p>3) Campaigns</p> <ul style="list-style-type: none"> To promote tree-growing by rural people, some campaigns were held as so-called mass approach. 	<ul style="list-style-type: none"> Tree planting campaign, dance and song, and picture contests were held. Although people had become more familiar with the name of the project, they did not necessarily enhance their tree-growing activities. 	<p>{Problems}</p> <ul style="list-style-type: none"> Follow-up and evaluation after campaign was not planned. Measures to be taken To conduct a campaign should not be an objective.
<p>4) Calendar</p> <ul style="list-style-type: none"> Calendars carrying extension messages are prepared each year. 	<ul style="list-style-type: none"> Calendars were prepared and distributed to promote tree-growing activities by rural people. Though, it has been rare to find somebody started tree-growing because of the messages printed on the calendars. 	<p>{Problems}</p> <ul style="list-style-type: none"> Since calendars are precious in Tanzania, there has always been trouble to distribute them. Rural people see calendars as decoration but not as the measures to convey messages. Measures to be taken Role of calendars is publicity rather than extension. Therefore, calendars should be used strategically in this context.
<p>5) Seminars on nursery techniques</p> <ul style="list-style-type: none"> Owners and small-scale nurseries were trained on nursery techniques in seminars. 	<ul style="list-style-type: none"> Seminars were held for group nurseries, school nurseries and on particular techniques such as grading. 	<p>{Problems}</p> <ul style="list-style-type: none"> Involvement of Nursery section was not enough. Measures to be taken Extension section should be the organiser of such seminars and technical training should be given by Nursery section.

Annex 2: Time Table for PRA Workshop

To provide Participants with an opportunity to practice PRA by conducting a PRA in selected villages in the project area.

Date/Time	Activity / Topic	
24th November 1998		
8:00 - 10:30	Opening address Introduction Confiscation of the titles Expectations of the participants	25th November 1998 Overview of previous day Review of 2 ^o information Direct observation Semi structured interview
10:30 - 11:00	TEA BREAK	
11:00 - 01:00	Objectives of the workshop Communication flow Definition of PRA History of PRA	Ranking: • Preference ranking • Pairwise ranking • Direct matrix
01:00 - 02:00	LUNCH BREAK	
02:00 - 04:00	Features of PRA PRA v/s other research approaches Possible dangers of PRA PRA "tool basket"	• Wealth ranking
04:00 - 04:30	TEA BREAK	
04:30 - 05:00	PRA & the project cycle Evaluation of the day Adjourn	Construction of Diagrams Evaluation of the day Adjourn
26th November 1998		
8:00 - 10:30	Overview of previous day Participatory mapping Transect	27th November 1998 Overview of previous day PRA teams formation Preparation for field work
10:30 - 11:00	TEA BREAK	
11:00 - 01:00	Mobility map Seasonal calendar Historical profile	Preparation for fieldwork
01:00 - 02:00	LUNCH BREAK	
02:00 - 04:00	Daily routine diagrams Venn diagrams	Preparation for fieldwork
04:00 - 04:30	TEA BREAK	
04:30 - 05:30	How to Prepare for fieldwork Evaluation of the PRA tools Evaluation of the day Adjourn	Adjourn
28th November 1998		
8:00 - 10:30	FIELD WORK - Bangalala - Kitamuri	29th November 1998 Compiling & analysis of information
30th November 1998		
8:00 - 10:30	FIELD WORK - (Phase 2) Report writing	01st December 1998 Presentation of field work results Overview of the fieldwork Participants review of PRA
02nd December 1998		
8:00 - 10:30	Participants formulation of action plans CLOSING CEREMONY	03rd December 1998 Facilitators return to DSM



Forestry and Beekeeping Division



Japan International Cooperation Agency

GENDER AND COMMUNITY FORESTRY FROM KVFP PERSPECTIVE

Paper Presented During End of Phase Seminar

Raphia Koshuma (Gender Officer)

November 1999

Kilimanjaro Village Forestry Project

1. Introduction

KVFP has been actively promoting community forestry in Same district. In the past, we have tried a few approaches to promote afforestation among people. What is an effective way of promoting community forestry with people?

In our experience, we have found that their situations are not always the same among people. One of the biggest difference was seen between men and women. Even husband and wife in a family have different activities in everyday life, different resources, different needs, and different constraints, therefore their response and needs in community forestry differed. Now we have realized that it is very effective if we take the differences into our minds and make a better strategy of extension.

Paying attention to gender, the social and cultural difference between men and women helps us to support more people in community forestry. Moreover, we, as one of the development practitioners should equally participate in development activities, as required by different national policies such as that of forestry and social development.

2. Gender? What is it? That's for Women?

Well, take it easy. Gender is not just for women. It is for both men and women. Gender is a difference between men and women. But not "sex". "Sex" is a biological difference between men and women while "gender" is a social and cultural difference

For example, women can bear a child, while men do not. This is unchangeable (unless you have an operation). Then taking care of a child is considered as a women's work. It is not just because of biological reason. Men can as well take care of kids, can't they?! So, this is a socially different practice between men and women.

Generally when we talk of "gender", we refer to the different roles and responsibilities for men and women in societies and cultures.

Gender and Development

So, "gender" means that the difference between men and women can be flexible. "Gender and Development" means that:

- We can be free from "what men should be" and "what women should be". Men and women can share some roles and responsibilities, which accelerates development.
- For example; women can have more opportunities to receive technical training. They can contribute their good ideas in public meetings. Men can share some household chores which burdens women. They can also invite women to discuss on future planning jointly.

Currently much more emphasis is on women's side, because they have not been involved in development activities and benefits. This is a necessary process to make a gender balance.

- Important things are a mutual understanding and an equal partnership between men and women.

3. Why Consider Men and Women in Development?

For example, in village A, all the population had a chance to learn useful knowledge and skill. They have developed their capability, so they are able to plan a better future and work together. On the other hand, in village B, only half of the population had a chance to learn the useful knowledge and skill, and have developed their capability, while the rest half were left out. Which village can achieve development more effectively and faster? Of course village A.

Participatory development is the development by the people. Then who are the people? Men or women? The old or the young? The rich or the poor? The Pare or the Maasai? The Muslim or the Christian? Well, all of them.

However, the powerless groups of the society were often overlooked in the process of development. Their opinions were less heard, their contributions were not recognised, and they were excluded from sharing benefits.

If we look at men and women, women have been under such conditions. But, if we leave women out of development investment and activities, it is as same as choosing the village B.

Do we really want that? Therefore, if we want to achieve development effectively and rapidly, it is necessary for both men and women to participate in all development activities. We have to remind ourselves if women, the powerless group in a society, have an equal chance.

This is not only for men and women, but also for the rich and poor, for any ethnic groups, and for any religions groups. All this social consideration is for the effectiveness and the equity of the development.

4. Community Forestry and Gender

Participation by everyone in a community is the key to the development process in which villagers themselves set priorities and work together towards their goal. We need men and women in the community to participate in every process of community forestry activities, by involving community members from the start in generating, analysing and owing information about their own situation.

Therefore we involve gender perspective in community forestry because both men and women are active users and managers of forest and tree resources. However, forestry is considered a men's field. Women's roles were invisible to project designers and to policy makers; it was invisible that women and men often have different uses of forest resources and products. Men and women plant trees, but women do not always benefit because the harvest from trees is often controlled by men. The lack of recognition over the gender-based community forestry activities. Women sometimes have special cultural constraints in regard to land and natural resources (beyond those that men have), which would hamper their ability to participate in project activities. (FAO, 1989).

Therefore, in order both men and women to get benefit from all community forestry activities, both genders need to be aware of their share in the work and in the harvest. In order to achieve full participation of both men and women, it is important that both of them are able to speak out their problems and wishes in meetings. They need to be active participants in decision making structure and need to be aware about legal rights related to land, inheritance, marriage, etc. This will create effective idea for the development.

According to the analysis done by KVFP staff and members of the implementation committee on gender participation in community forestry, it shows the following results:

(1) Activity Analysis

- **Land preparation-** Men do more than women
- **Pot filling-** Both are engaged. Women do more than men.
- **Watering-** Women are engaged.
- **Sorting-** Both men and women are engaged.
- **Weeding-** Women are engaged mostly in nursery weeding. Field weeding are mainly done by men.
- **Pitting-** Men are engaged.
- **Tree planting-** Mostly men are engaged.
- **Root pruning-** Both men and women are involved.
- **Seed collection-** Men are engaged.
- **Making decision on land use-** Men are the land owners
- **Making decision on what to plant-** Both men and women decide, but men are the main decision makers. Men prefer the trees that can be used for commercial purposes such as timber and coffee. Women prefer fruit trees, and trees for shade and fuelwood.
- **Attending PRA workshop in the village-** Both men and women attend. But more men attend than women. Women have to engage in household chores and are not encouraged to attend the meeting in the village. Men should attend meetings/workshops in the village.
- **Attending the training-** Mostly men, but there are female participants because of the condition by KVFP. When KVFP conduct the training in the village, we gave the chairperson/village executive leader the condition on how to select the participants. In this case men and women had an equal chance to participate.
- **Seeing Extensionists-** Mostly men contact with the Extensionists because women have more work to do from morning up to evening. It is not easy to find women at home. Even if you can find them, it is not easy to interview them because women are not supposed to give their opinion without their husband's permission
- **Participation in VECC-** There are female member's because of the condition by KVFP. In practice, participation of women members are less than male members.

(2) Analysis on Access and Control over Resources:

(Access: right to use, Control: ownership, right to manage)

- **Communal Forest-** Basically the village government manages. Both men and women have access. Men control and little control is left for women.
- **Timber and Coffee trees-** These trees are source of income. The ownership belongs to men, while women also take care of these trees.
- **Fruit Tree-** Men have access and control for commercial fruit trees, and for fruit trees for domestic use, women have access and control.
- **Shade trees-** Both men and women have access. As for the control, men hold control and women do not.
- **(Planted) medicinal trees.** Both men and women have access. As for the control, it depends on a person's knowledge and distance from the homestead. If it is around the homestead and non-commercial use, women have access but the control is for men.
- **Fuelwood-** Women have both access and control. While men have access but no control.
- **Fruit-** Both men and women have access and control. Women have control over fruit for domestic use. Men have control over the fruit for commercial purpose.
- **Coffee-** Both men and women have access. The control is for men because it is a source of income.

- **Timber-** Only men have access and control.
- **Beehives-** Only men have access and control, because it is a source of income.
- **Profit form forest products-** Both men and women have access but, the control is for men.
- **Land for tree planting-** Access and control for husband. Women have no land ownership.
- **Tools for Afforestation-** Both men and women have access and control but, women have more control.
- **Water-** Both men and women have access. Control is for men. Women's access in reality is by fetching, watering plants etc.
- **Money for buying seeds, pots, tools-** Women have access only. Men have both access and control. Men are the one who decide what to use money for in the household.
- **Fuel saving stoves/techniques-** Women have both access and control. Men have a little access but no control. It is because women takes care of the kitchen.
- **Forest laws-** Men have more access than women. Men are more aware about forest laws, while women are not. Women violate forest laws for daily survival without being conscious about the law

5. Women Participation in Community Forestry

Women in villages are the main users of forestry products in their daily life, for instance they always collect fodder for livestock, fuelwood, medicine and mainly involved in environmental conservation. Women have important roles to play in all phases of forestry project, either as a separate group or as a part of the community in forestry development. But this is not always easy; there are still constraints to their full participation such as women are short of land, time and money. They are often poorly organised have restricted access to political power and a limited ability to influence decision makers.

They are more often illiterate than men and have no collateral to offer credit and they are restricted in the jobs they are allowed to do and the distances they are allowed to travel.

Together with these general constraints that women face world-wide, particularly in developing countries, KVFP as a social forestry project thought that, women's groups interested in forestry activities if given support to eliminate some of the mentioned constraints could be registered as logical units which in one way or another can not only contribute to its effort in the development of extension methodologies which involve people but also to the recognition and improvement of women's welfare.

Since 1997/1999, KVFP offered support ranged from technical advice, material assistance to some women's groups in Same lowland areas. Kamero, Chemchem and Tausi groups in Bendera, Hedaru and Makanya villages respectively have been among of them.

Both women groups are engaged in tree planting activities. Some also have taken initiative to establish their own nurseries which supply tree seedlings (more than 500 seedlings production capacity) to meet their own demand and the excess are distributed to the community either on the sale basis or freely.

It has been noted that among small scale nursery operators in Same district, 83% and 17% are women and men respectively (KVFP Gender – Sensitive Extension Handbook 1998).

Though it is not easy to quantify the exact afforested area by or as a result/participation of these women's groups initiatives, however, encouraging efforts can be recorded. For instance, Tausi and Chemchem groups have established their woodlots for fuelwood, windbreaks and environmental conservation which counts to 2.75 acres with total of 1950 trees. On the other hand homestead tree planting of nutritional fruits and amenity tree species are also encouraged by Kamero women group

6. Men's Participation in Community Forestry

For a long time men were exposed to the concept of community forestry unlike women. This exposure contributed in high participation of men in community forestry activities. This could be as a result of social, economic, and cultural settings which lack recognition over gender based community forestry and therefore providing more opportunity to men over control of resources and outside contact. In community forestry initiatives land and technology are basic resources for successful implementation of initiative within the community. These resources and others influence people motivation for participating in various community forestry activities.

In same district the participation of men in community forestry can be expressed as follows.

(i) Tree planting.

As mentioned earlier men were exposed in tree planting technologies before women therefore they started planting trees in their areas. Mainly the planting is done at household level around their compounds and also in agriculture fields. The planting is done either individually or in a group as communal work. Normally men do not have separate groups for tree planting but they are mixed with women. The activities which men do in tree planting include: Land preparation, weeding in the field, pitting and actual planting.

(ii) Nursery establishment.

Apart from tree planting men are also engaged in seedling production in small- scale nurseries. The activity is done either individually or in mixed groups of men and women. However, there is a clear division of labour in nursery activities between men and women. In a group nursery where men are members their main duties include: pot filling, sorting, root pruning, ingredients mixing and seed collection.

(ii) Environmental Conservation Committees

The composition of members in environmental conservation committee varies. Normally the male members are more in number than female. In most committees the male members dominate for about two thirds of the number required. This is a common practice in most villages that anything to do with decision making is done by men with very little or no input from women. The committees are crucial bodies in managing environmental conservation issues within the village. In this case the participation of men is higher since it is a decision making body on environmental conservation issues in the village.

7. Experience

- Women are busier than men with farming, household chores, and child-care, having less spare time. Besides, men take first responsibility to see the extensionists, attending meetings and training. Women lack those chances because of more domestic duties.

According to experience, if women could get the chance to participate in meetings, training and discussing on development issues with extensionists as men do, women could develop their capability so they can be able to plan a better future. In this case women could be empowered.

- Women groups create an opportunity for women to be empowered; because they can:
 - ✦ Generate income
 - ✦ Have better access to donor support and credit.
 - ✦ Express their opinions freely.
 - ✦ Encourage each other
 - ✦ Obtain social recognition
- Women also, tend to feel shy and less confident to speak up in front of men. It is not only because of culture, but also because of their less education than men.
- Both Pare and Maasai culture, it is basically men who are supposed to participate in village meetings and take part in decision making for the community. Some women were not expected to participate in those meetings. Moreover women have more domestic duties.

This hinder both men and women development because village meeting in extension activity is an important occasion in a two meaning:-

- ✦ It is a place where villager's opinions are heard.
- ✦ It is also a place of villager's decision making.

For example, if the meeting is for PRA (Participatory Rural Appraisal) to discuss about the situation of the village, and development strategies,

- ✦ It is also a place of understanding the village situation.
- ✦ It is a place of encouraging the villager's sense of developing for themselves.

8. Recommendations

Since women are often responsible for more subsistence related forestry activities than are men, women burdens may be substantially increased if their access to forestry resources is jeopardised. This means that their ability to contribute to other productive activities may be diminished.

Possibility should be looked into division of labour between men and women at least to be equal so that both have equal opportunity to participate in other development activities.

Both men and women need rights and equality. Therefore deliberate efforts should be made to invent tactics and strategies of solving problems caused by sex differences.

Women are the main user and are those who conserve forestry, they should be developed and participate in all activities. They should be given knowledge, right techniques and chances for participating in production and uses of forestry products.

Things to be considered:

- More opportunity should be given to women in decision making, planning and implementing development activities.
- Relationship between men and women should be well understood and how they relate with surrounded trees and forests.
- Indigenous knowledge of men and women on conservation and use of trees, forests and forest products, should be properly utilized.
- Women have to be given priority in being listened to their ideas, needs and their opinions

NB: Currently much more emphasis is on women's side, because they have not been involved in development activities and benefits. This is a necessary process to make a gender balance:

Important things are a mutual understanding and an equal partnership between men and women.

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Forestry and Beekeeping Division



Japan International Cooperation Agency

KVFP'S EXPERIENCES OF FORESTRY EXTENSION METHODOLOGIES IN THE SEMI-ARID COMMUNITIES OF SAME DISTRICT

Paper Presented During End of Phase Seminar

M.E. Makupa (Project Extension Officer)

November 1999

Kilimanjaro Village Forestry Project

1. Introduction

One of the important objectives of the Kilimanjaro Village Forestry Project (KVFP) is the development and improvement of forestry extension methodologies for semi-arid areas.

From the beginning of the Phase II (January 1993 – January 1998), KVFP has adopted the “Programme Approach” in KVFP’s terminology. In this approach, common activities and support packages for all over Same district are prepared by extension KVFP and delivered to interested villagers. Small-scale nursery scheme and free seedling distribution programme are two main activities initially employed by KVFP. In 1996, KVFP conducted a series of surveys (e.g. follow-up survey of small scale nurseries, socio-economic baseline survey and gender sensitive survey) and found that these traditional approaches were easy to prepare but inherently had severe limitations. In the case of traditional approaches, in general, people’s commitment is insufficient since the degree of their participation is very limited.

In traditional approaches extension projects plan all activities such as the establishment of small-scale nurseries, free distribution of seedlings and technical seminars. Activity is the unit used for planning by the projects. KVFP has acknowledged that using activity as the unit for planning severely limits people’s participation and adapted a participatory approach that uses social unit in communities as the unit for planning and implementing extension works.

2. Traditional Extension Approaches

KVFP had initially tried traditional extension approaches, which is often blamed as ‘top-down’ approaches. Above examples of seedling distribution and small scale nurseries indicate that the success or failure of the traditional extension approaches is determined by chance. However, further review of KVFP’s previous extension approaches has revealed that there have also been many failures which were initially not known, a classical example is from Bendera. When being interviewed people in Bendera village, they expressed that, ‘KVFP didn’t do anything for us’, although KVFP had distributed free seedlings and demonstrated how to plant to Bendera villagers according to the request made by village chairperson.

Two points were identified as possible reasons for discrepancy between Bendera villagers and KVFP staff. The first was the assumption that village chairperson did represent all villager’s needs and interests. Because it was not practical for KVFP staff to interview all or most villagers directly, KVFP expected chairperson to sum up villager’s needs and communicate it to KVFP. In reality, however, a chairperson was not a right representative of the tree-related needs and interests of villagers. Consequently many villagers could not obtain their favourite species and necessary numbers or, if they got, they could not get them at good timing.

The second assumption was that there was a common method to plant trees. However, villager’s needs were very diverse and specific, such as the establishment of windbreaks and tree lines to demarcate the borders of paddy fields. It seemed that the tree planting technique shown by KVFP did not appeal to most villagers.

3. KVFP’s Activities According to Forestry Policy

Tanzania’s new Forestry Policy aims at increasing awareness on the threat of deforestation and soil degradation and to promote people’s participation in reforestation activities. In addition, the policy emphasises to promote village forestry activities to integrate with agriculture, livestock, other land uses and rural development. Participatory approach as an

extension method is principally recommended after KVFP realised non-participatory approaches can not raise awareness that rural people themselves are the real players.

Participatory method is a two way system with active participation of the people concerned in planning, implementation, monitoring and evaluation. The needs and problems of the people are identified through continuous dialogue. Indigenous knowledge is considered as well as social, cultural and economic implications of new technologies introduced.

4. Activities According to KVFP's Objective

During follow-up phase, restructuring of KVFP's project objective on extension services was done by shifting from ministerial central government to district local government authority. The shift brought a big impact to both KVFP itself in abolishing sectionalism among working of the project staff and working in isolation with district staff, thus encouraged collaboration in planning and implementation of activities.

It was possible therefore after collaboration with other sections to utilize technical manuals (e.g. working papers No. 1-21) prepared by nursery, silviculture and extension sections when planning for extension social needs analysis. KVFP can eventually be assessed by its quality and practicability of the manuals produced by each section and disseminated to the communities in collaboration with District Forest Office Same.

In addition, KVFP in collaboration with district forest office conducted various surveys to know natural and social variables in Same district, e.g. natural vegetation, geography, village structures, social organisations, decision making mechanism among groups, gender differences, use of forests and farming systems. The information collected was used to develop appropriate tree-growing technologies and extension methodologies for communities in semi-arid and lands in Same district.

5. Achievements

Achievement of expected out put by each section after interrelation of various activities with the community, the following key areas has been achieved and implemented.

- Development of natural forest improvement and management methods based on people's participation (Joint Forest Management).
- Development and Improvement of extension methods both participatory and programme approaches.
- Adoption of people's participatory approach as practised in 6 model villages – (Masandare, Njoro, Bendera, Meserani, Mwembe and Kirinjiko chini). Also conducted Participatory Rural Appraisal (PRA) in several other villages.
- Capacity building of District Forest Office by:
 - Training to district forest extension staff
 - Training forest extension agents
 - Training school teachers on forestry knowledge
 - Provision of some facilities to district and extension staff such as, bicycles office equipment and office building.
 - Participatory training and learning workshops involving district officers in facilitation skills.
- Survey on environmental education to schools in Same district and produced project working paper No. 19
- Access of seedlings for planting and distribution
- Assistance in establishing small scale tree nurseries and provision of the technologies.

- Development of training materials and distribution to target groups.
- Conduct village study tours – (e.g. farmer to farmer extension).
- Exploitation of potential indigenous knowledge and utilized to others.
- Involvement of gender balance in development activities.
- Inter-sectional co-operation, District and other sectors on technical matters. More than 21 working papers were prepared and printed ready for use in sharing technical matters.
- Introduction of drought tolerant tree species and KVFP established various tree plots to demonstrate growing techniques under semi-arid conditions.
- Film/Video shows conducted when necessary during training workshops and when requested by villagers in providing awareness to environmental protection, especially during dry season on fire protection.

6. Recommendations

Certainly, KVFP has now clear vision of knowing what it can do for the people and what people wants from them. More so, methodologies of approach and final adaptability have triggered much concern when dealing with community matters.

In view of importance for people's development, we suggest few factors to receive out-most priority during implementation of our on-going activities.

- (i) Participatory Training and Learning should be adopted when designing workshops or seminars to be held. People have their own indigenous knowledge which facilitators don't know before making decisions for advise.
- (ii) Participatory methods needs skilled facilitators in carrying out its process. Proper training and practices should be intensified to all extension staff dealing with the communities. Facilitation skill is highly required as well as professionalism in conducting participatory methods.
- (iii) Environmental Education in schools should be included as a subject in the training syllabus for all primary schools in Tanzania. KVFP's guideline book on Environmental Education (EE) in schools for Same district should be extended to all primary schools in Tanzania mainland.

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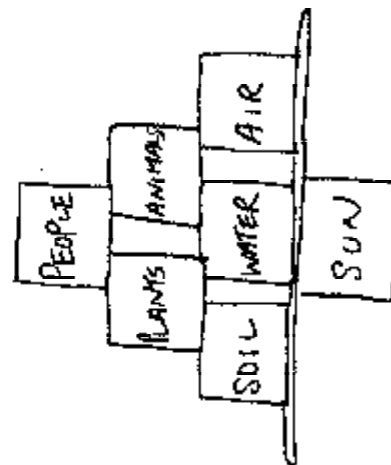
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1. BACKGROUND OF ENVIRONMENTAL EDUCATION PROGRAMME

- ◆ **Why Environmental Education in the forestry project?**
 - Because of the effectiveness of involving primary schools for the forestry activities
 - Because of their influence on the community

- ◆ **What is the policy of the Tanzanian government about it?**
 - A tendency of promoting 'Elimu ya Mazingira' (Environmental Education)
 - Some environmental messages have been included in the new curriculum.

- ◆ **What do we mean by 'environment'?**
 - 'the inter-relationships between the human and the natural elements'



2. THE SURVEY ON ENVIRONMENTAL EDUCATION PROGRAMME

Recommendations:

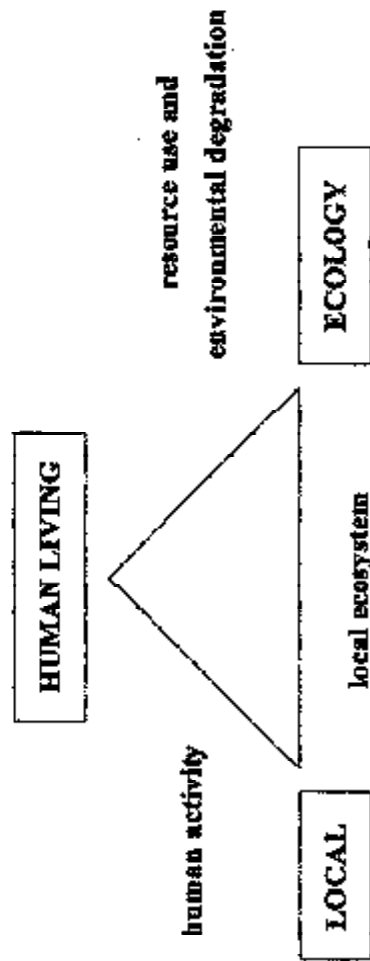
- 1) Clarification of the Concept of Environment
- 2) Contents of Environmental Education: From 'utility' to 'linkage'
- 3) Teaching Forestry Techniques
- 4) Integrating with the Existing Curriculum
- 5) Improving the Teaching Method: From 'knowledge-oriented' to 'realisation'
- 6) Teacher Training

3. ENVIRONMENTAL EDUCATION GUIDELINE

The Philosophy of Environmental Education:

- Teaching the 'inter-relationships between forests and people in their daily living in the local environment'

The principle of Environmental Education:



3.2. Putting into Practice

◆ What should be taught?

- Inter-relationships of Natural Elements
- Limitation of Natural Resources
- Interaction between the Human Activities and Environment
- Local Environment

◆ How should it be taught?

- Cross-curricular Approach
- Participatory Learning Approach
- Localism Approach

Participatory Learning Approach:

◆ How can we encourage people's spontaneity?

- Observing/experiencing → Questioning ⇒ Thinking Critically → Realising ⇒

ACTION

◆ What is the teaching method for active learning?

- Learning through experience and participation

6. Teacher's Guide for Environmental Education

The environmental topics in the science subject (Sayansi) :

- Air and Water Cycles
- Soil
- Food Chain
- Plants
- Environmental Conservation and Degradation
- Natural Resources

The environmental topics in the social studies subject (Maarifa ya Jamii) :

- Local Geography
- Local History
- Human Activity and Environment
- Local Environmental Degradation and Its Control Measures

**THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF NATURAL RESOURCES AND TOURISM
SAME DISTRICT COUNCIL**

**KVFP EXTENSION SERVICES IN RELATION
TO DISTRICT FOREST EXTENSION STRATEGIES**

Paper Presented During End of Phase Seminar

J.C. Mboya (District Forest Officer) – Same

November 1999

Kilimanjaro Village Forestry Project

1. Introduction

Traditionally forests are regarded as a gift of nature and that regardless of the extent of cutting, forests can regenerate themselves. Thus for many years now, some people still think that there is no need to plant trees and therefore the culture is to cut trees for various needs but not to grow them. It is against this background that forest extension becomes an important intervention in order to change people's attitudes and perceptions regarding natural forest utilisation and tree growing. It is expected that by understanding forestry extension services farmers would be educated and sensitised on the importance of planting trees around their home steads and within their crop fields. It is through forestry extension services that farmers and foresters can communicate and interact with each other and therefore share knowledge and experiences needed to enhance sound forestry practises.

Forest extension services at the district level are responsibility of the District forest office in the Natural Resources department. Same District Council has 14 forestry extensionists including DFO to work for the whole district having 24 wards and 78 villages in a vast area of 5152 Sq. km. Out of the 14 staff, only 4 have formal forestry training and the rest were employed on merit and received on the job training.

Currently the district is supported in its forestry extension services by 4 major donor funded development programmes which include tree planting and natural forest conservation components in their packages.

These are:-

1. KVFP- Kilimanjaro Village Forestry Project.
2. TIP - Traditional Irrigation Improvement Program
3. TCRS –Tanzania Christian Refugee Services
4. GEF/E.A. Cross border Biodiversity Project

2. Problem/short Falls the District had in Executing Community Forestry Extension Services in the Years-up to 1990s when KVFP was Started

When KVFP started its activities in the district in 1990s the district council through DFO's Office was also undertaking community forestry extension services. However the extension services rendered by the district at that time was very limited and ineffective. Factors which led to poor forestry extension services in those years before the inception of KVFP and other forestry related projects included that of:

- Few forest extension staff
- Few skilled staff to community extension techniques.
- Lack of transport facilities.
- Lack of funds

Up to 1991/1992 the districts in Tanzania mainland were getting development funds from central government for raising tree seedlings in the departmental paid labour (central) nurseries and distribute the grown up seedlings to the villages free of charge. We also advised for the establishment of school and communal village nurseries and woodlots but all were not very successful due to poor tending and lack of follow ups for technical advice

Seedling distribution to villages & advice on establishment of school & village nurseries/woodlots were the principal tasks we termed to be extension services at that time.

It has to be noted that before the launching of the village forestry program in Tanzania way back in 1975 the villagers were used to plant trees (though few) around their premises by using their indigenous knowledge, e.g. of planting cuttings, wildlings /saplings, etc.

After the start of this national tree planting campaign most villagers reduced using their indigenous knowledge of planting trees and instead kept waiting to be sent by the government free seedlings well raised in polytops by experts for planting in their areas. This system to some extent decayed the indigenous knowledge of planting trees. We had 3 departmental nurseries located in Mwembe, Kisiwani & Maore with an average production capacity of 100,000 plants per year. Owing to the big district area coupled with poor infrastructure in terms of highland roads and few central nurseries as indicated above, only few villages could be distributed with seedlings and as a result many villagers could not plant trees. Even the amount of seedlings raised were not enough to cater for the whole district community.

As a result of the above shortfalls many tree seedlings distributed and planted by the villagers died due to carelessness in handling, planting, tending operations, and unreliability of rains.

- Inadequate community extension services to the villagers.
- Failure to meet the demand of the seedlings needed by the villagers (quantity and varieties).
- Breakdown in use of some important indigenous knowledge & techniques in various forestry practices by the local community.

3: Forestry Extension Strategies for Same District

In efforts of the District (DFO) trying to achieve effective and sustainable community forestry extension services, it developed some of the following strategies/techniques, which are all in line with the National forestry policy.

These strategies are also aimed to act as guidance to forest project donors working in the district for common approach in working with the community.

3:1. Peoples Participation

To involve the respective communities in all aspects regarding development and protection of the forests (Maximum participation of the community should be sought for in planning, implementing monitoring & evaluation of various forest programmes within their areas through PRA.

3:2. Build the Sense of Self Reliance by Limiting Free Issues

Try as much as possible to make the villagers be self reliant to issues pertaining to forestry practices by limiting free issues e.g. nursery inputs or tree seedlings. To

encourage and assist in the establishment of small homestead nurseries by using locally available materials or else providing other shopped materials on sale at full price or subsidised at half the prevailing market price for some "donor supported" inputs. - (Cost sharing).

For the unaffordable enthusiastic new adopters to nursery establishment they can be supported with few pieces of polypots only in the first start:- e.g. 100 pieces to individuals and 500 pots to group nurseries. Additional needs should be bought. Also we keep on advising the community to reduce dependency on nursery raised seedlings by emphasising simple and locally adaptable techniques of tree planting- i.e. use of cuttings direct seed sowing/in-situ planting, wildlings/saplings.

3:3. Collaborative Extension Work

To emphasise and popularise the integration of forestry extension services with that of related land use departments - e.g. Agriculture and livestock, beekeeping, etc.

3:4. Building Capacity of the Forest Extension Staff who are at District, Division & Wards in Order to Realise Optimum Output from Them, i.e.

- (i) Training - Forest extension workers to be trained from time to time in order to improve skills, (PRA techniques, forestry techniques and communication skills).
- (ii) Provision of working gears and facilities.

3:5. Organised groups, Institutions and Capable Individuals to be Encouraged (where Conditions are Favourable) to Assume the Role of Producing Enough Tree Seedlings for Their Own Use as Well for Selling to Their Neighbours i.e.

- Schools are to be used fully in disseminating forestry education and knowledge through children to the villagers/ Centres for seedling production.
- To ensure that teachers and pupils acquire skills required to raising seedling in nurseries and other silvicultural and tending techniques.

3:6. Establish Local Voluntary Sub- village Forestry Extension Agents

This is to curb the problem of few district forestry extension personnel who are also not well equipped with means of transport and the vastness of the district area.

The sub-village community to meet under the chairmanship of the sub-village chairperson to propose and select 2 villagers (gender balance) who are then to be trained for several days on basic forestry for efficient facilitation of extension services to the farmers.

The villagers themselves based on the following qualifications will select these candidates: -

- (a) Permanent resident of the sub-village.
- (b) Has a remarkable interest in forest issues.
- (c) Ready to work voluntarily

The roles of these extension agents will be to give technical advice to the surrounding farmers and to act as a model farmer. It is assumed that the existence of such a key person in a sub-village community can greatly enhance villager's involvement and initiative in tree growing activities.

3:7. Making Provision for Future Local Source of Funds to Continue Extension Activities after the Termination of External Donor Funding (Issue of Project Sustainability)

The source of funds for this provision can be from the sale of nursery inputs -- e.g. Polypots, watering cans, spades etc. to be provided by forestry project donors working in the district and sold to the community at a half cost (sharing) rates. The district through DFO will be provided with these materials to act as a starting capital for future revolving fund to enable him/her continue buying and providing nursery materials for sale to the villagers after the end of the external donor funded project.

It is proposed that money accrued from the sale of these nursery materials be placed in a separate account to be known as "Forest Extension Service account" and be kept by the District Treasurer of Same District Council for normal government financial transactions & regulations.

The account will have 4 signatories authorising the withdrawal of money and it is proposed that they be: -

Group A:	DNRO - Same
	DFO - Same
Group B:	DED - Same
	DT - Same

Two signatories (one from each group) can validate the withdrawal of money from the account.

4. KVFP Extension Approaches/Activities in Relation to District Forestry Extension Strategies

Up to the midyears of project implementation phase II (1996) the approach was a top down and very extensive. Extension services were sporadically conducted in response to requests sent by individuals, groups or institutions from where ever place in the district. Main activities were that of free seedling distribution, assisting the establishment of small scale nurseries, provision of free nursery materials and technical advice and conducting publicity through-calendars, caps, T-shirts, cinema, etc.

- Project worked in isolation of the district forest and other department's extension staff.

There after mid 1996 the project made major changes in its extension approaches by shifting from top down approach (with their pre-prepared technical extension packages to the community) to that of people's participation (bottom up approach).

- Started working in collaboration with the district extension staff.
- Project working area was confined mostly to semi- arid lowlands of Same District and selected 6 model village/sub-villages to intensify participatory extension methodologies.
- Started to strengthen and improve the working capability of the district forest sector by using project resources.

The following are some of the extension activities conducted by KVFP which are in line with the formulated district forestry extension strategies mentioned above: -

- Tree seedling distribution to the community free of charge (with exception of few species- *Doryalis caffra*, *Grevillea robusta* & some fruit trees, which were sold) up to 1998 when seedling distribution was commercialised (no more free issues of seedlings or nursery inputs to individuals or groups up to now)- which is in compliance with the district forestry extension strategy.
- Provision of assistance in the establishment of small-scale nurseries (Groups, individuals & institutions).
- Training of district forestry extension staff (multi-sectoral).
- Organise and training of sub-village forestry extension agents.
- Organise and facilitate field exchange visits/study tours to various village groups.
- Provision of transport assistance to DFO (Vehicle & fuel) once per week for general Forestry activities follow up within the District since 1996 to date.
- Provision of transport facilities. 1 motorbike & 18 pedal bicycles) to district forest Extension staff to alleviate the problem of transport.
- Preparation and development of teaching materials for schools
- Provision of nursery tools and materials to the district forest office-for selling to community(individuals/groups at a reduced half price and money accrued to be banked in a forest extension services account for future continued community forestry extension activities after the end of donor funded project.
- Publicity and awareness creation:- The most important achievement by KVFP as a whole as far as the general community of Same is concerned is that of creating/building up peoples enthusiasm to tree planting. I dare say that many people in Same are now aware of the importance of forests and the need to plant trees for their lives (This was done through seedling distribution, film shows, frequent field visits/meetings/seminars/study tours etc.

- Conclusion - The above KVFP approaches/activities indicates some relationship with the previously explained district extension strategies. This happened so as a result of KVFP extension section and the district forest office started working collaboratively in the late years of project implementation (follow-up phase) and also adhering to the new National Forest Policy.

5. Future Plans

- (i) Continue advocating the establishment of homestead small-scale nurseries. House holds have proved to be appropriate levels of community intervention to issues pertaining to forestry development in semi-arid areas (where water is a limiting resource) like some parts of Same lowlands (we have now over 588 small scale nurseries with an average production of 250 plants each within the district - (the number is very dynamic keeps on & off).
- (ii) To keep on disseminating the techniques developed by KVFP to the community of Same District.
- (iii) If resources allow to continue training sub-village forestry extension agents in Same highland villages.
- (iv) To revive and emphasize the application of the indigenous knowledge/techniques of sound forest practises and management through application of PRA – e.g. Mlimbiko a traditional way of the natural forest conservation, use cutting saplings/wildlings, direct sowing of seeds instead of nursery raised seedlings.
 - It funds allow to continue raising some highly marketable tree seedlings in Mwembe central nursery for sale to people who cannot start their own nurseries and also as a source of income to the district council. This nursery will also be a source of seedlings for planting in public areas/public activities i.e. planting along the boundaries of forest reserves or communal roadside planting during officiating of arbour weeks e.t.c.

6. Conclusion

Community participation is the way forward in implementing various forestry development and management projects in the district. Such a strategy/direction requires working very close with the community which demands a lot of human and financial resources (frequent visits and follow-ups is crucial).

Certainly, as regards the issue of skills and knowledge for effective forestry extension to the community, the district is left in a capable position.

Our worry in the natural resources department of Same district council and the most expected major constraint we are likely to face in execution of our extension duties after the withdrawal of donor funds is that of UNAVAILABILITY OF FUNDS from the district council – (for operation and maintenance costs).

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Forestry and Beekeeping Division



Japan International Cooperation Agency

**DIRECT SOWING OF Cassia siamea
INDIGENOUS KNOWLEDGE OF TREE PROPAGATION**

Paper Presented During the End of Follow-up Phase

November 1999

**Mtama B. Siuhi
Silviculture Section**

Kilimanjaro Village Forestry Project

FOREWORD

Tree planting in villages, particularly in semi-arid areas is a challenging undertaking. Apart from unfriendly weather conditions more cheap and appropriate technologies are yet to be developed. Tree planting in villages has to be implemented by farmers. They are the stakeholders who have the land where trees should be planted. Though farmers understand the urgency of tree planting they are always confronted with time constraint. In semi-arid places like Same tree planting in villages usually faces a stiff competition with farming of agricultural crops. Rains are scarce and usually unreliable. Farmers have to be keen in timing the rains in order to achieve some fair harvest of the season. In Same farmers sometimes plant maize in unprepared farmland but have to do extra job during weeding.

Kilimanjaro Village Forestry Project has been working in Same district since 1991 with main objective of developing and improving afforestation techniques suitable in semi-arid areas. The project also looks into identifying and improving indigenous knowledge of tree planting. Direct seed sowing of *Cassia siamea* was identified as one of indigenous knowledge practised in Njoro village for the past many years. According to villagers, this method was cheap and was giving good results. The project decided to set an experiment to verify the validity of villagers explanations.

This report of the results shows how appropriate the technology is for village afforestation. It is a cheap technology for village afforestation. It can easily be incorporated with farming activities with little or no conflict as far as time planning is concerned.

June, 1999

Joseph M. Butuyuyu

Project Manager

Kilimanjaro Village Forestry Project.

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1. INTRODUCTION

Cassia siamea (*Senna siamea*) is a tree cultivated all over the tropics from sub-humid to semi-arid and even arid zone, altitudes 0-1,600 meters above sea level. It prefers a high water table but will tolerate extended drought and variety of soils. In Tanzania it is widely grown in drier areas below 1,000 metres above sea level. The most suitable soils are deep, fairly fertile, well drained and neutral or alkaline. Uses of *Cassia siamea* include firewood, charcoal, poles, timber (furniture), medicine, fodder (leaves), bee forage, ornamental, mulch, soil conservation and windbreak, Mbuya, et al (1994).

In Tanzania planting of *C. siamea* started during the colonial era. It was introduced for planting along roads and around administrative quarters at that time. In Tanzania there is imbalance between natural forest resources and potential demands for fuelwood energy and other forest products. The government has appealed to people for planting trees to alleviate the situation. Among the trees promoted, *C. siamea* has wide acceptance because of its versatility in addition to being one of multi-purpose trees. This species has been planted all over Tanzania. Furthermore, people have gained knowledge on its propagation as it has a relatively long history of propagation in this country.

Kilimanjaro Village Forestry (KVFP) is implementing a social forestry (Community forestry) programme in semi-arid area of Same district in Kilimanjaro region. The main objective of the project is to develop and improve reforestation technologies suitable for semi-arid areas. KVFP also looks into indigenous knowledge of natural resources management and propagation of trees. Tree propagation by direct seed sowing was identified as one of indigenous knowledge practised in Njoro village. This was not popular to many foresters and some villages in the district. It caused an interesting argument between foresters and villagers at Njoro during a session of participatory rural appraisal (PRA) conducted in the village. Whereas villagers favoured direct sowing of *C. siamea* seeds, foresters argued that planting using potted seedlings was better. A joint experiment between villagers and foresters was proposed to investigate the validity of villagers' argument. KVFP set two plots of experiments in Njoro village. One at Ishinde sub-village and the other at Njoro sub-village.

2. OBJECTIVE

The objective of the experiment was to investigate the validity of Njoro villagers argument that propagation of *C. siamea* in their area using direct sowing of seeds is better than the use of potted seedlings from nurseries.

Farmers had further pointed out that trees propagated through direct seed sowing developed strong root systems to withstand prolonged droughts than trees from potted seedlings.

3. LITERATURE SURVEY

Direct sowing in Africa has been practised in different situations over the past twenty years. D. Rocheleau et al (1988) have written the following, "Over the past twenty years, direct seeding has also been used in different many situations, sometimes with notable success."

It was first tried with tree species like *Acacia albida* in Niger near Matameye. Such an experiment was undertaken more than 25 year ago.

A tree known as Borassus is seeded by slightly burying the entire fruit and allowing it to germinate in the field. Experiments in Senegal, Chad and Sudan have indicated that *Acacia senegal* seeds can be treated and sown in hills or by broadcasting if rainfall is sufficient. The seeds are sown in seedbed in strips approximately 1 metre wide, with the soil surface lightly scarified or dug to remove some of the existing ground cover and to increase water infiltration.

This shows that field preparation and timing of rains is essential. Also for seeds which require pre-treatment to achieve better results should be pre-treated even for seeds intended for direct seeding.

In Tanzania normal practice is to line-sow *Cassia siamea* along ridges, preferably 'tied ridges' 2.5-3 metres apart, after thorough soil cultivation. The attractions of direct sowing are its cheapness. It eliminates nursery costs and all the trouble and labour of raising plants and of planting them FAO (1974).

Many literature show that for a tree species to qualify as suitable for direct seed sowing it should possess the following characteristics:

(a) Seed is plentiful and cheap;

- (b) Adequate germination under field conditions can be relied on;
- (c) The seedlings rapidly send down a deep tap root and are able to withstand adverse climatic conditions in the weeks and months after germination;
- (d) The rate of growth of seedlings from direct sowing is sufficiently fast to make a prolonged period of tending and weeding unnecessary.

Same lowland conditions are in general harsh for tree growing. However, *Cassia siamea* has almost all the pre-requisite characteristics mentioned above. It produces abundant seeds after rain season. Germination of seeds is fairly good if pre-treated by soaking in hot water overnight. It produces tap root which enables it withstand adverse climatic conditions and the tree grows fast under favourable conditions so that prolonged tending periods may not be necessary.

4. METHODOLOGY

4.1 Location

Two experimental plots were established at two places. One at Ishinde sub-village and the other one at Njoro sub-village.

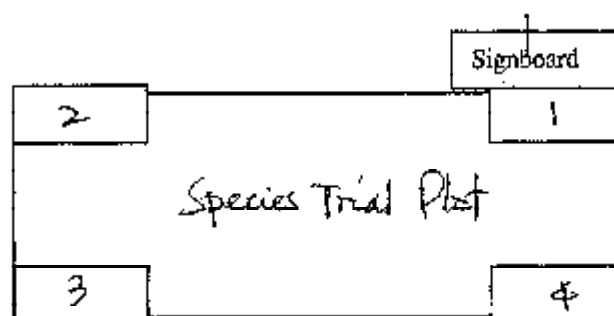
4.2 Tree species to be tested

Cassia siamea (*Senna siamea*) was the tree species to be tested at both tests plots. Seeds for test were collected from Njoro village.

4.3 Layout of Plots

The same plot layout was used at both Ishinde and Njoro plots.

Figure 1: Plot Layout



Small pots Nos. 1, 2, 3 and 4 were for direct seed sowing of *C. siamea* from Njoro provenance. The major part of the plot (special Trial Plot) was planted with potted seedlings of *C. siamea*, *Acacia tortilis*, *Azadirachta indica* and *Tamarindus indica*. Sowing/planting holes were as shown in Table 1.

Table 1: Sowing/Planting holes

Plot	Method	No. of Holes
Ishinde	Direct sowing	No. 1 - 12
		No. 2 - 12
		No. 3 - 12
		No. 4 - 12
	Total	48
Ishinde	Seedlings Planting	<i>C. Siamea</i> - 55
		<i>A. Tortilis</i> - 53
		<i>A. indica</i> - 53
		<i>T. Indica</i> - 53
	Total	212
Njoro	Direct Sowing	No. 1 - 12
		No. 2 - 12
		No. 3 - 12
		No. 4 - 12
	Total	48
Njoro	Seedlings Planting	<i>C. Siamea</i> - 53
		<i>A. Tortilis</i> - 64
		<i>A. indica</i> - 42
		<i>T. indica</i> - 53
	Total	212

4.4 Site Preparation, Planting/Sowing and Tending Techniques.

Clearing of the site was done by slashing down all weeds. All holes were dug to the size of 60cm deep and 40cm diameter. Before planting, holes were filled with soil. A small hole was made for sowing 3-4 seeds per hole. Seedlings were also planted the usual way by making a hole to cover the root portion up to root collar of seedling and firmly pressing the soil around it. Seeds were pre-treated by hot water soaking for overnight prior to planting.

Tending included weeding two times a year. Complete weeding was done on direct sowing plots and line weeding was used on the other portion of the area. Singling of seedlings was done after seed germination for direct sowing. One seedling was left per each stand. Protection of the area involved fencing off using thorny twigs and fireline weeding around the plots.

5. ANALYSIS OF DATA AND RESULTS

Assessment including survival, germination and growth was conducted. For direct seed sowing plots germination and survival assessment was done every after two weeks for the first eight months (May – December, 1997).

Growth (diameter and height) and survival assessments were conducted every after three months to all trees for two years (March '97 – April, '99). However diameter measurements were not taken from direct sowing plots during first growth assessment as were still too young. Each time measurements were taken from the same tree. Table 2 shows assessment data for both Njoro and Ishinde plots from March 1997 to April 1999.

Table 2: Assessment Data for Njoro and Ishinde Plot, March 1997 – April 1999

Plot	Potted/ Direct	Species Assessed	Mar-97			Jun-97			Jul-97			Sep-97			Dec-97				
			Aver.h(cm)	Surv.no.	Aver.d(cm)	Aver.h(cm)	Surv.no.	Aver.d(cm)	Aver.h(cm)	Surv.no.	Aver.d(cm)	Aver.h(cm)	Surv.no.	Aver.d(cm)	Aver.h(cm)	Surv.no.	Aver.d(cm)		
Ishinde	Potted	<i>Cassia siamea</i>	48.00	48.00	4.82	48.00	48.00	0.80	34.00	46.00	1.40	43.60	46.00	1.90	76.30	47.00			
			44.00	46.00	1.73	46.00	46.00	0.60	28.70	48.00	0.80	29.50	47.00	0.80	41.10	44.00			
			51.00	51.00	1.47	51.00	51.00	0.50	30.00	52.00	0.70	35.40	51.00	0.90	60.10	51.00			
			52.00	52.00	3.18	52.00	52.00	0.70	57.80	62.00	1.10	69.30	62.00	1.50	89.30	62.00			
			32.00	32.00	3.79	32.00	32.00	0.00	6.70	36.00	0.90	24.30	32.00	1.00	63.80	32.00			
Njoro	Potted	<i>Cassia siamea</i>	48.00	48.00	4.57	48.00	48.00	0.60	25.30	47.00	1.40	45.10	41.00	2.20	83.00	41.00			
			38.00	38.00	2.42	38.00	38.00	0.70	33.20	40.00	1.00	45.40	40.00	1.20	70.00	35.00			
			49.00	49.00	1.41	49.00	49.00	0.50	28.80	53.00	0.70	33.40	50.00	0.80	46.60	48.00			
			61.00	61.00	3.09	61.00	61.00	0.70	55.20	64.00	1.10	79.10	61.00	1.80	110.30	61.00			
			25.00	25.00	3.86	25.00	25.00	0.00	6.10	24.00	1.00	28.50	24.00	1.80	71.80	25.00			
Sub-total	Potted	<i>Cassia siamea</i>	48.00	48.00	4.55	48.00	48.00	0.70	29.65	39.00	1.40	44.35	37.00	2.05	79.65	38.00			
			57.00	57.00	3.83	57.00	57.00	0.00	5.90	62.00	0.90	26.40	56.00	1.70	70.30	57.00			
			46.00	46.00	5.78	46.00	46.00	0.90	45.10	41.00	2.20	83.00	41.00	1.20	70.00	35.00			
Mar-99	Direct	<i>Cassia siamea</i>	48.00	48.00	4.52	48.00	48.00	0.60	23.90	46.00	1.40	43.60	46.00	1.90	76.30	47.00			
			44.00	46.00	1.73	46.00	46.00	0.60	28.70	48.00	0.80	29.50	47.00	0.80	41.10	44.00			
			51.00	51.00	1.47	51.00	51.00	0.50	30.00	52.00	0.70	35.40	51.00	0.90	60.10	51.00			
			52.00	52.00	3.18	52.00	52.00	0.70	57.80	62.00	1.10	69.30	62.00	1.50	89.30	62.00			
			32.00	32.00	3.79	32.00	32.00	0.00	6.70	36.00	0.90	24.30	32.00	1.00	63.80	32.00			
			41.00	41.00	4.57	41.00	41.00	0.60	25.30	47.00	1.40	45.10	41.00	2.20	83.00	41.00			
			38.00	38.00	2.42	38.00	38.00	0.70	33.20	40.00	1.00	45.40	40.00	1.20	70.00	35.00			
			49.00	49.00	1.41	49.00	49.00	0.50	28.80	53.00	0.70	33.40	50.00	0.80	46.60	48.00			
			61.00	61.00	3.09	61.00	61.00	0.70	55.20	64.00	1.10	79.10	61.00	1.80	110.30	61.00			
			25.00	25.00	3.86	25.00	25.00	0.00	6.10	24.00	1.00	28.50	24.00	1.80	71.80	25.00			
			67.00	67.00	4.55	67.00	67.00	0.70	29.65	39.00	1.40	44.35	37.00	2.05	79.65	38.00			
			57.00	57.00	3.83	57.00	57.00	0.00	5.90	62.00	0.90	26.40	56.00	1.70	70.30	57.00			
			Mar-99	Direct	<i>Cassia siamea</i>	46.00	46.00	5.78	46.00	46.00	0.90	45.10	41.00	2.20	83.00	41.00	1.20	70.00	35.00
						46.00	46.00	2.17	46.00	46.00	0.90	45.40	40.00	1.00	45.40	40.00	1.20	70.00	35.00
						51.00	51.00	1.77	51.00	51.00	0.70	33.40	50.00	0.80	46.60	48.00	0.80	46.60	48.00
Apr-99	Direct	<i>Cassia siamea</i>	46.00	46.00	4.08	46.00	46.00	0.70	28.50	24.00	1.80	71.80	25.00	2.05	79.65	38.00			
			42.00	42.00	4.93	42.00	42.00	0.70	28.50	24.00	1.80	71.80	25.00	2.05	79.65	38.00			
			42.00	42.00	8.03	42.00	42.00	0.90	26.40	56.00	1.70	70.30	57.00	1.70	70.30	57.00			
Apr-99	Direct	<i>Cassia siamea</i>	46.00	46.00	2.18	46.00	46.00	0.90	45.10	41.00	2.20	83.00	41.00	1.20	70.00	35.00			
			48.00	48.00	1.58	48.00	48.00	0.90	45.40	40.00	1.00	45.40	40.00	1.20	70.00	35.00			
			48.00	48.00	3.41	48.00	48.00	0.70	33.40	50.00	0.80	46.60	48.00	0.80	46.60	48.00			
Apr-99	Direct	<i>Cassia siamea</i>	48.00	48.00	4.61	48.00	48.00	0.70	28.50	24.00	1.80	71.80	25.00	2.05	79.65	38.00			
			48.00	48.00	5.91	48.00	48.00	0.70	29.65	39.00	1.40	44.35	37.00	2.05	79.65	38.00			
			48.00	48.00	4.72	48.00	48.00	0.90	26.40	56.00	1.70	70.30	57.00	1.70	70.30	57.00			

D/F, Direct/Potted number of seedlings

S/G, Survival/Germination number of tree/seedlings

5.1 Field Survival

Table 3(a) and (b) show clearly survival of trees and percentage survival for both categories. Assessment covers a period of two years from March 1997 to April 1999.

Table 3: Survival Assessment: Njoro and Ishinde

(a) Number of trees

Plot		Mar.97	Jun.97	Jul.97	Sep.97	Dec.97	Mar.98	Jun.98	Oct.98	Dec.98	Apr.99
Ishinde	Potted	53	46	46	46	46	46	46	46	46	45
	Direct	48	36	38	32	32	32	32	32	32	32
Njoro	Potted	53	48	47	41	41	41	42	42	42	36
	Direct	48	26	24	24	25	25	25	25	25	25

(b) Percentage Survival

	Potted	100	87	87	87	87	87	87	87	87	85
Ishinde	Direct	100	75	79	67	67	67	67	67	67	67
	Potted	100	91	89	77	77	77	79	79	79	68
Njoro	Direct	100	54	50	50	52	52	52	52	52	52
	Potted	100	89	88	82	82	82	83	83	83	77
Average	Direct	100	65	65	59	60	60	60	60	60	60

Figure 2: Survival %, Ishinde Plot

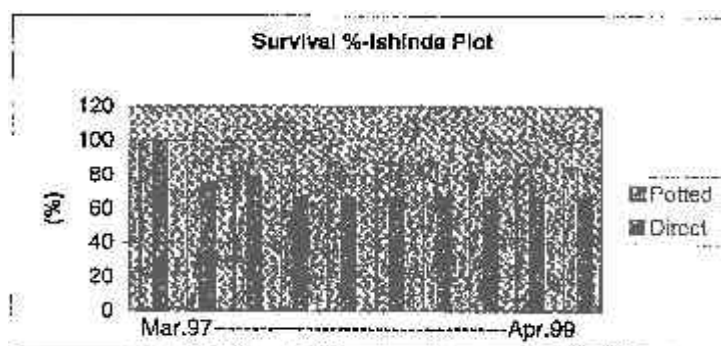
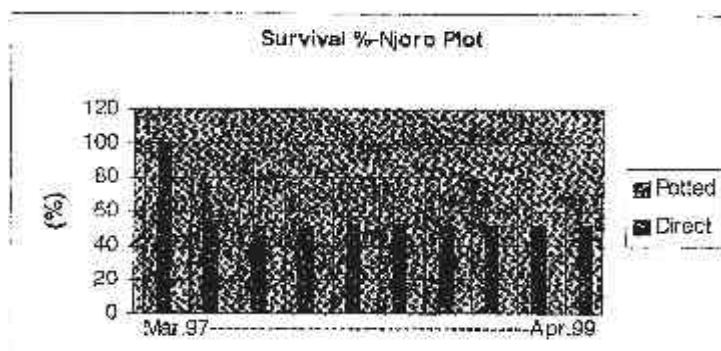
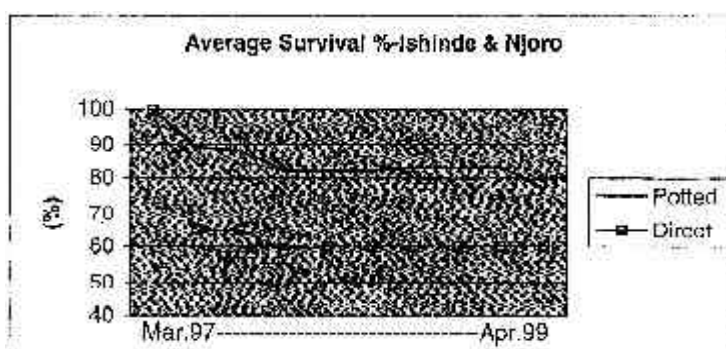


Figure 3: Survival %, Njoro Plot**Figure 4: Average Survival %, Ishinde & Njoro Plot**

At Ishinde, number of potted trees dropped from 53 to 46 between March 1997 and June 1997. It remained 46 up to December 1998 but dropped again to 45 by April 1999. For direct sown trees, 36 had germinated by June 1997. Two more germinated to give a total of 38 by July, 97. However the number dropped from 38 to 32 between July and September 97. It ~~remained~~ ^{remained} constant until last assessment of April 1999.

For Njoro, number of trees from potted seedlings dropped from 53 to 48 between March and June, 1997. It further dropped to 47 by July, 97, then to 41 the following assessment (September 97) where it remained the same until March 98. The number raised by one tree bringing the number to 42. A tree which was declared dead sprouted between March and June 98. This is possible because the period between March and June is a long rains season.

From June to December 98 the number remained 42 but changed to 36 by April 1999. For direct seed sowing, the trend is the same as that of Ishinde plot. 26 seeds germinated by June 1997. The number dropped to 25 by December 1997. Two misrecording was done in July and September 1997 where 24 were recorded instead of 25. After the first drop the number remained the same until the last assessment conducted in April 1999.

Putting survival counting into percentages, the trends are shown in figure 2 for Ishinde and figure 3 for Njoro. Trends based on total averages for both Ishinde and Njoro are shown in figure 4.

5.2 Height Growth

Table 4 shows average height growth data recorded from July 1997 to April 1999, for the two plots. Figures 5 and 6 indicate height growth trends for Ishinde and Njoro plots respectively. Figure 7 shows the general height growth trend based on total height growth of both plots.

Table 4: Average height of *Cassia siamea*(cm)-Ishinde &Njoro

Plot		Mar.-97	Jul.-97	Sep.-97	Dec.-97	Mar.-98	Jun.-98	Oct.-98	Dec.-98	Apr.-99
Ishinde	Potted	0	34	43.6	76.3	145.3	228.9	231.9	230.9	262
	Direct	0	6.7	24.3	68.8	125.8	196.4	211.3	210.2	223.6
Njoro	Potted	0	25.3	45.1	83	149.8	198	192.5	194	212.1
	Direct	0	5.1	28.5	71.8	109.7	164.1	170.9	170	184.7
Total	Potted		29.65	44.35	79.65	135.49	213.45	212.2	212.45	237.05
	Direct		5.9	26.4	70.3	117.75	180.25	191.1	190.1	204.15

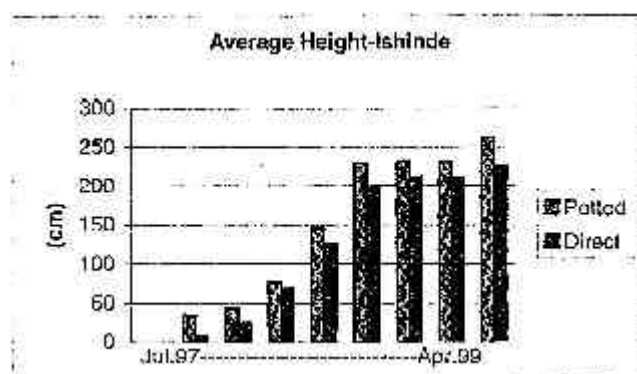
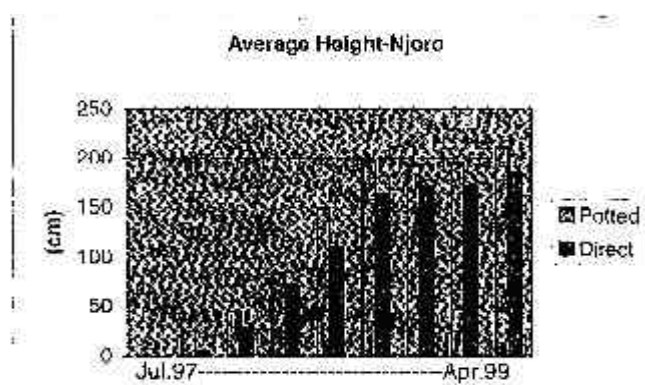
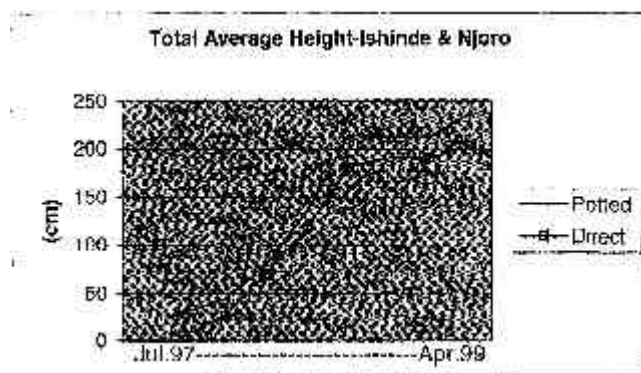
Figure 5: Height Growth, Ishinde Plot**Figure 6: Height Growth, Njoro Plot**

Figure 7: Total Average Height-Ishinde & Njoro

5.3 Girth (Diameter) Growth

Table 5 shows measurements of average diameter growth for the two plots of Ishinde and Njoro. Also total average diameter growth for both plots. Assessment started June, 97 up to April 99. Figure 8 and 9 show diameter growth for Ishinde and Njoro plots respectively. Figure 10 indicates total average diameter growth trends for potted and direct sown trees of both plots.

Table 5: Average Diameter of *Cassia Siamea*-Ishinde&Njoro

Plot		Mar.97	Jun.97	Sept.97	Dec.97	Mar.98	Jun.98	Oct.98	Dec.98	Apr.99
Ishinde	Potted	-	0.8	1.4	1.9	3	4.5	5.5	5.33	5.78
	Direct	-	-	0.8	1.6	2.8	3.8	4.62	4.75	4.93
Njoro	Potted	-	0.6	1.4	2.2	3.4	4.6	5.48	5.44	6.03
	Direct	-	-	1	1.8	3	3.9	4.48	4.63	4.51
Total	Potted	-	0.7	1.4	2	3.2	4.6	5.49	5.39	5.91
	Direct	-	-	0.9	1.7	2.9	3.9	4.55	4.69	4.72

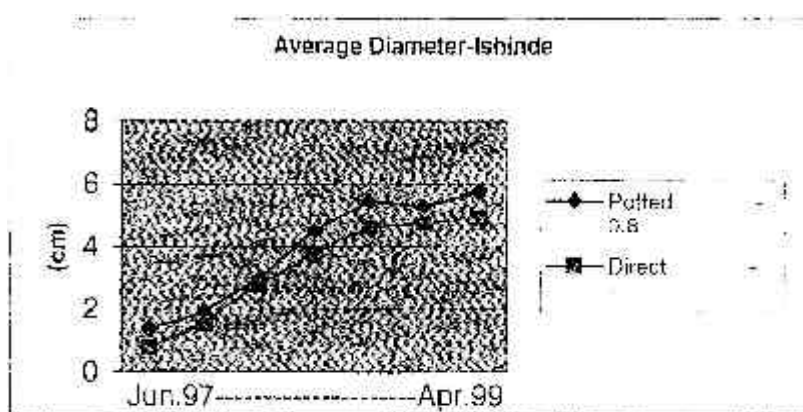
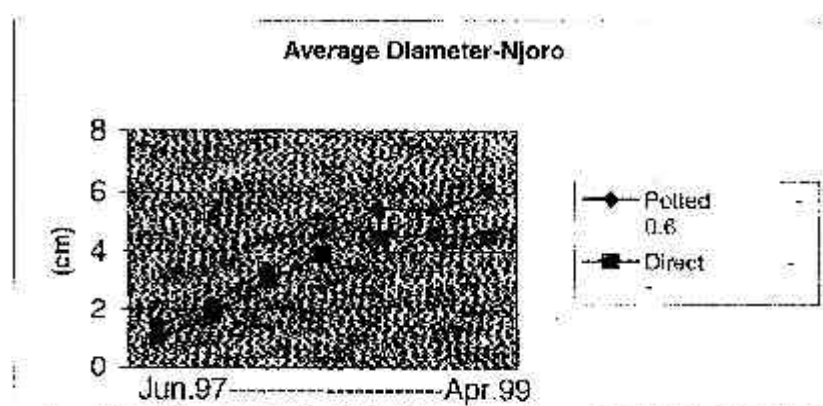
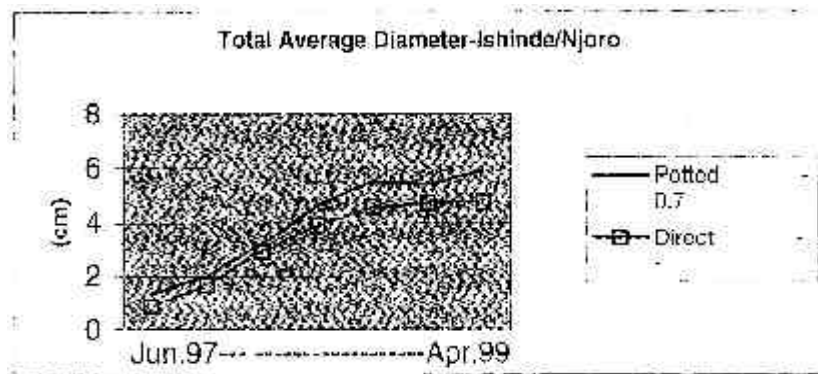
Figure 8: Diameter Growth, Ishinde plot**Figure 9: Diameter Growth - Njoro Plot**

Figure 10: Average Diameter Growth – Ishinde and Njoro

6. DISCUSSION

The discussion will be confined within the results of two years period of data collection that is from March 1997 to April 1999. Forest trials require much more time in order to come out with a real conclusive result. However, our observations that we carried out for two years may form a good basis of argument based on our objective. Discussion will involve the three parameters studied that are survival, height and diameter growth.

6.1 Survival

At Ishinde, survival of trees from potted seedlings dropped to 87% in the first year from 100%. In the second year it dropped to 85%. For trees from direct sowing, survival dropped to 67% from 100% in the first year. It has remained 67% throughout the rest of the assessment period.

At Njoro, a similar trend as that of Ishinde can be observed. Survival of trees from potted seedlings dropped to 82% from 100% in the first year. It further dropped to 77% in the second year. For trees from direct sowing, survival dropped to 52% from 100% in the first year. It has also remained the same throughout the rest of the assessment period. See figure 2 and 3.

Summing up the situations from both plots, we still observe the same trend of survival. Figure 4 depicts this trend. Average survival of trees from potted seedlings continues to drop even in the second year of assessment. On the other hand average survival of trees from

direct seed sowing remain constant into the second year of assessment after the first drop in first year.

The trend seems to support farmers argument that trees from direct seed sowing are able to develop a strong root system that enables them withstand adverse weather changes.

The average survival of 60% from trees for direct seed sowing is one of the best achievements for semi-arid areas. Similar experiments carried out in areas with relatively good rainfall have recorded achievements as low as 1-10% e.g. Dalmacio and Banrigan (1976) only achieved 4.2% with *Pinus kesiya* J. Evans. (1982). However, Rimando and Dalmacio (1978) achieved 75% survival with direct sowing of *Leucaena leucocephala* J. Evans. (1982).

6.2 Average Height Growth

Looking at figure 7 which shows an analytical trend for total average height growth for both plots, trees from both potted and direct seed sowing grow vigorously during rain period. There is little or no growth increments during dry period (July – December). However, a height ^{difference} ~~defence~~ between trees from potted and direct seed sowing is maintained throughout growth period of the first two years. At the time of sowing the seeds, potted seedlings had already attained a certain height. The trees from direct sowing within the first two year cannot cover up this difference in height.

6.3 Average Diameter Growth

Figure 10 shows the total average girth growth of trees from both plots. The trend is like that of height growth. During rain season, notable increase in diameter can be observed (September to October 1998). The sketch (graph) line becomes more or less horizontal. Again, the graph starts to rise between January and April, 1999 because this period enters a rain season.

A notable diameter difference is again seen between trees from potted seedlings and those from direct seed sowing. Just like in height growth comparison (see 6.2). The same reasoning can also be applied here (same as in chapter 6.2 above). Potted seedlings had already attained a certain level in diameter at the time of planting in the field whereas those from seed sowing started growing in diameter after germination. Given that all trees were subjected to similar

conditions and periods of weather it was not possible for those from seed sowing to close this gap in the first few years of growth. This can be possible when all trees approach maturity age.

7. PRACTICAL SIGNIFICANCE

From the results and discussion above (chapters 4 & 5), several practical observations can be noted. Here three factors can obviously be identified.

(i) Field Survival

Trees from direct seed sowing have revealed to have less percentage of field survival compared to trees from potted seedlings, 60% and 77% respectively. However, for village afforestation especially in semi-arid areas, 60% field survival is acceptable. So direct seed sowing can be recommended for community forestry practices. We have seen earlier that the method eliminates other costs such as nursery plantings and transportation.

(ii) Equal Growth Increments

Height and diameter increments seems to be the same at any given favourable season for both trees from direct seed sowing and potted seedlings. This has been revealed in graphs of height and girth growth (figures 7 and 10). A constant difference is maintained in both growth increments, which is attributed by the difference at planting or sowing time. Whereas potted seedlings are planted after attaining certain height and diameter levels, direct seed sowing start with absolute zero values. Possibly this gap can be covered when trees approach maturity.

(iii) Tolerance to Adverse Weather Conditions

Another factor with practical significance is the level of tolerance to adverse weather conditions depicted by both tree types. Trees from direct seed sowing have depicted high level of drought tolerance than those from potted seedlings. This is shown in graph of field survival. In the first drought season survival percentage of trees from direct seed sowing dropped from 100% to 60%. It remained the same for the rest of the period of assessment. Those from potted seedlings, survival percentage dropped from 100% in first dry season to 83%, it further dropped 77% in second dry season. This fact is even revealed in individual test plots (see figures 2 and 3).

8. CONCLUSION

The aim of this experiment was to find out if direct seed sowing of *Cassia siamea* is better than planting potted seedlings in Njoro village as claimed by farmers. Also to verify that trees from direct seed sowing can withstand drought much better than trees from potted seedlings.

From our findings, direct seed sowing of *Cassia siamea* in Njoro gives good results nearly equal to planting potted seedlings. However, it appears to be true that trees from direct seed sowing can tolerate drought conditions much more than those of potted seedlings. Now, considering costs of nursery operations, planting and sometimes transportation, direct seed sowing stands a better chance to be chosen by farmers.

Furthermore, trees from direct seed sowing can withstand drought conditions better than those from potted seedlings. We can therefore conclude that direct seed sowing of *C. siamea* is a better method of forest establishment compared to potted seedlings. This is so because of the following facts;

- (i) It eliminates costs of nursery, planting and transportation of seedlings.
- (ii) Farmers can sow tree seeds simultaneously with agricultural crops, thus eliminating time constraint in planning tree-planting activity.
- (iii) Field survival achievement is better.

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