Promotion of Tree-based Alternative Livelihoods while Conserving the Environment and Rehabilitating Degraded ASAL Ecosystems in Kenya

Annual Report

July 2009 - June 2010

KENYA FORESTRY RESEARCH INSTITUTE
KEFRI

PARTICIPATION, COLLABORATION AND PARTNERSHIPS
NALEP
GOVERNMENT OF KENYA AND STAKEHOLDERS

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Contents

List Acronyms and Abbreviations

AGFOR	*Agriculture and Forestry*
ALRMP	*Arid lands Resources Management Project*
AOP	*Acacia Operation Project*
ASALs	*Arid and Semi Arid Lands*
ATC	*Agricultural Training Center*
CBO	*Community Based Organization*
DAEO	*District Agricultural Extension Officer*
DAO	*District Agricultural Officer*
DELDO	*District Environmental & Lands Development Officer*
DLPO	*District Livestock Production Officer*
DVD	*Digital Visual Disk*
ENNDA	*Ewaso-Ng'iro North Development Authority*
FAO	*Food and Agricultural Organization*
FGD	*Focused Group Discussions*
GOK	*Government of Kenya*
K24	*Kenya 24 Hours Television Network*
KBC	*Kenya Broadcasting Cooperation*
KEFRI	*Kenya Forestry Research Institute*
KFS	*Kenya Forest Service*
KPLC	*Kenya Power and Lighting Company*
MOA	*Ministry of Agriculture*
MOA-AES	*Ministry of Agriculture – Agricultural Extension Service*
MOLD	*Ministry of Livestock Development*
MOU	*Memorandum of Understanding*
MOWI	*Ministry of Water and Irrigation*
NALEP	*National Agricultural and Livestock Extension Programme*
NGARA	*Network for Natural Gums and Resins in Africa*
NGOs	*Non-Governmental Organizations*
NTFPs	*Non-Timber Forest Products*
TOTs	*Trainer of Trainers*
WFP	*World Food Programme*

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Executive Summary

KEFRI and NALEP initiated research and development partnership in 2008 which was operationalized by signing an MoU in June 2009. Following this development, a work plan and budget was jointly developed and approved by NALEP. Whereas KEFRI and NALEP appreciated the existing wide scope for collaboration, both parties agreed to initially focus attention in the promotion of tree and allied natural resources-based technologies and innovations with significant potential for the promotion of alternative livelihoods and environmental conservation in the drylands of Kenya. This is being realized by demonstrating, adapting and up-scaling some of the successful technologies and innovations developed by KEFRI and partners. As part of this effort, KEFRI with the support of NALEP established pilot demonstration and technology validation plots in Kibwezi, Garbatula, Isiolo, Kajiado and Baringo Districts which are currently in progress. Significant progress has been realized in the last one year in which 15 demonstration plots in 5 districts, totaling about 98.6 ha, have been identified, ploughed and about 86 ha planted with high value trees, pasture and food crops. Out of this 40 ha were established between January-June 2010. Monitoring and assessment of the plots is on-going. Despite the harsh weather conditions and interference from domestic animals in some of the pilot sites good results have been achieved in a number of sites. A mean grain yield of 1937.5 $Kgha^{-1}$ for plants within the micro-catchments and 1187.5 $Kgha^{-1}$ for plants in between micro-catchments was realized in Kibwezi. The grain yields were observed to be higher in pilot plots ploughed than other parts of the farm.

To enhance the capacities of collaborating partners/stakeholders in this process, a series of technology & innovation-based training sessions were conducted including 4 field days. The training activities of the project have subsequently been mainstreamed in the project by developing tailor made curriculum which has been used to train 58 TOTS from 30 ASAL Districts on tree-based production, processing and marketing of wood and non wood products. A number of emerging issues which are critical for the success of the training activities have been identified and Documented in the training report which has been circulated. The overwhelming success of the TOT training programme activities has provided the impetus to develop project proposals on community trainings for consideration for future funding by NALEP and other potential supporters.

Some of these TOTs have been used in conducting trainings and the field days for the local communities and stakeholders. A total of 915 people (114 at Garbatula, 275 in Isiolo and 526 in Kibwezi) attended these field days where technologies and innovations for production and processing of key ASAL products were demonstrated. A total of 45 participants, consisting mainly of group leaders from local non-governmental organizations (NGOs), and community-Based Organizations (CBOs) were also trained on the management and utilization of Prosopis in Garbatula District.

In order to enhance networking and linking of Aloe producers to markets one workshop was held in Baringo attended by 23 producers and 3 representatives from 3 industries (Desert Edge Company- Laikipia, Bemah Industries-Nairobi, Husein & Sons Ltd-Maralal). Similarly, Jatropha producers in Kibwezi District were also networked and linked to KENSOL during a field day at Kibwezi. To enhance marketing of ASAL products, an evaluation of the role of incentives /motivational factors for rural entrepreneurs was carried out in Marigat (Baringo), Narok and Makueni districts with a focus on three commodities: Aloe, charcoal and honey. It was observed that provision of incentives for local communities to initiate entrepreneurship of NTFPs is influenced by level of abundance of raw materials, transaction costs and prices for the products. The market demand for NTFPs, on the other hand, is influenced by distance to the major market centres and prices for products. Thus, it is imperative that strategies to enhance accessibility of

local communities to sources of raw materials for NTFPs and outlets with better product prices offered for products are instituted to motivate them into commercial exploitation of these resources for food security and enhanced rural welfare

In response to provide solutions to sustainable management of Prosopis, a study was initiated in Garbatula District to assess the status and distribution of *Prosopis juliflora* in the District and a technical report produced. Prosopis was found to occur in pockets of tree densities ranging from 10 trees/ha to 300 trees/ha. Small or isolated Prosopis trees were also found at local centers - although the Prosopis populations were generally low at these centers implying early stages of invasion hence management interventions should be introduced before the situation gets out of hand.

The project also examined the implications of effective dissemination of relevant information. To this end, a review and analysis of KEFRI's dryland information products and the production of a documentary on the various tree based ASAL technologies was undertaken during the study in which useful information have been generated to share with various stakeholders. The review also highlighted the information and knowledge gaps in ASALs. Finally, the project has documented relevant information by publishing and distributing technical reports, brochures, leaflets, guidelines and documentaries which draw the following conclusions:

- *Melia volkensii*, *Jatropha curcas*, *Aloes*, Prosopis products, grafted mangoes and gums and resins are some of the avenues for increasing household incomes in ASALs. Increased accessibility to NTFP raw materials and better prices offered for products would motivate local community into entrepreneurship.
- TOTs are useful resource persons in training of local communities.
- It is demonstrated that de\graded sites can rehabilitated by agricultural crops or pasture crops intercropped with high value trees using mechanized water harvesting system.
- Demonstrations during field days are effective information pathways and may lead to positive attitude change and perception as exemplified in the case Prosopis in Garbatula District.
- The project has documented relevant information by publishing and distributing technical reports, brochures, leaflets, guidelines and documentaries than can provide useful knowledge and skills to improve livelihoods of the local communities.

Based on lessons learnt from the project, it is recommended that the following should be addressed and supported in subsequent implementation of activities:

- Technology demonstration and validation while developing strategies for commercialization and up-scaling of validated technologies in collaboration with other partners.
- Monitoring and maintenance of promising established pilot sites
- Studies on marketing information, intelligence and surveillance on products, sources, prices, markets, supply, demand, and quality.
- Capacity building of local communities and key actors through relevant training programmes, provision of basic facilities for value addition and exchange visits locally and across the borders.
- Increase access to information by the service providers and beneficiaries through wider dissemination of existing information and production of additional relevant information products.

1. Background

KEFRI through its drylands research programme and the Network for Natural Gums and Resins in Africa (NGARA) is implementing various activities in the drylands of Kenya that are focusing on promotion of alternative livelihoods in mitigating rural poverty and environmental degradation. To enhance uptake and scaling up of some of the successful technologies and innovations (which have significant potential for the promotion of alternative livelihoods and environmental conservation in the drylands of Kenya), KEFRI initiated discussions with the National Agriculture and Livestock Extension Programme (NALEP) for collaboration. During the consultations, it became apparent that NALEP is supporting extension related activities on alternative livelihoods in the drylands. The complementary activities of KEFRI and NALEP in ASALs thus opened a window for collaboration between KEFRI and NALEP. A workshop supported by NALEP was held in KEFRI Kitui in August 2008 and a joint work plan for KEFRI-NALEP-NGARA and a draft MOU were developed. However, no activities were carried out in 2008. In 2009, the issue on collaboration with NALEP was revisited and a number of meetings held to kick-start activities. An MOU was finalized, signed and a work plan with a budget ceiling of KShs10,000,000 developed and approved by NALEP. An initial payment of KShs 5,000,000 was released by NALEP in September, 2009 to start off the initiative and the second tranche released in February 2009.

The proposed activities were guided by the expectation that effective participatory demonstration and capacity building of the local communities and farmers would enhance uptake and promotion of alternative livelihoods and environmental conservation in the drylands. Some of the key technologies and innovations which were proposed included domestication of high value trees, capacity building (on production, processing, primary quality control, marketing of wood and non timber dryland resources), product development, market support, information and knowledge sharing, rehabilitation of degraded lands, control and management of regeneration and spread of *Prosopis juliflora and* policy and awareness creation, among others.

Following the successful implementation of ''get-started" activities from July 2009, a progress report covering the project activities in the period July-December 2009 was prepared, submitted to NALEP and a discussion on the activities held in January 2010. This report is therefore a follow up of the initial and subsequent activities covering one year (July 2009-June 2010), being the period of he first year of KEFRI-NALEP partnership.

As already articulated above, the main objective of the project was to promote alternative livelihoods while ensuring environmental conservation and rehabilitation of degraded ecosystems in Kenyan ASALS.

1.1 Specific Objectives

The specific objectives of the project were:

1. To identify and document relevant technology, innovations and knowledge gaps in natural resource management in ASAL areas.
2. To demonstrate how to increase household incomes from production and marketing of wood and non-timber products in ASALS.
3. To build the capacity of farmers, pastoralists and extension service providers in the ASALS on production, processing, primary quality control, marketing of wood and non timber dry land resources.
4. To demonstrate rehabilitation of degraded areas in ASALs using high value trees, fodder and browse species.
5. To demonstrate control and management of regeneration and spread of Prosopis juliflora in selected project areas.
6. To inform policy making process through information and technology generation on sustainable resource management and utilization in ASAL areas.

1.2 Expected outputs

Output 1: Technology, innovations and knowledge gaps in Kenyan drylands identified and documented;

Output 2: Production of gums, resins, Prosopis charcoal, indigenous fruits and high value trees demonstrated;

Output 3: Processing and marketing of wood and non timber dry land products promoted;

Output 4: Extension service providers from 30 ASAL Districts trained as TOTs on production, processing and marketing (''value chain'') of wood and non timber dryland resources and other relevant technologies for ASALS;

Output 5: At least 200 beneficiaries trained on wood and non timber dryland products-(production, processing, primary quality control and marketing) and other relevant technologies;

Output 6: At least 100 ha of land from 4 Districts to establish demonstration plots with either high value trees such as *Melia volkensii* or improved fruit trees and fodder crops and /or pastures;

Output 7: Regeneration and spread of *Prosopis juliflora* in selected project areas managed;

Output 8: Policy brief on at least 2 dry land commodities produced and disseminated;

Output 9: Relevant information generated, packaged and shared amongst the stakeholders.

1.3 Brief Description of Pilot project Districts

1.3.1 Upper Eastern-Garbatula and Isiolo Districts

Isiolo is one of the thirteen Districts in Eastern Province. The District covers an approximate area of

25,605 Km^2. The District was recently sub-divided into Isiolo and Garbatula Disticts. Most of the District is a flat, low lying plain. The plain rises gradually from an altitude of about 200m above sea level at Lorian Swamp (Habaswein) in the northern part to about 300m above sea level at Merti Plateau. The District is hot and dry for most of the year. It has two rainfall seasons; the short rains, coming in October and November, and the long rains which fall between March and May. The rainfall received in the District is scarce and unreliable. The District is basically arid with an average annual rainfall of 580.2 mm). The wettest months are November (during the short rains} with an average of 143 mm and April with an average of 149 mm during long rains. Since rainfall is erratic and unreliable, it cannot support perennial agricultural crops.

High temperatures are recorded in the District throughout the year, but there are slight variations in some places due to differences in altitude. The mean annual temperature for Isiolo station, at an altitude of 1,104m above sea level is 26.6^0 C while in Merti which is 300m above sea level it is 27 ^{0}C.

Most parts of the District records about nine hours of sunshine per day and therefore the rate of evaporation is high. Monsoon winds blow across the District throughout the year and attain their peak during the months of July to August. They sweep away all the moisture and evaporation is high hence reduced humidity in the District.

1.3.2 Lower Eastern-Kibwezi District

Kibwezi District is situated in the Southern Rangelands of in the Eastern province of Kenya. It has a population of 80,236. It forms part of Kenya's drylands and has difficult environments prone to vagaries of nature. Livelihood options are limiting and crop production is risky making food insecurity and poverty rampant. The community living in the project sites are Kamba speaking and their main economic activities are livestock production and subsistence farming. The mode of farming is by use of oxen drawn ploughs, tractor drawn disc ploughs and hand made planting hoes.

Rainwater harvesting through tied ridges and open ridges are some of the methods that have been practiced in the area to mitigate dry spells. Kibwezi has an annual rainfall of 560 mm.

1.3.3 North Eastern-Garissa District

Garissa District is located in North Eastern Province and covers an area of 34,389.7 km^2. The District1 is generally flat with altitude range of between 70 and 400 meters above sea level. The vegetation ranges from shrub land to thorny thickets. The District's population is 517,789 persons (inclusive of about 189,000 refugees). The larger Garissa is currently administered under three Districts namely Garissa, Lagdera and Fafi with a total of 12 divisions. Garissa is classified as arid with temperatures ranging between 33^{o}C and 42^o C. It receives bimodal rainfall with annual average of between 250-300mm and is dominated by five livelihood zones.

1.3.4 Rift Valley

Kajiado District

Kajiado is one of the arid and semi Districts that form Rift Valley Province of Kenya. It occupies about 21,902.9 Km^2 with a population of 464,883. The landscape consists of plains plus some volcanic hills and valleys. The region is very dry with no continually flowing rivers and is officially designated as semi-arid.

There are two wet seasons, the 'short rains' between October and December and the 'long rains' between March and May. Rainfall is estimated at between 500 mm and 1250mm. However rains have failed for the last five consecutive seasons bringing about one of the worst droughts in the resent history. The average distance to water sources is 15kms and increasing as some of the water pans and boreholes dry up.

Due to lack of resources, alternative economic activities, gainful employment charcoal burning has increased many folds in the District. In addition the new highway under construction and a sharp increase in demand for charcoal in Nairobi and other urban centres (after neighbouring Narok District banned charcoal burning) has fuelled the destruction of the environment to unprecedented levels.

Baringo District

Baringo District is an administrative District in the Rift Valley Province of Kenya. The District has a population of 264,978 (1999 census) and an area of 8,646 km². Baringo District is one of Kenya's semi-arid Districts that is experiencing severe land degradation, primarily due to over grazing of communal rangelands. Approximately 70% of Baringo District is semi-arid, unproductive lowland, subject to increasing soil erosion and the loss of vegetative cover. Land reclamation is therefore crucial to reduce the vulnerability of populations and improve their livelihoods.

1.4 Key collaborators

The project emphasizes collaboration as a basis of promoting collective action and synergy among principal actors. To this end, the following organizations constitute the key stakeholders /partners in the implementation of activities:

1. NALEP programmes at the District and provincial levels
2. Arid Lands Resources Management Project (ALRMP)
3. World Food Programme
4. ENNDA
5. FAO
6. KFS
7. MOA-AES
8. Farmers
9. Producer Associations
10. NGOs/Civil Society Organizations, CBOs
11. Among others

2. Achievements

The main achievements during the reporting period (July -June 2010) are summarized under each of the expected outputs:

Output 1: Technology, innovations and knowledge gaps in Kenyan drylands identified and documented

In order to adequately address these key output additional funds were provided by NALEP. Two Service Providers - Consulting Firms (ADDSKILL Communications Ltd. and AGFOR Technical Services) were engaged and supervised by KEFRI to carry out the tasks. The two activities carried out by the Consultants were: A review and analysis of KEFRI's and other Partners dryland information products and production of a documentary on the various tree-based ASAL technologies. One DVD documentary was produced and shown on KBC and K24 televisions (each 3 series on a weekly basis). In addition, 4 newspaper articles were published in the Daily Nation and the Standard newspapers.

A review and analysis of KEFRI's dryland information products

The review was done through focused group discussions (FGD) with researchers, MOA, MOLD & KFS staff, farmers and other service providers. Site visits were made to each of the Districts of Baringo, Kibwezi, Kitui and Isiolo in order to familiarize with the promising technologies as well as validate some of the research findings, methodologies and findings with the beneficiaries and other stakeholders.

This was followed by an appraisal of KEFRIs dissemination pathways such as open days, shows and field days.

Best Practices developed by KEFRI in the ASALs

The key technologies developed by KEFRI for the ASALs with the potential for up scaling were reviewed based on the main achievements, constraints and relevance. The following technologies supported by publications have the potential to improve the livelihoods of communities living in the ASALs;

- Aloe Propagation, Processing and Value addition
- Propagation, management and utilization of bamboo
- Processing and value addition of baobab
- Socio economic importance of doulm palm
- Promotion of promising biofuels technologies
- Improved charcoal production
- Production, quality control and marketing of gum and gum Resins
- Promotion, Utilization and Marketing of high value indigenous fruit trees
- Promotion and utilization of Prosopis species

- Promotion of high value dryland timber species
- Water Harvesting Technologies in the ASALs and
- Promotion of Dyes and Tannins

KEFRIs Dissemination Pathways

KEFRIs dissemination pathways were reviewed and recommendations given to enhance wider impact. Currently, the pathways used for KEFRI's dissemination include;

- Production and dissemination of various information products
- On farm and on station demonstration plots e.g. TIVA experimental forest site
- Field and open days including agricultural shows
- Farmer to farmer Linkages including farmer field schools, exchange visits
- Training and capacity Building through both tailor made and demand driven courses
- Coverage of topical issues and Progrmmes in the print and electronic media

In order to maximize the impact for KEFRIs research and technology(ies) developed, further promote uptake, utilization and scaling up of available knowledge, the institute should consider developing a Knowledge management and dissemination policy, strategy and action plan. This will assist in promoting structured transfer of existing research knowledge and experience to farmers, policy makers, researchers, and entrepreneurs and extension agents.

The review identified the following challenges in scaling up technologies for use at the grassroots;

- Inadequate access to information on technologies in ready to use formats
- Provision of readily available support in financing and commercialization of innovations
- Inadequate resources for fabrication and replication of equipment for greater adaption and adoption
- Weak research and extension linkage
- Lack of sustainability in initiated projects and activities
- Disjointed value chain activities

Some of the products ready for publication for use by beneficiaries include:

- Status of bamboo resources development in Kenya (20 copies per District)
- Guidelines for growing bamboo(1,000 copies per District)
- Commercial timber resources of Kenya (10 per District)

Publications ready for mass production with minor editorial amendments

The following require publication after minor editing:

- Distribution ,conservation and utilization of the Baobab tree (20 copies per District)
- Doulm Palm on farm propagation and management (20 copies per District)
- *Jatropha curcas.*The untapped potential (20 copies per District)
- Gum arabic leaflets (10,000 copies)
- Myrrh leaflets *(10,000 copies)*
- *Tamarindus indica: Propagation* and marketing guide
- Frankincense leaflets *(10,000 copies)*
- Hagar leaflets *(10,000 copies*
- Commercial Plant Gums and Gum Resins in Kenya: Sources of alternative livelihood and Economic

development in the drylands (20 copies per District)

- Review and synthesis on the state of knowledge of Boswellia species and commercialization of Frankincense in the drylands of East Africa (20 copies per District)
- Gums and resins community training curriculum (20 copies per District)
- Gums and resins TOT curriculum (20 copies per District)
- Distribution and Utilization of *Berchemia discolor* in the Dryland of Kenya (20 copies per District)
- *Screrocarya birrea:* Propagation management, establishment and management (10,000 leaflets)

- *Screrocarya birrea:* The under utilized resource propagation, management and utilization (20 copies per District)
- Propagation, establishment and management of *Melia volkensii (*10,000 copies*)*
- *Melia Volkensii:* Creating wealth to smallholder farmers in arid and semi-arid areas of Kenya (10,000 copies)

Emerging Issues and Gaps in Technology development – utilization/uptake continuum

- Inadequate access and financing of promising technologies
- There is lack of capacity and resources to fabricate and replicate equipment required to scale up technologies e.g. drum and casamance kilns, demonstration equipment for processing herbals, fruit juices and aloes
- Poor feedback between research, extension and beneficiaries iinaccessibility to high premium markets due to lack of standards and effective marketing strategies
- Lack of a framework and capacity to commercialize tested and validated innovations
- Poor infrastructure in the ASALs
- There is no inventory of community resource persons and innovative extension officers leading to poor management of knowledge and information.

Output 2: Production of gums, resins, Prosopis charcoal, indigenous fruits and high value trees demonstrated;

Production and processing of Melia volkensii, Jatropha curcas, Aloes, Prosopis products and gums and resins were demonstrated during four field days held at Kibwezi (2), Garbatula (1) and Isiolo (1) Districts. A total of 915 people (114 at Garbatula, 275 in Isiolo and 526 in Kibwezi) attended these field days as shown in **Table 1**, *below. Full reports on the field days have been prepared for knowledge and information sharing.*

Table 1: Summary of Field days activities

Venue	Stakeholders	Number of participants
Garbatula	*MOA, NALEP, KFS, MOLD, Local Community*	*114*
Isiolo	*NALEP,ENNDA, KFS, MOA, Local community, Students, Government Officers, Business men, Gum traders & collectors*	*275*
Kibwezi	*NGOs, Students, Government officers, Farmers, Local community*	*526*

The main objective of the field days was to enhance the transfer of some of the Kenya Forestry Research Institute's (KEFRIs) and Partners best-bet technologies developed in the drylands through displays and demonstrations to various stakeholders and local communities. Some of the displays are shown in **plates 1 to 3**. The field days in Isiolo and Kibwezi were presided over by the respective District commissioners while in Garbatula, the DAO was the chief guest. The participants were impressed by the activities and technologies displayed and demonstrated during the field days and were challenged to pick up some of the technologies. In Garbatula for example, there were about 20 community members who had started being involved in gums and resins trade one month following the demonstrations. The attitude of the community living in this area on Prosopis was also positively changed.

Plate 1: District Commissioner, Kibwezi, graces Field day at Kituku's farm

Plate 2: Field day displays at Isiolo

Plate 3: Field day at Garbatula

Impact of tree farming in the life of Mr. Kituku-one of the KEFRI famers on whose plot the Kibwezi field day was held

Mr. Jonathan Kituku, a farmer and a resident in Nyayo village of Kibwezi District attracted a presidential award (a medal) in 2009 for having excelled in Melia volkensii (local name - Mukau) tree planting in the dry lands. Kituku, a former employee with Kenya Power & Lighting Company (KPLC) resigned from work in the year 2000 to do tree farming/ planting. He now has 11 hactares of land planted with 12,000 Mukau trees. However, Kituku tried planting trees for three years without success until he met Kenya Forestry Research Institute (KEFRI) who trained him and he is now an expert in tree growing and especially Mukau tree species as he testifies. He has been able to train about forty six farmers, out of whom 36 (78.3 %) have planted Mukau in their farms. He also gets contracts to plant Mukau seedlings for his neighbors and quite a number of these farmers have taken up tree planting as an income generating enterprise.

Plate 4: Mr. Kituku's Melia farm *and* **Mango plot**

He has also ventured in mango growing since 2007 and now has 1400 mango trees (800 seedlings donated by KEFRI and 400 bought by him). He obtained an income of KShs 28,600 from the sale of the mangoes in 2009 and he is optimistic for a better harvest in 2010 (about five times more).

Output 3: Processing and marketing of wood and non timber dry land products promoted

Processing of on farm timber

On farm processing of *Melia volkensii* and *Prosopis juliflora* timber were demonstrated during the three field days.

Plate 5: Processing of Melia volkensii

Plate 6: Processing of Prosopis julifloria

Marketing of Non-timber Forest Products from the ASALs

*One study on the effects incentives/ motivational factors for rural entrepreneurs (***A case of Non Timber Forest Products (NTFPs) enterprises in the drylands of Kenya)** *was carried out in Marigat (Baringo), Narok and Makueni Districts with a focus on three commodities: Aloe, charcoal and honey.*

This study was motivated by the failure by local communities in the drylands to adopt and adapt new innovations, technologies and high value products in the non-timber forest products (NTFPs) for business. The level of entrepreneurship in the NTFPs sub-sector is low despite existence of opportunities in form of high value products and favourable policy environment. The low uptake of the NTFPs enterprises and their poor performance raises the investigative question, "What shapes aspirations of rural communities in drylands toward entrepreneurship?" To investigate this question, the study was conducted in sample units selected from three drylands Districts of Makueni, Marigat (Baringo) and Narok using multi-stage stratified purposive sampling procedures.

The three Districts were characterized with high ecological activities including commercial exploitation of NTFPs forming the reason for their choice. In total 34 extractors/processors and 44 traders of NTFPs were selected purposely for the interviews using a semi-structured questionnaire. It was observed that motivation/ incentives package for entrepreneurship in the NTFPs sub-sector is influenced by level of abundance of raw materials for NTFPs and prices for the products. The market supply for the NTFPs products was influenced by the price offered, labour costs and availability of raw materials. The market demand for NTFPs was influenced by distance to the major urban centres and prices for products but at ten percent significant levels.

It was thus concluded that increased accessibility to raw materials especially by increasing local community's accessibility to sources of raw materials for NTFPs and better prices offered for products would motivate them into entrepreneurship in the sub-sectors. This would motivate them into increased production thus increasing their market supply volumes. Some of the pictures taken during the study are shown in **plates 7 to 12**.

Plate 7: Interview session with some of the members of Kapkuikui (Honey)

Plate 8: Kamasaiwa women self help group members during the interview session in their Aloe field

Plate 7: Interview session with some of the members of Kapkuikui (Honey)

Plate 10: Bee hives, equipment for honey production and Products made by Kapkuikui group (Honey, Jelly and candles)

Plate 11: Aloe and Aloe products: Kamasaiwa women self-help group



Plate 12: Tree Species for charcoal production and charcoal in wholesale and retail markets

Linking of producers to markets

A one day workshop was held in Baringo in June to link Aloe producers to the markets. A total of 23 producers and 3 representatives from 3 industries (Desert Edge Company- Laikipia, Bemah Industries-Nairobi, Husein & Sons Ltd-Maralal) attended the workshop.

Overview/background information on Aloes

Aloe is one of the resources found in dry lands of Kenya Aloe also written *Aloe*, is a genus containing about four hundred and fifty (450) species of flowering succulent plants. The most common and well known of these is *Aloe vera* or "true aloe". The genus is mainly found in Africa.

There are about 60 species in Kenya but only five (5) are of any commercial value. Aloe gum and gel have been widely used in cosmetic and pharmaceutical industries. Aloe is also important in environmental protection, rehabilitation of degraded lands, living fence and dry season livestock fodder in ASALs.

Five indigenous aloes have been identified to have potential for commercial production of bitter aloe gum. These are *A. barbadensis*, *A. turkanesis*, *A. secundiflora*, *A. scabrifolia*, *A. rivae* and *A. calidophila*. Other introduced species include *Aloe vera* for gel production and *Aloe ferox* for gel and bitter gum production.

Kenya Forestry Research Institute through its aloe research programme has undertaken a lot of research in the dry lands on Aloe propagation technologies and product development. Some of the products developed by KEFRI and approved by Kenya Bureau of standards (KEBS) include *Aloe* soap, lotion, shampoo, hair conditioner; shower gel, facial cream, health drink and hair activator gel. Technologies on suitable aloe propagation methods have also been developed and technical guidelines produced.

However, adoption of the developed technologies has been slow due to issues related to marketing of the Aloe raw materials as well as the products. Others include lack of technical knowledge on sustainable wild harvesting, domestication and processing.

Scarce information on a wider range of opportunities for Aloe extracts, low incomes from existing Aloe enterprises and poor produce/market linkages.

KEFRI in collaboration with stakeholders such NALEP, KWS, and the Communities in Marigat District organized a one day seminar in Marigat town to bring together the Aloe producers i.e., the community and marketers as shown in **plates 13 and 14** below.

Plate 13: Facilitators and Participants: Aloe Seminar in session

Plate 14: Aloe plantation and products – Baringo District

Specific objectives of the seminar

- To share knowledge and experiences among stakeholders on Aloe production and marketing.
- To share market information among producers.
- To Identify the challenges and opportunities in the aloe value chain

Target group

The target group was the Aloe producing farmers in the larger Baringo District and the marketers.

Expected output

- Develop linkages between the Aloe producers and marketers.
- Develop guidelines on how to enhance the resource base to support the Aloe industry.
- Develop guidelines to streamline marketing of Aloe and Aloe products.

Key emerging issues

- Disseminate guidelines on production of Aloes and develop simple guidelines on processing, marketing and certification of Aloe products
- Strengthen Baringo Aloe Bio-enterprise by streamlining its activities to play a more stabilizing role in the Aloe whole value chain

- KWS in partnership with other key partners to strengthen its regulatory role through development and approval of village based Aloe management plans

Linking of Jatropha farmers/ producers to markets

A field day was held in KEFRI's Jatropha demo farm in Kibwezi and the producers were linked with potential buyers who were in attendance**.** This event was held in Nzoila on Mr. Kaunda's farm. A total of 63 participants attended drawn from farmers, government Officers, University students and a representative from a local NGO (KENSOL). The farm has a *Jatropha curcas* plantations established in 2005, 2008 and 2009. It is one of the model farms where experimental work on screening has been taking place involving 22 provenances from different parts of East Africa.

The objectives of the field day were to: -

- Share with the local community local community the experiences of *Jatropha curcas* farming.
- To disseminate information and create awareness of forestry, agricultural and other related technologies to the local community of Mtito Andei
- To link the farmers and potential farmers to the market (KENSOL).

KENSOL mentioned that they are recruiting farmers to plant Jatropha and from whom they will buy a kilogram of dry Jatropha seeds at between KShs 15 -20 at farm gate.

Key emerging issues

- Some pest and disease related symptoms have been noticed on Jatropha
- Jatropha leaves and branches are used for mulch.
- Farmers have little or no skills on management of Jatropha.
- The biofuels policy is being formulated by the Ministry of Energy that will facilitate development of the sector Jatropha being a candidate crop for promotion among others. This enhanced their morale to plant Jatropha on their farms.
- The farmers had concerns on where to acquire Jatropha seedlings or seeds but the field day acted as source of information. Similarly, the market for the feedstock was a concern once the yielding has started.
- Research & development on management regime is underway, especially, spacing and provenance screening is being carried out.
- There is need for the farmers to have cottage industries i.e. soap making in collaboration with KIRDI.
- Other issues being investigated is crop diversification and hence to intercrop Jatropha with other food crops.
- Many stakeholders have high expectations that Jatropha could be an emerging cash crop for the dry lands.

Linking of gums and resins producers to markets

This activity was carried out during the field days in Isiolo and Garbatula where one gums and resins trader was in attendance and had a chance of briefing the potential traders on these commodities. During the field day demonstrations on harvesting and post harvest handling of gums and resins, primary value addition through cleaning, sorting and grading were carried out by the trader and KEFRI personnel. More of these fora need to be organized in future. A detailed report is provided separately**.**

Output 4: Extension service providers from 30 ASAL Districts trained as TOTs on production, processing and marketing of wood and non timber dryland resources and other relevant technologies for ASALS;

A training report for the TOT carried out in 2009 was finalised and a copy submitted to NALEP

Two training activities were carried out between 8 -13th November 2009 (lower Eastern and Rift valley) and 22-27th November, 2009 (Upper Eastern and North Eastern) at KEFRI's Kitui Regional Research Centre. The main objective of the training was to impart necessary knowledge and skills to equip GOK extension service providers (MOA, MOLD and KFS officers) on production, processing and marketing of wood and non wood dryland resources and relevant technologies. A total of 58 TOTs from 30 ASAL Districts were trained. A final draft training report on this activity was provided together with the previous 6 month progress report covering July-December 2009.

Output 5: 200 beneficiaries trained on wood and non timber dryland products-(production, processing, primary quality control and marketing) and other relevant technologies

- *One training was held in Garbatula town and 45 participants (comprising of members and leaders of the local community, NGOs and CBOs) were trained on issues related to management and utilization of Prosopis juliflora and processing of its products of which a report was produced.*
- *Four informal trainings were carried out during the field days attended by 915 participants*

The training of beneficiaries was put in the work plan with the assumption that the NALEP Coordinators at the District level would fund the participation of the local communities and facilitate the trained TOTs to carry out the training. However, this was not possible as this activity had not been factored in the District budgets. It was therefore only possible to carry out this one training within our budgetary allocations. The training on management and utilization of Prosopis is summarized below:

Training was conducted both in classroom set up and practical demonstrations. Skills in Prosopis tree silvicultural practices; thinning and pruning of heavy infestations to reduce them to manageable densities, processing of timber using improved chain saw framed system as well as making of human food and animal feeds from pods and were demonstrated.

Many participants were amazed at the various food products that could be obtained from Prosopis pods. From their taste experience of the food products they suggested that several other products could be tried too. The participants requested for a more detailed training on these skills pointing out that these could help them fight the challenges of drought and food insecurity.

Plate15: Trainers and participants in a training session and in an open discussion.

The key achievement of the training was the positive change in attitude of the participants on Prosopis. However, the training revealed the following key emerging issues:

- The communities had never had any experience in management of the Prosopis thickets and they always viewed them as a threat to their livelihoods
- Processing and utilization of Prosopis pods for human food and animal feeds was a new invention for them
- Processing of sawn timber from the species did not look possible to them but for the first time they were able to process timber in the middle of a dry area which is characterized as a timber deficient area.

Harvesting Prosopis trees (Trainers showing a guided tree felling technique)

Processing Prosopis logs (Participants look on as a machine operator prepares the logs)

Sawing Prosopis timber (A participant has hands on the sawing system)

Sawn Prosopis timber (Some of the participants and trainers with pieces of sawn timber)

Plate 16: Harvesting and processing of Prosopis wood products

Output 6: At least 100 ha of land from 4 Districts to have demonstration plots with either high value trees such as *Melia volkensii* or improved fruit trees and fodder crops and /or pastures

In 2009 a total of 7 demonstration plots in 4 Districts, totaling about 58.6 ha (Kibwezi, 10 ha, Kajiado 20 ha, Garbatula 19 ha, Isiolo 9.6 ha) identified, ploughed and about 46 ha planted with high value trees, pasture and food crops. During the period under review. An additional 40 ha were ploughed in Baringo (10 ha), Barambate (5 ha) and Isiolo (25 ha). The pilot sites established in 2009 were also monitored and maintained.

Establishment of demonstration plots

The drylands are characterized with low and erratic rainfall and high transpiration rates. In order to

improve crop and tree production in these areas, sustainable drought and dry spell mitigation farming methods through better on-farm rainwater management are required.

This initiative established some pilot sites to demonstrate one method for water harvesting- the Vallerani System. The Vallerani System is a mechanized water harvesting system (The Vallerani System) which has been tested in Sahelian countries and other parts of the world and piloted in Kenya through the Acacia Operation Project (AOP) coordinated by KEFRI. The Vallerani system is a micro catchment system for rainwater (surface runoff) harvesting in order to restore heavily degraded soils for afforestation and increased agricultural production in arid and semi-arid regions. Rain and runoff water, fine superficial soils and organic matter are harvested and concentrated in the micro-basins and vegetation sprouts. The Vallerani system comprises of a tractor (155 HP) that makes micro-basins using two types of ploughs (Treno and Delfino, Plates 17 and 18). By using this tractor, large areas of land can be worked on in a short time. The tractor can work on 2 ha/hour or 14 ha/day or 5-7000 half moons or micro-basins/day. Sites for the operation are selected and activities developed based on community-identified needs. Spacing between the rows of micro catchments is dependent on the annual rainfall for the site and the spacing for the tree crop to be planted. The technology works best in rehabilitating degraded areas that are plain or gently sloping with annual rainfall of 150-600 mm.

Plate 17: Delfino plough in action and micro-catchment after the rains

Plate 18: Treno plough in action and micro-catchment after the rains

The various activities carried out in January-June 2010 period in each of the pilot sites are summarized below:

(a) Lower Eastern-Kibwezi District

Two farms (10 ha) in two different locations (Kikumbulyu and Utithi locations) had been ploughed in 2009. One of the farms is situated in NALEP focal area for 2009 in Kibwezi District in 2009 (Kikumbulyu location). These farms had been planted with *Melia volkensii and short rotation agricultural crops (*Maize (DH-04), Green grams and cow peas). The following activities were carried out during: **See Table 1 below.**

Table 1: Activities carried out in the two farms in Kibwezi District

Activity	Achievements
Data collection and analysis	*Data from crops planted last year in the two farms was collected for those planted within and between micro catchments in consultation with KARI Katumani Agronomist. It was observed that the number of cobs, cob weight and grain weight were significantly higher for plants within the micro-catchments than those planted in between the micro catchments (Figure 1). The mean grain yield per ha was 1937.5 Kg for plants within the micro-catchments and 1187.5 Kg for plants in between micro-catchments.*
Crop seed supply for planting:	*Each of the NALEP farmers was supplied with 10 Kg of N 26 green grams for intercropping with Melia volkensii in the pilot sites. Daniel Kivisu managed to sow green grams. However, Joseph Kitema was not able to plant the green grams.*
Management and Maintenance of Planted Melia volkensii trees	
(a) Propping of trees	*Wind and competition for light among maize and young Melia trees were responsible for bending and falling down of Melia volkensii trees at Joseph Kitema's farm. This prompted for propping and straightening of the fallen trees by fixing support pegs*
(b) Slashing and spot weeding	*This was carried out at Kitema's farm a long the trenches due to bushy state of the farm following heavy rains along the Chyulu hills foot slopes. The farmer was also assisted to weed/slash between the tree lines to keep the farm neat*
(c) Pruning and removal of buds	*Pruning and nipping of buds (at the higher tree positions) were undertaken on both farms.*
(d) Beating up	*This was not done as expected due to insufficient moisture build up.*
(e) Harvesting	*Plots were marked and 400 Kg of green grams harvested from Mr. Kivisus farm and 13,500 Kg of maize from Mr. Kitema's farm*

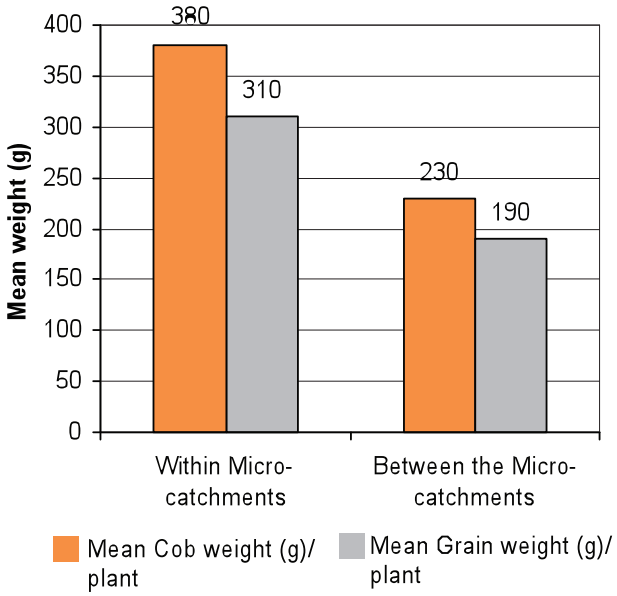

Figure 1: Mean cob and grain weight within and between micro-catchments

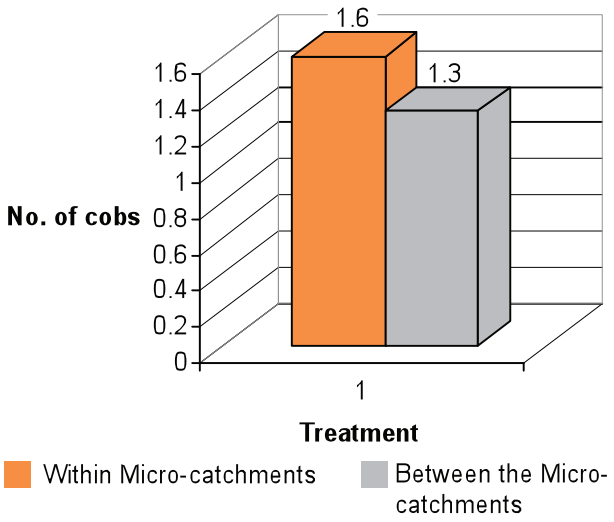

Figure 2: No. of cobs within and between micro-catchments

(b) Upper Eastern- Garbatula and Isiolo Districts

(i) Garbatula District

In 2009, a total of 19 ha (3 ha in Kiina and 16 ha in Barambate) were ploughed and planted with *Acacia Senegal,* pasture seeds (*Boma Rhodes* and *Cenchrus ciliaris* (Buffel grass) and some agricultural crops. The community members also participated in the establishment of a live fence to help in protecting the demo plots. Rainfall events following the planting were quite erratic with only one event in November 2009. In 2010 an additional 5 ha was ploughed and planted with pasture seeds. The activities are illustrated in plate 19 below.

Plate 19: Land ploughed and planted with Acacia Senegal, pasture seeds (Boma Rhodes and Cenchrus ciliaris (Buffel grass) and some agricultural crops.

(ii) Rehabilitation of degraded lands in Isiolo District

In 2009, a total of 9.6 ha were ploughed in Isiolo District, 1.6 ha in Baraka farm, 4 ha in Oldonyiro–Mlima Chui and 4 ha Oldonyiro – Loturo. Collaborative effort between NALEP and KEFRI helped in the rehabilitation of the denuded rangeland by construction of rain water retention ditches using a mechanized method during the month of November 2009. These initiatives in Isiolo were in collaboration with KFS, Arid Lands Resources Management Project (ALRMP), Ministry of Agriculture (MOA), Ministry of Livestock Development (MOLD), Ministry of Water and Irrigation (MOWI), United Nations World Food Programme (WFP) and Action Aid. However, insecurity and inadequate rainfall events affected the performance of the sites. In 2010, an additional 25ha were established in Isiolo Holding Ground in Central Division, where the soils are prone to erosion a situation that is exacerbated by sand harvesting and wanton tree harvesting for charcoal and firewood. As a result, deep gullies have developed making the area unsafe for livestock. Along the micro catchments, cuttings of *Euphorbia tirucalli* (*finger euphorbia)* and C*ommiphora spp* were planted to boost water retention as well as browse availability. The plan to reseed the site with *Cenchras ciliaris* was postponed as the rainy season came to an end before it could be done.

The strategy was to limit run-off above the head of gullies to facilitate healing with the support of check dams. The activities are illustrated in plates **Plate 20).**

Plate 20: Gully forming and Mechanized trenches planted with Euphorbia tirucalli for fodder and land rehabilitation at government livestock holding grounds in Isiolo

(c) Rift Valley-Kajiado District

The demonstration plot at Kajiado is located at Masaai Eco Farm. Masaai Eco Farms had proposed to mitigate on the environmental degradation in Kajiado through participatory and sustainable afforestation. The farm had proposed to carry out awareness campaigns using participatory media and planting of drought resistant *Acacia senegal* var. senegal for the production of commercial *Gum arabic*. The farm has adequate facilities for a demo plot where farmers can be trained on tree farming.

The demo farm measuring approximately 20 ha was established in September 2009. Water catchment trenches and micro pans were dug in October 2009 while direct sowing of Acacia senegal seeds was done in November and December 2009. Gapping of areas where germination failed was done in January and February 2010. The seedlings have done exceptionally well ever since.

Four thousand bales of hay (Plate 21) were harvested from the plot during the months of March through May 2010. This was possible due to initial strategy to keep animals (especially the big ones) from entering the plot.

Plate 21: Established seedlings in Eco farm Kajiado District and Harvested hay from the demo site in storage

Six beehives (**plate 22)** were also installed at the same period and three of them are occupied by bees.

Plate 22: Top-bar bee hive installed in the farm

The mortality rate of direct sowing was high and therefore there was need to establish a tree nursery which will supply the community with seedlings ready for planting during the rain seasons. The nursery with a capacity of 100,000 tree seedlings was established in June 2010 and sowing is in progress.

(d) Rift Valley-Baringo District

About 10 ha was ploughed and planted with high value trees (Jatropha curcus, Azadirachta indica (Neem), grafted mangoes, agricultural crops (Cowpeas, green grams, Sorghum, Pear /Millet) and Pasture seeds.

Selection of sites in Baringo District

During the selection exercise in Marigat District, the following criteria were used:

(a) The piece of land or farm should have deep soils (non-rocky)
(b) The gradient or relief should be flat to undulating and of good drainage.
(c) Land to hold demo sites should not have conflicts regardless of whether it is owned privately or communally.
(d) The farmers should be willing to own the technology and sustainably manage the sites after establishment of crops, trees or pastures.
(e) Protection of sites by fencing off the area or by physical protection.
(f) Acceptable by the NALEP stakeholders' forum as represented by the extension agents and the chiefs who were present during the mission

Based on the above criteria, 5 sites (2 from Ng'ambo, 2 in Salabani and 1 in Mogotio locations) were chosen and demo plots established. The details of the crops planted in each site are indicated in **Table 1** below.

Table 2: Summary of sites ploughed, trees and crops in Marigat District

Site	Crops	Quantity supplied	Unit	Area (acres)
1: Salabani David Kakimon	Neem	1400	Seedlings	2
	Grafted Mangoes	60	Seedlings	1
	Cowpeas	4	Kg	1
	Green grams	4	Kg	1
	Sorghum	4	Kg	1
	Pasture seeds	30	Kg	3
	Pearl millet	2	Kg	½
Total				9.5
2: Salabani Jonnes kakimon	Jatropha curcas	1000	Seedlings	2
	Pasture grass	20	Kg	2
	Cow peas	20	Kg	½
	Green grams	2	Kg	½
Total				5
3: Ngambo Loropil Primary school	Pasture	20)	Kg	2
	Grafted mangoes	60	Kg	2
	Jatropha curcas	600	Seedlings	1
	Cowpeas	5.5		1
Total				6
4: Mogotio	Graft mangoes	60	Seedlings	5
Grand Total				25.5

Plate 23: A Senior Research Officer explaining a point to Agricultural Extension Officers and World Vision field officers in Salabani immediately after ploughing (a) and then later after intervention

Plate 24: Jatropha seedling established in Salabani farm

Plate 25: Site in Ng'ambo at Loropil Primary school before and after intervention

Plate 26: A well performing demo site in Ng'ambo before and after the intervention

Output 7: Regeneration and spread of *Prosopis juliflora* in selected project areas managed;

Two key activities were carried out under this out put:

- *A study was conducted on status and distribution of Prosopis juliflora in Garbatula District.*
- *Two day training on management of Prosopis, processing and utilization of its products was held in Garbatula town. A total of 45 participants, consisting of mainly group leaders from local non-governmental organizations (NGOs), and community-Based Organizations (CBOs) were trained.*

Status and distribution of *Prosopis juliflora* in Garbatula District.

Overview /background on Prosopis species

About 44 species of the Prosopis genus have been identified with four native to Asia and Africa while 40 are predominantly found in America from southern parts of USA to Argentina. They are mainly found in hot and dry regions having specialized slowly over millions of years.

In most of 19th century, Prosopis species were introduced to other parts of the world intentionally to address the problems of expansion of deserts, as a source of wood materials, shade, to improve the climate among other noble intentions and also accidentally in some areas. Unfortunately, these introductions were not coordinated and undesirable varieties easily found their way to some of those new areas without

the benefit of proper scientific research or phytosanitary regulations that have only been introduced globally in the late 20th century.

Lack of understanding of other characteristics of Prosopis that require serious selection besides fast and adaptable growth in dry zones led to introduction of those invasive, with bad form, large spines and astringent/bitter pods that could not be consumed by humans (in contrast to erect thornless species with highly desirable tasting pods found in the native range). Other introduced varieties became infected with fungal pathogens that severely stunted their growth but nevertheless induced considerable stress that stimulated production of pods and seeds. Thus the introduced species have not been very useful or desirable in the newly introduced environments in many continents.

Kenya has had problems with invasive species, especially *Prosopis* in the recent years. However, its management and control has been largely constraint by lack of knowledge and experience to deal with the species. As part of capacity building initiative to address the *Prosopis* problems in the country, the Government of Kenya in collaboration with NALEP undertook a brief survey on status and distribution of Prosopis invasion in Garbatula District. In addition, a seminar to introduce skills for management and utilization of the species was also carried out.

Objectives

The objectives for the work were as follows;

(a) Carry out a brief survey on status and distribution of Prosopis invasions in Garbatula District
(b) Conduct introductory training on management and utilization of the species
(c) Formulate recommendations on way forward

Methodology

Consultations with the Ministry of Agriculture (specifically the DLPO and staff) and the District administration (DOs and chiefs) at Garbatula town were made to seek their opinion on the current distribution of Prosopis species in the District. This was followed by a guided tour of the known infestations for purposes of assessing their current status in terms of extend of coverage and plant densities at the hot spots. Informal interviews were also carried out with the local leaders within the infested sites to understand the history of planting, spread and their perception on the species. The survey covered several sites within Garbatula township and the surrounding areas; Madogashe, Sericho, Ireca, Jafa Gafarsa, Malka Daka, Kula Mawe and Kinna.

Status and distribution of Prosopis in Garba Tula District

According to the local communities, Prosopis was introduced in the larger Isiolo District in late 1980s where both the Government and NGOs carried out the first trial plantations within Merti Division. These plantings were deliberately carried out as part of the efforts to mitigate against desertification and to introduce trees in the most degraded parts of the District where demand for tree products and fodder was overwhelming.

The success of these first plantings encouraged many local communities to actively participate by purchasing Prosopis seedlings that were common in many Government and private tree nurseries at the time most of early 1990s. The plantings gradually spread to many areas of Garba Tula, Kinna, Madogashe and other areas through deliberate introduction and livestock movements. Owing to the aridity of most of the areas within the District, Prosopis are now mainly confined to moist areas such as laggas and rivers.

Invasions along Laggas

Invasions along Uaso Nyiro river

Isolated trees in settled areas

During the survey, considerable Prosopis biomass was found around settled areas of Garbatula District where livestock populations were concentrated. These are townships such as Garba Tula, Kinna and Madogashe. In these three areas, Prosopis occurred in pockets of tree densities ranging from 10 trees/ha to 300 trees/ha. Small or isolated Prosopis trees were also found at local centers such as Sericho, Ireca, Jafa Gafarsa, Malka Daka and Kula Mawe. Although the Prosopis populations are generally low at these centers, they are signs of early stages of invasion hence management interventions must be introduced before the situation gets out of hand.

The highest Prosopis biomass in the District, according to the local communities and other respondents interviewed are found along the Ewaso Nyiro floodplain along the boundary between Isiolo and Garba Tula Districts. It was not possible to establish the tree densities within River Ewaso Nyiro during the survey period owing to the flooding incidences.

Prosopis trees are generally found to be very useful as a source of wood products and fodder in all the areas of its occurrence across the District. However, in areas of high densities, grass and other useful forage species for livestock have been displaced. Most respondents cited the grazing areas along River Ewaso Nyiro as the most affected part, and they made a passionate call for assistance to tame the species. Continued evidence of early spread to the adjoining areas has been a big worry to the local communities.

2.2.5 North Eastern- Garissa

A visit was made to Garissa District where some pilot sites were to be established and meetings held with officers from KFS, KEFRI, MOA, MOLD, and ADC.

A number of issues emerged from the discussions:

- Garissa District is unique in a number of aspects such as: the issue of clanism is quite strong, the community members are used to hand outs, land is communally owned, the dominant community needs a strategic approach as they do not buy in ideas quickly and may not be easily pushed into doing something.
- Working in Garissa requires first to understand the community and also a lot patience before one can be able to penetrate the community and bring them on board.
- With this background in mind, it was observed that for any demo to succeed in Garissa, it would need to be established in a government institution. A potential government institution where the demo plot could be located is the Agricultural training Centre (ATC) with about 200 acres of land. However, this land is infested with *Prosopis juliflora* and there is need on whether to clear this species or demonstrate its management and utilization. It is also necessary to get clearance from

ATC headquarters to use their land for the establishment of the demo plots.

- Need to understand modalities of using group farms viz-avis government institutions
- KFS about 100 ha of land in Wajir and also having plans to work there in the next financial year.
- Some of the possible entry points in Garissa District would include:
- Management and utilization of *Prosopis juliflora*
- Production, post harvest handling and marketing of Gums and resins
- Fodder tree development
- Rehabilitation of degraded lands
- Need to share the MoU with key partners e.g. MOA and KFS
- There is need to bring all the relevant stakeholders on board
- Agreed to have a stakeholder's workshop cum an open day before any activity is carried out in Garissa District to highlight the key technologies to be demonstrated in ASALS and chart the way forward (develop an action plan for the District).

Output 8: Policy brief on at least 2 dry land commodities produced

Relevant data and information was collected and production of draft policy briefs initiated but yet to be finalized.

Output 9: Relevant information generated, packaged and shared amongst the stakeholders

During the life of the project a total of 11 documents (technical reports, brochures, and publications) with useful information were produced and are to be shared with the key stakeholders. Some of these are being printed while others are being edited for printing. A copy of each type of publication is provided separately. These documents were:

List of Publications and Reports

1. Report on Training Of Trainers (TOT) On Production, Processing and Marketing Of Kenyan Dryland Wood And Non Wood Resources
2. *Melia volkensii* Leaflet (Investing in trees)
3. Handbook on improving Tree Survival in Dry Lands
4. Booklet on Propagation of *Melia volkensii*
5. KEFRI-NALEP Collaborative Project- Linking Aloe Producers to the Industry -**A Case of Baringo District.**
6. Non-timber forest products value chain analysis in the drylands of Kenya **: A case of Non Timber Forest Products (NTFPs) enterprises in Marigat, Narok and Makueni Districts**
7. Report on KEFRI NALEP Field Day held in Isiolo and Garbatula Districts
8. Report on KEFRI NALEP Field Day held in KIbwezi on *Jatropa curcus*
9. Status and distribution of Prosopis in Garbatula District.
10. Rehabilitation of rangelands in Kibwezi, Kajiado, Isiolo and Baringo Districts.
11. Review and Analysis of KEFRI's Dryland information products.

A number of TV clips and newspaper articles were also produced which included the following:

- Documentary

  A DVD documentary based on success stories of KEFRI/NALEP Dryland value chain Technologies in the target areas of (Kibwezi, Kitui, Isiolo and Baringo Districts) is being finalized.

- Electronic features/news segments

  Four electronic features were broadcasted /show-cased in two of popular media houses namely KBC TV and K24 TV both of which have grass root/ countrywide coverage.

  They included:

  1. Melia volkensii in dryland which was featured on 30th June 2010 on K24 TV.
  2. Aloes in Kenya featured on 5th July 2010, on KBC TV.
  3. Mangos growing as a nature based enterprise in drylands on 12th July 2010, KBC TV.
  4. Jatropha curcas as an alternative source of fuel and incomes in drylands of Kenya on 21st July 2010 on KBC TV.

- Print features

  Print features based on the above dryland activities, highlighting how best practices and innovations for targeted value chains impact on livelihoods and the environment have been produced in newspapers as follows;

  Print Features,

  i. Green Revolution Changing Dry Face Of Ukambani, Breakthrough By Research Body Turns Dormant Tree Into Sprouting Green Forests in Dry Areas Of Eastern Province, Standard Newspaper 2nd July 2010.
  ii. Simple method that uses cold water struck agricultural breakthrough, Standard Newspaper of 2nd July 2010.
  iii. Planning For a Changing Climate, Daily Nation Newspaper of 8th July 2010.
  iv. Benefiting from Aloes in Kenya in Standard Newspaper of July 29th 2010

3. Conclusions and Recommendations

Conclusions

- A review and analysis of KEFRI's dryland information products and the production of a documentary on the various tree based ASAL technologies carried out during the study have provided useful information that can be used by the various stakeholders;
- Production and processing technologies and innovations of high value indigenous and fruit trees in ASALS such as *Melia volkensii*, *Jatropha curcas*, *Aloes*, Prosopis products, grafted mangoes and gums and resins were demonstrated as avenues for increasing household incomes in ASALs;
- The evaluation on the role of incentive packages for rural entrepreneurs indicated that increased accessibility to NTFP raw materials by local community and better prices offered for products would motivate them into entrepreneurship in the sub-sectors. This would motivate them into increased production thus increasing their market supply volumes;
    i. A total of 58 TOTs from 30 ASAL Districts have been trained and equipped with appropriate knowledge and skills in production, processing and marketing of timber and non timber forest products. The TOTs are being used as resource persons to train local communities;
    ii. The project further demonstrated rehabilitation of 10 degraded sites which involved community participation. This was done by intercropping agricultural crops or pasture crops with high value trees using mechanized water harvesting system;
    iii. The status and spread of Prosopis has been established in Garbatula District and sustainable management practices and utilization technologies demonstrated to the local communities. The technology demonstration has resulted in positive attitude change and perception of Prosopis as an invasive species; and,
- Finally, the project has documented relevant information by publishing and distributing technical reports, brochures, leaflets, guidelines and documentaries.

Recommendations

i. Technology demonstration

Based on lessons learnt the project will continue with:

- Technology demonstration and validation while developing strategies for commercialization and up-scaling of validated technologies;
- Supporting monitoring and maintenance of promising established pilot sites; and,
- Up-scaling rehabilitation of degraded sites in other ASAL Districts in collaboration with other projects such as the Finnish Government funded Miti Mingi Maisha Bora (MMMB) Programme.

(ii) Capacity Building

In order to empower the producers, processors and entrepreneurs and other actors in the value chain, there is need to undertake the following:

- Support and facilitate TOTs to train local communities on production, processing and marketing of wood and non timber forest products;
- Produce training materials and guidelines/ extension materials on various technologies focusing on specific ASAL based commodities;
- Support and facilitate knowledge exchange visits locally and externally/across the borders for both the TOTS and local community groups;
- Support service providers to develop viable projects to address priority problems and opportunities in their areas of operation;
- Support training of local communities and extension service providers on management and utilization of Prosopis; and,
- Training of key stakeholders in participatory monitoring and evaluation

(iii) Information dissemination pathways

In order to increase access to information by the service providers and beneficiaries there is need for enhanced dissemination pathways of existing information through:

- Mass production and distribution of information products i.e. bulletins, manuals, leaflets, guidelines, books, documentaries etc. Success stories will be packaged and made available to extension programmes to ensure that the lessons learnt from the project can benefit the rural poor and smallholder producers in other parts of the country;
- Updating existing databases to include information on service providers and community resource persons and sharing these to strengthen the linkages for enhanced sustainability;
- Updating and linking various websites to enhance interaction between the different actors in the area;
- Profiling of the various demonstration sites and enterprises. The knowledge generated and successful models/ case-studies will be made available on the internet and shared with several stakeholders and institutions including NGOs to enhance uptake and adoption; and,
    - Supporting open fora e.g. field days, open days, barazas, shows, trade fairs, side events to disseminate information.

(iv) Marketing and trade of Timber and non-timber products

Provide marketing information, intelligence and surveillance on products, sources, prices, markets, supply, demand, and quality through:

- Upscaling value chain analysis for selected dryland products in other ASAL Districts;
- Supporting standardization and branding of selected ASAL products e.g. Aloe sap chemical analysis;
- Supporting increased networking and linkages of selected ASAL products (e.g. Aloe, Gums and resins, Jatropha products, Neem products, Melia products) to markets;
- Supporting product development/value addition on key products; and,
- Supporting periodic market assessments.

Annex 1: Work plan and indicative budget

Expected out put	*Activity*	*Resources*	*Indicative Budget*	*P M& E indicators*	*Implementation (2009-10)*			
					Q_1	Q_2	Q_3	Q_4
Production of high value trees demonstrated	*Survey and mapping of production areas and resources*	*Personnel/ Transport*	*200,000*	*At least 4 sites mapped*	■			
	Land preparation (including staking and digging of holes)	*Personnel*	*40,000*	*At least 4 sites prepared for planting of trees*	■	■		
	Fencing of sites for demo wood lots for high value trees	*Personnel/ Materials/ Transport*	*100,000*	*At least 4 demo wood lots (50 x 50m) fenced using live fences*	■	■		
	Acquire suitable germplasm	*Personnel/ Germplasm/ Transport*	*100,000*	*Germplasm for at least 2 tree species acquired*	■	■		
	Planting of germplasm	*Personnel*	*10,000*	*Germplasm planted in at least 4 sites*		■		
	Field days in the four demo sites	*Personnel/ Transport*	*300,000*	*Field days*			■	■

Expected out put	Activity	Resources	Indicative Budget	P M& E indicators	Implementation (2009-10)			
					Q_1	Q_2	Q_3	Q_4
Processing and marketing of wood and non timber dryland products promoted.	Conduct value chain analysis	Personnel/ Transport	400,000	Value chain analysis done for charcoal and gums and resins in at least 2 Districts	■	■	■	■
	Facilitate formation of associations	Personnel/ Participants/ Transport	200,000	At least 4 producer associations formed and registered		■	■	■
	Procure demo kits for processing of aloes and indigenous fruits	Demo kits (Moulding machines, dry and wet de-pulpers, de-hulling machines, stainless steel sufurias, chemicals, packaging materials)	1,000,000	At least 2 sets of demo kits for Aloe and Indigenous fruits procured	■	■		
	Carry out demonstrations on harvesting, post harvest handling, processing and packaging of products	Personnel/ Transport	360,000	Demos carried out in at least 4 sites		■	■	■
	Develop market linkages with relevant players	Personnel/ Transport	200,000	At least 120 people from 4 sires linked to various market		■	■	■

Expected out put	Activity	Resources	Indicative Budget	P M& E indicators	Implementation (2009-10)			
					Q_1	Q_2	Q_3	Q_4
Extension service providers from 30 ASAL Districts trained as TOTs on production, processing and marketing of wood and non timber dryland products and other relevant technologies for ASALS.	Production of training materials and demo kits	Personnel/ stationery/ materials/ equipment	300,000	At least 60 training materials produced and used during trainings				
	Carry out 2 TOT trainings for Extension service providers	Participants/ Personnel/ Training Materials / Venue/ Transport	900,000	At least 2 TOT trainings conducted and reports compiled				
200 beneficiaries (Youths through KKV initiative) trained on wood and non wood products-production, processing, primary quality control, marketing in collaboration with local NALEP focal points.	Train members of FADC and relevant CIGs	Personnel/ Training Materials / Transport	200,000	200 beneficiaries trained				
Relevant workshops, conferences and seminars attended by NALEP and KEFRI personnel	Key project personnel participate in relevant workshops, conferences and seminars	Personnel/ Transport	250,000	At least 2 workshops/ Seminars/ Conferences attended by at least 2 key personnel from KEFRI and NALEP				

Expected out put	Activity	Resources	Indicative Budget	P M& E indicators	Implementation (2009-10)			
					Q_1	Q_2	Q_3	Q_4
At least 100 ha of degraded areas from 4 Districts to have demonstration plots with either Melia volkensii, improved fruit trees, fodder crops and pastures.	Site and demo plot selection	Personnel/ Transport	200,000	At least 4 sites selected				
	Transfer of equipment (Mechanised Technical Unit) to selected sites	Personnel/ fuel/oils	300,000	Equipment transferred to at least 4 sites				
	Preparation of demo plots	Personnel/ fuel/oils	350,000	Micro-catchments dug in at least 4 demo plots				
	Production and acquisition of germplasm	Personnel/ Transport/ materials/ germplasm	1,000,000	Tree, pasture and fodder germplasm acquired				
	Fencing of demo plots using live fence	Personnel/ Materials/ Transport	600,000	At least 4 sites fenced				
	Training of community	Personnel/ Materials/ Transport	200,000	At least 40 people trained				
	Germplasm planting in demo plots	Personnel/ Materials/ Tools	200,000	At least 4 plots planted and supervised				
Regeneration and spread of Prosopis juliflora in the project area managed	Survey to quantify coverage	Personnel/ Materials/ Transport	200,000	At least one survey carried out per site				
	Procure demo kits	Personnel/ Transport	400,000	At least 2 of each demo kits procured				
	Carry out demos using high recovery charcoal production kilns, animal feeds, wood carvings, furniture etc	Personnel/ Transport/ Materials	300,000	At least 4 demos carried out				
Policy briefs on selected dry land commodities developed	Package research findings on management of drylands using fires, sustainable charcoal production and exploitation of gums and resins	Personnel/ Stationery/ Transport	250,000	At least two policy briefs produced				

Expected out put	Activity	Resources	Indicative Budget	P M& E indicators	Implementation (2009-10)			
					Q_1	Q_2	Q_3	Q_4
Relevant information generated, packaged and shared amongst the stakeholders.	Carry out desk studies to review existing information and identify existing gaps	Personnel/ Transport/ Stationery	20,000	At least one report produced	■	■		
	Review KEFRI-NGARA database and update the existing data collection tools	Personnel/ Data base software/ Stationary	50,000	No. of data collection tools updated	■	■		
	Collect, analyse, document relevant information on wood and non timber dryland products	Software/ Trained Personnel	120,000	Data from at least 6 enterprises posted to NAFIS and NGARA websites/ databases		■	■	■
	Redesign KEFRI-NGARA database	Software/ Trained Personnel	150,000	Re-designed database in use		■		
	Upload the generated information in the NAFIS, KEFRI and NGARA. Websites	Trained Personnel	-	Existence of data base on the NAFIS and NGARA websites No. of hits on website		■	■	■
	Develop/ procure, package and distribute different information booklets/ brochures/ posters on production, utilization and marketing of wood and non timber dryland products	Personnel/ (CDROM / Stationery	600,000	At least 15,000 copies of at least 5 different information booklets/ brochures/posters	■	■		

Expected out put	*Activity*	*Resources*	*Indicative Budget*	*P M& E indicators*	*Implementation (2009-10)*			
					Q_1	Q_2	Q_3	Q_4
Supervision, monitoring and evaluation	*Visit to project sites* *Quarterly meetings*	*Personnel/ Transport*	*500,000*	*At least 4 M&E visits/* *Meetings held*				
Total			*10,000,000*					