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

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PARTICIPATION, COLLABORATION AND PARTNERSHIPS
NALEP
GOVERNMENT OF KENYA AND STAKEHOLDERS

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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
NACODEV	Ngangani Acts Community Development
NAFIS	National Farmers Information Service
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
RCMRD	Regional Centre for Mapping of Resources for Development
TOTs	Trainer of Trainers
WFP	World Food Programme

EXECUTIVE SUMMARY

KEFRI initiated collaboration with NALEP in 2008 which resulted in the signing of an MoU in June 2009. The first phase of the collaboration ended successfully and a second phase approved in 2010. A work plan and a budget for this second phase was jointly developed and approved by NALEP. The main objective of the project is to promote alternative livelihoods and environmental conservation and rehabilitation of degraded sites in Kenyan ASALS. This is being realized by demonstrating and adapting some of the key ASAL technologies developed by KEFRI which have significant potential for the promotion of alternative livelihoods and environmental conservation in the drylands of Kenya. As part of this effort, KEFRI in cooperation with NALEP established pilot sites (detailed description of the sites is provided in **Annex 1**) to demonstrate and validate best practices and innovations in 2009-10 in Kibwezi, Garbatula, Isiolo, Kajiado and Baringo Districts which are currently in progress. Significant progress was realized with about 15 demonstration plots being established in the 5 districts, totaling about 98.6 ha. The project continued to monitor and evaluate the performance of these demonstration plots to determine their suitability, maintenance and outputs. In 2010-11 financial year, the project established another 19.2 ha of demonstration plots in new sites at Voi, Mwatate, Makindu, Kathonzweni and Kibwezi Districts. Owing to the rainfall failure the whole year, it was not feasible to establish crops and trees in the worked pilot sites. Consequently, a major planting and re-planting is planned during the October-December 2011.

As an integral part of technology development process, the project initiated various capacity building activities to enhance the capacities of service providers and beneficiaries on production, processing, primary quality control and marketing of dry land timber and non-timber products. As a result of this effort, 167 local community members were trained and 517 attended field days during the reporting period. Key among these were demonstration of processing and utilization technologies for various Prosopis products, a national Gums and Resins Stakeholders Forum and Trainings on production and processing of *Melia volkensii* and Aloes. Gums and resins resource assessment and mapping was also carried out in Garbatulla District. Similarly, a field study to map, and investigate the performance of existing Jatropha provenances /germplasm across different ecological zones has also been initiated and progressing well. Other activities initiated during the reporting period included strategic engagement with a leading Private Sector in developing public-private partnership for *Melia volkensii* value chain products. Discussions are underway on how best to implement this kind of partnership.

Information generation being an integral part of the project and is expected to result in production of publications and some key policy briefs. So far a guideline on

Prosopis has been finalized and a draft policy brief on "Status and Intervention Measures required in managing Prosopis (Mathenge) invasions in Kenya" also produced. The project has also reviewed relevant research findings as a basis for the development of 13 livelihood briefs, 9 of which have been finalized and being edited for publication. Additionally, 2 booklets and 1 leaflet have been published, 2 technical reports, 1 Jatropha resource book and 9 training/ workshop reports are being edited for publication. The updating of KEFRI website has also been done on a quarterly basis and linkage with NAFIS database is planned. It is proposed that the gains so far made be consolidated as NALEP winds up in December 2011. KEFRI has played a key role in the development of the NALEP successor programme which is envisaged to be operationalized as from January 2011.

1. BACKGROUND

1.1 An overview of ASALS in Kenya

Kenya's arid and semi-arid areas (ASAL's) cover about 80% of the total land surface; hold 25 % of the human population and 65% of the wildlife. On the basis of moisture availability for plant growth, the country is classified as 88% arid to semi-arid (ASAL). The ASALs represent a very important socio-economic region with a potential value of about Kshs. 180 billion annually.

The ASAL districts are in four (out of 8) Provinces: Rift Valley, Eastern, North-Eastern and Coast Provinces. The districts include: Turkana, Moyale, Marsabit, Isiolo, Wajir, Mandera, Garissa. Ijara, Kitui, Makueni, Tana River, Taita Taveta, Kajiado, Samburu, Machakos, Mbeere, Tharaka, Laikipia, West Pokot, Kwale, Kilifi, Baringo, Meru North, Lamu, Narok, Malindi, Keiyo, Marakwet, Nyeri (Kieni), Rachuonyo, Suba, Thika and Koibatek[1].

Most ASALs in Kenya have a wide range of wood and non-wood products such as gums and resins, aloe, fuel wood, carvings, materials for handicrafts, essential oils, silk, edible oil, commercial juices, frankincense, indigenous fruits, bush meat, fodder and honey which are vital for local populations and also provide many important environmental services. Because most of these products are collected for household use or for sale in local markets, their significance is often underestimated and insufficiently addressed by national policies, programmes and statistics. Among the many environmental services they provide, the most critical ones are soil and water conservation (i.e. protection against soil erosion and maintenance of soil fertility), shelter against wind and shade. The dryland forests and wood lands are therefore important in sustaining livelihoods of the local communities and thus contributing to the greater national goal.

The rapidly increasing population and over grazing in ASALs have led to serious environmental degradation. There is a need to intensify agricultural production while improving and sustaining the resource base. Increased adoption of agroforestry in ASAL areas is one of the practical solutions to this

[1] Republic of Kenya – National Policy for Sustainable Development of the Arid and Semi-arid Lands of Kenya, Draft of August 2003).

problem. The ASAL areas which the project is targeting face crisis in the availability of food, a consequence of a growing population forced to live with scarce resources and sharing a limited amount of arable land. Declining soil fertility, high rates of soil erosion, poor management of livestock and trees and decreasing sources of income, accelerates this situation. Limited cash prevents farmers from purchasing agricultural inputs. Farmers also face the problem of shortage of firewood, timber and construction material and the availability of dry season fodder for livestock has drastically reduced. In adequate biomass energy resources such as firewood and charcoal adds to the prevailing land degradation which is one of the main factors leading to increased impoverishment of the rural communities.

1.1 Overview of KEFRI-NALEP intervention in the ASALs

KEFRI and NALEP initiated research and development partnership in 2008 which was operationalized by signing of an MoU in June 2009. Following this development, a work plan and budget was jointly developed and approved by NALEP in 2009-10 financial year (Phase I) and 2010-11 financial year (Phase II). 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 provision of alternative livelihoods while enhancing 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 sites to demonstrate and validate best practices/ technology in 2009-10 in Kibwezi, Garbatula, Isiolo, Kajiado and Baringo Districts which are currently in progress. Significant progress was realized with about 15 demonstration plots which have been established in the 5 districts, totaling about 98.6 ha. A brief description of the pilot districts is contained in Annex I. The project continued to monitor and evaluate the performance of these demonstration plots to determine their suitability, maintenance and outputs.

As an integral part of technology and innovation demonstration, the project initiated various capacity building activities during the first phase to enhance the capacities of collaborating partners/stakeholders. In this regard, a series of technology & innovation-based training sessions have been conducted including 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 more than 58 TOTS from several ASAL Districts on tree-based production, processing and marketing of wood and non wood

products. Similarly, the project undertook a review and analysis of KEFRI's dryland information products and the production of a documentary on the various tree based ASAL technologies during the same period. The information generated has been instrumental in dissemination and up-scaling of best practices, technologies and innovations among various stakeholders. Furthermore, the information review and documentation process highlighted information and knowledge gaps in ASALs ecosystems with respect to forestry and natural resources management.

Most of these activities being in their initial stages require further support for greater impact. However, the project is in the process of profiling some of the success stories for up-scaling particularly in other ASAL areas. Therefore, the continued collaboration between NALEP and KEFRI provides a greater opportunity for further development, testing and validation of best practices.

It is worth noting that 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: NALEP programmes at the District and provincial levels, Arid Lands Resources Management Project (ALRMP), World Food Programme, ENNDA, FAO, KFS, MOA-AES, Farmers, Producer Associations or Common Interest Groups (CIGs), NGOs/Civil Society Organizations and CBOs and among others.

This report gives a brief overview of the key achievements/ results for the second phase under the following five expected outputs:

Output 1: Production and processing technologies for high value tree based products including; gums, resins, pharmaceuticals, bio-pesticides, aloe and Prosopis products demonstrated

Output 2: Marketing of timber and non timber dry land products promoted

Output 3: Capacity of service providers and beneficiaries on production, processing, primary quality control and marketing of dry land timber and non-timber products strengthened

Output 4: Information on dry lands tree technologies and innovations generated, packaged, published and shared amongst the stakeholders

Output 5: Policy making process informed through information and technology generation on sustainable resource management and utilization in ASAL areas.

2. ACHIEVEMENTS

The main achievements during the reporting period (July 2010 -June 2011) are summarized under each of the expected outputs:

Output 1: Production and processing of high value tree based products including; gums, resins, pharmaceuticals, bio-pesticides, Aloe and Prosopis products demonstrated.

The key results under this output included:

- √ Maintenance of demo plots established in 2010 in Kibwezi, Garbatula, Kajiado and Marigat Districts were carried out. The key activities included replanting of trees, fencing and weeding;
- √ 19.2 ha of additional demonstration plots were established using the Vallerani mechanized water harvesting system for high value trees such as *Melia volkensii, fruit trees and* other suitable species;
- √ A field study to investigate and describe patterns of Jatropha development in Kenya by mapping the existing provenances/ germplasm across different ecological zones is in progress;
- √ The project initiated strategic engagement with a leading Private Sector in developing public-private-partnership to provide Technical Support to KEFRI in the design & development of research programme on *Melia volkensii* value chain with emphasis on processing and marketing of a wide range of Melia products;
- √ Demonstration of processing utilization technologies for various Prosopis products were carried out in Garissa, Isiolo and Tana River Counties; and,
- √ Gums and resins resource assessment and mapping was also carried out in Garba tulla district.

√ Maintenance and monitoring of pilot sites established in 2009-2010;

Maintenance of demo plots established in 2010 in Kibwezi, Garbatula, Kajiado and Marigat was carried out. The key activities included replanting of trees, fencing and weeding. In Garbatula, 2500 seedlings of *Melia volkensii* and 100 of Grafted mangoes (sourced from Kitui) were delivered to Baranbante and Kina. Tree planting techniques were demonstrated but tree planting and reseeding of grass were postponed due to lack of rains. However, 150

households were each given 3 seedlings to plant in their homes, water and protect. .

In Kibwezi, a total of 4775 trees (78 %) out of the 6120 planted in the two pilot sites survived the drought, the sites were weeded and pruning of the Melia trees carried out (Table 1).

Table 1: The Silvicultural management and survival counts for the two farmers in Kibwezi District.

Name of farmer	Technology/Species	No. Planted	No. Surviving	Survival %	Remarks
Daniel Kivisu	*Melia volkensii*	3250	2515	77.4	Properly pruned & weeded
Daniel Kivisu	Mangoes	120	75	62.5	weeded
Joseph Kitema	*Melia volkensii*	2750	2185	79	Pruned
Total		6120	4775	78	

Plate 1: Melia Volkensii trees in Kibwezi

In Marigat similar progress was realized in which fencing of 3 pilot sites was supported and planting of trees and crops initiated on a pilot basis in the villages of Ng'ambo and Salabani. The table below shows how the three plots in Marigat were planted.

Table 1: Re-planting of pilot sites in Marigat District

Site	Farmers	Crops	Spacing	Quantity
Salabani	David Kakimon	Neem	3x3m	236 trees
		Jatropha carcus	3x3m	310 trees
		Pasture	broadcasting	10kg
Ngambo	Loropil Pri. School			
		Jatropha carcus	3x3m	404 trees
		Neem	4x4m	350 trees
	Mrs. Eunice Nachuru	Grafted Mangoes	8x8m	45 trees
		Cowpeas		2 Kg
		Sorghum (KARI Mtama 1)		1 Kg
		Green grams		2 Kg
		Pasture		10 Kg

The 2 Jatropha plots at the Loropil Primary School and Mr. Kakimons farm and Neem at the school are performing well despite the long dry spell (Plate 2).

Plate 2: Neem and Jatropha trees at Marigat

Key challenges:-

Some of the key challenges experienced in maintenance of the sites in Marigat District, included: drought (led to germination failure), Livestock browsing (Goats were especially very notorious and could pass through very small openings on the fence) and lack of cooperation from some of the neighbouring community members and some farmers**.**

Finally, in Kajiado about 812 seedlings of *Acacia senegal* trees were surviving despite the severe drought. There were however, challenges arising from livestock encroachment and this necessitated assistance with fencing of part of the pilot site. The pilot site was also weeded. A nursery with about 60,000 assorted seedlings of Acacia spp was also established.

- ✓ **Establishment of additional demonstration plots using mechanized water harvesting system for high value trees such as *Melia volkensii*, fruit trees and other suitable species.**

About 48 acres (19.2 ha) were ploughed using the TM 155 tractor in Voi, Makindu, Kibwezi, Kathonzweni and Mwatate Districts (Table 2) but were yet to be planted as rainfall was quite erratic and unreliable during the whole financial year. More hectares could have been done but the tractor had some mechanical problems that took CMC Motors several weeks to fix and it was also found un-necessary to open up additional sites given the prevailing drought conditions.

Table 2: Pilot sites ploughed using the TM 155 tractor

Name of Farmer	Acres	District
Mrs. Rhoda Mkari	2	Voi
Naftali Ngete	2	Voi
Chard Lamela	2	Mwatate
Anold Marami	6	Voi
Henrique Kalema	8	Voi
Peter Nduulu	8	Makindu
Mr. Ndua	2	Kibwezi
Mr. Mulandi	2	Kibwezi
Douglas Kimeu Moki	7	Kathonzweni
James Mbithi	5	Kathonzweni
Thomas Makai	4	Kathonzweni
Total	**48**	

√ Collection of Jatropha seed/germplasm from strategic floral regions (different ecological range) in Kenya and East Africa

The project continued to register good progress through monitoring, documenting and mapping wild and planted Jatropha populations as a reference point for germplasm sources. The field survey and evaluation for seed sources is an on-going activity whose aim is to provide the necessary foundation for laying a systematic and regular seed and germplasm sources development through genetic (crop/tree) improvement process. This activity was carried out with the support and participation of community Resource Persons and other strategic partners/institutions working with Jatropha.

Owing to differences in growth cycle arising from ecological variations in the floral regions across Kenya and other countries in Eastern Africa where Jatropha grows, it is to be noted that the field surveys did not cover all the Jatropha growing areas (Floral Regions). In this regard, the mapping process will be continued during the remaining period (July – December 2011) to map and document the remaining areas as follows: Coastal region, North Rift Valley Eastern (Marsabit and Moyale) and North Eastern regions of Kenya as well as coordinate seed and germplasm collection /access from Tanzania and Uganda Seed Centres/Authorities respectively. To this end, a field programme will be developed to observe and collect seeds from the mapped wild germplasm for genetic evaluation focusing on the existing populations in the remaining regions

in Kenya, Tanzania and Uganda. Subsequently, the project will facilitate genetic characterization of the existing germplasm (local and imported germplasm) using appropriate molecular and phenotypic tools. These initial activities will enable KEFRI and partners to put in place a programme to develop Jatropha varieties through conventional breeding and molecular approaches.

Crop Performance

During the third quarter, the project continued to monitor and assess Jatropha's performance across the different areas/ sites, including established plots in Eastern ASAL regions, in the Lake Victoria Basin and Coastal regions. As earlier reported in the 2nd quarter, much of the observed variations in growth performance were with planted Jatropha. These variations imply that the original seed are not from one source, a situation which makes it difficult to evaluate the crop performance. So far the best performing planted Jatropha (planted as hedges) (**Plate 3)** are found in the Nguruman area of Kajiado District and some parts of Lake Basin areas. Interestingly, the wild Jatropha populations across the sites visited appear to be doing so well with no sign of disease and pest threats.

Plate 3: Jatropha planted as hedges

Jatropha Germplasm characterization

As already reported during the second quarter, this activity is on-going and is currently concentrating on the investigation of field performance of different provenances collected from Kenya, Tanzania, Uganda, Asia and Latin America. The evaluation process is being conducted by KEFRI as well as the University of Nairobi Experimental Farm in Kibwezi and Kenya Agricultural Research Institute (KARI) in Thika. The study seeks to investigate the genetic diversity of wild and cultivated *Jatropha curcas L*. This activity involves systematic evaluation of 49 accessions of Jatropha using both morphological and

molecular tools. By identifying and banking rare provenances within the species, this work serves to locate potential traits of interest for future production needs.

Similarly, the University of Nairobi and Pipal Ltd are jointly undertaking a similar study at the University farm in Kibwezi (Plate 4). KEFRI is a collaborating partner following the existing MoU which was signed with Pipal Ltd for cooperation in Jatropha and other biofuels tree crops. This is an extension of DEG Jatropha Support Programme which is being carried out by Pipal Ltd. Pipal is a private company funded by the German Ministry for Economic Cooperation and Development through DEG to conduct Jatropha research in East Africa. The evaluation process involves 22 Jatropha provenances, the research programme has test sites across East Africa and aims to contribute towards the understanding of which types of Jatropha give the best yields under which conditions and sustainable management practices. The programme seeks to enhance the productivity of Jatropha thereby addressing the economic viability of growing Jatropha as a sustainable biofuel feedstock in East Africa?

Plate 4: Provenance trial at the University of Nairobi Field station in Kibwezi

√ Engagement with Leading Private Sector in developing public-private partnership for *Melia volkensii* value chain products.

Strategic engagement with a leading Private Sector in developing public-private partnership.

In order to enhance the relationship and cooperation with private sector and public research and development entities such as KEFRI and NALEP, the project initiated strategic engagement with a leading Private Sector in developing public-private partnership. The principal role of the private sector operator is to provide Technical Support to KEFRI in the design &

development of research programme on *Melia volkensii* value chain with emphasis on capacity building, processing and marketing of a wide range of Melia products. This cooperation with the private sector is on-going following successful field visits and discussions held between the company and several Melia stakeholders in Kibwezi, Makueni and Kitui regions. This cooperation is on-going and is set to be strengthened in the agreed framework as elaborated in the existing ToR during the remaining quarter of this work plan.

√ Demonstration of processing utilization technologies for various Prosopis products in Garissa, Isiolo and Tana River counties

Kenya has had problems with invasive species, especially Prosopis species, in the recent years. However, management and control of Prosopis has been largely constrained by lack of knowledge and experience to deal with it. As part of capacity building initiative to address the Prosopis problems in the country, KEFRI in collaboration with NALEP undertook a training and awareness creation of the communities living with Prosopis in some of the most affected parts within Garissa, Isiolo and Tana River Counties. The activities carried out during the year were aimed at controlling the invasion of Prosopis through sustainable management and utilization of its products for improved livelihoods**.** These included classroom lectures and field demonstrations. These activities were carried out in Garissa (Garissa town), Isiolo (Malka Gala and Badana locations) and Tana River (Manyatta and Chewele locations) counties.

Classroom lectures

The classroom trainings covered some background information on current global distribution, management and utilization of Prosopis. This was aimed at sharing these experiences in order to close the existing knowledge gaps on the challenges and potential of the species. Specifically, experiences from countries such as Australia, Argentina, Djibouti, Ethiopia, Kenya, India, Peru and South Africa were cited. These experiences showed that Prosopis is now gradually being considered as a critical resource and focus on the species is now shifting towards minimizing the demerits through management and utilization. Other topics covered during the classroom sessions included lessons on harvesting and processing of utility and commercial value added Prosopis wood and pod products. Harvesting and processing technologies were explained at these stages.

(a) (b)

Plate 5: Training opening sessions in Garissa (a) and Merti (b)

Field trainings/ demonstrations

Field trainings/demonstrations focused on management of Prosopis thickets. The thickets were selectively thinned to reduce the number of trees in a population to a desirable density. In addition, excessive numbers of branches from the remnant trees were also removed by pruning to improve the stem quality and enhance tree diameter growth, which are important characteristics for timber and other commercial wood products. Procedures for reducing new regeneration of the Prosopis seedlings by alternative land use like planting of grass and other desirable vegetation was also covered. Bushy thickets are managed by selecting thinning to reduce the number of tree per stump and then well pruned to certain height to produce straight poles (Plate 6). This management regime was demonstrated in both sites. The community plans to grow grass on cleared areas to exclude Prosopis regeneration in the coming rainy season. Prunings were used for charcoal production and firewood for the community.

Plate 6: Thinning Prosopis field

Training in operation and maintenance of processing equipment

Some of the community members attending the trainings were trained on operations and maintenance of the processing equipment used. The main equipment and systems covered included tree cutting tools (chainsaws) and various methods of charcoal making.

Processing of Value Added Products

Harvesting and processing of value added products from Prosopis were demonstrated and communities trained in their production at different levels during field trainings. The use of the cleared biomass was demonstrated, particularly through charcoal making process using improved methods such as drum and improved earth kilns (Plate 7). Straight and large diameter logs were converted into sawn timber using an eco-efficient framed chainsaw timber processing system (Plate 8). Small diameter logs were converted into poles and posts for commercial construction and fencing purposes, which find ready market.

Plate 7: Charcoal making using (a) Drum kiln and (b) Earth kiln

Plate 8: Use of chain guide frames

Field days

At the end of the field training sessions in each site, the results were shared with the larger community through hosting of field days. A total of three one – day such events were held at Tana River County (Jabesa Community Forestry group, and Shika Adabu) sites. Prosopis has quite a number of other uses such as production of wood carvings, animals feed, kitchen ware, fiber for basketry, human food (fruits, jam and baking flour) (Plate 9) were also demonstrated during the field days.

Plate 9: Prosopis products being demonstrated

√ Gums and resins resources assessment and mapping carried out in Garbatulla district

Garbatulla District in Isiolo County is endowed with gum Arabic from (*Acacia senegal)* and gum resins (Hagar [from *Commiphora holtziana*] and frankincense [*Boswellia neglecta and Commiphora confusa*]) of commercial value. The district has a lot of potential for gum production (especially hagar), however, there is very limited information on the inventory and distribution of these resources and their potential in terms of gum production. It is for this reason that a resource assessment and mapping study was carried out in collaboration with Ministry of Agriculture, KFS and RCMRD to establish the extent, distribution and potential yield of gum resources by type and a resource map for the district produced. Due to resource constraints, a detailed resource assessment was carried out only for *Commiphora holtziana, while a quick assessment was done for the other species.*

The study generated a lot of important information. The information obtained included data on site factors (e.g. soil type, terrain, current use of the resources and other vegetation in the neighbourhood), distribution of diameter classes,

stocking, density, tree height, diameter and crown cover and their variations. The results are summarized in the Table below:

Table 3: Data on soil type, terrain and other tree species at the sampling plots in Garbatula District

Species	Location	Stocking density (stemsha^{-1})	Soil type	Terrain	Current use	Other species in the same habitat
A. paoli	Kulamawe	525	Loam	Flat to gently sloping	Gum collected for sale	*C. sinesis*
A. senegal	Eskot, Eldera Garbatula, Malkadaka, Barambate	285	Rocky sandy-Rocky and sandy loam	Flat to gently sloping	Gum collected for sale	*C. holtziana, C. confusa, C. africana, B. neglecta, B. coriasea, A. tortilis, C. sinensis, G. bicolor, B. aegyptiaca, G. villosa, P. resinosa and other Commiphora Spp,*
Commiphora holtziana	Garbatula, Boji, Eldera, Escort, Barambate, Gafarsa, Malkadaka	156	Brown / reddish rocky and sandy or sandy loam	Flat to gently sloping and steep slope at Malkadaka	Gum collected for sale	*A. senegal, A.tortilis, A. melifera, B. coriasea, G. tenax, C. sinesis, P.resinosa, C. confusa, G. villosa, B.*

						neglecta, *Cadaba spp*, *S. pasica*, *C. campestris*, *C. africana*, *G.bicolor*, *L.triphyla*, *E. burtii*, *P.resinosa*, *C. Rostrata*, *A. horida*, *A. paoli*, *I. donaldsonia*, *C. faminosa*, *A. reficiens*,
Commiphora confusa	Garbatula, Malkadaka, Eskot	188	Rocky sand	Flat to gently sloping	Gum collected for sale	*C. rostrata*, *C. africana*, *A. senegal*, *B. coriasea*, *B. neglecta*, *C. holtziana*, *C. confusa*, *A. tortilis*,
Boswellia neglecta	Garbatula, Escort	662	Reddish sandy loam	Flat to gently sloping	Gum collected for sale	*A. horida*, *A. tortilis*, *C. Africana*, *Sinesis*, *I. I. donaldsonia*, *C. holtziana and C. confusa*

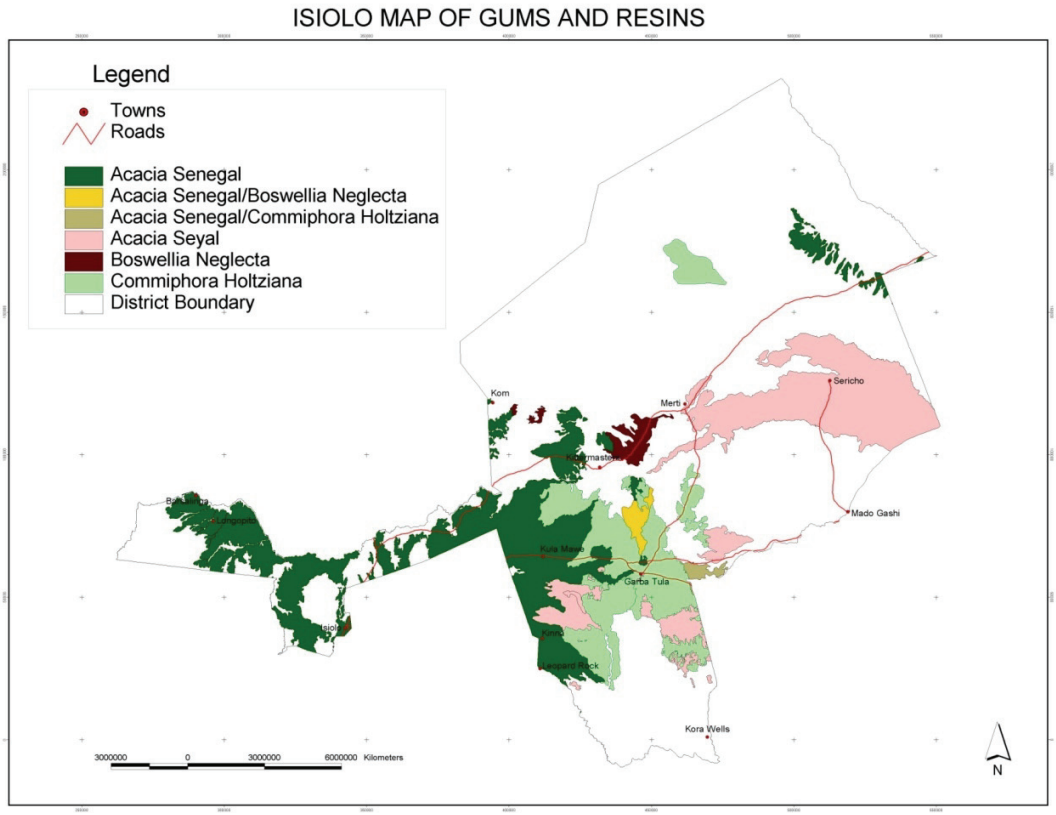

Figure 1: Draft Map of gums and resins in Isiolo County

Output 2: Marketing of timber and non-timber dry land products promoted

This has been accomplished in part through some of the already carried out training programmes and is expected to be finalized during the July-December 2011 period in Garbatula once the preparatory activities have been finalized.

KEFRI has played a key role in the development of concept notes targeting 10 tree based value chains for consideration in the NALEP Successor Programme which is envisaged to be operationalized as from January 2012.

Output 3: Capacity of service providers and beneficiaries on production, processing, primary quality control and marketing of dry land timber and non-timber products strengthened.

A number of activities have been carried out under this output and detailed training reports have been prepared. The key achievements include:

- Production and processing of *Melia volkensii*, Aloes, and Prosopis products were demonstrated during five field days held at Kibwezi (2), Merti (1), Bura (2), and Yatta (1) Districts. A total of **517** people (185 at Kibwezi, 260 in Bura and 72 in Yatta) attended these field days as shown in **Table 4**, below. Full reports on the field days have been prepared for knowledge and information sharing.
- A total of six trainings were carried out in Kibwezi, Garissa, Moyale (Dabel), Merti and Yatta Districts and **167** participants (comprising of community members and leaders of the local community, NGOs and CBOs) trained on issues related to management and utilization of *Prosopis juliflora* and processing of its products, propagation, management & utilization of Melia *volkensii,* Gums and resins and Propagation, Field establishment and management of Aloes and training reports produced. A summary of the trainings is contained in **Table 5.**
- Community sensitization on Prosopis project was carried out in Merti District, Isiolo County
- Stakeholders brainstorming/sensitization meeting held in Garbatula
- Gums and resins stakeholders forum held in Isiolo
- Conducted a needs assessment of community groups in Kibwezi, Yatta and Garissa on promotion, uptake and application of best practices in production, processing and marketing of timber and non-timber products.

Table 4: Summary of Field days

Site/Venue	Commodity	No. of Participants			Stakeholders
		Male	Female	Total	
Kibwezi	*Melia volkensii*, fruit orchards	15	5	20	MOA, NALEP, MOLD, Local Community
Kibwezi	Agro forestry and Agricultural technologies	73	92	165	Farmers ,Pupils of Nyayo primary school, Teachers, MOA, MOLD, Twiga Chemicals, Provincial Administration, KFS, USAID
Yatta	Melia volkensii Fruit orchards, Tree nurseries			72	NALEP, MOA, Local community, NACODEV
Bura	Prosopis	145	115	260	MOA, NALEP, MOLD, Local Community
Total				**517**	

Table 5: Summary of Trainings

Site/Venue	Commodity	No. of Participants			Stakeholders
		Males	Female	Total	
Garissa	Prosopis	14	7	21	MoLD, NIB, KFS, MoA, Community groups.
Kibwezi	*Melia volkensii*, Aloes	12	3	15	MOLD, COMMUNITY
Merti/Isiolo	Prosopis	37	17	54	MOA, KFS, MOLD/COMMUNITY
Yatta	*Melia volkensii*	18	12	30	MoA, NACODE(NGO) Community Groups,
Moyale	Gums & resins(tapping, primary value addition and marketing)	14	7	21	FARM AFRICA,KFS, NGARA
Kajiado	Seed Collection and Handling, Tree planting and environmental management	18	8	26	MASAI ECO-FARM, LOCAL COMMUNITIES
Total		**113**	**54**	**167**	

Output 4: Information on dry lands tree technologies and innovations generated, packaged, published and shared amongst the stakeholders

During the financial year a total of 8 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.

✓ Publications and Reports

Technical reports

1. Technical report on Prosopis
2. Propagation of Melia volkensii (booklet)
3. Investing in Melia volkensii (leaflet)
4. Improving dryland tree survival (booklet)
5. Report on Gums & Resins resource assessment in Garbatula District

Training reports

6. Six (6) community training reports
7. Gums & Resins Stakeholders' Forum report

Livelihood briefs

The project has reviewed relevant research findings as a basis for the development of 13 livelihood briefs, nine of which were finalized and the rest being edited for publication. The finalized livelihood briefs are on the following commodities: Gum Arabic, Myrrh, Hagar, Frankinsense, Aloe, Prosopis, Dyes & tannins, *Vitex payos and*, East African Sandal wood.

Updating of Websites

- √ KEFRI website has been updated on a quarterly basis and linkage with NAFIS database is planned.
- √ KEFRI Scientists developed a draft concept on 10 tree based value chains as part of the inputs/development for NALEP Successor Programme (concept note for the new programme).

Publishing Jatropha Resource Book

- Considering the overwhelming demand for credible information about Jatropha, the project is supporting information generation and exchange

through the development and publication of Jatropha resource book. The book is designed to address information needs of a wide range of issues of Jatropha value chain. The first draft of the publication has been developed.

Dissemination of mechanized water harvesting system

√ NALEP supported a team from AMS to travel to Kibwezi to observe the Vallerani system and recommend a viable way forward in the up scaling of the mechanized water harvesting which is crucial for conservation agriculture and afforestation in the Kenyan ASALS. The team was impressed with the impact of tree farming using this technology in the life of at least two KEFRI collaborating farmers. The team recommended that:

- ✓ There is therefore need to consider redesigning/ modifying the ploughs to reduce the weights so that they can be used by the locally available 75-90 HP tractors.
- ✓ There is also need to consider the possibility of purchasing the entire unit for AMS Centers in ASALS
- ✓ It is also crucial that the Vallerani system be piloted alongside other technologies available at the AMS e.g. the sub-soiler

Output 5: Policy making process informed through information and technology generation on sustainable resource management and utilization in ASAL areas.

Information generation is an integral part of the project and is expected to result in production of some key policy briefs. So far a guideline on Prosopis has been finalized and a draft policy brief on "**Status and Intervention Measures required to manage the Prosopis (Mathenge) invasions in Kenya"** also produced

3. EMERGING ISSUES FOR FUTURE ACTION

During the implementation of the various activities, a number of issues arose concerning the various commodities/high value trees as below:-

✓ *Melia volkensii*

- Need for a more intense /detailed training on Melia seedling production by KEFRI supported by NACODEV and MoA
- Possible sources of Melia seedlings and their prices for on-farm tree planting
- Need for clarification to the farmers on the difference between *Melia volkensii* and other related species such as *Melia azedaratch* and *Azadirachta indica*,
- Short on-job training can be offered to a few individuals at KEFRI Kitui Centre as starting point to boost adoption of Melia growing in the area.
- Need for communities to be trained on sustainable use of natural resources to ensure resource availability for future generations and also to avoid environmental degradation
- Community members to adopt the short, medium and long term investment policy in their farms to ensure availability of incomes, food and other farm based resources.
- Promote the growing and use of Mukau (*Melia Volkensii*) in all suitable ASAL areas due to its multiple uses.

- There is under exploitation of *Melia volkenssii* in Taita Taveta District due to lack of knowledge on its importance. There is therefore need for training on sustainable harvesting and conservation of Melia in the area.
- Need for more practical/demonstrations on the Mukau value chain in areas with potential such as Kathonzweni which could also be utilized as training facilities for the local communities.
- There is need to promote formation of producer partnerships/associations (Common interest groups) for the various indentified commodities for ease of adoption of technologies such as growing of Mukau and Aloe and marketing of their products and by products.
- Participant's encouraged to share information received with other community members
- KEFRI to conduct more research on use of non-timber Melia products such as **Melia leaves to control termites.**

✓ **Seed collection and handling, tree planting and environmental management**

- Need to demonstrate methods to community on how to curb over harvesting of trees for medicinal plants and charcoal burning. Formation of forest conservation committees, which can then sensitize the general public on the need to use the available resource sustainably, is recommended. It is equally desirable to undertake an inventory and mapping of available tree resources of commerce and then promote mass propagation/planting.
- MoLD should encourage communities in Kajiado district to harvest and store the abundant fodder arising from the occasional heavy rains.
- The pastoral communities such as the Maasai should be motivated through exchange visits to other semi arid areas such as Makueni or Kitui to be involved in agricultural production using best bet practices.

Gums and Resins

- Warehouses for bulking, storage and primary value addition of gums and resins should be put up in key gum producing areas.
- The existing groups should form and register as a CBO or cooperative Society to help bulk the gums and resins and bargain for better prices
- The gums and resins producers and traders should be encouraged and supported to develop bankable business plans in order to compete effectively in the market.
- KEFRI-NGARA should consider making formal engagements with other development partners operating in gums and resins producing areas in order to promote synergies and complementarities and eliminate unnecessary duplication of efforts.
- Need for national and regional standards on quality of gums and resins
- Need for further training on gums and resins production and post harvest handling in order to produce quality products

Prosopis

- Need for commitment in the part of the communities on the management & utilization of Prosopis
- Need to bring stakeholders (Community members, Government line ministries, Researchers e.g. KEFRI & KARI) to work together in the control, management and utilization of Prosopis.
- There is need to avoid using immature Prosopis poles (unless they are preserved) for building as these are often attacked by insects as the sapwood has a lot of sugar, thus susceptible to attack.
- Need to avail the training information/materials to the TOTs for use to train others
- Diseases affecting donkeys which have fed on Prosopis – Live stock staff to look into the same
- More information needs to be provided to the communities on the sources and prices of charcoal kilns and other tools and equipment used in the management and utilization of Prosopis.
- There is a possibility of other tree resources being cut while cutting the Prospos. Therefore, KFS and the local leadership need to work closely with the community groups to ensure only Prosopis is being targeted and that the only wood being extracted is that which is extracted during

opening up the area during management practices. Products movement permits should strictly be issued after the areas have been inspected to ensure compliance. It is also essential that the community groups sign a memorandum of understanding with the project to commit themselves to ensure that the main thrust is management of Prosopis and production of products is only a secondary activity.

- The groups involved in Prosopis management and utilization need to be registered and should comprise of both gender and a diversity of age groups..

Aloe

- Aloe utilization-need for more research to find out if Aloe sap (being medicinal) can be used in the management of Aloe pests and diseases.
- There is need to organize a seminar in Kibwezi or Voi to link Aloe farmers to Aloe processers and marketers

4. CONCLUSIONS AND RECOMMENDATIONS

Conclusions

- ✓ The mechanized water harvesting system (the Vallerani system) has ploughs that are very good for conservation agriculture, however, the size of the tractor and the weights of the ploughs are a bit prohibitive due to the high cost of purchasing the equipment and the restriction of the ploughs for use only by the TM 155 -180 HP tractors. AMS should provide professional advice on the up-scaling of the use of the Vallerani system in mechanized water harvesting in the ASALs through either purchase of additional units for selected AMS Centres or modification of the ploughs for use by smaller tractors (75-90 HP).
- ✓ 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 have been demonstrated as avenues for increasing household incomes in ASALs.
- ✓ Capacity of 684 service providers and community members has been enhanced on production, processing, primary quality control and marketing of dry land timber and non-timber products through field days and training sessions.

- ✓ A number information product (reports, brochures, and publications) with useful information have been produced and are to be shared with the key stakeholders.
- ✓ Garbatula has reasonable quantities of gum resources that have a potential to make significant contributions in improving the livelihoods of the local communities.
- ✓ Information generation through the project has continued to result in the production of some key policy briefs such as a draft policy brief on "**Status and Intervention Measures required for managing Prosopis (Mathenge) invasions in Kenya".**

Recommendations

- ✓ Based on the preliminary results of the on-going study on Jatropha, it is important to consider accurate documentation and mapping of planted Jatropha as well as wild Jatropha populations as a reference point for on-going and future work on Jatropha R&D, genetic evaluation and characterization of existing germplasm.
- ✓ In order to domesticate the mechanized water harvesting system, there is need for AMS to consider redesigning/ modifying the Vallerani system ploughs to reduce the weights so that they can be used by the locally available 75-90 HP tractors, purchasing the entire unit for AMS Centres in ASALS and piloting the Vallerani system alongside other technologies available at the AMS e.g. the sub-soiler.
- ✓ Further ground truthing be done to improve the map produced for Garbatulla District and resource assessment and mapping be carried out in Isiolo District in order to finalize the County map on the resources
- ✓ There is need for further engagement of some of the participating farmers in order to assure the success of the intervention. There is also a further need to fence off all pilot sites to keep off livestock to ensure greater survival of the trees.
- ✓ In order to increase access to information by the service providers and beneficiaries there is need for enhanced dissemination of existing information.
- ✓ Marketing studies and value chain analysis to be carried out for gums and resins in Garbatulla District between August and December 2011.

5. ANNEXES

Annex 1: Brief Description of Pilot project Districts
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.

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.

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 33ºC and 42º C. It receives bimodal rainfall with annual average of between 250-300mm and is dominated by five livelihood zones.

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 km^2. 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.

Annex 2: Work plan and indicative budget

Expected Outputs	Activities	PM&E Indicators	Resources/ Inputs and Indicative budget (Kshs)	Total Indicative budget (Kshs)	Responsibility	Implementation period			
						Q1	Q2	Q3	Q4
1. Production and processing of high value tree based products including; gums, resins, pharmaceuticals, bio-pesticides, aloe and Prosopis products demonstrated	Maintenance of demonstration plots established in 2009	Demo plots maintained and replanted	Casual labour 150,000 Transport- 100,000 Supervision-200,000 Seeds procurement-150,000 seedlings- 400,000 Fencing -200,000	1,200,000	Muchiri/ Mutunga/ Salina/ Sukuru/ Fatuma				
	Collect Jatropha seed/germplasm from strategic floral regions (different ecological range) in Kenya and East Africa	Seeds/germplasm collected	Personell-250,000 Transport-100,000 Sees/germplasm-250,000	600,000	Nyamai/ Muchiri				
	Establish at least 60 ha demonstration plots of high value trees such as *Melia volkensi* or other suitable species integrated with fodder crops and /or pastures in 2 Districts	Demonstration plots established in 2 target districts	Personnel – 200,000 Fuel and maintenance-200,000 Communication- 10,000 Seedlings- 300,000 Seeds – 90,000 Casual labour-150,000	1,000,000	Muga/ Muchiri/ Mutunga				
	Demonstrate processing utilization technologies for various Prosopis products in 3 districts	Demos done in 3 target districts	Personnel-250,000 Stationery-10,000 Transport-90,000 communication-10,000 Community facilitation (refreshments and transport refunds) -90,000 Demo kits- 150,000	600,000	Muthike/ Choge				
	Engage with Leading Private Sector in the development of public-private partnerships for *Melia volkensi* value chain products	Consultative process and programme of activies agreed on	Secure services of Private sector expert in Melia At least 5 Programme/strategy development contact sessions	300,000	Melia Limited Company				

2. Marketing of timber and non timber dry land products promoted.	Monitor the quantities and value of at least 2 high value ASAL products along the market chain	Value chains conducted, reports	Personnel-200,000 Stationery-15,000 Transport-60,000 Communication-5,000 Community facilitation (refreshments and transport refunds) -20,000	300,000	Wekesa/ Luvanda				
	Undertake market assessments and surveillance to provide information on demand and supply for at least 2 commodities	Research and Surveillance report	Personnel-200,000 Stationery-15,000 Transport-60,000 Communication-5,000 Community facilitation (refreshments and transport refunds)-20,000	300,000	Luvanda/ Wekesa				
	Network and Link at least 2 ASAL commodities' producers to the market	Catalogue of Producers, buyers and processors of at least 2 products produced.	Personnel-100,000 Stationery-15,000 Transport-60,000 Communication-5,000 Community facilitation-120,000	300,000	Wekesa/ Luvanda/				
3. Capacity of service providers and beneficiaries on production, processing, primary quality control and marketing of timber and non-timber products strengthened	Carry out a needs assessment of service providers and community groups in promotion, uptake and application of best practices	At least 200 members from at least 5 service providers and 5 community groups covered	Personnel – 230,000 Stationery – 10,000 Transport – 50,000 Communication – 10,000	300,000	Ng'ethe/ Choge/ violet/				
	Produce training/extension materials on various technologies focusing on specific ASAL commodities	At least 1,000 copies on at least 2 commodities printed	Personnel – 115,000 Stationery – 10,000 Transport – 20,000 Communication – 5,000 Printing - 100,000	250,000	Sheila/Emily / Choge/ Dorothy				

	Training of local communities by ToTs (trained in 2009)	At least 150 community members from at least 5 dryland districts trained	Personnel - 550,000 Stationery – 30,000 Transport – 200,000 Communication – 20,000 Demo kits – 50,000 Community facilitation (Lunches, teas and transport refund)-150,000	1,000,000	Muga/Emily / Ng'ethe/ Violet				
	Organize local exchange visit for both ToTs and local community groups	At least 30 people participate in at least one local tour of sites with best bet practices	Personnel – 170,000 Stationery – 10,000 Transport - 150,000 Communication – 10,000 Accommodation and meals for participants-450,000	800,000	Muga/ Nyamai/ Ng'ethe				
4. Information on drylands tree technologies and innovations generated, packaged, published and shared amongst the stakeholders	Profiling of the various demonstration sites and enterprises.	At least 5 demonstration sites and at least 2 enterprises profiled	Personnel-230,000 Transport-75,000 Stationery-5,000 Publication-50,000	350,000	Wekesa + Intern to be identified				
	Packaging success stories, repackaging and updating of existing information including Jatropha Resource Book	At least three drylands technologies packaged/repackaged	Authors & Editors- – 350,000 Stationery – 10,000 transport – 30,000 communication – 10,000	350,000	Sheila/ Emily/ Tuwei/ Choge				
	Printing of relevant information products, including Jatropha Resource Book	At 2,000 copies of at least 4 different information products printed	Printing costs @ 250/ booklet/copy	500,000	Sheila, E. Kitheka & D. Nyamai				

	Updating KEFRI, NGARA and NAFIS databases and linking various website	At least 2 databases updated	Personnel-50,000 Supplies-75,000 Transport-10,000 Communication-5,000	140,000	Sheila/ Charles				
	Information dissemination and knowledge sharing through open fora and distribution of information products	At least 1 open day, 2 field days, 1 side event and 2 workshops /conferences held/attended	Open day – 100,000 Workshop/Conference – 450,000 2 Field days – 300,000 1 Side event –50,000	900,000	Emily/Sheila				
	Provide markets and marketing information using media (electronic and print) and linking this to NAFIS	At least 10 producer associations provided with information on products and markets	Personnel – 30,000 stationery – 5,000 transport – 10,000 communication – 10,000 adverts clips – 350,000 information products – 100,000	510,000	Communication & Marketing Specialists (Sheila & Wekesa); Media Experts				
5. Policy making process informed through information and technology generation on sustainable resource management and utilization in ASAL areas.	Produce draft Policy briefs on prosopis, gums and resins	At least 1 retreat held to finalize briefs	Personnel-175,000 stationery – 5,000 transport – 15,000 communication – 5,000	200,000	Nyamai/ Choge/ Sheila/ Muthike/ Muga				
	Workshop to validate policy briefs	At least 1 workshop held and briefs validated	Accommodation-200,000 stationery – 15,000 transport – 60,000 communication – 5,000 Group teas and lunches-60,000	340,,000	Nyamai/ Ng'ethe				
Supervision, planning, monitoring & Evaluation	Monitoring & Evaluation	At least 1 monitoring visit per site carried out	Personnel – 200,000 Transport – 80,000 Communication – 10,000 Stationary – 10,000	300,000	Nyamai/ Muga/ Mutunga				

	Planning and review retreats together with NALEP representatives	At least 2 retreats held	Personnel-520,000 stationery –20,00 transport – 50,000 communication – 10,000	600,000	Nyamai/ Muga/ Emily				
Grand total				**10,000,000**					