

BARINGO FUEL AND FODDER PROJECT (BFFP):  
PLANS, MANAGEMENT AND LINKAGES

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## INTRODUCTION

This report is the output of process consulting on Baringo Fuel and Fodder. It was commissioned by the Royal Netherlands Embassy. A draft report was submitted, comments made and incorporated into this, the final report.

As is the case in process consulting, we at Mutiso Consultants Ltd. worked very closely (at times too closely!) with the BFFP personnel but are solely responsible for this report. It is important to note that in pursuit of fulfilling our terms of reference, as we understand them, differences of opinion with project management, as evidenced by comments on the draft report, did crop up. We have not tried to patch them, for to do so is to demean the potential long-term development objectives of the project.

The bulk of the work for this consultancy was related to TOR 1, an instruction which was made after efforts along all terms of reference were initiated. In any case all the TORs are interrelated.

Many meetings were held with officers at the District, Provincial and National levels. The issue was to first clarify to different levels the aims and purposes of the project and secondly to link the project to ongoing GoK processes. The established contacts should enable the project to have less turbulent relations.

However, it is extremely important that project management not only continue active official liaison, but also become more systematically active in community institution building in the spirit of District Focus.

The burden of cementing project relations with district officialdom and the assorted communities is on the project and not on the assorted officials. Further the processes of interaction must be outside the social system of the enclave that is Lake Baringo for in a primary sense the district officials and community processes are not part and parcel of the enclave even though they dip into it from time to time.

The Report is in five parts. These are Achievements and Plans covering TOR 1 & 9; Integration into District Focus System covering TOR 2, 3 & 7; Management, Training and Recruitment covering TOR 4, 5 & 6; Applied and Basic Research covering TOR 8 and Mechanized Land Preparation Costs covering TOR 8. A list of acronyms is found at the end. We have tried to specify what action needs to be taken on specific issues and the person or institution which should take action. Where more than one person or institution must take a decision, we have listed the initiator first and other concerned parties in descending order.



## 1. ACHIEVEMENTS AND PLANS [TOR 1 & 9]

### 1.1. THE PROJECT'S PAST

The Baringo Fuel and Fodder Project is a Ministry of Energy research and development project directly funded by the Royal Netherlands Government. The primary project objective since its inception in 1982 has been:

"To rehabilitate denuded land and establish local management of these improved areas, while increasing the availability of fuelwood and fodder for the local people." (Project Agreement).

To ensure that basic resources for sustaining human livelihood are not depleted within the next few decades, there is an urgent need to rehabilitate land on a large scale and halt soil erosion in Baringo District. Ecological deterioration has become so critical that some studies predict Lake Baringo will become a shallow swamp in 20 years time (PENCOL 1984). For both social and ecological reasons there is an urgency to improve the productivity of marginal lands and land utilization practices, especially in regards to the production of fuelwood and fodder.

As technical solutions for large scale rehabilitation are worked out, it is recognized that community actions are important in ensuring that, in the long-term, appropriate development is maintained. It was in this spirit that the Joint Energy Mission (JEFM) of December 1987 recommended that:

"--- in the design of energy and energy related projects and programs specific details of how activities are to be continued by the various communities must be specified over and above the specification of relationships between projects and line ministries."

JEFM further stated and recommended as follows:

"The Baringo Fuel and Fodder Project has a number of promising fodder tree species that have impact outside the geographical location. It has developed a technically feasible range of rehabilitation approach. The research capacity of the Project is, however, very limited. It is therefore, necessary that more research efforts should be put in the following areas:

- a) environmental monitoring including vegetation survey;
- b) fodder and pasture development; and
- c) applied socio-economic research.

The recruitment of a full-time fodder specialist is recommended".

The Baringo Fuel and Fodder Project began in 1982. There is budget commitment from the Royal Netherlands Government till the

end of 1989. Funding for the rest of the Sixth National Plan Period will be negotiated by the Kenya Government (Ministry of Energy) and the Dutch Government, who both favor large-scale expansion of the project.

## 1.2. ACHIEVEMENTS 1982-1988.

### 1.2.1. Construction.

Since inception of the project, the following facilities necessary for efficient operations have been constructed:

1. Three Offices
2. Two Stores
3. Workshop/Garage
4. Workshop Stores (2)
5. Project Manager's House

### 1.2.2. Nursery

#### 1.2.2.1. Tree Seedling Production.

320,000 seedlings have been produced in the project headquarters nursery in past seasons. Of these, 145,525 seedlings have been planted in project fields. 174,475 seedlings supplied to other tree planting institutions in the district.

In April 1988, there were 100,000 seedlings ready for planting in the project nursery.

#### 1.2.2.2. Species Trials

Since inception, 50 tree species were tried both in the nursery and in the fields. Out of these, 19 species have been identified for long-term planting.

#### 1.2.2.3. Seed Orchard

20 tree species are established in the seed orchard under irrigation conditions as a source of seed.

### 1.2.3. Planted Fields

A total of 388 hectares have been planted since 1982. An extra 109 hectares are scheduled for planting during 1988. The planted fields have been successfully rehabilitated with high survival rates and good growth of trees, shrubs and grasses. Soil erosion has been stopped within these rehabilitated areas.

### 1.2.4. Pan Dams

8 new pan dams have been constructed.



#### 1.2.5. Roads

Approximately 20 km. of roads have been constructed.

#### 1.2.6. School Assistance

The project has assisted Kampi Ya Samaki Primary School in rehabilitating its compound and also supplied seedlings to 3 other schools. These activities have been a useful extension of project activities to young people.

#### 1.2.7. Applied Research

Applied research in project nurseries have been carried out on seed germination techniques for fuel and fodder producing exotic and indigenous species.

Applied research on tree growth and survival rates under different spacings and micro-catchments after outplanting has been done.

Applied research has been done on grass species relevant for reseeded denuded land.

Applied research has been done on micro-catchment and field preparation techniques.

Applied research collection of indigenous grass, shrub and tree species to determine their use and importance in the socio-economic life of the people and for rehabilitation has been done.

#### 1.2.8. Training

All Permanent Staff (30) have been trained in nursery, field preparation, planting and field maintenance.

Two Field Assistants have been trained in all facets of managing the project fields.

To ensure proper maintenance of the project's electric fences an electric fence installation and maintenance assistant has been trained.

### 1.3. SIXTH PLAN PERIOD [1989-1993] OBJECTIVES

#### 1.3.1. Field Expansion

The project plans to expand during the plan period and to cover 4,300 hectares. It is expected that 300 hectares will be planted in 1989 and 1,000 hectares each subsequent year.

The project has already received and processed requests from sixteen sites in five locations in Ginyang, Marigat and Kabartonjo Divisions. These requests, shown in the following table, amount to 1,950 hectares. These and other requests inviting the project to specific sites are being processed through the District Focus Committee structure. It is expected that more land than the planned target will be offered by the communities over the plan period.

Sites	Hectares	Location	Division
5	500	Saimo-Soi	Kabartonjo
3	300	Korossi	Ginyang
1	50	Njembo	Marigat
2	100	Ng'ambo	Marigat
5	1,000	Mukutani	Marigat

#### 1.3.2. Nurseries

It is estimated that 3 new nurseries will be established over the plan period to facilitate rehabilitation efforts in sub-locations too far from the existing nursery. Precise nursery numbers and sites will depend on availability of a reliable water source and the areas offered to the project. However, subject to detailed planning, good sites can be found at Kisarian, Mukutani and Loboi.

#### 1.3.3. Charcoal Production

Central to the project is the development of woodfuel production. The trees planted will not mature within the plan period, however, thinnings will be utilized in developing more efficient charcoal making systems than exist locally. Efforts towards this end were made in 1988, when thinnings produced 30 bags of charcoal.

#### 1.3.4. Rural Access Roads

Where needed, the project will use project machinery to construct access roads to new fields. More often than not these are the only roads in the particular communities.

#### 1.3.5. Pan Dams

Project machinery will be used to construct a pan dam near each new field on request from the community. These dams will also be used to service BFFP field operations.



#### 1.3.6. Research and Development

Soil erosion is a government priority. However, no localized detailed data and maps of soil erosion exists for the project area. These are necessary for planning purposes.

Bio-economic assessment of the project will be done during the plan period. This includes a bio-mass and carrying capacity of project fields in comparison to near-by areas outside the fields, and the economics of large scale land rehabilitation.

Studies on social organization is necessary in field areas. These will include issues of distributing project field benefits to the communities concerned, and local management of the rehabilitated areas.

The project will continue its applied research on appropriate nursery technologies and semi arid tree species particularly with indigenous trees and shrubs.

Applied research on project fields will continue including tree growth and survival rates, identifying successful tree, shrub and grass species, spacing trials and microcatchments among others.

#### 1.3.7. Schools Assistance

The schools near project nurseries will be assisted on request in rehabilitating their compounds and in provision of seedlings since the project considers the extension through schools as an important long-term objective.

A special extension program for schools to create awareness of causes and solutions of environmental degradation issues will be started during the Plan Period.

#### 1.3.8. Increase Extension Activities

The project intends to expand educational activities in communities within the project area, on the necessity of rehabilitating land and land use management. This will be done through holding seminars for local leaders and members of the community. Field trips within the project area and in related projects will be organized. To facilitate spread of the information to more people in the project area, the district, and the rest of the nation, manuals on rehabilitation will eventually be developed.

#### 1.3.9. Formalization of BFFP Project Field Committees

Existing fields were identified by communities who formed committees to liaise with the project. For long-term management of the project, it is important that these committees be

formalized and integrated into the process of Sublocational Development Committees and the Locational Development Committees.

Over the Plan Period, these committees will continue to be a communication link and source of information for BFFP. These committees will be the channel for education in field management, land utilization and improved livestock management.

The long-term sustainability of rehabilitated fields is dependent on the successful organization and formalization of these committees and their evolution into viable community institutions able to protect the rehabilitated land by judicious utilization of the resources.

#### 1.3.10. Charcoal Production

Central to the project is production of wood energy. The planted trees will not mature within the Plan Period, however, thinnings will be utilized in developing more efficient charcoal making systems than exist locally.

#### 1.3.11. Construction

The project will need a new site of approximately 3 hectares to construct facilities to accommodate staff and service other project activities needed for the expanded program. These include a charcoal storage barn, two offices and stores, two managerial, five supervisors and 15 staff houses and a guest house.

#### 1.3.11. Management

The project expects to expand its staff by two researchers who will also have management responsibilities, and an administrative assistant over the plan period to enable it to cope with the expanded work program.

### 1.4. EXPECTED IMPACTS

The expected socio-economic and environmental impacts will be:

- 1.4.1. Increase in bio-mass
- 1.4.2. Erosion control
- 1.4.3. Improvement in land utilization practices
- 1.4.4. Increased production of wood energy
- 1.4.5. Increase in fodder production
- 1.4.6. Increase in livestock production
- 1.4.7. Increase in economic activity/production.



### 1.5. ORGANIZATIONAL LINKS AND ACTIVITIES

So as to meet the objectives identified by the project, a few organizational issues necessary for consolidating links between the project and other GoK actors need to be resolved. Below, we discuss them and identify the parties who should take action. Where more than one actor are identified, it is assumed that initiative will be with the lead actor, the one listed first.

#### 1.5.1. Project Planning Framework.

The detailed workplan for 1989 has been written. No documentation of detailed review of the project's Phases 1 and 2, which would have been done before the current Phase 3 were made available to the consultants. It is planned that a Formulation/Review Mission will be mounted in 1989.

The project's planning periods do not exactly fit the five year planning cycle of the GoK. Consequently project staff prepare different documentation for GoK and for the donor. This is an unnecessary load on project management. Phase 4 of the project which starts in 1990, should therefore be for four years so as to fit the project to the Sixth National Development Plan.  
ACTION: Embassy and Project Staff.

#### 1.5.2. Inclusion in the Sixth National Development Plan.

The targets, objectives and expected impacts identified under 1.1 to 1.4 above were based on discussions with project management while preparing a document for presentation to the Baringo District Development Committee (DDC) through the District Development Officer (DDO). The DDO was expected to prepare the Baringo District Development Plan for inclusion in the Sixth National Development Plan as no DEDO had been posted by December 1988. An indicative Energy Plan was developed by the DDO and included in the District Plan.

The project and the DDO will have to liaise so as to prepare documentation for the district rolling plan each year.  
ACTION: Project Management and DDO

#### 1.5.3. District Energy Development Officer.

The Joint Energy Formulation Mission of December 1987 called for the establishment of a District Energy Development Officer. Five were proposed but the Ministry of Energy has already established nine, one of which is supposed to service Baringo. There was confusion on whether there would be one specifically appointed for Baringo or one would be based in Nakuru to service Nakuru and Baringo and other districts. One officer was appointed, posted to Nakuru, but had to be terminated immediately.

The latest (December) District Energy Planning Task Force (DEPTAF) planning position is that there will be a DEDO posted to Baringo during the first staffing which is supposed to come on stream during the current financial year.

The MoE has accepted the need for the DEDOs but there is some debate within the ministry on the type of officer to post and the internal reporting responsibilities.

A Baringo DEDO appointment, so that the MoE has a representative in the district is important. When one is posted, then he can represent the project at the district level for direct funded project managers cannot represent ministries at district level as they are not GoK employees.

ACTION: Embassy, DEPTAF, MoE.

#### 1.5.4. Baringo District Energy Center Financing

Given current funding problems on Nakuru, where the donor is caught in an implementation organi bind, it is important that the Netherlands Government specify its stand on financing a Baringo District Energy Center. JEFM specifically identified the need for one of the first energy centers to be located in a semi-arid district. There was expression of interest from the Embassy for financing such a center in Baringo. Towards that end, the Embassy should clarify its latest position with the Ministry. Specifically, the Embassy intentions should be transmitted to the Biomass Energy Programs/Projects Steering Committee (BEPPSC), DEPTAF and the Biomass Energy Division for structurally all seem to be part of the decision process. Formally, this does not have to wait for the resolution of other JEFM related matters now in the Biomass Energy Programs/ Project Steering Committee. It can be resolved on its own. However the MoE will have to send a formal request for funding of the center to the Netherlands Embassy.

ACTION: Netherlands Embassy; Head, DEPTAF MoE; Biomass Energy Programs/Projects Steering Committee; Head Biomass Div. MoE.

#### 1.5.5. Location of the District Energy Center

Where to locate a District Energy Center is a matter for the Baringo DDC. Discussions have been held with interested parties on the issue at the district, provincial and national level about possible sites in the semi-arid parts of the district. The DEC has considered a possible site. A final selection of the site, which will take into account project interests and possible support, should be earmarked by the DDC. Although the project may hold a watching brief on the site, its running will be the part of the responsibilities of the DEDO after posting and familiarization with Baringo district energy needs.

ACTION: Baringo DDC; Baringo DEDO



#### 1.5.6. District Energy Subcommittee

JEFM December 1987 called for the establishment of District Energy Subcommittees of the DDCs in keeping with the practices of District Focus. In a basic sense these will not function effectively, even where established, until DEDOs are in place and they can watch over them. Since Baringo DEDO will be in place in the near term, the committee should be established to service the project among other things. The project should participate in the District Energy Subcommittee since all project managers are automatically members of the DDC/DEC sector subcommittees according to DF practices.

ACTION: DC and DDC Baringo; DDO and DEDO Baringo; Project Management.

#### 1.5.7. Planning Time-frame Phase 2 of BFFP

The Project's Phase 2 should be made a four year program so that project planning activities can fit into district and national planning mode and thus avoid separate planning exercises for the District Development Plan and its Annual Annex (rolling plan) and National Plans and the donor internal planning time frames.

ACTION: Embassy and Project Management.

#### 1.5.8. National Energy Projects Steering Committee

JEFM proposed a unified committee to handle all MoE renewable energy projects. Such a committee was established by a circular from the Permanent Secretary, MoE dated January 27, 1988 and titled Biomass Energy Development Program/Project and issued under his signature. The committee is formally called Biomass Energy Development Program/Project Steering Committee. Its Chairman is the PS who is represented by Mr. S. M. Mullei. The Head of Biomass Div. is also the Head of Biomass Development Programs/Projects as well as the Committee Coordinator. BFFP is a member.

The policy prescriptions in the document are to:

"A. Have all Biomass Energy Development Programs/Projects prepare project documents as per the already adopted Ministry's standard project format.

B. Have all Woodfuel Development Programs/Projects adopt the following guidelines:-

- i. Each project to concentrate on one specific activity and in a particular region.
- ii. The areas of activity to be limited to:-  
Biomass energy enhancement  
Woodfuel energy conversion system/device

c. Have all Biomass Energy Development Programs/Projects come under the management of one Steering Committee. "

According to this circular, the functions of the Steering committee are:-

"To evaluate and approve the yearly project work plans.  
To receive and approve quarterly project progress reports.  
To guide and help the project implementing teams towards the attainment of project goals."

It should then be clear from the above that the Project has to;

- Attend committee meetings.
- Prepare project documents to MoE standard project format.
- Participate in committee deliberations.
- Submit yearly project work plans.
- Submit quarterly project progress reports.

ACTION: Project Management

#### 1.5.9. Links Between Project and Ministry.

This unified committee, which had been called for by JEFM, has to date concentrated on reviewing its proposals and struggling with the KWDP issue. To date has not specifically reviewed BFFP. Although it is a good idea that in one of its meetings it discuss BFFP formally, for purposes of clarifying to the Baringo DDC and the Provincial Monitoring Committee the R & D role of the project, our judgment is that it will not happen soon given the more urgent issues of KWDP on its plate. Consequently, the formal projects links with the MoE remain as the Biomass Division and the unified committee but for purposes of the immediate decisions on District Energy Center and the posting of a DEDO contact with DEPTAF is important.

ACTION: Project Management.

#### 1.5.10. Procedure to Get Request for Phase 4 Funding

There are problems with the MoE internal process of accepting JEFM recommendations as evidenced by the slow progress towards that end in the three meetings between January and September 1988. These have been complicated by the KWDP problems. In the circumstances, MoE line operators are not likely to focus on BFFP. Yet request for its extension is needed. In view of this we strongly recommend that the issue be handled at the Ambassador and Minister level. The procedure would be for the Embassy to formally write to the Minister a brief with detailed pictorial annexes on the program pointing out that the Dutch Government is desirous of continuing the project for the following reasons;

a. It is the only project in the country doing R&D for Arid and Semi-arid afforestation.



b. It is thoroughly district based and thus there is every likelihood it will be transferable particularly given the Ministry's District Energy Strategy which will put District Energy Development Officers in each district over the Sixth National Plan period.

c. The Dutch Government would finance a District Energy Center in Baringo as per JEFM briefing by Embassy.

The Embassy should then seek audience with the Minister to get clearance for proceeding with the requests for extension of BFM along the usual channels.

ACTION: Netherlands Embassy.

#### 1. 6. PROJECT STRATEGIC PLAN

In project documents perused and discussions, no clear strategic plan for the project emerges. In some ways TOR 9 suggests that we get involved in this exercise. This has not been possible and project management has suggested that we could be involved at a later date.

A strategic plan for a R & D project should specify in concrete terms the long-term objectives of the project and alternative implementation pathways to the objectives. There should be specification of techniques related to emerging land use/tenure changes driven by either changes in the economy, communication or access to the political system (e.g. strengthening of DF institutions at the community level).

A strategic plan should begin to specify what monetary, management, physical and machinery resources are needed for alternative operational approaches or even differentiation in the institutional capacities of different parts of the project area.

It goes without saying that such a document cannot be prepared without specification of what probable changes are expected in the socio-economic and physical environments, their costs and benefits to specific populations. Such specification enables projects to make relevant operational plans. It allows the donor to think through the possible long-term support commitment, including linkages with other institutions, necessary for bringing the development experience to national focus.

There should be a project strategic plan developed to guide the formulation of the next phase of the project. Its preparation should get inputs from the relevant district officials in keeping with DF dictates. It is the responsibility of Project Management or their hires to coordinate the inputs needed from others at GoK district and national levels as well as donor/donors internally and externally.

ACTION: Project Management.

## 2. INTEGRATION INTO DISTRICT FOCUS SYSTEM [TOR 2,3 & 7]

### 2.1. Field Committees and DF

#### 2.1.1. Relations with Development Committees.

Right from the beginning, the Project realized that the only long-term justification of the project activities is their being rooted in the community. It was recognized in the planning documents and all the subsequent annual reports that the way to link the communities with the project is to create field committees.

In spite of this recognition, at the operations level, there does not seem to be clear and formal relation with the District Focus Strategy for Rural Development committee structure.

There are several levels of the problem. To begin with, Project Management now concedes that there is a complete development committee system at the Divisional, Locational and Sublocational levels. The problem then seems to be how project activities can be discussed and ratified by the existing structures.

The project has to insist that in those Sublocations, Locations and Divisions, it is operating in, development committees be convened to discuss its activities. Since the convening is a prerogative of the GOK, a detail is that the meetings called specifically to discuss project activities maybe subcommittees of the full committees. In that case project management will still have to show up when the full committees meet to ratify or modify the decisions made by the subcommittees. In strict legal terms if project management is only involved in some meeting which is not a formally constituted subcommittee of a development committee, and minutes of such meetings are prepared under titles like "Leaders meeting" these cannot be interpreted by project management as having fulfilled the dictates of District Focus. If project management does not participate in legally constituted development committee, whatever is agreed in "leaders meetings" can be challenged.

What is called for is for the project to call attention to the District Officers and Chiefs to the necessity of formal minutes from legally constituted committees which will make the necessary decisions affecting the project.

Efforts along these lines have been made during the consultancy to link Project Management to District Officers, the District Commissioner and the District Development Officer as well as the Provincial Monitoring and Evaluation Committee personnel. It would have taken too much of the consultants time to interact with chiefs who, in any case, are already in touch with Project



Management. These contacts should not turn out to be a one time activity but a process which Project Management jogs along continuously.

ACTION: Project Management.

#### 2.1.2. Acquisition of Project Fields

The other level of problem is the process by means of which the project acquires project fields. From reports and interviews with project management, the sequence for getting a project field is varied. However the following is our understanding of the various steps.

##### Step 1

It seems as if the first step is for leaders to write to the project asking it to take over a field. This is normally the subchief but at other times is a community leader. The project manager usually visits the person writing and calls through the subchief a community baraza to discuss the proposal. This stage may take several meetings before the Project proceeds with acquiring a field.

##### Step 2

Once there is agreement that the diffuse community is willing to part with a land parcel to become a project field, then community leaders and the subchief meet with the Project Manager to walk the boundaries of the field before the project proceeds with fencing.

##### Step 3

Having agreed on the boundaries, the project proceeds with fencing and treatment of the fenced field.

##### Step 4

Once project activities start, a field committee is created to begin to deal with the field management issues which may arise.

In this process it is not clear how the activities fit into the DF committee structure. Further, by convening a Field Committee this late and only for field management reasons, extension and development leadership opportunities are lost to the committee and the project. To satisfy the spirit and the letter of the law on DF, as well as to create possibilities for extension, we propose the project adopt the following system:

##### Step One.

All requests coming from community leaders, subchiefs or any other person be returned/ sent to the various subchiefs with discussions and/or a covering letter stating that they can be acted on by the project only if they are accompanied by minutes of the Sublocational Development Committee. In any case, the Project Manager or his nominee should attend all development

committees meetings where such fields are being discussed from sublocational through locational to divisional level.

During this step, the project should deploy its resources to investigate:

- a. The community structure with a view to suggesting possible membership of the field committees.
- b. Investigate issues of local conflicts as they may affect the project.
- c. Familiarize itself with the personalities in the development committees, the ranching committees, the social services committees and any other project committees within the proposed area of operation.

This pre-project activity is important and should be done more systematically and documented for even if a field does not materialize it is information needed for the long-term planning, monitoring and evaluation of the development possibilities in various localities.

ACTION: 1. Project Manager  
2. Socio-Economic Researcher

#### Step Two.

Once the Project Manager receives requests which have been passed by Sublocational Development Committees, he should take them to the Chief of the Location and insist that they be discussed by a

Locational Development Committee which he should attend.

ACTION; 1. Project Manager

#### Step Three.

Only after the request for a particular field has been passed by a Locational Development Committee should the project manager, the Chief, the subchief, members of the locational development committee from the particular sublocation and members of the sublocation development committee visit the site to:

- a. mark boundaries.
- b. establish a field committee by holding public baraza or barazas at the site.

ACTION: 1. Project Manager  
2. Socio-Economist

#### Step Four

Once a field has been marked and the field committee has been established, the Project Manager should formally write to the Divisional Development Committee, through the District Officer, copied to the District Development Officer, who is the secretary to the Divisional Development Committee, to get the field into the Division's development project list for discussion.



The documentation should, at a minimum, include and not be limited to:

- a. Statements on substantive points agreed in formal and informal meetings in the community.
- b. Summary/references of the minutes of the development committees relevant to the field.
- c. A list of field committee members.
- d. Statement on activities the project is to undertake in the field.
- e. Statement on identified beneficiaries and their participation in the project.

This point should not be misunderstood as stating that it is the responsibility of Project Management to transmit development committee minutes to the higher level. It is intended to assist the project in documenting its authority from lower levels to higher levels to enable it to act on agreed activities.

ACTION: 1. Project Manager  
2. Socio-Economist

#### Step Five

It is mandatory that the Project Manager attend the specific Divisional and District Development Committees where the project fields are being discussed. Once a District Energy Officer is in place, he should represent the project at the District level. Although there may be attempts to get the District Development Officer to represent the project at District level in all aspects, it is our judgment that this will not be systematic and thus the Project Manager should request the DC to invite him to the District Development Committee meetings touching on the project.

ACTION: Project Manager

#### Step Six

If authority is granted by the Divisional Development Committee, then project activities can start.

ACTION: Project Personnel.

#### Step Seven.

Since the District Development Officer and the District Officer are members of the Divisional Development Committee, secretary and chairman respectively, as well as members of the District Development Committee, inclusion of Project Proposals and Activities, cleared at the Divisional level, in the District Development Committee agenda should be easy. Representation of the Project at the District level (specifically the District Executive Committee of the DDC) will be through the District Energy Officer. Note though that the Project Manager can be formally requested to attend either the DEC of the DDC if the Chairman of the DDC, the District Commissioner, so desires. Further, any time there is formal discussion of the Project at the DDC, the Project Manager is to attend. This is general

practice in all districts.

ACTION: District Development Officer; District Energy Officer; Project Manager.

#### 2.1.3. Field Committee Relations with other Development Committees.

There is no fast rule on who constitutes a field committee to date. It can be totally composed of traditional leaders or a mixture of traditional leaders and local level governmental leaders. In the project area there are also committees which are called Ranch Committees who seem to be equivalent to the village committees found in other parts of the country. We would like to make the following proposals;

2.1.3.1. As suggested above in Step One of the process of integrating the Project into the DF system of committees, the Socio-Economist should be involved in the initial exploration of whether a field will be taken by the project. The output of this exploratory exercise in specific communities should be:

- an inventory of development activities, organizations and community personalities in a particular locality

- a list of all development oriented committees in the locality (field catchment area)

- a statement on the status of the area sublocational development committee.

- identification of community leaders active in local development fora.

ACTION: Socio-Economist

2.1.3.2. As far as possible, the membership of each Field Committee should have at least one person who is a member of the sublocational development committee other than the subchief.

ACTION: Socio-Economist

2.1.3.3. If there are people in the field catchment area, who are members of other development committees like ranching committees, it is important that some of them be included in the Field Committees for experience from the rest of the country shows that overlapping membership in different development activities usually leads to a synergistic contribution in projects.

ACTION: Socio-Economist

2.1.3.4. There are implicit suggestions in some of the project documents that traditional organizational forms could be the route to creating the field committees. Whereas this is a sensible suggestion, these traditional organizational bases must be linked directly to the DF system. We have suggested how above. Traditional organizational forms, which will vary from each ethnic area in importance, and which also vary in terms of the penetration of modern activities in localized situations, should



form the basic composition of the field committee. However, they must be reinforced by other development representatives for in the long run the traditional forms will be supplanted by the development system.

Mastering how to mesh traditional organizational forms and the DF committee system, in our opinion, is the key organizational and extension issue which must be tightly conceptualized and planned by the project before it can plan the strategy for implementing Phase Four of the project. It should therefore get more Project attention than it has to date.

Towards resolving this issue, perhaps the most pressing Project activity is the completion of the socio-economic analysis of the Niempes, Pokot and the "non-urbanized" Tugen areas before the formulation of Phase Four.

Specific recommendations on existing traditional and developmental institutions, which form the substrate for the selection of the field committees, to reflect the suggestions above, should be made by the Project Socio-Economist after completing the socio-economic studies of the three areas.

ACTION: Socio-Economist.

2.1.3.5. Finally, there is project evidence that women are the ones utilizing the fields directly in the Kampi ya Samaki area, where the socio-economic study is complete, since traditional relations of production have changed. They should therefore be directly represented in the Field Committees. Their interests should not be taken care of indirectly by referring them from the Field Committee to some traditional organizational form and back to the Field committees. Perhaps the sensible approach is to ask the traditional organizational forms themselves to select the women who will become members of the field committees.

ACTION: Socio-Economist

### 3. MANAGEMENT, TRAINING AND RECRUITMENT [TOR 4, 5 & 6]

#### 3.1. MANAGEMENT STRUCTURE

The following management structure was developed in consultation with project management. It is projected to the next phase of the project.

##### LEVEL ONE

#### 3.1.1. PROJECT MANAGER

##### Tasks:

1. Responsible for project administration and management.
  2. Initiates all negotiations for community land to be handled by the project.
  3. Responsible for budgeting and financial management of the project.
  4. Responsible for all donor relations.
  5. Responsible for GoK relations in the sublocations, locations and divisions where there are project activities.
  6. Responsible, together with the District Development Officer or MoE's Baringo District Energy Development Officer, for relations with GoK at District and National Levels.
  7. Responsible for the project buildings, machinery, equipment and fields.
  8. Responsible for hiring and firing project staff in Levels 3 to 11.
  9. Together with the Royal Netherlands Embassy, responsible for interviewing candidates for project staff in level 2 perhaps after initial identification and short listing by a management firm.
- STATUS: In place.

##### LEVEL TWO

#### 3.1.2.1. SOCIO-ECONOMIC RESEARCHER

##### Tasks:

1. Responsible for planning, management and coordination of social and economic studies and operations of the project.
2. Responsible for planning, management and coordination of project community extension operations.
3. Deputizes for Project Manager as instructed.

STATUS: The Consultant in place but should be converted to project staff for the need is for a full-time professional.

ACTION: Netherlands Embassy and Project Manager.



### 3.1.2.2. SEMI-ARID/RANGE/FORESTRY RESEARCHER

#### Status:

The post does not exist but was recommended by JEFM. It should be filled urgently to give the project its proper R&D role and to give management depth to facilitate leaves and so on for the managers.

#### Qualifications:

1. The desired specialization is dryland forestry but, given the fact that specific courses do not exist in the country, and further that few people have obtained them elsewhere, the nearest substitute is range training and practical experience in forestry or livestock production.
2. The formal qualification are: B.Sc., M.Sc. and Ph.D.
3. The minimum age, so as to give due weight to experience, is 35 years.
4. The individual must have experience in supervision of field staff, budgeting, use of microcomputer for research and management and perhaps most important, experience in development work in Arid and Semi-Arid Lands.
5. Finally, he must hold a valid driving license.

#### Nationality:

Kenyan absolutely.

#### Tasks:

1. Responsible for planning management and coordination of fodder and forage research operations and studies, including write-ups of previous work.
2. Responsible for planning, management and coordination of field operations related to fodder and fuel production (including charcoal).
3. Deputizes for the Project Manager as instructed.

#### Staffing Time:

This person is needed immediately for induction into the project. He will have to assume leadership of the Project whilst the Project Manager and the Project Socio-Economic Consultants will be away towards the end of the year.

#### Recruitment:

This is a fairly senior position and should be advertised and recruited through a development management firm familiar with ASAL development needs. The Project Manager and a representative of the Royal Netherlands Embassy, should sit on the interview panel to be organized after the firm sifts the applicants.

#### Pay Level/Benefits:

Basic pay including taxes	Ksh. 20-30,000
Housing/Schooling/Insurance/Medical	Ksh. 20,000
Leave 1 Month a Year	

Support Needs:

1. Vehicle: This person will need a four wheel drive vehicle since the bulk of his work will be in the field. The existing 1988 budget savings are able to finance a vehicle for this officer.

2. House: Currently the project does not have housing for staff other than the Project Manager. It also is not feasible that a house can be built before December 1988. The interim solution therefore seems to be that the Project asks the District Commissioner Baringo, who has housing allocation responsibilities in the district, for a temporary allocation of a building in Marigat. Since this is a temporary solution, the Project must immediately begin construction of staff houses. Again the allocation of land is with the District Commissioner and discussions with the DO's who will ultimately recommend it must begin now. Since the line item in the 1988 budget for housing has not been utilized as planned, the recommendation is that it be reallocated to provide this housing. We do not recommend the acquisition of another plot at either Kampi ya Samaki or Marigat without fully utilizing the land at the project headquarters in spite of presentations towards that end by project management.

3. Office: With a little reorganization of the office bloc, by moving stores out of it, this person can be accommodated. Extra storage space will have to be constructed next to the garage.

4. Extra Computer: The computing capacity of the one machine will be stretched to accommodate all the management staff. Provision of a second one should be considered.

ACTION: Netherlands Embassy and Project Manager.

LEVEL THREE

3.1.3. ADMINISTRATIVE ASSISTANT/OFFICE MANAGER

Tasks: Office administration routines  
Preparation of wages and payments  
Preparation of cost data as an input for budgets  
Preparation of purchase orders  
Preparation of reports

Staff Needed: 1  
Nationality: Kenyan  
Training: Hire with microcomputer skills.  
Staff Source: Local if existing, National.  
Basic Pay: Ksh. 4000-8000 including taxes.

Other Benefits: Medical/Schooling/Insurance/Housing



Leaves:                      Ksh. 6000  
                              Sick Leave      2 weeks annually  
                              Annual Leave 1 month annually

#### LEVEL FOUR

##### 3.1.4. GENERAL TECHNICAL ASSISTANTS

Staffing:                    1 Existing  
 Staff Needed:            1 (Mechanic) 1988 budget  
                              1 Needed next budget  
 Training:                Okello - Technical training in welding  
 Work:                     In charge of workshop/tools  
                              Operation and general maintenance  
                              Mechanical operations  
 Staff Source:            National but local if identified  
 Benefits:                Basic transport [motor cycle or bicycle]  
                              Project pays N.S.S.F.  
                              Project organizes training  
                              Housing element included in salary  
                              Sick Leave  
                              Annual Leave  
 Pay Level:                Ksh. 1000-3000  
                              Ksh. 3000-6000

#### LEVEL FIVE

##### 3.1.5. FIELD ASSISTANTS

Staffing:                    2 Njemps existing - Marigat Div.  
 Staff Needed:            2 Tugen needed - Kabartonjo Div. 1988 budget  
                              2 Pokot needed - Ginyang Div. 1989?  
 Staff Source:            Local and community specific  
 Training:                Kajos - on job computer/office records  
                              Paul - Driving license  
                              On job - procurement  
 Work:                     Record and monitor field/nursery/community data  
                              Participate in community organizing and extension  
                              Supervise field and nursery labor  
                              Supervise field operations  
 Benefits:                As in Level 4  
 Pay Level:                Ksh. 1000-3000  
                              Ksh. 3000-6000

## LEVEL SIX

### 3.1.6. PLANT OPERATORS

Staffing: None  
Staffing Needed: 1 Bulldozer operator  
1 Grader operator  
Staff Source: National and local if identified  
Training: Hire trained  
Work: Operates and maintains specific plant/machinery  
Benefits: Housing included in pay  
N.S.S.F.  
Sick leave  
Annual leave  
Pay Level: Ksh. 3000-6000

## LEVEL SEVEN

### 3.1.7. DRIVERS

Current Staffing: 1 Existing for truck  
Future Staffing Needed: 1 needed for small vehicles  
Staff Source: Local  
Training: Organize licensing  
Work: Drives project vehicles/tractors  
Benefits: Housing included in pay  
N.S.S.F.  
Sick Leave  
Annual Leave  
Pay Level: Ksh. 1000-2000

## LEVEL EIGHT

### 3.1.8. FENCE ATTENDANT

Current Staffing: 1  
Staff Needed: 3  
Staff Source: Local  
Training: Elijah has no schooling thus no possibility of formal training  
Work: Fence installation and maintenance  
Benefits: Bicycle  
Pay Level: Ksh. 600-1200



#### LEVEL NINE

##### 3.1.9. NURSERY ATTENDANTS

Current Staffing:	3
Staff Needed:	0
Staff Source:	Local
Training:	On the job
Work:	Responsible for nursery operations
Benefits:	None
Pay Level:	Ksh. 600-1200

#### LEVEL TEN

##### 3.1.10. WATCHMEN

Current Staff:	16
Staff Needed:	0
Staff Source:	Local
Training:	On the job
Work:	Checks & cleans fencing and solar panels Checks intrusion of livestock to fields Supervises/records controlled grazing
Benefits:	Two weeks sick Leave Thirty days annual leave.
Pay Level:	Ksh. 600-1000
Contract Format:	

#### LEVEL ELEVEN

##### 3.1.11. CASUAL LABORERS

Current Staff:	50-100
Staff Needed:	Same
Staff Source:	Local
Training:	On the job
Work:	As instructed
Benefits:	None
Pay Level:	Ksh. 360-600

### 3.1.12. DIVERSIFYING MANAGEMENT AND TRANSFER OF KNOWLEDGE

The fact that there are no nationals in management level is a problem from two points of view. To begin with there have been those who argued that this project is the personal property of the manager. More important is the issue of transfer of the project experience to locals and by extension increase in the possibility of its replication elsewhere.

To date an argument was made that there is not a need to hire high level nationals for the need was for staff indigenous to the area who would relate to the project area population. This argument is not only fallacious but counter productive in the long-term.

By limiting management capacity, expansion of the project is limited to such a low level it probably is not making significant ecological and socio-economic impact.

Further, as a direct funded project, justified originally in terms of its uniqueness and the need to develop some new techniques (including management of the project), it must be seen to be developing management capacity to implement the new technologies not just locally but for other districts. This can be assured only if junior and high level national staff (whether recruited locally or from other parts of the country is a detail) capable of running similar projects is put in place and trained.

If the project is expanded during the next phase it is critical that the new management hires be nationals for these adduced reasons.

ACTION: Project Management and Netherlands Embassy.

## 3.2. TRAINING

### 3.2.1. MANAGEMENT LEVEL STAFF

The management level staff in place now are only the Project Manager and the Socio-economic Consultant. Other than computer use training which is afoot, there does not appear to be any training necessary for purposes of the project.

The management staff to be hired, i.e. Semi-arid Range/Forestry Research Scientist should be hired with the qualifications spelled out elsewhere and thus will only need to visit other relevant projects in the country but not be formally trained.

### 3.2.2. OFFICE SUPERVISORY STAFF

The proposed office supervisory staff i.e. Administrative Assistant /Office Manager should be not only fully trained but



also competent. Other than induction to the systems in use in the project there is no formal training envisaged.

### 3.2.3. FIELD SUPERVISORY STAFF

The field supervisory staff in place do not have the formal schooling qualifications to fit into formal training institutions. They thus can only be trained on the job for those functions which the project is undertaking.

However the plans to convert one or two into data entry work will mean they have to be trained in house in the use of computer. This training should be extended to all the supervisory staff in the project so as to spread the knowledge and not to encapsulate it within one individual at the supervisory level for that individual has weaknesses which could lead to his holding the project at ransom.

For the long-term, new Form 4 recruits into the nursery and fields may mean they can be upgraded to field supervisory staff. Since they have academic credentials to cope with formal training, they should be considered for formal training perhaps in institutions like AHITI for range specialization, Londiani for forestry - when they start dry zone forestry, and Embu for dry zone agriculture over and above their in-house training on the computer.

These plans must be long-term for there are not many people scheduled to join the project at this level immediately.

Having said all this, it is important that the project find ways of taking field supervisory staff to other related projects to get experience on related development work.

### 3.2.4. OTHER STAFF

All other staff should get on job training for they do not have the academic background for formal training.

### 3.2.5. TOURS, SEMINARS ETC.

For all categories of staff, Project Management ought to be on the lookout for relevant tours and seminars for improving its staff. This cannot be worked out as a training package but should be used by the project not only as a training but a management tool. The institutions to look out for opportunities are really NGOs like CARE, KENGO and the Catholic Diocese in Marsabit, Kitui and Lodwar for they have projects which can assist their staff to image the future of the project.

### 3.3. RECRUITMENT

We recommend that the Semi-Arid Range/Forestry Research Scientist and the Administrative Assistant/Office Manager, who are in management Level 2 & 3 respectively, be hired through a development management firm with experience in development work particularly in arid areas, and not the usual management firms specializing in corporate hiring.

All other staff are local hires and there does not seem to be any special measures required to either identify or hire them for many drift in looking for work. Project management should hire ad lib.

However, it is important that Project Management go out of its way to hire field staff who are women for as extension is built up, there will be need to have a mixed extension cadre. Similarly, Project Management should ensure that its staff between levels four and eleven has representatives from the ethnic groups found in the district for favoritism of one over the others will have negative impact on the management of the project.

ACTION: Project Management and Netherlands Embassy



#### 4. APPLIED AND BASIC RESEARCH [TOR 8]

##### 4.1. THE HIGH COST OF INFORMAL APPLIED RESEARCH

Significant amount of applied research has been done by the project and others who seem to drop in on the project from all sorts of institutions. This latter practice is counterproductive for several reasons.

It leads to unsystematic applied research by individuals and organizations who do not have long-term responsibility to the project, district, MoE, donor, or the country in general. It takes significant amount of project management time. It becomes a basis for the project to be attacked politically since it is common knowledge all research work in the country, which is not part of project implementation, must be cleared.

For the future, we make the following recommendations which we urge the donor and project management to take seriously for we are convinced that part of the political problems of the project in the past can be traced to the research traffic.

1. NO PERSON OR INSTITUTION SHOULD BE ALLOWED TO CONDUCT APPLIED OR BASIC RESEARCH UNLESS THEY ARE FORMALLY PASSED BY THE DONOR, MOE OR OFFICE OF THE PRESIDENT WHICH IS RESPONSIBLE FOR BASIC RESEARCH. SUCH CLEARANCE MUST BE TRANSMITTED TO THE BARINGO DISTRICT COMMISSIONER AND HIS DISTRICT OFFICERS AS IS NORMAL PRACTICE ON RESEARCH CLEARANCES.

2. ALL BASIC RESEARCH IN THE PROJECT SHOULD BE PLANNED AND FORM AN AGREED SYSTEMATIC PATTERN WHICH IS WRITTEN UP AND CIRCULATED TO THE RELEVANT DISTRICT AND MOE.

3. THE PROJECT SHOULD NOT HOST INDIVIDUALS CONDUCTING RESEARCH IN THE DISTRICT EVEN WHERE THEY CLAIM TO BE DOING WORK OF INTEREST TO THE PROJECT WITHOUT FORMAL CLEARANCE BY THE DDC, DONOR AND MOE, AND OFFICE OF THE PRESIDENT.  
ACTION: Project Management and Embassy.

##### 4.2. WRITE UP OF PAST APPLIED RESEARCH

According to Project Management, past applied research has been conducted on the following:

- a. Seed germination techniques.
- b. Tree growth and survival rates under different spacings and micro-catchments.
- c. Grass species for reseeding.
- d. Micro-catchment and field preparation techniques.
- e. Grass, shrub and tree species relevant to socio-economic life.

The bulk of this work is not written up in a form it can be used

by other organizations or individuals in the country.

It is our strong recommendation that the project find a consulting group or an individual with the range of skills necessary for writing all these in popular form for what is needed is not a technical treatise for specialists but documents which can be used by district level project people and farmers/pastoralists immediately. We do not agree with project management that they will have the time to do the writeups particularly if they take the community organizing work seriously.

Further, it is our strong recommendation that the two researchers to be added to the project, i.e. socio-economist and the range/forestry researchers, immediately write up previous technical work completed but not professionally reported.

By producing such documentation, the project will begin to fulfill one of the other requirements of R & D projects i.e. to disseminate information on what works in semi-arid reforestation immediately both to practitioners first and specialists second.

At all times, the priority in dissemination must be within the country, for the project is not mounted for international consumption.

ACTION: Embassy and Project Management

#### 4.3. FUTURE APPLIED RESEARCH

##### 4.3.1. LOCALIZED SOIL EROSION DATA AND MAPS

These do not exist. They would greatly assist the development committees and the project in selecting and planning treatment fields. Again the approach should be contracting a firm/individual to prepare such for the general area initially and specifically for each field being treated so as to build up long-term data.

ACTION: Embassy and Project Management.

##### 4.3.2. STUDIES ON CARRYING CAPACITY

This issue has not been resolved for no baseline data exists and previous attempts were not done properly. Establishing this and systematic periodic monitoring based on records and regular field studies is called for if the project is to argue its value scientifically. This work should be contracted out.

ACTION: Embassy and Project Management.

##### 4.3.3. ECONOMICS OF LARGE SCALE REHABILITATION

No effort towards this end have been made yet. They should be a central element of the future phase of the project. This should



be contracted out.

ACTION: Embassy and Project Management.

#### 4.3.4. STUDIES ON SOCIAL ORGANIZATION AND CHANGE.

Efforts are underway by the Socio-economic Consultant to complete a socio-economic survey of the area. How much more will need to be done will depend on these current efforts. A decision must be made on what socio-economic operations research needs to be done, and fast, to specify organizational forms which the project can utilize for its activities particularly in the management of the improved land resource.

ACTION: Socio-economic Consultant, Embassy.

#### 4.3.5. NURSERY AND FIELD SPECIES TRIALS

Quite a lot has been done along these lines. The process of writing up the past work should lead to identification of gaps which should then be covered. However these should continue for the project keeps running into problems which were not anticipated, for example the bug attack on one field or the drying up of indigenous tree seedlings in the nursery. Most important in capturing relevant information is accurate diary of what happens and the immediate remedial solutions for quite a lot of innovations by project management is likely to disappear if not formally written immediately.

ACTION: Project Manager.

#### 4.3.6. LAND PREPARATION

As project management is aware, the efforts on land preparation techniques, as part and parcel of applied research and long-term planning concerns, was initiated and completed before the instruction to concentrate on other aspects were given. In spite of the subsequent instructions, issues of equipment as it relates to determination of what could be done annually so as to have ecological as opposed to only social and economic impact, were raised by project management later. It is therefore our obligation to include the material as part and parcel of our report for some of the major R&D questions relating to project costs, establishment of trees and fodder, relevance to other ASALs and appropriate management clearly hinge on land preparation techniques.

##### 4.3.6.1. BFFP EXPERIENCE IN LAND PREPARATION

The BFFP has five fields, established on the rocky uplands on top of the escarpment to the west of Lake Baringo. The project has effectively cleared and ripped the land to a depth of at least 0.5 meters. This has broken up the soil and stones, allowing the tree seedlings and grass to better establish roots. What has yet to be scientifically proved, however, is whether the main impact

on improved tree growth is a direct result of the ripping technique.

The BFFP has established five tree fields on the Njemps flatlands. The plains slope gently from the surrounding higher ground to Lake Baringo. The soil is very poor and subject to extreme water and wind erosion. There is little tree, shrub or grass cover.

The grader prepared microcatchment system used by the project is effective, as evidenced by the prolific tree and grass growth in the fields. The grader formed catchments and bunds have proven to be an effective land preparation technique for the Njemps flatlands and would work well in many areas of Kenya with similar soil, meteorological and geological characteristics.

#### 4.3.6.2. DESIRED CHANGES IN LAND PREPARATION

##### 4.3.6.2.1. CRAWLER TRACTOR ALLEY RIPPING OF ROCKY LAND

General land preparation utilizing a ripper, initially uses the bulldozer blade to clear the land of trees and bushes before the actual ripping is done. This conventional practice has been adopted by the Baringo Fuel and Fodder Project, although 'important' trees are left in the field. The cleared trees are supposed to be made into charcoal.

The initial tree and bush clearing practice should stop for various reasons. First, it is important to allow the growth and natural seeding of indigenous trees, shrubs and grasses, however poorly they are performing from a fuel and fodder point of view. This assures species diversity and ecological balance. Avoidance of clearing also has a significant machinery cost reduction impact. Savings realized can be used to expand the project acreage.

The Baringo Fuel and Fodder Project has also ripped all the land cleared. For the future it should alley rip only. The ripper operation should be that it rips its swath twice (about four meters) and skips the next four meters. This would mean that the untouched swaths could take advantage of the water retention and nutrient release from either side, stimulating natural growth, while exotic or indigenous trees are planted in the ripped portions.

Alley ripping would require a 25 degree angled bulldozer blade that would push rubble and brush into the unripped alleys. This strip of brush and rubble would form a bund, further assisting in slowing and holding rain water. During the alley ripping operation, the dozer blade use should be minimal and only for operations related to clearing of the obstacles which would



interfere with the ripper. It is in the uncleared and unripped swaths that the indigenous vegetation should be allowed to regenerate.

ACTION: Project Management.

#### 4.3.6.2.2. ALLEY RIPPING WITH MOULD BOARD PLOW OF HARD PAN SOILS

In some of the areas, the project is set to expand into, there are soils which create a hard pan. Land preparation in these situations will call for the use of the ripper. To increase water retention in these extremely compacted soils, a mouldboard plow with modified wings could be attached behind the center shank of the three shank ripper to form a ditch along the contours. This would integrate soil break-up with greater water retention and soaking capacity stimulating not only more rapid tree growth, but enhancing the growth of grasses and revegetation in general. As in the case of rocky ground land preparation, alley ripping should be practiced.

ACTION: Project Management.

#### 4.3.6.2.3. GRADER MICROCATCHMENT PREPARATION

In the Njemps flatlands, the creation of microcatchments utilizing a road grader have been very successful. Since there is hardly any plant cover in the area, it is not feasible to work the land in strips. The variation of the existing practices by the project which we recommend is the setting of a shallower blade angle to create a wider water spreading area.

ACTION: Project Management.

#### 6.3.6.2.4. LABOR INTENSIVE LAND PREPARATION (WAMATENGO PITS)

On very steep hillsides, it is not possible to use machinery. Thus, even though we are aware of the unavailability of labor in semi-arid and arid areas, the only land preparation technique possible is to use human labor to create wamatengo pit microcatchments. This is not a large scale technique in situations of labor shortage but it is necessary to complement the specialized large scale site preparation techniques identified above. In the semi-arid situations of abundant labor the wamatengo pits technique would be of value. Its documentation therefore should not be ignored by the project.

ACTION: Project Management.

#### 6.3.6.2.5. FORMAL LAND PREPARATION RESEARCH PLOTS PROJECT

The Baringo Fuel and Fodder Project has so far successfully grown trees using two land preparation techniques, subsoiling by clearing and ripping in rocky soils and surface preparation by grading and bunding in the poor friable soils on the Njemps Flats. Although it can safely be said that the project has successfully grown trees using these methods, it cannot be

determined scientifically how successful the methods have been because there is nothing with which to compare them. To prove that these are the best methods scientifically, or to find even better land preparation techniques for the project, research must be carried out using a number of different land preparation methods. Each technique used should be planted with several different tree species to see if certain trees respond better to one kind of land preparation, soil, rainfall and slope of the land being equal.

The project should carry out research using four land preparation techniques: 1. ripping; 2. ripping with mouldboard plow attachment; 3. grading and bunding; and 4. wamatengo holes.

To assure statistical reliability, there must be four replications of each land preparation method on similar soil and slope sites using the same spacing and tree species. Each tree species researched must have four replications of each land preparation technique on similar soil and slope sites and use the same spacing.

The project should have at least 48 individual plots. Each plot could be one half hectare for easy measurement of fuel and fodder returns.

Clusters of 4 plots on 12 sites should be grouped to demonstrate different tree species, soil preparation types and vegetation and tree management techniques in one area and type of soil. They should be mutually fenced and each plot should be separated by 10 meter fire breaks. Each plot should have at least one 0.6 x 0.6 x 1-2 meter ditch to measure soil erosion, and each plot cluster should be equipped with a rain gauge, temperature/hour recorder and a wind speed/hour/direction recorder.

Electric fencing could be used initially, but along the fence row, a ditch could be dug and planted with a tree or shrub known for its natural fencing ability.

#### a. Ripping

On rocky ground, there should be 4 plots identified of 0.5 hectares each that would be totally ripped and 4 plots of 0.5 hectares that would be alley ripped at intervals of 4 meters and 4 meters left untouched. These should all be planted with similar trees at similar spacing intervals.

#### b. Ripping and Mouldboard Plow Combination

This would break up the soil as well as leave a deep, permanent furrow to further enhance water retention. The mouldboard plow (60cm) would be attached directly behind the middle ripper shank. Trailing the ripper shank will assure that the plow sets in



firmly, even in very hard soil.

There should be 4 plots of 0.5 hectares each totally ripped and 4 plots of 0.5 hectares each strip ripped at intervals of 4 meters and 4 meters left untouched. They should all be planted with similar trees at similar spacing intervals.

#### c. Grading and Bunding

Grading and bunding plots should use the incline and bunding methods currently employed by the BFFP as well as a flat surface preparation with bunding.

There should be 4 plots of 0.5 hectares each which should use the incline and bunding method currently used by the project and 4 plots of 0.5 hectares each which should have flat preparation and bunding.

A further 4 plots of 0.5 hectares should use the incline and bunding method in strips and 4 plots of 0.5 hectares each use the flat preparation and bunding and unprepared strips should be 10 meters wide.

#### d. Wamatengo Pits

Wamatengo pits, 0.5 square and 0.5 meters deep should be dug in banded squares of 4, 6, 8 and 10 meters to a side, covering 0.5 hectare plots. Each pit should have only one tree.

There should be four plots of 0.5 hectares each using 4 meter square plots, four plots of 6 meters square, four plots of 8 meters square, and four plots of 10 meters square.

There should be four sites with a cluster of four plots of 0.5 hectares, each having one plot for 4 meter squares, one for 6, 8 and 10 each.

ACTION: Project Management

#### 4.4. TREE SPACING

The Wamatengo hole experimental plots have preset spacing intervals. The rest of the plots should combine different spacing intervals as part of the research. Within the plots, trees could be planted, for example at 3, 4, 5, 6, 7, 8, 9 and 10 meter intervals on the contour to ascertain optimum tree spacing for site specific conditions and preparation method. The plot should then be divided latitudinally with the same measurements. This results in the plot having one corner square of 3 x 3 meters and its opposite corner square along the diagonal being 10 x 10 meters. Trees are then planted along the contour, first at 1 tree per 3 meters, then 1 tree per 4 meters, and so on.

ACTION: Project Management.

#### 4.5. ENTOMOLOGICAL MONITORING

Project Fields nos. 2 and 2a have had serious entomological infestations where about 90% of the trees planted were damaged. This was investigated by our consultants even though it was not included in the original terms of reference. A preliminary and a final report, which identified the main pests and recommended cultural methods of pest control were sent to the project. We are aware that Operation Raleigh is also conducting some entomological studies for the project.

In the long-term it will be important to systematically monitor pest damage. This can be organized with the Kenya Forestry Research Institute (KEFRI). We have discussed this with them and they are willing to systematize a monitoring program for the long-term on request.

ACTION: Project Management.

#### 4.6. NURSERY SEEDLING BLIGHT AND DIE-BACK

Outside the original terms of reference, we were later asked to assist in investigations of blight and dieback of indigenous species seedlings in the nursery. The causes seem to have been related to the quality of water used in the nursery and some fungal infection.

We have discussed with KEFRI the possibility of their mounting a long-term monitoring program on nursery pathological problems particularly since indigenous species seem to be vulnerable in ways the prosopis species are not.

ACTION: Project Management

#### 4.7. PH PITS

Before beginning a forestry project, soil pH, depth, texture and other characteristics must be determined to ascertain site suitability and species choice. A pit dug two meters deep and soil samples taken from different levels should be adequate for soil testing and to determine if the soil is subject to panning.

ACTION: Project Management



## 5. MECHANIZED LAND PREPARATION COSTS

### 5.1. MECHANIZED FIELD RIPPING AND CLEARING COSTS

#### 5.1.1. Alternative 1. (Current BFFP practice)

##### a. Standard machinery

-D7 Caterpillar

##### b. Standard Specifications

-Three shank ripper

-Bulldozer blade 25 degree angled

##### c. Optional Equipment Required

-Heavy duty batteries

-Perforated engine enclosure

-Crank case guard, extreme service

-Tracks, 560mm extreme service

-Direct drive transmission

-Logging canopy with rear and front lights, two each

-Radiator guard, hinged and heavy duty

-Engine upper guard

-Shank tip guards

-Mould board plow, 24 inches.

##### d. Purchase Cost (Nairobi, with duty June 1988)

Actual	Ksh. 5,000,000
Contingency (10%)	Ksh. 500,000
Total	Ksh. 5,500,000

##### e. Operating Costs

Actual per hour running cost Ksh. 1,100

Of which:

-Depreciation 5 yrs. (10,000 hrs.) Ksh. 450

-Fuel Ksh. 250

-Driver and Assistant Ksh. 100

-Maintenance, Insurance & Spares Ksh. 100

-Contingency (10%) Ksh. 100

Commercial per hour hire costs 1988 Ksh. 1,800

##### f. Workload

1 Hectare clearing and ripping time 3 hours

Actual cost per hectare @ Ksh. 1,100/hr. Ksh. 3,850

Commercial cost per hectare @ Ksh.1800/hr. Ksh. 6,300

Working hours per day 10 hours

Hectares cleared and ripped per day 3.5 hectares

Work days per year 200 days

##### g. Yearly Workload Costs

- Yearly clearing and ripping capability 700 hectares  
 Actual cost clearing and ripping 700 ha. Ksh. 2,695,000  
 Commercial cost clearing&ripping 700 ha. Ksh. 4,410,000
- h. Project Owned D7 Caterpillar Saving  
 Annual savings Ksh. 1,715,000
- i. Purchase Period from Savings  
 No. of years to pay for D7 Caterpillar 3.2 years.
- j. Machinery Purchase Lead Time  
 Lead time purchase and shipping-Nairobi 6 months.

#### 5.1.2. Alternative 2 (Proposed Alley Clearing and Ripping)

- a. Standard Machinery  
 -D7 Caterpillar

- b. Standard specification  
 -Three Shank Ripper  
 -Bulldozer blade 25 degree angled

- c. Optional Equipment Required  
 -Heavy duty batteries  
 -Perforated engine enclosure  
 -Crank case guard, extreme service  
 -Tracks 5600mm extreme service  
 -Direct drive transmission  
 -Logging canopy with rear and front lights, 2 each  
 -Radiator guard, hinged and heavy duty  
 -Engine upper guard  
 -Shank tip guards  
 -Mould board plow, 24 inches.

- d. Purchase Costs (Nairobi, with duty, June 1988)

Actual	Ksh. 5,000,000
Contingency (10%)	Ksh. 500,000
Total	Ksh. 5,500,000

- e. Operating Costs

Actual per hour running costs Ksh. 1,100

Of which:

-Depreciation 5 yrs. (10,000hrs.)	Ksh. 450
-Fuel	Ksh. 250
-Driver and Assistant	Ksh. 100
-Maintenance, Insurance and Spares	Ksh. 100
-Contingency (10%)	Ksh. 100

Commercial per hour hire costs 1988 Ksh. 1,800

- f. Workload



1 Hectare alley clearing and ripping time	1.5 hours
Actual cost per hectare @ Ksh.1,100 per hour	Ksh.1,650
Commercial cost per hectare @ Ksh.1,800 per hr.	Ksh.2,700
Working hours per day	10 hours
Hectares alley cleared and ripped	7 hectares
Work days per year	200 days
g. Yearly Workload Costs	
Yearly alley clearing and ripping capability	1,400 hectares
Actual cost alley clear. and rip. 1,400 ha.	Ksh. 2,310,000
Commercial cost alley clear. and rip. 1,400 ha.	Ksh. 4,860,000
h. Project Owned Saving	
Annual savings	Ksh. 2,370,000
i. Purchase Period from Savings	
No. of years to pay for D7 Caterpillar	2.3 years.

## 5.2. MECHANIZED GRADING AND BUNDING

a. Standard Machinery	
-120 G Caterpillar Road Grader	
b. Standard Specifications	
-3658 mm blade	
c. Optional Equipment Required	
-Low profile canopy	
-V-type scarifier	
-Cab mounted headlights (2)	
-Center mounted floodlights	
-Rear mounted floodlight	
-Amber warning beacon	
-50 Ampere Alternator	
d. Purchase costs (Nairobi with duty June 1988)	
Actual	Ksh. 2,900,000
Contingency (10%)	<u>Ksh. 290,000</u>
Total	Ksh. 3,190,000
e. Operating Costs	
Actual per hour cost	Ksh. 650
Of which:	
-Depreciation 5 years (10,000 hours)	Ksh. 270
-Fuel	Ksh. 150
-Driver and Assistant	Ksh. 100
-Maintenance, Insurance and Spares	Ksh. 70
-Contingency (10%)	Ksh. 60

Commercial per hour cost	Ksh. 1,000
f. Workload	
1 Hectare Grading and Bunding time	4 hours
Actual cost per hectare @ Ksh. 650 per hour	Ksh. 2,600
Commercial cost per hectare @ Ksh. 1,000/hour	Ksh. 4,000
Working hours per day	10 hours
Hectares graded and bunded per day	2.5 hectares
Work days per year	200 days
g. Yearly Workload costs	
Yearly grading and bunding capability	500 hectares
Actual Cost grading and bunding 500 ha. / year	Ksh. 1,300,000
Commercial Cost grad. and bund. 500 ha. /year	Ksh. 2,000,000
h. Self Owned 120 G Caterpillar Saving	
Annual Savings	Ksh. 700,000
i. Purchase Period from Savings	
No of Years to pay for 120 G Caterpillar	4.1 years
j. Machinery Purchase Lead Time	
Lead time purchase and shipping - Nairobi	6 months.

#### 5.3. ANCILLARY COSTS

Mechanic and Assistant @ Ksh. 10,000 monthly	Ksh. 120,000
Contingency (10%)	Ksh. 12,000
Total	Ksh. 132,000

#### 5.4. SUMMARY MECHANIZED LAND PREPARATION RECOMMENDATION

The Baringo Fuel and Fodder Project has gained the backing of the people living in the project area, and sincere professionals, after showing that mechanized land preparation for growing fuel and fodder trees is viable.

We believe that communities will identify thousands of hectares of land for reforestation. The project cannot undertake this cost effectively with hired machinery.

Consequently we strongly recommend that the project acquire a D7 Caterpillar Crawler Tractor and a 120 G Caterpillar Road Grader to enable it to meet the demand for reforestation cost effectively. We have evaluated other types of machinery for this work and it is important that the project keep to this make for the equipment is reliable, spares are easy to get and servicing



is widely known in the country.

If this equipment is acquired, a minimum of two thousand hectares per year, strip prepared, should be the project target figure during the first years.

Increasing the number of machines to two or three each would have a major impact on the ecology of the District in a relatively short time. Procuring this machinery for the project should be a significant component in the planning of the next phase.  
ACTION: Embassy and Project Management.

#### ACRONYMS

BEPPSC	Biomass Energy Programs/Projects Steering Committee
BFFP	Baringo Fuel and Fodder Project
DC	District Commissioner
DDC	District Development Committee
DDO	District Development Officer
DEC	District Executive Committee
DEDO	District Energy Development Officer
DEPTAF	District Energy Planning Task Force
DF	District Focus for Rural Development
DO	District Officer
GoK	Government of Kenya
JEFM	Joint Energy Formulation Mission
KEFRI	Kenya Forestry Research Institute
KWDP	Kenya Woodfuel Development Project
MoE	Ministry of Energy
PS	Permanent Secretary