

**CHAPTER 12 VILLAGE NATURAL RESOURCES
MANAGEMENT PLAN (VNRMP)**

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12.1 Factors Considered in VNRMP

The first and foremost factor to regard in the formulation of any VNRMP constitutes the current status of natural resources and inventory of available resources in the village concerned, (because the plan starts from the identification of current resource distribution in the village concerned by providing an inventory of such natural resources as unused land, trees and grasses, water sources, wild life etc.) The more degraded the remaining natural resources in the village, the harder the villagers make their livelihood with a host of constraints in the form of poaching or theft. Likewise, if available natural and social resources like land, water and labor force are scanty, the expected output will be limited and the formulation of VNRMP will be difficult. So, the plan must be based on the observed, actual extent of deterioration of resources, current land use and availability of labor force that can be mobilized. More concretely, the degradation can be identified by erosion hazard, canopy cover and development of gullies, while availability of resources can be grasped from surface area, rate of arable land and (economically active) population in the village concerned. Also, topographic gradient, soil and climatic conditions as well as availability of water resources can be useful tools in formulating VNRMP. From these background data, villagers can come to a conclusion as mutual agreement what to do and what not to do for conserving still available resources and recovering the lost or damaged ones.

12.2 Community Participation in the VNRMP

12.2.1 Basic Concept of Community Participation in the VNRMP

Participation of local community members is pre-requisite for a sustainable natural resource management, as they are the main actors and beneficiaries of the activities. Therefore, the community has to take a full initiative in planning, implementing, monitoring and evaluating the VNRMP, which aims to bring sustainable development of villager's livelihood together with conservation and restoration of its environment.

However, as described in Chapter 10.10 it was found that local communities were currently not effectively organized or empowered to carry out such tasks unless some measures were taken to build and strengthen the capacity of the community. Need of capacity building was often brought up during the discussions with different community organizations including VDCs. Therefore, capacity building of local communities and formation of effective community organizations were identified as components of VNRMP. It is, however, important to stress that capacity building and formation of community organizations cannot stand separately from other components of VNRMP. These are the components necessary to facilitate in achieving each component's objectives.

12.2.2 Formation of Community Organizations for VNRMP

For the planning of VNRMP, the community needs to be facilitated and trained in communally analyzing their needs, problems and constraints as well as sensitized to the relevant issues as the components of VNRMP need to be identified by the community. For the implementation of the VNRMP, which consists of wide range of activities as components and sub-components of the program, the community has to form a body capable of formulating the strategy, overseeing each component and co-ordinate its activities. Because of the integrated scheme of VNRMP, VNRMC is not suitable to assume the role. VDC organized at village level will be best suited to take this responsibility, rather than creating a new body and duplicating the effort. For the planning and implementation of individual components relevant organizations have to be formed by the individuals who are interested and willing to take part in each activity.

Table 12.1 Possible Area under VNRMP Components by Village

Unit : ha

Village Name	Current status by village				Size of possible components in VNRMPs				
	Population	Woodlots	Arable land	Dimba	Agro-forestry	Expansion of IW	Village forests	Expansion of VG	Regeneration of EW
Kaumbata	489	88	176	4	115	19	20	15	0
Nanjiwa	714	78	97	3	62	21	5	5	30
Ndemanje	235	41	88	2	58	7	30	0	0
Chakana	200	2	16	3	10	8	6	1	1
Mdala	1,289	64	192	5	118	52	10	20	25
Siyamdina	899	10	58	3	34	32	3	0	3
Makonokaya	251	18	76	4	48	11	11	5	3
Chikoja	748	28	115	3	77	30	11	0	8
Maluwa	376	2	20	1	13	10	2	0	0
Kammata	1,513	12	36	1	21	13	3	0	5
Kumanda	258	8	38	3	23	10	9	0	2
Tamvekenji	501	2	6	0	4	2	0	0	0
D.Mbedza	154	14	30	0	20	6	0	0	4
Chilangali	258	13	21	0	13	11	1	2	5
M. Ngondo	493	14	52	1	35	15	3	0	5
Lemu	2,316	93	145	4	90	46	12	10	30
Teula	493	15	55	4	34	20	7	5	5
Manjelo	408	10	23	2	14	16	4	0	2
Kamwendo	353	27	152	1	98	14	24	8	10
Peter Bilila	435	6	14	1	9	9	3	1	0
S. Mponbe	327	17	21	2	15	6	0	0	3
K.Chigumula	782	8	15	1	10	12	0	0	3
Kumponda	1,584	4	23	1	14	16	1	0	0
Kateyo	92	1	5	0	3	4	0	0	0
Total villages	15,168	575	1,474	49	938	390	330	72	144

Note : group organizing and other social components are not included because of difficulty in quantification.

Currently no ready-made procedure of effective capacity building of local communities nor the steps to guarantee the formation of effective community organizations is available, that has been tested and proven to be workable and efficient. Some government agencies have their standardised procedures to form community organizations for particular objectives. For example, FD produced "Guidelines for Formation and Strengthening of VNRMC" in July 1999. Although this 15-page booklet enables forest extension workers to follow the steps to form a VNRMC, little is explained concerning concrete methods of how to sensitize the community, assist VNRMC in preparing the work plan, organize the communal activities, generate fund to carry out planned activities, etc. It is also found that due to constraints of extension services (see 10.10 Capacity Building and Education) this guideline has not yet been fully tried by forest extension workers in the MA. Some NGOs are also trying out certain capacity building measures in their implementations of projects. Lessons learned from such NGOs' experiences are reviewed and incorporated for the planning of capacity building and formation of community organizations

12.2.3 The Estimated Area of VNRMP in the MA

The following table suggests the estimated size of components by village in the MA, in correspondence with the current status and farming / forestry base where the estimation was made from available (or remaining, un-tapped) resources in the villages.

12.3 Methodology on Agroforestry Exploitation

12.3.1 Potential on Agroforestry Exploitation

(a) Target Area for Agroforestry Exploitation

Survey on land distribution shows that there are 1,891ha of arable land consisting of rainfed, dimba and fallow. This means that average land holding is approximately 0.7 ha per family. Since 1,891 ha of the MA has a potential to be exploited for agroforestry (hereinafter abbreviated as AF) by villagers, 62 ha out of 1,891ha accounts for Dimba along rivers that has more potential to benefit from AF that brings increased agricultural production and control soil erosion.

(b) Current Extension Efforts for AF Exploitation

Almost no positive effect is expected in the 1st year of AF practice on increase of agricultural production, nor on improvement of soil fertility. Effect of AF on the farm production will appear from the 2nd year, gradually increasing year by year. ICRAF research, performing at adjacent area on almost the same condition with the SA, has shown that the maximum effects will appear in the 5th years after starting transplanting of AF plants.

The RRA revealed that there is a good understanding on AF among the villagers represented by village headman. Yet, almost no AF has been practiced in the field, possibly because of lack of AF seedling and seed for providing such seedling.

It is concluded that the above two reasons have caused delay in development of AF and its benefits in the MA. Therefore, continuous extension efforts and supplying of such materials are key factors to realize the benefits of the AF in the MA.

12.3.2 Basic Approach to the AF Development Plan

(a) Objective

Practice of AF is expected to improve villagers' living standard through control of soil erosion, improvement of soil fertility, supply of fodder, material for cottages industry, and firewood, etc. The objectives of introducing agroforestry are not merely confined to nutrient enriching but covering multi-purpose usage, according to current situation and requirement of villagers production media and environment.

(b) Land Provision (acquisition) for Practicing AF

Those who cultivate low fertility field had better practice AF. It is recommended that AF practice may start at the cropped field belonging to the member of the AF farmers group. Additionally, it should be a requirement that the member should have strong intention of practicing AF. All the rainfed farmland, dimba and fallow should be mobilized as a target of the AF practice. Also, AF farmers group can develop demonstration AF farm in the customary land close to AF nursery. Hence both individual farmland and customary (public) land are targeted for AF practice.

(c) AF Development Unit

Small unit of 20 meters square is deemed suitable as a base for AF development. Generally, villagers do not have any experience of dealing metric units such as meter or hectare. A 20 meter rope with spacing marks will be useful for a homogeneous AF practice. Some of the tracts along rivers are allocated mostly to individual farmers. In most cases, farmers are allocated small parcels of dimba for vegetable or sugarcane planting and those plots have as small as a few hundred square meter, or 20 m wide along the rivers. From such point of view, it is recommended that a plot of 20 m square can be adopted as a unit for

practicing AF.

(d) AF Practicing Group

AF should be implemented through new formation of AF farming villagers group or consolidation of certain villagers group. Tentatively, the villagers' group will practice AF names as “ AF farmers group” on this plan. It is recommended that a minimum of 20 farmers in the same village should be participated in the formation of AF farmers group that will start practicing AF. Hopefully, the 20 farmers will collectively manage a grouped farm plots that are not individually owned for a smooth initiation of AF practice.

(e) Adopting AF Technology

Simple and readily practicable AF techniques should be applied in order not to discourage villagers. The techniques should also be easy for promotion and extension by the extension agents or assistants. Technically, those techniques must make positive impact on the preventive efforts against soil erosion, on improvement of soil fertility, supply of firewood and animal feed, etc. Also, the techniques must be adapted to all possible AF-practicing farms in the SA.

(f) Species to be Employed for AF

The following criteria should be applied in selecting species for AF:

- The species that should be able to accomplish objectives of the AF
- The species for which propagation material can be easily obtained
- The species that can be grown fast and readily maintained
- The species that can attract villagers interest, and
- sufficient number of species

(g) Combined Effects of AF and Agriculture

In parallel with progress of AF practicing and developing, agricultural improvement plan should be coupled with AF realizing crop diversification, rotation cropping.

(h) Basic Concept of AF Nursery

It is planned that a total of 8 AF nurseries will be constructed in the MA area, each nursery covering an area of approximately 500 ha. AF nursery will be a functional center serving villager's group activities for forestry, AF and vegetable seedling production, technical transfer, etc. Also AF nursery will propagate scions or stock for providing graft seedling, etc, in compliance with AF farmer's interest ⁴⁵.

An AF farmers group will provide and manage a nursery in cooperation with other villagers' groups according to the planned design. Equipment and materials for creating nursery and material production should be supplied from outside.

12.3.3 Technical Dimension of AF

(a) Practicing AF by Land Type

AF scheme is planned on the farmland through a grouping of land into four groups under different categories, classified by soils and slope gradient. Suitable models of AF techniques will accordingly be applied to these different types of land categories (See Annex II B, four sheets of illustrative diagrams).

⁴⁵ VNRMC will be able to produce tree seedling in the AF nursery individually or cooperation with AF farmers group. It will be concluded by themselves.

The AF practicing plots will be 20 by 20 meters. Spacing within rows and between rows will be as indicated in the diagram in the Annex. Farmers will have options to vary spacing dependent on their needs. Within the above major soil types, farmers will adopt with or without modification of the currently tried AF techniques. Seedlings or scions will be produced at AF nurseries / mother trees, are planted on these four types of land in accordance with the planned diagram. However, slope steeper than 8 degree shown in the following Table (Gradient E and F) is rather recommended to convert into/ utilized as woodlots or forest sites.

(b) Land Classification for AF Practicing

Field where land owners have intention of practicing AF will be identified for introducing AF practices and also examined prior to starting AF. Members of AF farmers groups will be advised to produce and plant AF materials in their own individual crop field. The said farmers group may modify AF practices in their own identified land so that the most suitable planting techniques are secured on their crop field.

Table 12.2 Land Classification for AF

Soil / Gradient	Less than 4 degree	4 < 8 degree	8 degree <
Sandy Loam	A	C	reforestation
Loamy Sand	B	D	reforestation

Within the above land classification for AF, farmers will adopt with or without modification of the currently tried AF techniques as outlined under section 12.3.4 on adoption measures of AF technology.

(c) Advisory Entities of AF Farmers Group

Prior to forming or consolidating AF farmers group, an enlightenment program will be provided to the villagers at target villages. Then initial program of the AF will be commenced by confirmation of villagers' intention. Thereby, AF farmers group will start their activities and an advisory program in these three villages will be initiated for supporting their activities. These groups will take charge of:

- Administrative advice for operation, management and monitoring of the AF farmer groups
- Technical advice for AF technology by the extension officer of the counter part
- Technical advice to the counter part by the foreign specialist of the verification survey or an international agent i.e. ICRAF
- Enlightenment activities to sustain farmers interest to the AF

12.3.4 Adopted AF Techniques

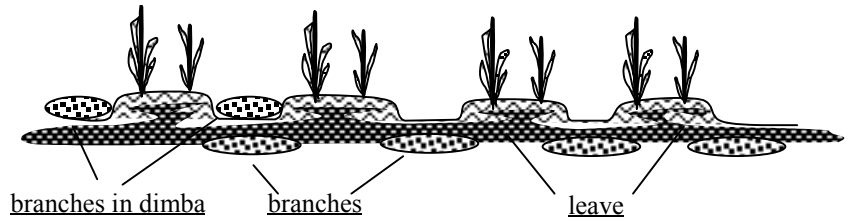
Four AF techniques will be applied to cover all types of potential AF area in the SA. These are a) Alley cropping, b) Intermix cropping, c) Short-term improved fallow and d) Relay cropping. Four of these AF techniques can cover all potential area in the SA. The following matrix shows how to adopt these types by field.

Table 12.3 Matrix for Selection AF Technology by Field

Necessity of agriculture	High	Middle	Low
Soil fertility			
Medium	a)	b)	b)
Poor	a)	d)	d)
Very poor	d)	c)	c)

Basically, leaves and branch are should be ploughed into soil of the AF practicing field separately. Leaves can spread and place all over the field and branches should be buried into soil between ridges. Transplanting or seeding plant at above branches in the soil should be avoided (see figure 12.1). In dimba, placement of organic materials in the

Figure 12.1: Placement Location of Organic Materials

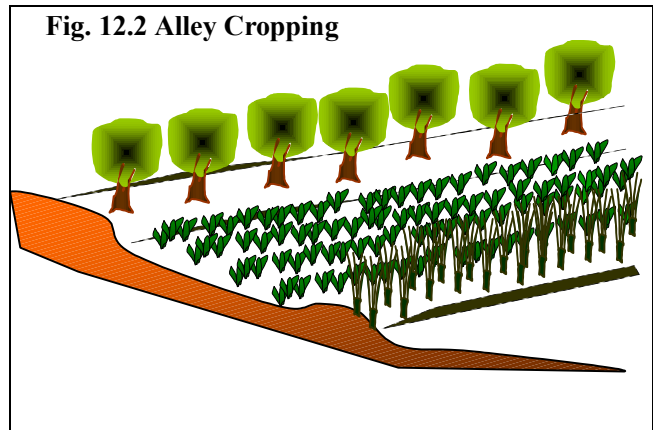


soil should be carefully incorporated into soil, especially during or before rainy season. An unfermented organic material makes damages to the plant. Therefore, in dimba, only leaves can ploughed into soil and branches should be placed on the surface between ridges as mulch.

(a) Alley Cropping

This technology involves planting rows of trees in farms along contour lines (marker ridges) and crops between alleys of such trees. Alley trees usually consist of fast growing ones at high survival rate to serve for copious supply of leaf biomass. For instance, from the second year after transplanting some branches and leaves can be cut off and incorporated into soils as green manure.

Objective of the technology: The technology aims at addressing the problem of low agricultural yields through improvement of soil fertility by application of green manure. Quite often, such technology also helps prevent soil erosion on steep area where terrace like beds eventually evolves naturally.



Recommended Site: The techniques will be established in all the targeted villages to the verification survey. Slope areas with a grade of exceeding 4 degrees and above will have more plots to assist in soil erosion control.

Species : The species to be used will mainly be *Gliricidia sepium*. *Leucaena leucocephala* will also be tried. *Tephrosia vogerii* and *Senna spectabilis* can also be applied over the slope for contour hedge grow at interval of 3 - 4 ridges.

Spacing: Planting of trees will be 50 cm apart within the rows and 5.4 m between the rows. On steeper area, closer spacing between rows will give remarkable effect for controlling soil erosion and for securing higher level of biomass production. Since it is advised that thick transplanting and thinning cut technology for keeping adequate growth of the species on steeper slope.

Establishment: Alley will be planted from tree seedlings grown in AF nurseries. Initially, agricultural crops will be inter-cropped with trees within the alley rows. Inter-planting will be stopped where crown shading does not permit crop growing.

Management: Start pruning hedgerows during the second crop season when the trees are about 1 meter tall. Strip off leaves and small twigs, then apply them to the soil along the ridges between the alleys. Collect stems and use them for firewood or small construction material.

(b) Intermixed Cropping

This technology involves inter-planting crops between rows of trees. It is a modified form of alley cropping. The difference lies in that the spacing between the rows of trees is reduced in such way that no

large empty space between rows of trees is placed. The trees density per ha is also considerably higher. The main reason of increasing density of trees planted is to produce enough organic matter to cover the whole plot.

ICRAF⁴⁶ commenced a trial intermixed cropping at 1993 in its experimental farmland adjacent to the SA. A result that indicates increasing maize production is shown below. Except first year, yield of maize at AF practicing field have exceeded standard (none AF or control).

Table 12.4 Effect on Maize Production by Intermix Cropping by ICRAF

year	Production of maize (t/ha)	
	Standard control (None AF)	AF practicing field
1993	2.0	1.6
1994	1.2	2.5
1995	1.1	2.1
1996	1.0	2.0
1997	4.4	4.8
1998	1.8	4.7

Objective of the technology: The technology aims at addressing the problem of low agricultural yields through improvement of soil fertility by application of green manure. A result of research by ICRAF indicated that maize yield per ha with and without trees increased from 1 to 4.8 tons and from 0.4 to 3.5 tons for the years 1993 and 1998 respectively without applying any inorganic fertilizer.

Recommended sites: The techniques should be established in all targeted villages and flat areas with deep soils will be preferred to apply this technology.

Species : Mainly *Gliricidium sepium* and *Senna siamea* as alternative tree species.

Spacing: Tree spacing will be 90 cm within rows. Rows of trees will be planted every other furrow, with an interval of 180cm. Practically, original spacing between ridges was 90cm but has now been modified by farmers to about 75cm. The spacing between ridges may therefore be about double of this spacing or 150-cm. In that case, spacing between rows of trees will be 150cm rather than 180cm.

Establishment: Tree seedlings are planted along furrows while crops are planted along ridges.

Management: Start pruning rows of trees during the second year. Incorporate leaves and small twigs into the soil on ridges. Each row of trees feeds the adjacent ridges with green manure. Stems can be collected and used for firewood. Pruning should be timed to minimize crop/tree competition.

(c) Improved Short Term Fallow

This technology involves planting short-term shrub plants in fields, which have been left fallow due to severe soil infertility. Such plants are planted alone for a period of two years. Strong nitrogen fixing tree species are recommended because their nitrogen-rich leaves and decaying roots can greatly improve soil chemical and physical properties.

Objective of the technology: The technology aims at rejuvenating soils, which have been impoverished through continuous cropping. Currently, soil fertility has been impoverished as is evidenced by extremely low crop yields and growing of an indicator weed, fields are abandoned for periods of six years and over to rejuvenate them. This is not easily practiced in countries including Malawi where land holding size is marginal. With the proposed system, rejuvenation period will be reduced to 2 years. Research in Zambia indicates that improved fallow system can double or treble maize yield and can eradicate striga parasite

⁴⁶ ICRAF survey data is attached at Annex II-B-2 ICRAF activities in Malawi

from the infested fields.

Recommended sites: The techniques will be established in the already abandoned fields such as Nanjiwa village. Kaumbata village also has some abandoned fields, which could be rehabilitated using this technology.

Species: The species to be used will mainly be: *Sesbania sesban* (jelejele). *Tephrosia vogelii* can also be tried in adjacent plots.

Spacing: Tree spacing will be 1m x 1m square, equivalent to 10,000 plants per hectare of land. On the other hand, a plot of 20 m x 20 m will require 400 plants each.

Establishment: Trees will be planted from tree seedlings. Direct sowing can also be applied but take a longer period before maturity. Plant maize crop and when knee-high, plant *Sesbania sesban* seedlings.

Management: Inter-crop tree with crop during first year. After harvesting maize crop, leave *Sesbania* to continue growing. During second year trees should be allowed to grow alone as shading is anyway too heavy. Clear-fell all trees at the end of the second year and apply the leaves and small twigs to the soil. Stems or coppices can be used for firewood.

(d) Relay Cropping

The technology involves planting of short rotation nitrogen fixing shrubs with crops and the land is continuously cropped instead of leaving it fallow. In fact, currently popularized planting of pigeon pea is in itself a system of relay cropping.

Objective of the technology: The main objective of the technology is to enrich soil by adding organic matter from by-products like paddy straw. Such organic matter contains some quantity of nitrogen when it is fresh and also other nutrients needed by plants and hence improves soil without addition of inorganic fertilizer.

Recommendable site: All the villages where mono-culture cropping has been continuously done in rainfed or irrigable field or both.

Species: Mainly *Sesbania sesban* (jelejele) and *Tephrosia vogelii*

Spacing: 1m x 1.5m - Within rows and planted every other row of maize or other staples

Establishment: Direct sowing of seeds or planting of seedlings later in the season after maize has germinated.

Management: Leave shrub growing in the field after maize harvesting. At the time of land preparation, uproot shrubs and incorporate leaves and coppices into the soil.

12.3.5 Recommended Species of Trees for AF

(a) AF Species Selection

AF species will be selected by villagers based on their intention or felt needs. "Annex II-B-3 Recommended AF Species" shows recommended species for AF in the villages that will be selected for support. Other than the following species, there are other candidate species i.e. fruit trees of citrus varieties of lemon, tangerine, etc., species to supply material for cottage industries or timber for house or furniture making (sisal hemp, reed, bamboo, etc.). Species of bamboo and the case of similar project case in Kenya are presented on the Annex II-B-4. Number of species should be minimized to those with known record of growth in similar areas. Besides, it is advised that scrutinized review on the specie selection be tried prior to the final designing so that dimension of logistics can be considered as to how to

obtain necessary amount of seed and scion material of the planned species. In this context, it is advised to begin with already existing indigenous or exotic tree species in the villages (for example, *Tamarindus indica* in Nanjiwa village and *Moringa oleifera* found in Michongwe village) for mother trees. Since trees for agroforestry practices are also made use of by women on farm plots, gender based consideration on the selection of useful species is essential. To this end, additional species / varieties of agroforestry trees will be employed through a questionnaire survey for the selection thereof to beneficiary women, prior to fixing the plan of implementation.

(b) Specific Attributes of the Recommended AF Species

Following are salient features of species.

• Preferred species group I

Faidherbia albida: Unique indigenous leguminous tree in that it fixes nitrogen from air for use by crop. Yields of crops under the tree have been observed to increase by 250% compared to those grown in the open. Deep rooted species, drought resistant and does not compete with crops much because its leaves are on during dry season and are shed off during wet season when other crops are growing with maximum requirement for sunlight (7500-10000 seeds per kg).

Gliricidia sepium: A fast growing exotic tree/ shrub that originated from Central America. It has copious supply of leaves, which are used for soil organic matter. Ideal for nutrient cycling due to its deep rooted nature. The tree can grow well in dry areas. It is also easily propagated from seeds (6500-8000 seeds per kg).

Leucaena leucocephala: A nitrogen fixing evergreen shrub which originated from Mexico. It is ideal for fodder and soil enrichment due to large concentration of nitrogen in the leaves and stems. Very fast growing and appropriate for land reclamation. The species can be propagated easily, as it is prolific seed producer. It is also good bee-forage (13000-34000 seeds per kg).

Melia azedarach: The tree, originated from south Asia, is good for firewood and can easily be propagated, as it is prolific seed producer with high germination rate. GOM introduced the species before Eucalyptus plantation round 1985. There is no new plantation of the species after start Eucalyptus planting during 1980s. Some farmers have planted the tree and such trees could be conserved as a source of planting material (500-3000 seeds per kg).

Senna siamea: The tree species, originated from Southeast Asia, is tolerant of extended drought and is not easily attacked by termites. It is prolific producer of leaves and hence ideals for soil organic matter and prevention of soil erosion. Good bee-forage. The tree has been planted in a few areas of the study area and extension agent are familiar with its propagation (about 39,000 seeds per kg).

Senna spectabilis: Good species for land mulch, originated from tropical America, which is also good bee-forage. The tree is fast growing on good sites but slow on poor sites (about 39,000 seeds per kg).

• Preferred species group II

Acacia polyacantha: Almost 20m tree height, indigenous species. Ideal for soil reclamation and soil fertility due to its nitrogen fixing ability. Leaves and roots of the tree have medicinal value and the species is also used for fodder and, fuelwood (14000-16000 seeds per kg).

Calliandra calothyrsus: An important multi-stemmed shrub as it is nitrogen fixing. Leaves and twigs good for fodder and soil organic matter. It is very fast growing on good sites and can be used for river bank stabilization and soil erosion control (about 19000 seeds per kg).

Syzigium cordatum: The tree has some medicinal and fruit value and could be used as an income generating source. It grows well along river bank with extensive root system which is good for river bank

stabilization (about 2400-3700 seeds per kg).

Tephrosia vogelii: This is a shrubby legume, which has high capacity for nitrogen fixation and by implication soil fertility improvement. It can be inter-cropped with maize in relay cropping resulting into significantly higher yields. (about 15,000 seeds per kg)

Ziziphus mauratiana: This is a drought resistant tree species, which is truly multipurpose and highly useful in dry areas where other trees cannot be grown. Its fruits are already widely marketed in the study area, its roots are good for medicine. The tree is also good bee-forage and live fence (430 – 2000 seeds per kg).

(c) Recommended Speceis of Fruits and for Production Cottage Industries Materials

Following list shows a recommended speceis of fruits and cottage industries. Fruits speceies included commercial and possible indigenous fruits in the Miombo. AF farmers' group will choose their preferable speceis as their villages production (refer to Table 12.5)

Table 12.5 Recommended Fruits and Material Trees in the SA

Indigenous fruits in the Miombo		Commercial fruit	Material species
Scientific	English		
<i>Uapaca kirkiana</i>	Wild Loquat	Avocado	Sisal hemp
<i>Parinari curatellifolia</i>	Mobola Plum	Banana	Bamboo
<i>Strychnos cocculoides</i>	Monkey Orange	Citrus (Lemon, Tangerine, etc)	Elephant grass
<i>Flacortia indica</i>	Indian Plum	Grenadine	Papyrus (Paper reed)
<i>Azanza garceana</i>	Snot Apple	Guava	Reed
<i>Vangueria infausta</i>	Wild Meddler	Mango	
<i>Syzygium cordatum</i>	Water Berry	Ramon (mulberry)	
<i>Adansonia digitata</i>	Baobab Tree	Papaya (peaupau)	
<i>Ficus vallis chudal</i>	Sicamore Fig	Pineapple	
<i>Sclerocarya birrea</i>	Mfula Mango		

Note1) Miombo indigenous fruit: ICRAF is carrying research on such indigenous fruits for commercialization. Some of species are already in the process of trials in the field.

2) Commercial fruits: Vvumbwe agriculture research center recommend fruits at the SA

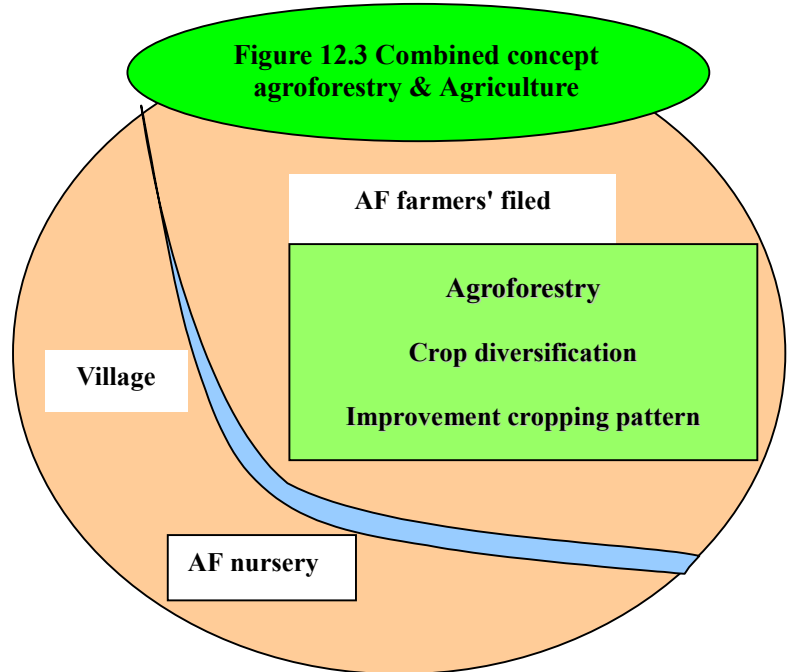
3) There are both indigenous and exotic bamboo in the MA. Exotic bamboo has been transplanted by villagers for roof frame and other construction/furniture material.

12.3.6 Combined Concept between AF and Agriculture

(a) Diversification of Agri-crop Varieties and Looking for more Marketable Products:

Currently, the variety of crops being produced in both dimba and rainfed cultivated area are very limited i.e. leaf vegetables, tomatoes, etc. at dimba. Therefore, it is considered pertinent to diversify agricultural products by employing vegetables of cucurbit or brassica varieties such as cucumber, pumpkin (not for production of the leaf), etc, or bulbing up Chinese cabbage, lettuce, etc respectively. Current poor villagers' vegetable growing techniques can hardly afford to produce such vegetable species.

More important crop diversification, other than the above, constitutes introduction of maize production for harvesting during hunger season in dimba or rainfed field. Currently, lack of staple food causes a host of chronic and serious social problems. Natural conditions such as climate or soil, limit the production of maize to such cropping pattern.



The crop diversification can be practiced and must be accomplished in order to improve villager's life by means of adequate adoption of AF

(b) Rotation Cropping among AF Nursery Group Farmers or Individuals

The current AF promoted at Michongwe villages by MAFE or in Zomba district by ICRAF is limited to individually practiced farm plots. However, enough amplitude of AF practice by group of farmers can be expected to have more positive impact on prevention of soil erosion and improvement of soil fertility. In the course of the AF practice, crop rotation pattern among AF nursery group member can be established to avoid the current practice of continuous cropping and hence minimize detrimental effects of monoculture.

(c) Practicing Appropriate Mixed Cultivation Measures

Currently, villagers are in fact practicing mixed farming system as an insurance against failures of crop production. This mixed farming has led to overall lower harvests due to crop competition of for example maize and pumpkins. Mixed farming of maize and legumes would of course lead to higher yields because of soil fertility improvement introduced by legumes (mainly due to nitrogen fixation), a factor which compensates for crop competition. Combined agriculture which introduces AF, crop diversification, rotation cropping and appropriate mixed cropping will not only lead to less area cultivated but also to more increased agri-production.

(d) Development Different Crops Production by Village at Dimba and Rainfed

Current farm production of leafy vegetable at dimba causes high competition in the markets. It is understandable that farmer produce such leafy products because of ease of cultivation and the short cultivation period. It is necessary to develop more diversified crops by villages based on the commodity

trends in available and growing markets, thus avoiding the current glut.

12.3.7 AF Nursery Construction, Equipment and Material Supply Plan

(a) Selection of the AF Nursery Construction Site

Proposed sites for providing AF nurseries : . Selection of sites for AF nurseries is based on the following criteria:

- The site where irrigation water source is secured and free from flood damage
- The site where good quality earth to fill seedling pots is readily available
- The site located near the proposed consuming area of the produced seedlings, i.e. carrying distance is short enough. Ideally, it's located at the place of traffic convenience and intense demonstration effect can be expected.
- The site that has similar environmental conditions to the area of planting seedlings, and
- The site of flat topography should be selected to provide nurseries, to keep ventilation and sunlight and well-drained condition, and in case of slope, terracing should be made to maintain nursery ground as flat as possible.
- The sites which are not subject to frost or hail damages

As concern raising seedlings of orchard fruits etc., it is recommended that technical advice and training for individual farmers are desirably provided by extension agents in parallel with group training so that they can be engaged in seedling production in their own plots individually.

(b) AF Nursery Production Capacity

The capacity of AF nurseries is designed taking account of the annual requirement of seedling supply in four different demand areas (individual woodlot, fast growing trial/demonstration /village forest belonging to AF nursery, reforestation at public facility land, and rehabilitation of degraded natural vegetation) as well as such medium-term requirements to be supplied to river banks or water source conserving forests and village forests. The following table indicates the maximum requirement of seedlings by village, where the survival rate is estimated at 75% for wood tree species and also 75% for vegetable ones, including the supplementary planting to fill vacant hills on the planting rows. As regards the scale (surface area per nursery) and number of tree nurseries to be created, it should further be reviewed and revised in the light of such variable factors as availability of land acquisition / preparation, number of households that need to rely on the nursery.

Table 12. 6 Estimation of Seedling Demand by AF Nursery

Supplies	Area (ha)	Seedling demand	Ref.
AF seedling	10	80,000-90,000 ¹⁾	10ha: 0.5ha x 20 prs. (AF farmers group)
Vegetable seedling in the AF practicing field	1	40,000-50,000 ²⁾	1ha/ village, 10 % of AF practicing field
Individual woodlot Village forest	15	60,000 ³⁾	5ha/village, rotation by 8 years

Note 1) Average seedling demand of RRA for the three villages practicing implementation of AF. survival rates 75 %, 50 % for surplus production other than subsistence production.

Note 2) Planting density 2,000/10a (cucurbit varieties) , survival rates 75%, 50 % for sales

Note 3) Total afforestation target area in the MA 934ha. Average annual afforestation area is 15 ha per AF nursery (rotation by 8 years, construction 8 AF nursery, planting density 2000/ha, survival rates 75 %, 50 % for sale.

(c) AF Nursery Construction Target Villages

AF nurseries are planned to be constructed and operated in 8 villages in the MA where positive willingness is felt towards the production of AF materials, tree seedling, or vegetable seedling (see Figure

12.4 Candidate AF Nursery Location Map). Henceforth, AF nursery should be located at a convenient site for every villager for commuting to or distributing various kinds of seedlings. Meanwhile, in fact, creation of AF nursery at each village is not necessary, because of land availability or limited needs. It is predicted that during the progress of the verification trials, several village people will start to utilize an AF nursery located at adjacent village based on the traditional relationship among villages. Hence, tentatively, 8 AF nurseries are planned in the MA which is one third of target villages number, but enough to cover the entire MA.

Construction of eight AF nurseries is planned at following 8 villages in the MA, each nursery covering almost 500 ha. Kaumbata, Ndemanje and Ndemanje villages are planned as 1st year batch. Second year batch is planned at the Kam'mata and Chilangali, while 3rd year batch is scheduled at Makonokaya village and Mdala village. Then, as the fourth year batch Lemu village is selected for the nursery construction. (See Figure 12.4 Candidate AF (AF) Nurseries Location Map). The proposed locations of these AF nurseries will allow every villagers to reach the nursery site for daily managing works within 30 - 40 minutes of commuting on foot, walking almost 2.5 km at maximum

(d) Function and Facilities of AF Nurseries

Following is a proposed plan about function and facilities of AF Nursery (see annex II-B-5 AF nursery design)

12.3.8 Agroforestry and Soil Conservation

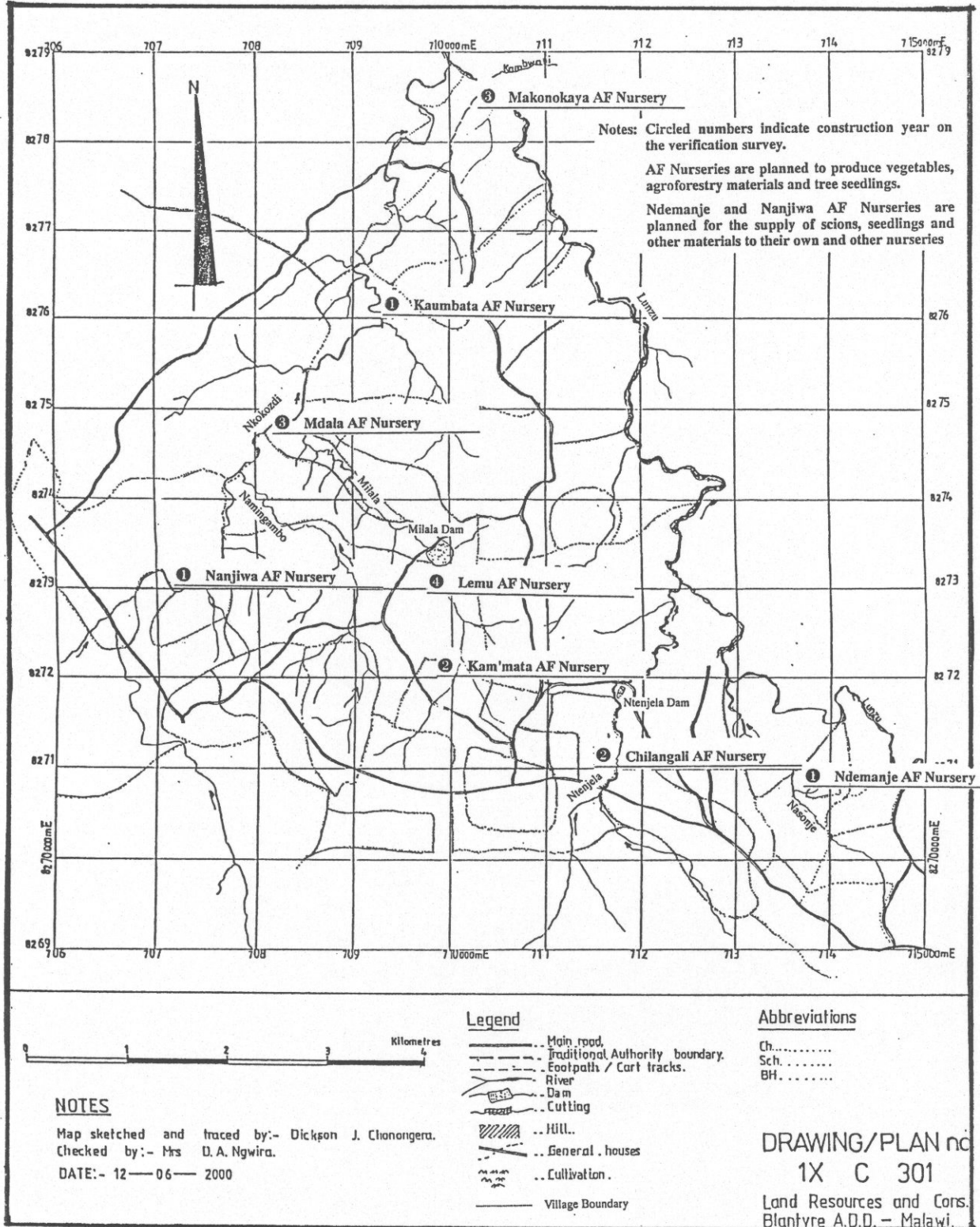
Since tree row(s) can be provided through the practice of agroforestry at the lower edge of a parcel, it is expected that soil loss from the parcel can be greatly controlled by this practice. Yet, it will still be necessary to practice contour ridging inside the parcel, desirably practicing box ridges for cropping in rainy season. This practice should be demonstrated by extension agents for further diffusion in parallel with promotion campaign for aroforestry. Particularly, in Zone II ~ IV where crop field has been developed on slope coincided with the distribution of highly erodible soils (gully is apt to form under such conditions), it is recommended to such plant species with thriving root zone as *Molus alba* and *Tea sinensis*. These can be planted along the hedge of parcels along inclination, as a device to minimize soil loss from the rill surface.

Table 12.7 Function and Facilities of the AF Nursery

Item	Function	Facilities
Seedling production	Production seedling	Facilities for tree, AF, vegetable seedling production
	Maintain seedling propagation material	Germination bed, scion / stock farm, etc.
	Storing equipment and materials in safe, working shop	warehouse, workshop
	Preparation pot media	Manure depot
	Watering	Weir, manual watering system
Security		Guard house 24 hours
		Fence surrounding the nursery
		Wind, shade forest
O & M Villagers group	Meeting space for the group	Nursery office
Tech. transfer, extension activities	Resident or temporal extension officer	Residences for extension officers
	AF technology transfer	AF nursery AF demo. field
	Forest technology transfer	AF nursery demonstration forest

Item	Function	Facilities
Trial & research	Fast growing species Collection seed by villagers Alternative seedling raising methods to vinyl pot Direct sowing of tree seed Propagation material crop (bamboo, etc.)	Af nursery demonstration forest

Figure 12.4 Candidate AF Nursery Location Map



12.4 Forestry Extension Plan

12.4.1 Basic Approach of the Forest Extension Plan

Sustainable forest should be developed. Sustainable forest must meet following conditions.

- the reforestation measures must meet villagers' interest
- contents of afforestation activities must be attractive to the villagers that they are willing to form groups
- villagers' interest and needs about reforestation should be directly or indirectly connected to the cash income and/or self-consumption.
- developed forest must be maintained in good conditions.

Following are basic approach to the forestry extension plan those will be able to satisfy conditions for development sustainable forest.

- Indigenous or successful exotic species: Basically, indigenous species is preferred to utilize for reforestation project for restoring same natural condition with before deforestation.
- Target area of Reforestation: Reforestation should be planned to every space where tree planting can be made mainly in close proximity area of the villagers i.e. residential area or daily activity area, clinic, church, school, etc.
- Group activity: Villagers raise seedling for their reforestation project and collect seed also. Partly exotic species are planned as trial as well as rapid growth species for satisfying villagers requirements and needs.
- Sustainable management of forest and/or tree: Development sustainable management methods by villagers that can be affordable to maintain forest or tree vigorous and satisfy villagers interest and needs. Thus, improvement of environment condition based on increasing forest
- Reforestation measures must be one step up from an existing technology and must be affordable, easy understood and accepted by villagers.

12.4.2 Forest Development Potential of the MA

(a) General

The MA once carried a large diversities and large size trees before the current population had settled the area. Historical evidence adduced during RRA indicates that there once existed large forests in the area. Remaining varieties of tree species were quite large according to the inventory of trees made during a transect tour of the villages. The size of original vegetation can also be deduced from inventory of the vegetation in graveyards of the three villages. Other than the spots where the dead villagers have been buried, the rest of vegetation in the graveyards is intact and a true reflection of the original vegetation. Most of villagers remember very well about past fertile vegetation. Currently villagers can imagine a landscape of villages surrounded by rich forest and intend to restore such degraded vegetation.

(b) Area of Forest Development in the MA

Aerial-photo interpretation and subsequent verification of sites has been used to estimate forest development potential area. The result of estimation is that almost 20 % of whole area is confirmed as a forest development potential area for currently waste land or forested area i.e. degraded natural vegetation at Nanjiwa, grave yard, homestead woodlots, etc. These solid area have a possibility to be developed as a village forest, rehabilitation degraded natural vegetation, rehabilitation of graveyard forest, etc. Other than 20 % of forest potential area in the MA, individual woodlot belonging to each household were already allocated.

Table 12.8 Potential of reforestation area in the MA

	Whole Area	Reforestation potential area (ha)	Rate*
Woodlot	674	674	100%
Homestead	544	109	20%
Wasted land	450	90	-do-
Others	305	61	-do-
Total	1,973	934	

Note : * Rate indicates the rate of available space

(c) Village Natural Resources Management Committee (VNRMC)

VNRMC that is supported organization by the RFOS as village level expansion of forest, is planned also as a core of reforestation activities. It is recommended to promote new VNRMC or consolidation of existing VNRMC. The groups can be established at each village or some of certain number of villages. It is confirmed that villagers understand well about necessity of group activities for reforestation through RRA.

Meanwhile current activities of VNRMC are very limited about their duration and works, because of labor wage. VNRMCs are targeted to reforestation at bare hill of customary land and reforestation of already allocated land such as farmland, homestead, individual woodlot, is performed by only villagers' effort. RFOS budget is limited and their activities are concentrated to forest reserves⁴⁷.

12.4.3 Component of Forest Development in the MA

(a) Forest Development Components

Following four types of reforestation are planned, 1) is reforestation at already allocated land, 2) - 4) are forest activities at customary land or public land. It is expected to cover whole potential area in the MA through the proposed plan. Following 1) to 4) are a summary of each forestry plan and 5) are summarized all of them in a table. After 5), detail plans are described on b) - e).

- 1) individual woodlots and riverbanks or water source conserving forests: Majority area of the MA is already allocated to individual household. First type of reforestation is provided for the area where individual farmers plant trees on the allocated land to them as a scheme of mobilized reforestation. Allocated land is composed of homestead area, farmland, fallow, riverbank, roadsides, etc.
- 2) village forests with a trial of fast-growing species: Second type of reforestation is provided for planting trees at unallocated land in the villages. This village forest reforestation also comprises a component for trial reforestation of rapid growth tree species and mixed forest development. Therefore it is recommended to establish this type of reforestation around the plots with AF. Other villages, if villagers intend, can choose the area depending on availability of unallocated land.

⁴⁷ Budget of RFOS (ref.) (MK x 1000)

<i>RFOS</i>	<i>Current (1999/2000)</i>	<i>Requested (2000/2001)</i>
Current budget	55,882	58,630
Project budget	20,453	28,222
Total	76,335	86,852

3) Environmental Reforestation at public land, i.e. Graveyard, borehole/shallow well, road side, school, church, etc.: for rehabilitating deteriorated secondary indigenous forests that fall the same category of planting on unallocated land of village forest. Other reforestation on public land is also proposed for improvement environmental condition that is not objected for firewood or timber.

4) Indigenous forest rehabilitation: This aims at reforestation to restore degraded indigenous forest at unallocated land at each village. For instance, at Nanjiwa and Ndemanje Village, degraded area is found in and out of the villages. This type of reforestation is planned to adopt different technology of reforestation to create village forests.

5) Summary of the forest extension plan: The figure showing forest extension plan at the right illustrates forest components.

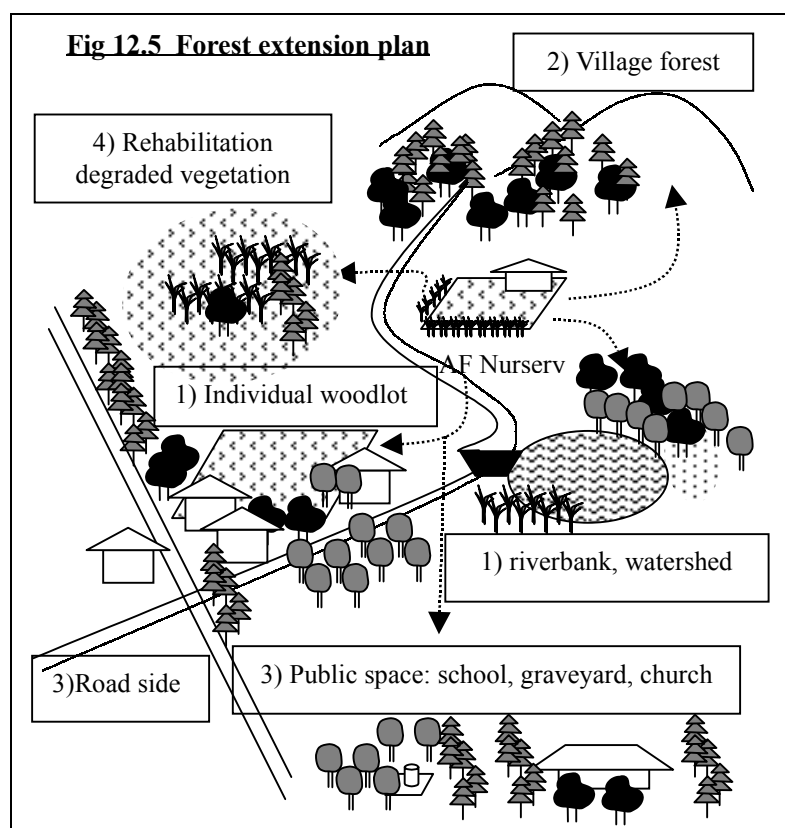


Table 12.9 Implementation Body and Target by Reforestation Component

Afforestation component	Implementation body		Target area
	main	sub (support)	
1) Individual woodlot reforestation	VNRMC	-	Allocated private land
2) Trial on fast growing species demo. village forest	-do-	-	Customary land
3) Environmental reforestation at a Public land	Villagers group	VNRMC	Reforestation at the type of Public space
4) Rehabilitation degraded natural vegetation	VNRMC	-	Customary land

The above table summarizes conceivable implementation bodies and target area by component.

(b) Establishment of Individual Woodlots and Riverbanks or Water Source Conserving Forests

This type of reforestation in individually allocated land has the objective of self-supplying firewood for household consumption, as well that of conserving river terraces and water sources for tube-wells, perennial or seasonal streams. Most of the land along main streams in Kaumbata and Ndemanje villages has already been allocated to individuals. Hence, creation or expansion of individual wood lots along with reforestation of riverbanks or water sources conserving forests should be carried out by the hand of individual villagers. Of which, the former has main objective of self-supplying firewood for daily use in future.

The participants form a VNRMC to be engaged in the seedling production in AF nurseries in a group. In producing seedlings to this end, they organize a group for conducting a group practice, to which technical and managerial support is granted. The target area to be covered by individual wood lots by villages is given in the following table as estimated from future supply-demand balance of firewood.

On the other hand, the river bank reforestation is aimed at the stabilization of river banks, prevention of soil erosion, augmentation in the water harvesting effect of canopy cover, and finally, enhancement of farm productivity in the irrigated vegetable (dimba) field which will be developed along the streams. The active farmers will, on their own initiative, provide seedlings for individual wood lots to cater for them, riverbanks or water source conserving forests

The tree species to be employed for individual wood lots are initially selected among those recommended by FRIM, for which seed is readily procured. However, the species for which seed collection can be made within the villages should be tied in the long run. For those to be planted in the riverbanks or water source conserving forests, priority selection shall be given to the tree species, which are also suitable for enhancing farm productivity in irrigated plots along the streams and for preventing soil erosion.

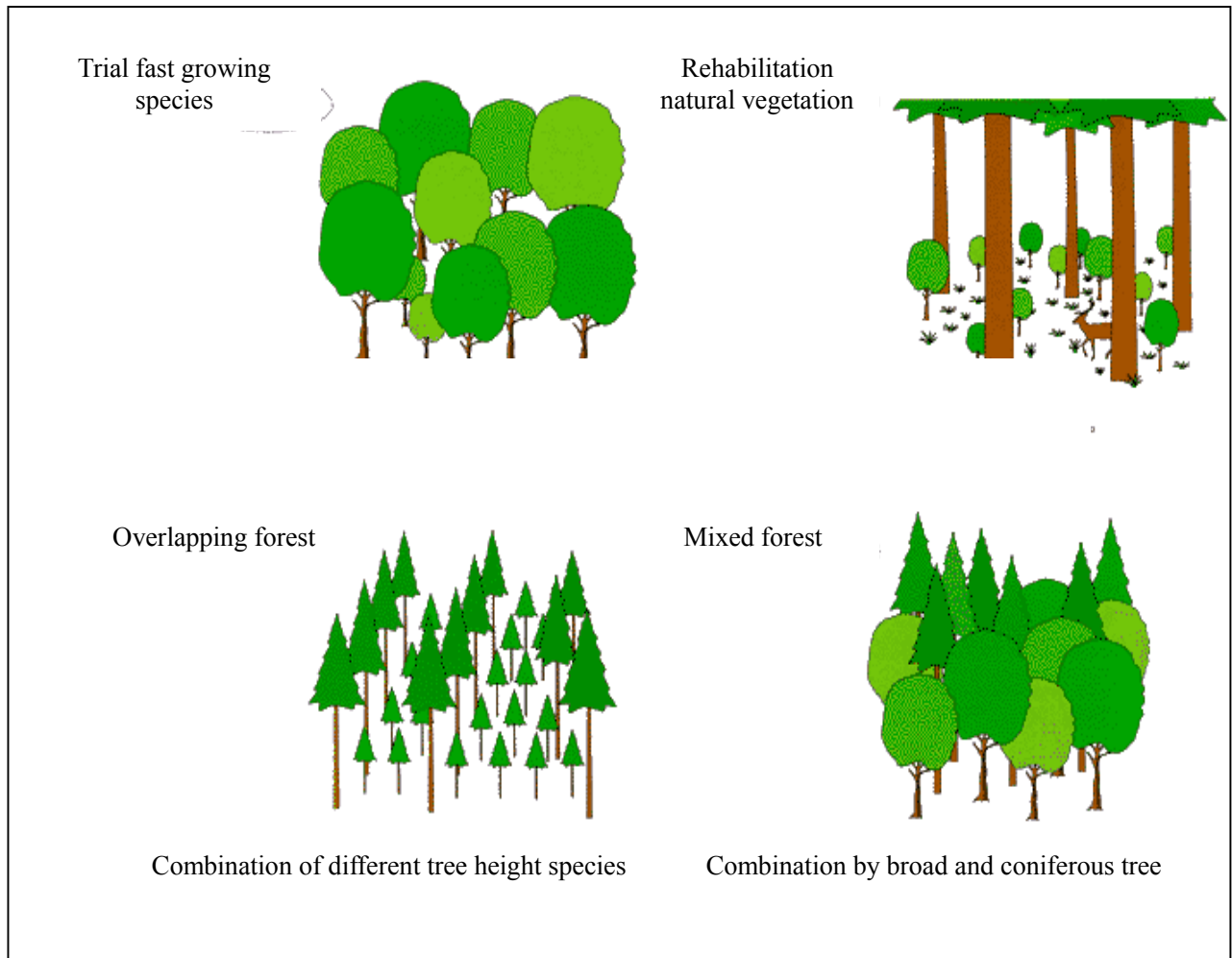
Fast growing species such as Acacia, are recommended for reforestation individual woodlot. Citrus tree, banana, papaya or bamboo⁴⁸ are recommended to riverbank and watershed reforestation that will be able to protect land erosion and supply materials for cottage industry or timber. Also *Khaya anthotheca*, *Khaya nyasica* (red mahogany, mahogany family) though slow growing, are recommended tree species for riverbank reforestation in view of their excellent timber and the fact that they have already been growing along streams.

(c) Creation of Village Forests and Test Trials of Promising, Fast-growing Tree Species

According to the result of RRA, farmer's intention of planting trees is limited, in favor of fast growing Eucalyptus species. This is the positive aftermath of government promotion campaign since 1980 that still continues for expanding firewood and pole production. As it takes time to renovate farmer's concept to diversify the species to plant, it is planned for the time being to begin improvement and reforestation with conventional fast-growing Eucalyptus species as far as the planned reforestation in individual woodlots with a participatory approach is concerned. Generally, the advantage of planting Eucalyptus is best brought about in semi-arid areas since it can grow fast even in the driest climatic regime.

⁴⁸ See Annex II-B-4 Bamboo (Species and similar project in Kenya)

Figure 12.6 Model Forest



However, Eucalyptus species have some shortcomings: they are highly inflammable with higher risk of catching fire, they form single and exclusive colony, hence they are often inconsistent with environmental improvement, except for such an area of adverse conditions on which only Eucalyptus specie can survive. In other words, little positive effect can be envisaged if one aims at amelioration of soils, erosion control, increased water retentive function and other public benefits of forests or benefit of enhancing IGAs and farming productivity. Taking these into consideration, it is planned to try to rectify the hitherto farmer's fixed belief devoted only to Eucalyptus (Blue-gum tree) into wider scope of selecting diversified tree species on one hand, as well to select proper varieties of fast-growing Eucalyptus other than *E. camadulensis* for the limited purpose of producing log-wood. In parallel with reforestation with Eucalyptus varieties, other fast-growing tree species than Eucalyptus are planted in the woodlots adjacent to the AF nurseries to be served as a model of mixed forest and concomitant trial lots in which different fast-growing Eucalyptus varieties are planted for growth comparison., thus promoting farmer's wider vision and concept innovation.

(d) Environmental Reforestation at Public Land, i.e. Graveyard, Borehole/Shallow Well, Road Side, School, Church, etc

Graveyard forests in this area have so far been conserved as almost natural vegetation since felling of any trees therein has been traditionally banned. However, vegetative cover in these graveyards is recently

endangered due to increasing numbers of new tombs, while difficulty arises in the expansion of cemetery and the land procurement for new cemeteries. To cope with the issue, as need arises from villages, it is advised to plant indigenous tree species around the existing grave yards, along the access roads to cemeteries and the sites scheduled for new cemeteries. It's needless to say that reforestation workers should observe traditional beliefs in planting trees and entering into the yards.

Other than graveyard, there is also a space for reforestation in the public land, for instance road side, church, school, etc. Those public spaces should be filled with tree for environmental improvement.

It is recommended that reforestation activities of the public facilities should be undertaken by the concerned villagers group (borehole committee, PTA/school class, etc). Their reforestation activities can be supported by VNRMC for technical and material requirements.

(e) Restoration of Deteriorated Natural Forests

A tract of gentle slope extends down to the original streambed of Nkokodzi in Nanjiwa village. The flat portion of the slope has already been allotted to village farmers for cultivation, but gradient portion still remains unallocated. Useful tree species have so far been all exploited and natural shrub thrives over the slope. Even such brush has been poached, and it is anticipated to become completely barren sooner or later, unless some rehabilitating / monitoring measures could not be taken. This slope is covered with futile and gravelly soils. So, it is advised to reforest it taking these into consideration. It mainly aims at fuelwood production, and VNRMC carries out the reforesting works. The proposed works comprise on-the-spot planting, land preparation in view of accelerating regeneration, creation of fire preventive belt and others. Seedlings for the planting works are reared in AF nurseries.

(f) Summary of Reforestation Activities by Component

Type of forest, target area and objective are summarized by the reforestation component.

Table 12.10 Salient Features by Reforestation Component

Reforestation component	Type of forest	Target area	Main Object
1) Individual woodlot, riverbank, watershed forest	Individual woodlot	Allocated private land (farmland, home garden, etc)	firewood/timber
	Riverbank forest	Riverside allocated to farmer	environment
	Planting border	Homestead or farmland border	-do-
	Planting surface stream	Along with surface stream causes land erosion	-do-
2) Fast growing species trial, demo, village forest	AF nursery village forest	Adjacent to AF nursery or individual village forest located in the customary land	Timber production
	Trial forest	-do-	-do-
3) Environmental reforestation at public land	Graveyard forest	Surrounding area of graveyard, etc	Environmental improvement
	Bore hole forest	Surrounding area of borehole	-do-
	Road side forest	Reforestation of road under village O & M	-do-
	School forest	School site	-do-
	Church forest	Church site	-do-
4) Rehabilitation degraded natural vegetation	Village forest	Customary land	Firewood, timber

12.4.4 Firewood Supply Plan

Firewood demand including consumption by cottage industries', is 0.44 m³/year/person. Current population of MA (calculated based on ratio of area) is 14,000, and growth rate is surveyed as 2% by the

Phase I. Since estimated population will increase up to 16,000 in the year 2006⁴⁹. 7,040m³ of firewood is demand to supply to the population.⁵⁰ In addition, further income generation activities will be promoted under this plan. Hence, increase of firewood demand will outweigh wood supply.

AF exploitation and forest extension plan will supply 5, 220m³/year of firewood in the MA and 1,820 m³ of firewood is shortage. It is impossible to cover whole firewood demand by supplying tree energy. On the other hands, current consumption of firewood other than wood is estimated as 4,928m³/year and balance of firewood can be supplied from this. When completion the plan, newly over 3,000 m³ will be able to put into soil as an organic material for soil improvement. Following table shows "Firewood supply plan". As for current demand/supply, it was cited in 10.7.2.

Table 12.11 Firewood Supply Plan

Firewood sources	Area (ha)	Supply per ha (m ³)	Supplies (m ³)
Demand			7,040
Supplies			
Reforestation	934 ^{note 1)}	3.01 ^{note 3)}	2,800
AF	1,891 ^{note 2)}	1.28 ^{note 4)}	2,420
Crop residue, weed			4,928 ^{note 5)}
Sub total supplies			5,220
Balance			3,108

Note 1) Woodlot, and 20 % of homestead, waste land and other land (included none firewood forest i.e. fruit, school forest, graveyard forest, etc).

Note 2) Total of rainfed and dimba area

Note 3) Current average growth of village forest

Note 4) Estimated firewood volume produced by AF practicing (*Gliricidia sepium*). Source: ICRAF⁵¹

AF type	Spacing	plant/ha	growth /ha (m ³)	Area (ha)	Yield m3/ha/yr
• Alley cropping	0.5 x 5.4	3,704	0.7	18.9	13.23
• Intermix alley cropping	0.9 x 1.5	7,407	1.4	5.8	8.12
• Short term fallow	1.0 x 1.0	10,000	7.0	2.2	15.40
• Relay cropping	1.0 x 1.5	6,667	0.5	3.2	1.60
Total growth					38.35
Weighted growth / ha					1.28

Note 5) Crop residue, weed is calculated as 80 % of current consumption

12.4.5 Provision of Seed, Scions and Planting Materials

RFOS is supplying purchased tree seed from FRIM to VNRMC for reforestation project. The same procedure regarding seed supply will be employed for the proposed implementation of the plan. Meanwhile, VNRMCs' activities have to be suspended when the supply is delayed. There is also occasional lift of extension activities by RFOS. Thus critical factor to control forestry activities must consider issues such as materials supply mainly seeds and the extension services.

Therefore, trial on alternatives i.e. seed sources or vinyl pots, becomes key factor for O & M of sustainable village and individual woodlots / forests. Since AF nurseries are planned to produce propagation material such as scions, stocks for grafting of fruit trees or AF material, mother tree etc., a device should be examined in a way that villagers will propagate seedlings by using stands in graveyard or other places as mother trees. Further, trials are suggested for rearing seedlings by means of earth floor in place of polyethylene pots. With regard to these techniques, ICRAF researches will be available to the

⁴⁹ Next national census scheduled to take place at year 2006. Last one was at 1996 by 10 years interval.

⁵⁰ Firewood consumption per person about 0.44m³

⁵¹ see Annex II-B-2 ICRAF Activities in Malawi

planners to meet the requirement.

12.5 Income Generation Activities

(a) Development Potential

Market

A few markets are located in the vicinity of the MA, such as Mombo trading center, Dziwe trading center and Lunzu Township Market. Vegetables are traded in these markets throughout the year. If sufficient lots of vegetables can be marketed from the MA, direct sale to larger markets including urban markets in Blantyre and Limbe.

1) Vegetable production / sale

As agriculture serves the mainstay of villager's life in the MA, IGAs are as a matter of course mainly confined to the activities related to farming. Their farming has faced with various constraints. Prevailing climate within the MA has a rainy and a dry season in a year and the precipitation occurs as a rule in rainy season only. Another farming problem arises from depleting soil nutrients caused by soil run-off that is often fostered by deforestation. However, year-round production can be realized in very limited farm plots along perennial streams where irrigated farming can be practiced to produce value-added cash crops like vegetables, beans, spices, fresh maize-cobs and sweet potato. Farmers can avail water from perennial Lunzu river and its tributaries such as Nkokodzi, Ntenjela and Nasonje as well as Milala and Namingamba tributaries of Nkokodzi. Currently, small-scale hand-irrigated gardening is practiced on the terraces of these streams for raising vegetables.

Though the catchment area of these tributaries is limited and available quantity of water for irrigation is also limited, there seems to be some room for the expansion of vegetable garden plots equipped with small-scale treadle pumps. Current vegetable farming is little diversified, with quite primitive production techniques due to insufficient technical guidance by extension workers. Hence, there is room for improving usage of irrigation water, maintenance of irrigation facilities, crop variety diversification through the instruction by FA. It is advised to establish production / sale groups under the guidance of FA so that group activities are envisaged for purchasing input materials by groups, quality management prior to marketing to mutually adjust quantities and period of vegetable marketing, thus avoiding glut supply of single vegetable specie with higher risk of dumping sale. Target villages are only a half of the number in the MA, with perennial streams, with limited beneficiaries due to limited water resources during dry season.

2) Small-scale fowl rearing

Since almost all farm households actually rear or have experience of rearing fowls in a limited scale, it is possible to organize groups for rearing fowls, especially chicken and Guinea fowls that can be kept in a free barn system around homestead area. All farm households in a village can be selected as target of husbandry orientation for which group purchasing of seed chicks / fertilized eggs, feedstuff, and sale of produce by group are programmed. In this connection, Guinea fowl rearing has not been introduced to the MA. It follows that not only farmers but FA should be instructed to establish rearing techniques thereof. Since NGOs that extend activities in the vicinity of the MA have ample experiences of the rearing, their cooperation can be counted on at the beginning of the rearing as to purchase of seed chicks, rearing skills and sale tactics etc. Another option lies in the technical transfer from FA stationing in the middle part of Malawi to those who are in charge of the MA, because Guinea fowl rearing is getting popular in central Malawi. Initially, the produced fowls in a group would be self-consumed but sale can be planned by themselves. In Blantyre, a cooperative for poultry rearing was established in 1991, with the currently functioning 17 groups in which 600 members have been affiliated. This cooperative practices planned sale of the products under the guidance of ADD. From this experience it is advised to join the existing cooperative or to organize a new cooperative for coordinated sale of what is produced by the group.

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Since almost all farm households actually rear or have experience of rearing fowls in a limited scale, it is possible to organize groups for rearing fowls, especially chicken and Guinea fowls that can be kept in a free barn system around homestead area. All farm households in a village can be selected as target of husbandry orientation for which group purchasing of seed chicks / fertilized eggs, feedstuff, and sale of produce by group are programmed. In this connection, Guinea fowl rearing has not been introduced to the MA. It follows that not only farmers but FA should be instructed to establish rearing techniques thereof. Since NGOs that extend activities in the vicinity of the MA have ample experiences of the rearing, their cooperation can be counted on at the beginning of the rearing as to purchase of seed chicks, rearing skills and sale tactics etc. Another option lies in the technical transfer from FA stationing in the middle part of Malawi to those who are in charge of the MA, because Guinea fowl rearing is getting popular in central Malawi. Initially, the produced fowls in a group would be self-consumed but sale can be planned by themselves. In Blantyre, a cooperative for poultry rearing was established in 1991, with the currently functioning 17 groups in which 600 members have been affiliated. This cooperative practices planned sale of the products under the guidance of ADD. From this experience it is advised to join the existing cooperative or to organize a new cooperative for coordinated sale of what is produced by the group.

3) Storage and primary processing

Seed production of sweet potato and cassava has been tried in the MA in order to diversify the crops and enhance their yields. However, mango fruits on dispersed mango trees are abandoned and rotten due to lack of storage or processing techniques. Within the marketing sphere of Lunzu Township primary processing is not yet developed, nor any trial seen at household level. Food storage techniques that can be extended at household level include dried mango, dried chips of sweet potato, boiled and dried sweet potato and bean cake dressed with cane syrup. The methods of food storage are also developed by ADD and diffused among FA, and now they are available for farmers. As far as the existing techniques are concerned, villagers can obtain the skill of primary processing through the instruction of FA, HFA and CDA. However, so long as diversified primary processing techniques are concerned, technical transfer to both FA and farmers would be necessary because both of them have not any practical experience thereof.

4) Bee keeping

In the MA, apiary is only observed in Ndemanje village where traditional comb-boxes are used. Though honey plants as nectar sources do not remain much as deforestation has been escalated, the expansion of bee-keeping is possible making use of stream-side woodlots or brushes and ample mango trees. Installation of new comb-boxes can be practiced at brushy areas along Lunzu river and its tributaries, Nkokodzi, Milala and Ntenjela streams. Through the process of planned reforestation of such indigenous deciduous trees as *Brachystegia* species, acacia species, citrus trees and other honey plants as nectar sources, together with vegetable flowers like rape, the scale of bee-keeping can be gradually expanded. Referring to the scale of apiary practiced in the vicinity, it is advised to start with ten boxes per unit keeping group.

5) Livelihood improvement

– Improved fireplace

Serious deficit of daily consuming firewood prevails not only in the MA but in the entire SA. Women spend three hours to look for and fetch firewood everyday. Despite that acute desire for using improved fireplace that can save the amount of fuel expands among housekeepers, the actual use cannot be observed except few cases in the MA. Also, the employed fireplaces have not enough rigid structure to last for months, but are subject to decomposition by weathering in a few months, leading to failure of diffusion to the neighbors.

Under such circumstances, possible and practical measures to introduce Enzaro-fireplace that is increasingly diffused among households in west Kenya and other places are proposed. As compared with conventional three-stone stove, the Enzaro-fireplace can save more than half of the firewood requirement, eventually leading to forest conservation in the MA. However, the prototype thereof used now in Kenya will hardly be introduced in the MA without verifying the suitability. So, it is advised to verify it under the guidance of experienced foreigners in such a way that CDA takes initiative to try to develop sample fireplaces to examine the usage and fitness to the local people.

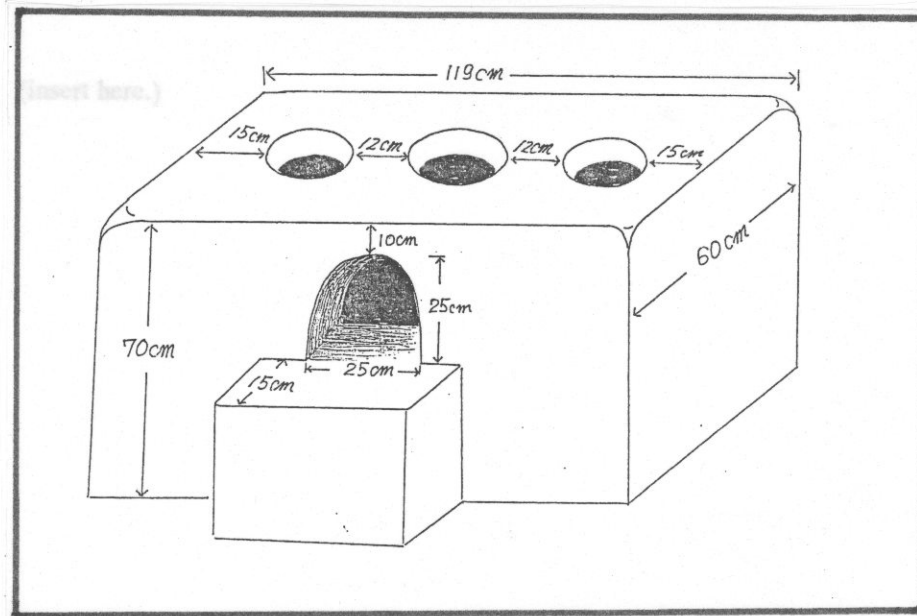
Cash money is commonly managed by husbands in the SA, and housewives must ask their husbands for money whenever need arises for them to buy commodities. Regarding this fact, the material of the fireplace is confined to that is readily available around their houses, such as brick, molding earth and water, so that women who desire to construct an improved fireplace can easily begin to try.

After the trial period of using sample fireplaces with necessary re-modeling and the recommended type for popularization is selected, The CDA display the sample to demonstrate how to utilize it. CDA can choose a few housewives willing to employ the improved type and teach them how to make it. Thus, they can learn the improved burning techniques in order to raise heating efficiency to master as an expert instructor. During ten days after the completion of the fireplace and allowing it to dry, the cooking time and consumed firewood are recorded. The record can be compared to that after the drying process. CDA allows a lady group to continue to use the trial sample fireplace for the purpose of monitoring. After a few weeks, CDA asks them to assemble the monitors to assess the efficiency. Based on their assessment, CDA

can add required re-modeling to the sample fireplace, thus extending the techniques to other women.

It is desirable to diffuse the improved fireplace in a way like merry-go-round among an informal group consisting of about six women, where members will take turn to serve as a communicator who gathers other group members to provide the improved fireplace in each house. The members cooperate one another to provide labor for fetching earth and water, to collect and provide material to construct it one after another. When the first improved fireplace is tried in a group, the expert as cited above can be asked as an instructor so that the saving of firewood can be efficiently realized without failure.

Figure 12.7 Improved Fireplace



6) Commercial horticulture

Vegetable raising in homestead gardens has been placed as a viable income generating activities in agricultural policies in Malawi. Vegetables can be rotated three to four times a year, and villagers in the MA have already carried their produce to nearby town perishable markets for sale. Accordingly, it is possible to promote this by constructing small weirs as suggested in 12.6 (c)1, where relevant instruction can be made to produce vegetables and fruits with quality worth marketing so that villagers do not have to resort to random felling of standing trees for additional income. In this connection, it is advised to organize group farming for joint use of such implements as trading pumps and watering tins.

(b) Development Strategies

The SA and MA extends over a hilly plateau (EL. 500 - 700m) where river terraces are allocated individually to villagers based on their usufruct right. There has not found any suitable site for farming water use than small reservoirs established during 1950s for dam construction with government initiative. Recently, decentralization has been becoming a leading policy and top-down type of decision for dam construction is fading away. Taking these into consideration, it is advised that villagers establish the plan of IGAs by themselves in the following manner:

- To select IGAs based upon deep-rooted and traditional skills to the area concerned that can be readily implemented and sustained by local population. These include vegetable production in marshy areas, poultry and apiary.
- To try to establish as many and different IGAs as possible so as to avoid inner competition among villagers or their groups engaged (commodity campaign known as "one product in one village").

- To provide an equitable arrangement for villager's organization so that all or as many villagers as possible have equal opportunities to be engaged in the proposed IGAs.
- To attempt the promotion of livestock oriented to poultry taking account of rural environment in the MA where dietetic behavior of villagers based to cereal consumption.
- Likewise, to try new, rational storage methods and primary processing of farm produce to make more rational use of their products like local mango varieties, sweet potato, pulses and sugarcane.
- Keeping deep-rooted individualism (lack of experience in group activities) of villagers in mind, to formulate the plan more oriented to human development that can make them accustomed to group activities.
- Since technical transfer by FA is limited in both quality and quantity, and it lacks dimension of their living, the plan should include technical transfer to FA along with that to villagers.
- Basically, FA, FHA or CDA are responsible for the technical transfer to villagers, which that to the instructors or extension staff is performed by experienced RDP, FA in other jurisdiction or NGO staff with ample experiences or experts of related research institutes. Especially, the instructor of apiary should be selected from well-experienced experts with sufficient background.
- To promote diffusion of improved fireplace so as to limit acceleration of firewood consumption through due demonstrative schemes for better cooking and improvement of living standard.

12.6 Infrastructure & Use of Water Resources

(a) Infrastructure

Serious problems arise from such infrastructures as roads, bridges, boreholes, clinics, schools, maize mills in the MA and these can hardly cope with and their maintenance is hardly funded. In view of current socio-economic conditions of inhabitants and governmental agencies concerned in the MA, improvement and expansion on infrastructures should be given priority as maximum effect will be obtained with minimum investment and small scale facilities involving beneficiaries villagers are recommended. Proposed location of facilities are shown in Figure 12.8.

1) Road

Road network system consists of main roads and cart roads in the MA. Not only for better access to the Markets, etc. but also as communication measures, a road is one of the most important facilities to the villagers. Main roads are paved by latelite and 4 to 5 m in width, 39.2 km in total length (1.01 km/ km²). Cart roads in 88 km (2.28 km/ km²) are narrow and difficult to pass by vehicles and also these surface are uneven eroded by flood. Both roads' densities at present are considered as sufficient. The condition of the main road between Lunzu and Nkula is better than the others but uneven surfaces are found at everywhere. Grading on road surface per year should be carried out by heavy equipment at the end of rainy season. On the other hand, uneven surfaces on the cart roads should be repaired by beneficiary villagers in cooperation.

2) Bridge

Currently existing bridges are only 4 places, 2 wooden bridges and a steel made located along the Lunzu-Nkula roads and a causeway crossing the Nkokozdi river at northern part of the MA. There are no bridges along the Lunzu and Nkokodzi rivers. In flood season especially in January to March water level becomes 1 to 2 m higher than the river banks, so people find difficult in access to the boreholes or markets at rivers and tributaries. Taking into consideration of the current condition of the roads' net works, new bridges are proposed at river/ tributaries which will be made by concrete or wooden materials. And also road crossing installed by reinforcement concrete pipe 2 to 3 series are proposed at streams. Proposed locations are

shown as Table 12.12, 12.13 and Figure 12.8.

Table 12.12 Proposed Bridge at Main Rivers/ Tributaries

Bridge No.	Village	River/Tributaries	Remarks
B 1	Siyamdima	Lunzu	Assess to Market
B 2	Salimu	-do-	-do-
B 3	Masangano	-do-	-do-
B 4	Ndemanje	Nasonje	Access to Borehole
B 5	Nanjiwa/Teula	Nkokodzi	-do-

3) School

Number of Primary Schools is only 7 in the MA. Some of children are difficult to go to school because school is remote from their villages. Taking into consideration of the distribution, 3 Primary School are proposed to be constructed in Nanjiwa, Kamwendo and Chikaja villages

Table 12.13 Proposed Road Crossing at Streams

Crossing No.	Village	Stream	Remarks
RC 1	Mdala	Kachere	
RC 2	Nanjiwa	Kaweta	
RC 3	Siyamdima	Nambindo	
RC 4	Teula	Namingambo	
RC 5	Lemu	Namingambo	
RC 6	Lemu	Milala	
RC 7	Kam'mta	Milala	
RC 8	Kumponda	Nasonje	

4) Clinic

Under Five Clinics are located at only 4 places in and around the MA. Sparse distribution, location and remoteness to the villagers pose serious problems. Construction of the clinics is proposed at Mdala, Makanokaya, Teula and Makanami villages.

5) Maize mill

In and around the MA maize mills are only 2 places. Usually women travel long distances to grind their maize into flour. Recently material of mortar and pestle is scarce and difficult to get. New location of Maize Mill are proposed at 4 places namely Kaumbata, Chikoja, Makanani and Simon Mpombe villages.

6) Boreholes

Taking consideration of design criteria of 250 persons/ well in GOM, more than 53 boreholes equivalent to 0.42 MCM should be necessary to construct in the MA. Currently groundwater consumption is about 0.13 MCM (1.0 liter/sec/well, 33 wells, 6 hours use). Balance between estimated potential in 0.63 MCM (See Table 12.14) and current consumption and necessary amount for 53 boreholes amounts to 0.08 MCM which is enough to supply necessary number of boreholes. Current condition in the MA, 11 number of boreholes are proposed to be installed in namely Chakana, Syamdima, Chimseu Dzimbiri, Makonokaya, Kumanda, Daniel Mbedza, Teula, Micongwe, Selimu, Ndemanje, Kateyo where are no boreholes is available in the village.

(b) Water Resources

Available water resources in the MA are currently 2 rivers and their 3 perennial tributaries, 2 dams and groundwater. Based on the M/P study, Chapter 2, 2.3 Water Resources, water balance in the MA is

estimated as table below. Surface runoff is 82 mm/year or 3.2 MCM and almost all of which is flushed out to the rivers in the rainy season. From the topographical and socio-economical condition, there seems to be no room to construct reservoirs in the MA. On the other hand, perennial flow potential in the dry season is also estimated at 1.18MCM which will be mainly used for dimba irrigation along the rivers and tributaries (See Table 12.15). Assuming irrigated area of 45 ha, consumption of 1.0 liter/sec/ha, cultivation period of 6 months in the current dimba irrigation, water consumption is estimated as 0.7 MCM and balance of 0.5 MCM is still available for dimba irrigation. Available groundwater is estimated at 16.4mm/year or 0.6 MCM, which is mainly used for portable water. Taking account of these conditions, how to keep and use water effectively in the dry season is an essential issue in water resource development plan.

Table 12.14 Water Balance in the MA

Factor of Water Balance	Ratio	Area (ha)	Runoff	
			mm/year	MCM
Annual mean rainfall (820mm/year)	100	3,864	820.0	31.68
Evapotranspiration	88		721.6	27.88
Surface runoff	10		82	3.17
Groundwater recharge	2		16.4	0.63

Table 12.15 Available Water of Rivers and Tributaries during the Dry Season

River Name	Discharge from April to		Discharge Water (MCM)	Available Water (MCM) * ¹
	October			
	April (m ³ /sec)	October (m ³ /sec)		
Lunzu	0.20	0.20	3.70	0.74
Nkokodzi	0.125	0.05	1.62	0.32
Ntenjera	0.03	0.0	0.28	0.056
Nasonje	0.005	0.0	0.05	0.01
Milala	0.03	0.0	0.28	0.056
Total			5.93	1.182

*¹ Available water is estimated as 20% of discharge and remained of 80% is considered as evapotranspiration and percolation.

(c) Water Resources Development Plan

1) Construction of weirs

Along the main rivers and tributaries, in order to store water for the dimba irrigation, construction of weirs is proposed. Based on the discharge condition, interval of weirs is proposed as about 1.0 km in main rivers and tributaries. Two types of weirs are planned. Type I dimension is 8m width, 2 m in height for main rivers which will be stored water about 12,000 m³ and the other is 5 m width, 2 m in height for tributaries about 7,500 m³. Weirs will be constructed by gabion nets (2.0m x 1.0m x 1.0m). Considering evaporation, 50 % of water, 90,000 m³ in total will be available to use and about 12 ha of dimba irrigation area will be possible to expand along the rivers and tributaries. Proposed weir location is shown in Figure 12.8. After construction of these weirs, dredging should be necessary once per year by villagers. In this connection, tillage practice with contour ridges and digging of drain channels will be advised in the parcels and “dimba” along perennial streams where remarkable soil erosion appears, as mentioned in 10.3.(a) (availability of water resources).

Table 12.16 Location of Proposed Weirs Construction

Construction of Large Weir (Type1)			Construction of Small Weir (Type2)		
No.	Village	River	No.	Village	River
LW 1	Makanokaya	Nkokozdi	SW 1	Chikoja	Milala
LW 2	Kaumbata	-do-	SW 2	Chikoja	-do-
LW 3	Mdala& Manjelo	-do-	SW 3	Lemu	-do-
LW 4	Nanjiwa & Teula	-do-	SW 4	Makanani & Kamwendo	Ntenjera
LW 5	Chakana & Nanjiwa	-do-	SW 5	Makanani & Kamwendo	-do-
LW 6	Makonokaya	Lunzu	SW 6	Chilangali & Peter Bilila	-do-
LW 7	Kaumbata	-do-	SW 7	Ndemanje	Nasonje
LW 8	Salimu	-do-	SW 8	Simon Mponbe	-do-
LW 9	Makanani	-do-			
LW 10	Ndemanje	-do-			

2) Rehabilitation and expansion of existing dams

Components of rehabilitation/expansion of dams are shown as table below. Around the reservoirs, dredging in 1 to 2 m depth shall be done with the width in 10 m. Consequently about 10,000 m³ of water will be available at both dams in the dry season. And also dikes of dams where are a important function as a road to access to the villages should be increased more than 1m. Dimba irrigation and aquaculture will become more active.

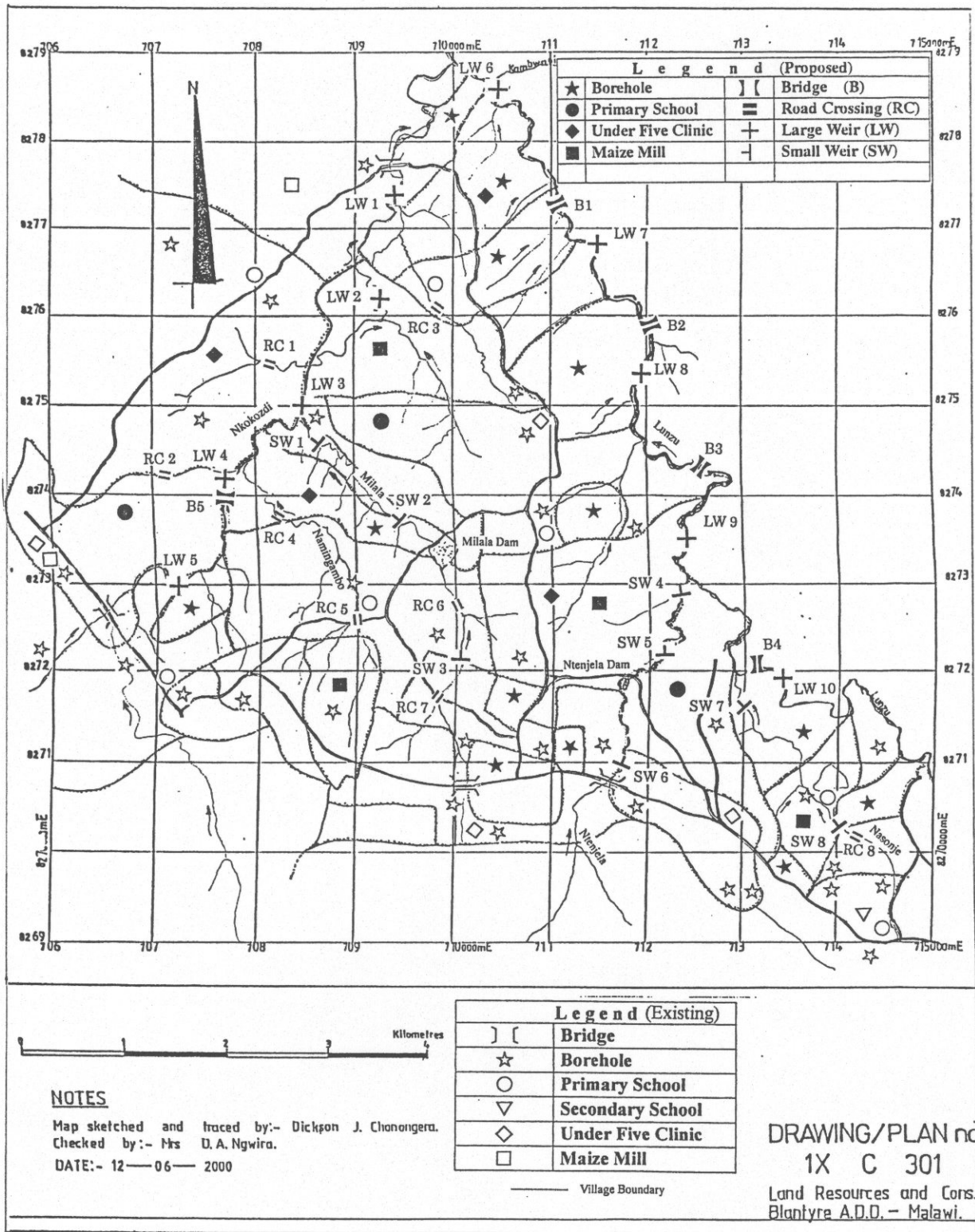
Table 12.17 Components of Proposed Rehabilitation/Expansion of Dams

Rehabilitation/Expansion Component	Ntenjela Dam	Milala Dam
Increase of dike	1.0m	1.0m
Masonry in width & length	4m x 20 m	4m x 30 m
Earth fill in length	4m x 20m	4m x 20 m
Dredging		
Depth	1 to 2 m	1 m
Around the reservoir	1,000 m	800 m
Intake facilities		
RC pipe 300 mm in diameter	10 m	10 m
Sluice gate 300 mm in diameter	One set	One set
Conservation of soil runoff		
Forestation	Around the reservoir	Around the reservoir
Ridges and Drainages System	Dimba Irrigation Field	Dimba Irrigation Field
Reservoir at present		
Reservoir area in dry season	0.90 ha	2.0ha
Reservoir depth in dry season	1.0 to 1.5 m	1.0 to 4.0 m
Storage Volume in dry season	about 10,000 m ³ m	about 25,000 m ³
Reservoir at Plan		
Reservoir area in dry season	3.0ha	2.5 ha
Storage Volume in dry season	about 20,000 m ³	35,000 m ³

3) Groundwater use at Namingambo river basin

Namingambo river basin is a part of Chileka Dambo. Supposed to annual rainfall in 800mm/year, groundwater recharge in 2% and catchment area in 5.29 km², about 85,000 m³ of groundwater will be available to use by shallow wells in the dry season. Using the water it will be possible to irrigate vegetable about 15 ha which is 2 to 3 times expanded of current irrigated area. In addition, rice cultivation from November to March will be able to expand more.

Figure 12.8 Location of Proposed Infrastructures in the Model Area



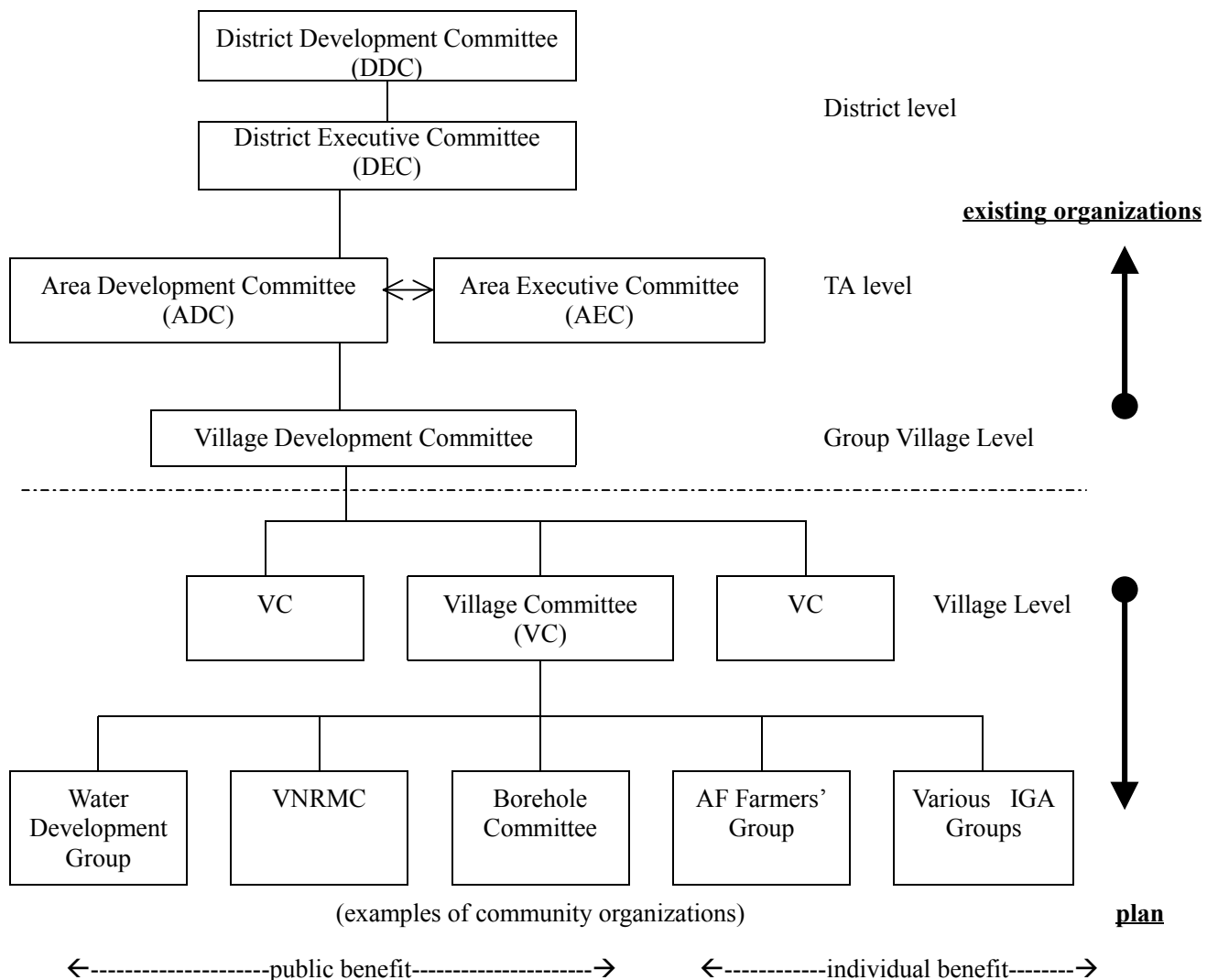
12.7 Community Organizations

12.7.1 Basic Approach to Community Organizations

(a) Importance of Community Organizations

The VNRMP is a plan for the improvement of the community, which is prepared by the community based on the community's needs and is implemented by community organizations. As the VNRMP is a comprehensive plan, which includes measures in various fields such as public infrastructure, agriculture, AF, community forestry, livelihood improvement, education and awareness creation, etc., several community organizations will be formed for the implementation of different components of the plan. In addition, each of the Village Committees (VC) is to be formed for the supervision, co-ordination and support of those various community organizations.

Figure 12.9 Organizational Structure of Community Organizations



(b) The Role and Structure of VC

For the implementation and management of development plans discussed in the preceding sections, it is essential for each village to have a body capable of formulating an overall work plan, supporting and overseeing various community organizations and co-ordinating their activities. Under the District

Development Planning System (DDPS), the VDC is formed at Group Village Level and it is composed of 3 representatives (village headman/woman and one female and one male representatives) from each village. Therefore, it is recommended to form a Village Committee consisting of these 3 village representatives and the representatives of other newly formed and existing community organizations, which will implement the VNRMP components.

Placing Village Committees at the village-level sub-committee of VDC is not only in line with the above DDPS but also acts as an important point of contact among community organizations in both horizontal and vertical manners. The organizational structure of VC and other community organizations under the DDPS is shown in Figure 12.9 above.

In the above structure the VC's roles should be defined as follows.

Table 12.18 Roles of VC

role	activities
Formulation of VNRMP work plan at village level	<ul style="list-style-type: none"> • Identification of people's needs and preparation of VNRMP through PRA and PCM • Preparation of overall work plans for VNRMP • Planning of organizational structures
Implementation of public works in the VNRMP	<ul style="list-style-type: none"> • Mobilization and utilization of labour and local resources (sand, gravel, rocks, etc.) • Implementation, monitoring, evaluation and management of public works
Supervision and support of community organizations for the implementation of VNRMP	<ul style="list-style-type: none"> • Support for community organizations in drawing work plans • Support for community organizations in implementing activities in the fields such as procurement, construction and management. • Support for community organizations in monitoring, evaluation and management of activities
Co-ordination among community organizations for the implementation of VNRMP	<ul style="list-style-type: none"> • Co-ordination of activities among community organizations • Mediation of problems between community organizations or within a community organization
Liaison between community organizations and VDC	<ul style="list-style-type: none"> • Liaison and co-ordination between VDC and community organizations

The VC is composed of VC chairperson, VC treasurer and village headman/woman, who would promote the VNRMP as the core members of VC, as well as the chairperson and the treasurer of each of the community organizations.

The work carried out by the VC members should in principle be onerous and the fund is considered to be best obtained through parts of profits accrued by each of the community organizations. However, the matter should be defined and prescribed in the VC operational framework, which will be set by VC members.

(c) Types of Community Organizations and Methods of Organizations

The measures and activities proposed here, as well as other development activities, may be loosely classified into two categories⁵² depending on the target beneficiaries as follows.

- Measures, which bring benefit to all the villagers, such as rehabilitation and construction of social infrastructures, reforestation of village forest areas, effective use and management of existing water resources, etc.
- Measures, which bring benefit to individuals who are participating the activities, such as small-scale irrigation scheme, introduction of AF practices, various IGA activities, etc.

For the former category of activities, it is best planned and implemented in an equitable manner by all the villagers communally. Some of the activities of this category, such as public works including rehabilitation of roads and bridges and construction of weirs, may be organized and villagers may be mobilized directly by the VC, with technical expertise provided from relevant agencies if necessary. Others, which are also for the interest of the public, such as afforestation of communal areas and management of existing water resources, may be best organized by more specialized committees such as VNRMC and the Dam Committee with technical support of implementing agencies. The members of the above mentioned community organizations, which act for the interest of the wider public, as well as the VC should be selected in an equitable manner by the villagers, who fully understand the objectives and roles of the organizations.

For the latter, groups will be formed by individuals who are interested and willing to take part in particular activities. Establishing equitable rules of sharing both responsibilities and profits among the group members is essential for the sustainable evolution of the project.

(d) Support System for Forming Community Organizations

Currently, formation of community organizations is initiated and supervised by extension staff in the related fields. For example, the VNRMC is initiated by forest extension staff, IGA groups by FAs or CDAs and the Health Committee by health surveillance officers. However, as described previously (see 10.10), extension services are not functioning well and the majority of extension staff who are engaged in such activities are not trained in forming community organizations. Thus, the sensitization of the community and formation of community organizations will be taken care of by the donor agency or an NGO, which is experienced in the field of human resource management and capacity building (hereafter referred as community organization expert). Relevant extension staff will take part in the above process, which are initiated by the community organization expert, as on-the-job-training, so that they will be equipped to assist in formation of community organizations, awareness creation of the community, extension and education in addition to their assistance in technical matters.

12.7.2 Procedure and Measures for Forming Community Organizations

(a) Procedure of Forming Community Organizations

Following the above mentioned basic approach and recognizing the weaknesses found in the existing community organizations (see 10.9), community organizations will be formed and strengthened so that they will be able to be engaged in the implementation of the project in a sustainable manner. The following Table shows the process of formation and capacity building of community organizations. First of all, the RRA and PCM will be conducted with the participation of the whole community in order to identify and analyse the problems and needs of the community as well as to define the measures included in the VNRMP. Then, after conducting a series of sessions for awareness creation and sensitization of the

⁵² However, some activities cannot be categorised one or the other easily as it depends on the way of organizing the activity. For example, a tree nursery may be set up to provide tree seedlings for the rehabilitation or creation of the village forest area or it may be run as an IGA to sell seedlings to individuals or to afforestation projects.

community relevant to the activities set for the VNRMP, formation of community organizations will take place. For the formation of community organizations, members will be selected and then leadership and other training is provided to the members before setting up the organization's operational framework and drawing work plans (implementation plans).

Table 12.19 Procedure of Formation and Strengthening of Community Organizations

	Item	Activity	Organization
1	Analysis of community needs Drafting of VNRMP by villagers	PRA and PCM	The community organization expert / C/P organizations (OJT)
2	(Sensitization of community)	Open air gathering	The community organization expert / C/P organizations
3	Formation of VC (1)	Election of two VC members (village representatives)	The community organization expert / C/P organizations (OJT)
4	Formation of VNRMP community organizations (1)	Defining members (participants) for community organizations Selection of group representatives to the VC	The community organization expert / C/P organizations ditto
5	Formation of VC (2)	Finalizing VC members	The community organization expert / C/P organizations (OJT)
6	(Leadership training)	Leadership training for all the community organizations	ditto
7	(Capacity building for members of community organizations)	Study tours to relevant and advanced projects	The community organization expert / C/P organizations
8	Formation of VC (3)	Setting VC operational framework Drawing VC work plan	The community organization expert / C/P organizations (OJT) The community organization expert / C/P organizations
9	Formation of VNRMP community organizations (2)	Setting operational framework of each community organizations Preparation of project plan Drawing work plan	The community organization expert / C/P organizations (OJT) The community organization expert / C/P organizations ditto
10	Monitoring, evaluation and support of VC and VNRMP activities		The community organization expert / C/P organizations
11	Post-ante Evaluation		The community organization expert / C/P organizations

Note: C/P organizations include verification study team, and the number shows time sequence

(b) Needs Analysis and Sensitization of the Community

1) Preparation of VNRMP based on the needs analysis of the community

Through the whole community will be facilitated in communally analyzing their problems and drawing a basic plan of community development and environmental conservation. For this purpose the community organization expert will organize a 5-day PRA/ PCM session in each village. The concept and the objectives of VNRMP should also be fully discussed during the PRA. Based on their identified needs and the objectives of the VNRMP, the components of the development plan should be defined by the community during the PRA/PCM session. The organizational structure of the development plans should also be discussed and the functions of VC, other community organizations and implementing agencies need to be well understood by the villagers. By planning the VNRMP themselves through PRA and PCM the villagers will then acknowledge themselves as the owner and the implementers of the VNRMP, instead of taking it as something imposed by the outsider. Therefore, this exercise should include as many

villagers as possible as well as relevant extension workers to prepare the outline of development plan consented by the community as a whole. This process will enable the community to attain the ownership of VNRMP. Forestry and agriculture extension staff, who will provide the community with technical support, have to explain what they can do and what they cannot do, so as to avoid the community's excessive dependency on the government services.

In other words, the participants of the PRA are the community, C/P organizations and the study team. However, the C/P staff and the study team should be careful not to hinder the community's initiative to make their own plan. The staff from the C/P organizations, who are in charge of the MA, will take part in the PRA and PCM as part of the organizer, taking a role as record keepers or some other functionaries, which will give them opportunities to learn "on the job" the techniques of PRA/PCM and the formation of community organizations (the training is a task of the community organization expert).

As extension workers have to concentrate on obtaining and upgrading technical knowledge at the initial stage, PRA and PCM moderators will be provided by an experienced organization on participatory approach such as an NGO. Extension staff will learn the concept and method of participatory approach as participants of the workshops, as they will, in the future, take over this responsibility as PRA and PCM moderators.

2) Sensitization of the community

After the PRA session, the community, who greatly lack information or have biased information, needs to be further sensitized over the issues related to the components included in the VNRMP in order to expand their knowledge and understanding. Relevant experts will be invited to discuss the issues with the community. For the IGA component, for example, a CDA, a FA, an international organization or an NGO with an experience in working with different IGA groups may be invited to discuss and provide information on how to launch and initiate the different types of IGAs, success and failure of some of the IGA groups, available credit sources, etc. by giving concrete examples. This will enable the community to understand the issues in a more concrete way and to explore their possibilities among villagers.

(c) Formation and Strengthening of the VC

1) Selection of VC members (village representatives)

After the PRA and PCM, two representative villagers will be selected to form a core group of the VC, who will promote the VNRMP together with the village headman/woman. For the fair and transparent election of these representatives, the community organization expert will explain the roles of the VC and required qualities of VC members to the villagers and facilitate the election process. The election may be organized in a manner accepted as fair to the community if such a method already exists⁵³. In case no such method exists in the village, the community organization expert will present different methods applied in neighbouring villages and the villagers will make a choice.

2) Formation of VC

In addition to the above, two representatives from each of the community organizations, which are either existing and strengthened or newly formed for the implementation of the VNRMP, will form the VC (the procedure of forming community organizations will be discussed later). In the presence of the villagers the formation of the VC will be announced and the members be introduced. Rules concerning the roles of VC, terms of VC membership, holding of regular meetings, recording of minutes, etc. will be drafted by the members and endorsed with the agreement by the community as a whole.

⁵³ One of the common election methods in the area is: a number of selected candidates stand blind folded in front of the villagers; villagers line up behind the candidate of his/her choice; and count the number of villagers for each candidate.

Member of VC

VC Member : Representative of Village(one man and one woman)

Members of VC : Elected Village Representatives (2 persons of each organizations)

3) Leadership training for VC members

The VC members need to be trained fully so as to facilitate and co-ordinate various activities of the VNRMP. All the VC members will participate in the training session concerning leadership, gender, problem solving and project management skills, so they can play a leading role in planning, implementing and managing the VNRMP. In particular, the village headman/woman, who is the non-elected member of the VC and whose position is passed on through family based on the clan system, needs to be exposed in a fair and transparent way of governing the community and promoting community development. As representatives of all the community organizations are members of the VC, the leadership training targeting the VC members will serve as capacity building of these community organizations. Therefore, a 5-day training course would be organized as soon as representatives are chosen from each community organization and the VC is formed.

The training course would take a period of 5 days at Lunzu Residential Training Centre and the trainers will be organized by the community organization expert. The training course will be organized for the VC members from several villages, which will provide an opportunity for the people from different villages to exchange their ideas and opinions.

4) Study tours

Once problems in the community are analysed and the projects to counteract those problems are identified, opportunities of visiting similar projects and visualising the possible outcomes will boost villagers' morals and help villagers as well as extension workers in formulating more concrete plans. Therefore, study tours to advanced areas will be organized for the VC members, members of relevant community organizations and extension workers. Listening to the fellow villagers, with whom people can identify themselves as they were previously suffering from same difficulties as the villagers in the MA, regarding their accounts on the progress of their lives and benefits brought by the project will give them the confidence that they can also make impacts and achieve goals by taking initiatives. Learning about how the fellow villagers had overcome the problems in the process of achieving their objectives will also lead them to prepare a more realistic and effective work plans.

No successful project comprising of various components following a comprehensive approach, which is similar to the one proposed in this study, has been identified in the surrounding area. Therefore, a number of projects, which have a single component in the field such as AF, community forestry, etc. will be chosen for study tour sites. For the purpose of future inter-monitoring (details will be discussed later), the study tour will be organized with the participants of three villages. At the end of the study tour the participants will have an opportunity to share their ideas and lessons learned from the study tour, which will lead them to establish rapport among villages and to exchange information and experience in the course of inter-monitoring.

Table 12.20 Proposed Study Tour Sites

Study Item	Site	Remarks
AF	ICRAF and areas supported by ICRAF	AF techniques were introduced to some villages in Chiradzulu in 1998 with the assistance from ICRAF. Farmers have already seen some benefit and further increase in the yield is expected in 2001.
Forestry Nursery management	Matindi Youth Organization	A tree nursery managed by a group of youth (secondary school graduates). Demand for seedlings is high and proceeds are utilized to expand the nursery.
Agriculture Rice growing farmers	Chilwa	Rice cultivated by individual farmers.
Inland fishery	Domsasi	Project type technical assistance by JICA.
IGA Bee-keeping	Mangweru village forest area in Lundu	FRIM introduced bee-keeping and currently 22 beehives are managed by the group.
Guinea fowl rearing	Mwanza	Supported by GTZ and NGO.

Table 12.21 Study Tour Arrangement per Village

Participants/Tour	No. of group/Tour	Total No. of tour*	Total participants/Year
8	2	3	24

Note: *Calculated with the provision of 6 groups per village.

5) Establishment of operational framework and preparation of work plan

After the leadership training, the VC will determine the operational framework and also prepare an overall work plan based on the VNRMP defined during the PCM.

The VC operational frameworks will be established following the examples set by BCFP implementing villages. Although these framework was set by the villagers and endorsed with the agreement of the VNRMC members, they are mainly a list of penalties and restrictions. The VC operational frameworks should include following items:

- Objectives of VC;
- Organization of VC, VC members, and selection method and terms of VC members;
- Declaration of VC activities;
- Work plan of VC;
- Provision of allowance to VC members; etc.

The main responsibilities of the VC are listed in the roles of VC in Table 12.18. For the public works for village public infrastructure (such as culvert crossing the road) defined under the VNRMP, the VC will take direct responsibility in implementing the project. With the assistance of community organization expert and the C/P organizations (study team), the VC will prepare a work plan concerning the following items:

Activities:

- Support and supervision of VNRMP community organizations;
- Co-ordination of VNRMP community organizations;
- Liaison between community organizations and VDC;
- Preparation of an implementation plan for public works: finalization of construction and procurement plan; budgeting of implementation cost and payment plan; plan of village labour and village natural resources (gravel, rocks, etc.) provision;
- Support for VNRMP community organizations to prepare work plans; etc.

(d) Formation and Strengthening of VNRMP Community Organizations

As described previously, based on the activities planned under the VNRMP, various community organizations will be organized. As shown in the Table 12.19 the formation of community organizations will take place after the outline of VNRMP is prepared through PRA/PCM and two village representatives to the VC are selected. The types of groups organized will depend on the project components selected by the villagers.

In principle it is expected that during the PRA the community will prepare the VNRMP taking in account of the items shown in 13.1. In the other words, these items will serve as a menu, from which the villagers will select the items that motivate the villagers for implementation or meet their needs. Community organizations will be formed for the implementation of these items.

As the VNRMC is organized in 8 villages in the MA, the VNRMC is taken as an example of strengthening (reorganising) existing organizations. As an example of forming a new organization and its capacity building, an IGA group will be referred to.

1) Formation and capacity building (reorganisation) of VNRMC

Basic approach

In 1999 the FD published “Guidelines for Formation and Strengthening of VNRMC” (see ANNEX II-G.4) in order to promote forest management at village level. For the implementation of forest rehabilitation under the VNRMP, this guideline will basically be followed to form and strengthen the VNRMC. However, as the use of this guideline is so far limited, it may need to be further reviewed and improved. Any findings and remarks will be fed back to the FD. Technical support and strengthening will be provided by the verification survey team to the C/P organizations and their extension staff by means of OJT and text books. The extension staff, who have received the above training, will be stationed in the village or visit the village to support the VNRMC. Eight AF nurseries and demonstration plots, which are planned to be constructed, will serve as main bases for technical transfer.

Procedure of VNRMC formation (reorganization) and capacity building

As shown in the Table 12.19, after the Formation of VC (1) , the formation (reorganization) of the VNRMC will be started and committee members will be selected. After the leadership training and capacity building for members of community organizations, the members will prepare their operational framework (constitution) of the VNRMC and draw up a project and work plan.

Selection of VNRMC members

The community organization expert, together with the forest extension staff in charge of the village, will explain to the villagers about the roles of VNRMC and the organization of committee members (10 members including chairperson, vice-chairperson, secretary, vice-secretary, treasurer and vice-treasurer) and their roles/requirements. The villagers need to agree on the method and date of selecting committee members. The selection of committee members will take place on the date set by the villagers in the

presence of community organization expert and the forest extension staff. When ten committee members are selected the formation of VNRMC should be officially declared. The chairperson and vice-chairperson will represent the VNRMC in the VC.

Preparation of VNRMC constitution

At the first committee meeting the following issues will be discussed and agreed upon by the members: objectives of VNRMC; functions and roles of members; term of office; condition of dissolving the committee; procedure of filling vacancies; regular meetings; method of drawing its structure and its work plan; wood management such as afforestation; etc. The community organization expert and the forest extension staff will be present at the meeting and provide advice if necessary. The items agreed upon should be recorded as a constitution by the secretary and sent to C/P organization/the district forest office.

Preparation of work plan

In the presence of the community organization expert and the forest extension staff, the committee members will prepare a concrete work plan for the activities, which are identified as the responsibility of the VNRMC during the PRA and PCM. The work plan should include a concrete reforestation plan by villagers (location, tree species, annual target, ground preparation, nursery management, etc.). Seedlings will be produced in the AF nursery in co-operation with the AF farmers' group. When a school committee, a church organization or any other organization wishes to plant trees in the premises of schools, churches and other communal areas, the VC will co-ordinate the activities with the VNRMC.

The work plan also includes the monitoring and evaluation plan for each afforestation project. For this purpose the following items will be recorded by the VNRMC.

Table 12.22 Items to be Recorded for the VNRMC Monitoring and Evaluation

Items		
Growing seedlings	Amount of seeds	farmer's name / tree species / date
	No. of seedling transplanted to poly-pots	ditto
	No. of transplanted seedlings	ditto
Planting trees	No. of transplanted seedlings	ditto
	Growth	farmer's name / tree species / date Year 1: quarterly, Year 2: biannually, after Year 3: annually No. of dead trees, tree height, dhl, etc.
	Supplemental transplanting	farmer's name / tree species / date
	Maintenance of plantation area	farmer's name / tree species / date under story weeding, thinning cut, ridging, etc
Harvest	Harvest	farmer's name / tree species / No. of trees / stems, coppices, etc

Approval of constitution and work plan by the community

As the VNRMC implements the activities of public interest, the constitution and the work plan need to be approved by the community. In co-operation with the VC a village gathering will be organized where the above mentioned items will be discussed and consented.

2) Formation and Strengthening of IGA Groups

Formation of IGA groups

For the IGA component, interested individuals will be identified and organized as a group based on the activities identified during the PRA, such as bee-keeping, guinea fowl rearing, vegetable production, food processing, etc. Depending on the activities there may be an imbalance of participants between men and women. In general, female headed households are resource poor and women normally carry out heavy work load both in the field and household. Therefore, the community organization expert will make an effort to include as many female participants as possible in the IGA groups as IGA is an important component to improve livelihood of the villagers.

Selection of group representatives

From the participants, two members (chairperson and vice-chair) will be selected to represent the group in the VC. Further members for other positions, such as secretary and treasurer, will be selected depending on the group's activities. The selection method should be fair and transparent and agreed among the participants.

Setting operational framework

The members will discuss and agree on the operational framework such as: objectives of the group; allocation of work; distribution of proceedings; collection or non-collection of member fees; term of office bearers; condition for dismissal or re-election of office bearers; etc. The items agreed upon should be recorded as the group's operational framework by a group representative or the secretary. If initial inputs are to be provided from an outside source, the group should formulate a method to manage the benefit as a group and share the gain equitably among the members. For example, if a guinea fowl is provided to a certain number of individuals, the group may make a rule to give the second hatch to a new member.

Preparation of work plan

Following the objectives, a concrete work plan should be prepared by the group. Those who took part in the leadership training as VC members will lead the group in drawing the work plan. For the IGA activity, production, transportation and marketing of items should be well planned based on the market analysis. Parallel to the technical assistance given by the C/P organizations, experts, international organizations, etc., the community organization expert will assist the group in preparing the work plan relevant to the technical level of the group. The work plan should include following items to meet the implementation plan:

- Production and marketing plan of IGA products:
- Procurement and production plan (farm produces) of equipment and materials;
- Processing plan;
- Plan of operation and marketing personnel;
- Financing plan; etc.

Monitoring and evaluation of activities will be included in the work plan, so as to improve the performance of the IGA group year by year. Specific monitoring criteria will be selected according to the activity, though the following items will serve as basis indicators. For the basis of comparison, basic indicators should be recorded as benchmark values at the time of group formation. Basic indicators will be evaluated annually while other indicators would be summarized and evaluated monthly and quarterly to monitor the performance.

Table 12.23 Basic Indicators for Monitoring and Evaluation

Items	
Basic Indicators	Income of group members, main assets (bicycles, furniture, etc.), education level, etc.
Procurement of production materials	
Volume of production	
Volume of production by IGA	
Volume of sales by IGA	
Financial status of the group	
IGA operational items and labour	

Technical support to the group

Experts and extension workers, who have knowledge and experience in the relevant field, will visit the group regularly and provide necessary support and advice. The group also needs to be assisted with the strategy to be deployed for marketing, expansion or adjustment of business.

12.8 Capacity Building and Extension

12.8.1 Basic Concept

When we look at the present condition of extension system, it is impossible to meet the demand and expectation of people in the MA. There is a limitation of devoting to extension services on supplier side. Especially it is difficult to recruit more staff to ease their load covering too many villages to cover by one extension staff. Therefore, capacity building on receiver's side should be considered to make extension service more effective. Whenever the chance to be visited by extension workers is there, all the information given from them should be fully absorbed by villagers. Capacity building for community side should be highly considered.

It is proposed to form strong community based organizations according to their interest and activities. Committee members of each will be strengthened and will act an important role to organize meeting with extension workers, learn technology from them and also become a village extension worker to pass the message to all the group members. They also have to recognize that it is they who should start action to improve their life instead of waiting until government supply everything for them.

On the other hand, capacity building of extension staff is required to meet the demand of community. Since most of the activities proposed in this project are under the management of forestry and agricultural staff, training should be provided for them to improve their knowledge and techniques on the proposed development activities.

Efforts should be made from both sides, one is from community and another is from the extension staff side. Details are discussed below.

12.8.2 Capacity Building and Strengthening of Extension Staff

(a) Target to Rural Population

The extent of exploiting natural resources has already reached the maximum capacity the land holds, leading to such serious problems as declining farm productivity and acuteness of fetching fuelwood, resulted in higher demand for sustenance to meet BHN. Technical extension will be successful if the extended techniques meet the demand. However, under current situations of top-down stream of administration, rural population has been accustomed to subdue what is commanded from the authority. It follows that a paradigm shift is essential for rural population to take up activities in a bottom-up mode. On the other hand, rate of literacy remains low among rural population, and this limits the application of formal training with written texts for what is required by them.

(b) Target Set at the Extension Staff

It is imperative to make efforts of capacity building for extension agents in the form of in-service training so as both to rehabilitate watershed concerned and to launch the pilot scheme as suggested in the following Chapter, as mentioned in the subsequent paragraph 12.8.3 (a).

In view of currently available resources and systems in the MA, it is almost impossible to offer an extension service that satisfactorily meets the demand of rural population. As cited above, the constraints of the side of extension staff make this extremely difficult. It is quite a hard core to fill a number of vacancy in extension staffing with quite limited budget available there-for. The solution can only be found in the effort of covering staff insufficiency with effective logistics mobilizing the remaining persons.

Since some of the technologies recommended to be introduced in the MA have not been fully acquired by agricultural and forestry extension workers who are in a position to provide extension service to villagers, it is indispensable to start with their capacity building. Even though community mobilization is important to implement a sustainable project, its part could be played by other sources such as NGOs at initial stage, while extension workers should concentrate on improving their technical skills, knowledge.

12.8.3 Measures for Capacity Building and Extension

(a) Capacity Building and Qualification of Extension Staff

What is suggested in this report for rehabilitating the MA includes the techniques and knowledge that are not yet mastered by agriculture or forestry extension workers in charge of extension activities oriented to the MA. It follows that it is imperative to train the staff in charge of technical instruction required for implementing the components as proposed in the report. In order to make the activities included in the proposed scheme fully sustainable, cooperation by such assisting bodies as capable NGOs that has ample experiences on village-based activities, in addition to extension staff responsible for technical diffusion. The extension staff in charge must learn to get familiar with methods of participatory approach in the course of OJT training.

1) Primary training of Forestry Guard and Patrol Man

As for Forestry Guard and Patrol Man, who had little training but still have to act as a part of extension unit, preliminary training seems necessary to catch up with other Forestry Assistant and agricultural FA. Because of limited space for accommodation, one training course will be given to a group about 30 staff. Proposed accommodation of rendering training courses for Forestry Guard and Patrol Man is located at Lunzu township where the following courses are advised

Table 12.24 Training Courses for Forestry Guard and Patrol Man in the SA

Course	No. of participants	Trainer	Period
1) Basic knowledge on forestry	17 Forestry Guard 70 Patrol Man	Regional Forestry Officer	5 days
2) Extension methodologies	17 Forestry Guard 70 Patrol Man	Regional Forestry Officer	5 days

Note: Course 1) includes nursery establishment, wood lot management, local collection of seeds, species identification and others.

2) Training on AF

In case of AF extension, forestry and agricultural extension staff have to work hand in hand to attain its goal due to complex activities from both fields and make it easy for villagers easy to receive extension service. Therefore, training should be organized for both; forestry and agriculture staff, and the staff who cover same area should be in the same class. In addition to leaning about technical issue, coordination

network could be established between them during the training course.

After the above basic training course is provided to Forestry Guard and Patrol Man, training on AF is provided to all forestry and agricultural extension workers. A group of trainee count about 30 with those coming from the same area. In addition to the technical training, workshop should be held to discuss future working plan in their villages.

Land Husbandry Assistant (LHA) and Assistant Development Officer from EPAs, Women's Program Officer (WPO), LHA and Horticultural Officer (HO) from RDP, and WPO, LHO and HO from ADD could join the training course to obtain common understanding.

Table 12.25 Training course for forestry and agricultural extension workers in the SA

Course	No. of participants	Trainer	Period
AF	98 forestry staff 47 agriculture staff	International organization	5 days

Despite the above mentioned intensive training, extension workers are trained only theoretically, but not practically. In the first, second and third year of implementation, the same trainers will be invited to village and they will teach AF techniques directory to farmers together with extension workers. They are constantly invited; at least once in two months, therefore they can monitor the activities and provide technical know-how to support villagers and extension staff. Through these activities, on-the-job training is given to extension workers.

3) Other training courses

In addition to training for AF techniques, training are provided for forestry and agriculture extension agents as to newly adopted or not yet introduced techniques accompanying with the proposed activities. The extension agents of both forestry and agricultural sector are target trainees who have been assigned to the SA. RFO(S) and ADD staff are trainers for these courses, but as necessity arises staff of international organizations or NGOs with experience or expertise are requested to assist them. Table 12.26 shows the proposed training courses mentioned here.

Table 12.26 Training Course for Field Assistant in the SA

Course	No. of participants	Trainer	Period
1) Agriculture	28 FA	ADD	5 days
2) IGA			
Bee-keeping	28 FA	ADD	3 days
Guinea fowl rearing	28 FA	ADD	2 days
Vegetable growing	28 FA	ADD	3 days

4) Leverage for assisting forestry extension system

Different from agriculture extension staff who live within their service areas, forestry extension workers often live far from their service areas To cope with this situation, it is proposed to assign three permanent extension staff for regular service in the SA, to whom accommodation and motor-bikes are provided for their convenience.

Besides AF, newly introduced or not fully understood techniques on agriculture and income generating activities (IGA) are taught to agricultural FA as follows.

As for agricultural FA, they are based at inside or nearby the MA while Forestry Assistants live far outside of the area. It is proposed to assign three Forestry Assistant with house constructed in the MA. Provision of motorbike is also recommended to improve their mobility.

(a) Capacity Building and Strengthening of Villagers

It is indispensable to put villagers in the center to implement proposed activities continuously. For that purpose, they should realize these activities are brought from their needs and they are the one who implement the activities. Though awareness creation will be provided by outsiders, following activities such as problem analysis, project formation, action plan, monitoring and evaluation should be executed by villagers. Details are discussed in 12.7.

(b) Monitoring Activities

1) Self-monitoring and evaluation

Once community based organization is formed, and its activities, target and responsibility of each member are identified, the level of achievement has to be monitored based on the planned schedule. If some obstacle or difficulties are recognized, the way of solving problems should be discussed by the members of group. Indicator to be monitored will be discussed and set through the workshop among organization members with the assistance of extension workers, and periodical monitoring and evaluation should be carried out by members themselves. One example of monitoring sheet on bee-keeping is shown below.

Table 12.27 Monitoring Sheet for Bee-Keeping (Example)

Activity	Target	Target Date	Responsible person	Supporting Agency	Achievement (Level 1-5)	Evaluation
						Remark (Reasons if not achieved)
1. Bee-keeping group is organized	Participants are identified and member list is prepared	Month	Villagers concerned	NGO, Agriculture FA		
2. Committee members are elected	Eight committee members are fairly elected.	Month	All members	-do-		
3. Two committee members attend leadership training	Chairman and Vice chairman attend leadership training	Year	Chairman and Vice-chairman	NGO		
4. All committee members receive training	Committee members attend training on record and book keeping and group management.	Month	All committee members	NGO, Agriculture FA		
5. Participate Study Tour.	Selected members visit proceeding area of bee-keeping.	Year	2 to 3 committee members	JICA		
6. Presentation of result of the tour	Participants of study tour present what they learn from the tour to other members	Month	Participants of study tour	NGO, Agriculture FA		
7. Discuss about group management	Discuss on how to prepare and employ fund and distribute benefit.	Year	All members	-do-		
8. By-low is prepared.	By-low is prepared based on the above discussion.	Month	-do-	-do-		
9. Action Plan is prepared.	Action plan is discussed and monitoring sheet is prepared.	Year	-do-	-do-		
10. Technical and marketing training	Receive technical training on how to make bee-hive, install and harvest and marketing	Month	-do-	FRIM, agriculture FA		
11. Fund raising by all members	All members contribute some money and total of X MK is collected	Year	-do-	Agriculture FA		
12. Required materials are purchased	Required materials are purchased.	Month	-do-	-do-		
13. Hives are installed.	X of bee-hives are installed near flower nectar and water.	Year	-do-	FRIM, Agriculture FA		
14. Honey is harvested.	X kg of honey is harvested.	Month	-do-	-do-		
15. Honey is marketed.	Honey is marketed considering season and marketing tout based on the marketing training	Year	-do-	Agriculture FA		
16. Benefit is distributed to each member.	Obtained benefit is distributed to all members.	Month	-do-	-do-		

Note: Achievement 5=Achieved 100%, 4=75%, 3=50%, 2=25% and 1=0%.

To show the achievement and share the experience with other community members, tables or graphs showing progress of work will be hung on a bulletin board. Materials to construct the board will be provided to the community. The place to install will be discussed and decided by villagers (should be somewhere many people gather such as maize mill or borehole).

2) Inter-monitoring by the village with project implementation

During the course of leadership and managerial training and study tour, affiliation must have been built between villages with project implementation in the same year. Inter-monitoring between three or more villages is proposed to monitor each activities and share and discuss their experienced difficulties and countermeasure for it. The villagers to be visited by others will present their progress so far made and show others, in such way their future target and activities will be defined and cleared again.

Basically, committee members will be the participants of the inter-monitoring tour. Since each activity is related each other, monitoring tour group will visit more than one kind of organization and monitor overall activities. They visit each other four times per year to monitor each step of their progress.

Table 12.28 Inter-Monitoring by Village with Project (Outline of one village)

Participants/ tour	No. of group/ Tour	No. or tour/ year/group	No. of tour/ term*	Total No. of tour/ Village	Total participants/ Year	No. of visiting villages
8	2	4	3	12	96	2

Note: * Number of organized group was considered as 6.

3) Inter-monitoring by the village without project

According to RRA survey conducted in three villages in the MA, there are a lot of inter-linkages found with those in neighboring and nearby villages. For instance, graveyard clearing, which is done to prevent bush fires, is practiced once a year by villagers from neighboring villages. Another example is organizational activities; borehole or school committee is formed by several villages to manage, operate and maintain one resource together. People have close connection with neighboring villages, and they work together in terms of development activities such as construction of school building or clinic.

In addition to the above inter-monitoring by people concerned, neighboring villages, especially the village in which activities will take place subsequent year, should join this monitoring activities. Therefore, they can learn from forerunner and can modify the way of implementing activities in the following year. It will make easier to expand and diffuse the activities year by year. On the other hand, villagers who are visited by outsiders would brace themselves to be monitored and evaluated, and at the same time, they could feel much confidence of showing others the proceeding activities.

Table 12.29 Inter-Monitoring by the Villages Without Project (Outline of one village)

No. of participants/ Tour	No. of tour/ Year	Total Participants/ Year	No. of visiting villages
8	3	24	2~3

(d) Environmental Education for Children

Since children are playing important role to support their parents' livelihood activities such as fetching firewood and farming, they cannot be left out when we consider about the development activities.

In the village, children used to learn tradition, culture, customs and others through informal education which is a kind of local knowledge handed down from generation to generation at community and at home. However, through RRA survey, it was noted that it is being threatened due to the influence of Christianity and modernization. Number of boys and girls who have gone through initiation ceremony has been declining.

Even though many issues are still taught informally at home, environmental education could be provided from outside of the community, in such way, these children can also pass the important message to their parents. Besides, children are the ones that carry the load of the next era.

As a first step, awareness creation should be take place. Children are asked to gather at school after the class, and film show, drama and band music containing environmental message are played. These are provided by NGO who has experience on those and materials. After the entertainment, Forestry Assistant will teach them how to prepare nursery, plant trees and take care of them.

Establishment of nursery will be started together with the activity of VNRMC in the same or nearby village. One example was already found in Kaumbata village where students from Nasonjo primary school established their nursery next to the one of the village. Wildlife club, which was organized by NGO for the purpose of environmental education and activities, can be the core group to manage nursery. Trees can be planted in their school plot.

Table 12.30 Primary School in the MA and Proposed Villages to Work with Them

Name of Primary School	Grade	Location (village)	Name of village to work with
Nasonjo	5	Siyamdima	Kaumbata
Mtengowambalame	8	Simon Mpombe	Ndemanje
Kachere	8	Mdala	Mdala
Monekere	4	Lemu	Lemu
Chigodi	6	Kumisati Chigumula	Kumisati Chigumula
Milala	8	Masangano	Masangano
Ntenjera	8	Mang'ani	Mang'ani