

## **CHAPTER 13    PILOT SCHEME**

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### 13.1 Basic Concept of Pilot Scheme

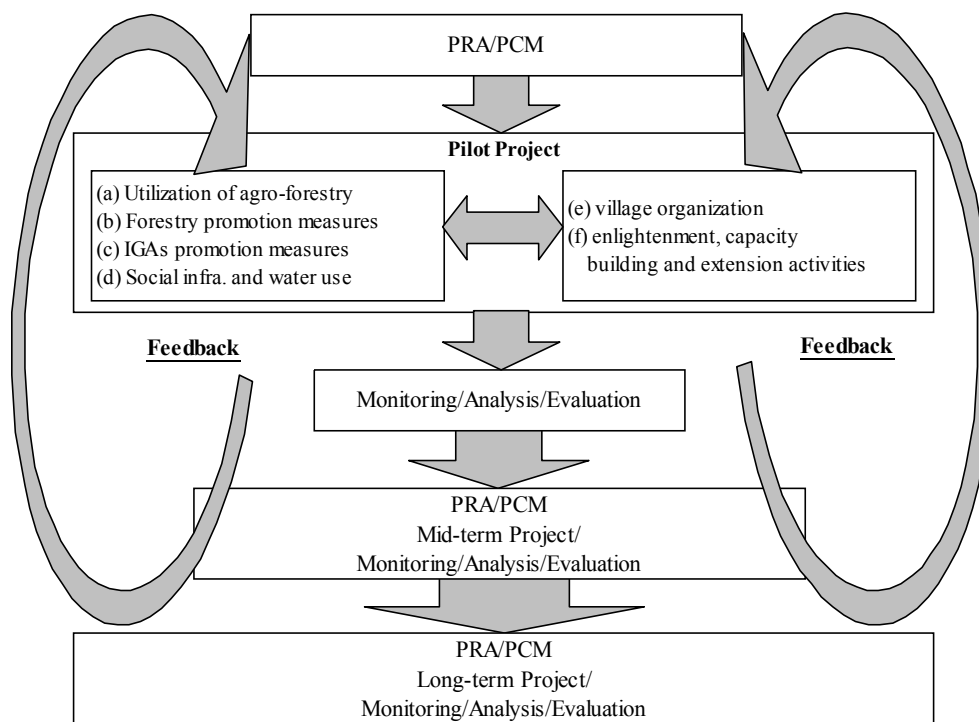
#### 13.1.1 Outline of Pilot Scheme

##### (a) Objective of Pilot Scheme

The Pilot Scheme has the objective of implementing a comprehensive scheme for watershed rehabilitation in the Model Area, of the SA. Components of the scheme include the establishment and expansion of nurseries, production of various seedlings, agricultural production combined with AF practices, creation of individual woodlots and trial for reforesting village forests. IGAs and consolidation of social facilities for villagers. They are to be verified, through monitoring, analysis and assessment of their performances and results, as to whether they can be implemented in a participatory way by the cooperative management systems, or whether it continues in a sustainable way and can or be extended to adjacent areas.

Targets of the pilot scheme, a short term one to be completed within five years, are placed on “improved livelihood and higher agricultural productivity of the people in the MA”. For the subsequent follow-up measures to cover all the SA, assumed within five to ten years, has another target, “watershed rehabilitation throughout watershed area of Middle Shire”. Namely, the first-step measures aims at betterment of living in the beneficiary through the application of the proposed comprehensive pilot scheme, thereby expecting that their improved life enables them to empower their capacity of implementing projects to greenize the environment, thus realizing watershed rehabilitation in Middle Shire.

**Figure 13.1 Component of Pilot Project and Flow to the Future Project**



(b) Components of the pilot scheme and its evaluation indicators

The pilot scheme is composed of four items as listed in Table 13.1, i.e., AF, forestry, IGAs and social infrastructure improvement and village organization including enlightenment,

**Table 13.1 Monitoring and Evaluation indicators of the Pilot Scheme**

Component	Proposed Indicators
<b>Technical items</b>	
(a) Utilization of AF	Production, marketing and margin of AF seedlings Number of households practicing AF, quantity of farm produce and yields, number of varieties thereof
(b) Forestry promotion measures	Number of trees, planted area, volume of stock by woodlots, number of households engaged in forestry
(c) IGAs promotion measures	Amounts sold of such products as honey and farm-processed foods by cooperative Number of fowls reared and of households by specie
(d) Social infra. and water use	Number of households using improved fireplace Number of households using dam and river water, area under irrigated farming
<b>Socio-economic items</b>	
(e) village organization	General indicators for socio-economic assessment
(f) enlightenment, capacity building and extension activities	General indicators for social activity assessment

### 13.1.2 Project Type

(a) Recommended Project Type by Component Composing the Short-term Scheme

Implementation method

The proposed short-term plan constitutes a comprehensive scheme composed of 6 types of components shown above. Project period and implementation methods should differ by component. The Study Team considers that two of implementation methodologies are technical core, namely reforestation or AF and socio-economic part of villagers' organization / education, extension / enlightenment each other. Trials should be adopted to cover the technical part of the plan such as verification scheme that is undertaken by donors. Socio-economic part of the plan is recommended to execute by NGO who has well experience in the villagers' organization, education, etc. In addition, extension of improved stove plan should sustainably be carried out by supporting agencies and volunteer groups with successful experience on the matters described above.

Validity of those projects types

The program proposed in M/P study for Watershed Rehabilitation of Middle Shire is based on the participatory way of implementing various schemes required for attaining watershed restoration and woodland rehabilitation in the area of Middle Shire. In the light of this plan, and taking the following host of elements into account, it was evaluated that the trial schemes are the best-suited implementation methods in a limited period to realize the proposal. Followings are reason of recommendation of trial measure instead of normal grant aid or loan.

❖ The contents of schemes are beyond the capacity of financial load by the executing agency

- Annual budgets for the state agencies including Forestry Department and Blantyre ADD fall short of the requirement. The evidence of budgetary constraints may appear in chronic deficit of the number of extension staff, insufficient budget for extension activities and inadequate skills, tactics of diffusing improved techniques and so on.
- On the other hand, GOM struggles for the restoration of state finance by way of privatizing government enterprises and the public works, which have traditionally been on force account. For instance, forestry department belonging to the Ministry of Natural Resources and Environmental Affairs is now trying to privatize commercial reforestation projects under its jurisdiction. Nevertheless, the privatization of commercial plantation would lead to a decline in the activities of the said department that would fail to secure the necessary budgetary appropriation for the works under force account.

❖ Necessity of liaison among the concerned executing agencies during village level

- M/P plans to implement what is needed to rehabilitate the watershed through a participatory way, covering short-term income generating devices, improvement of farm productivity and others as an integrated village development project. Additionally, to raise the level of villagers' livelihood, it further envisages a wide-range watershed conservation activities such as reforestation of woodlots at distant places from their homesteads, such as hill-sides, as a medium-term scheme which will run parallel with improvement in villager's capacity of implementing group activities.
- In the short-term schemes, related government agencies of the MNREA and MOAI that are responsible for various disciplines concerned will assist the implementation thereof. As to the promoter who handles such components as villager's capacity building, extension and education, the undertaking organization with ample experiences in similar works will take charge thereof.

❖ Lack of existing similar case to this type of project for improving environment through reforestation

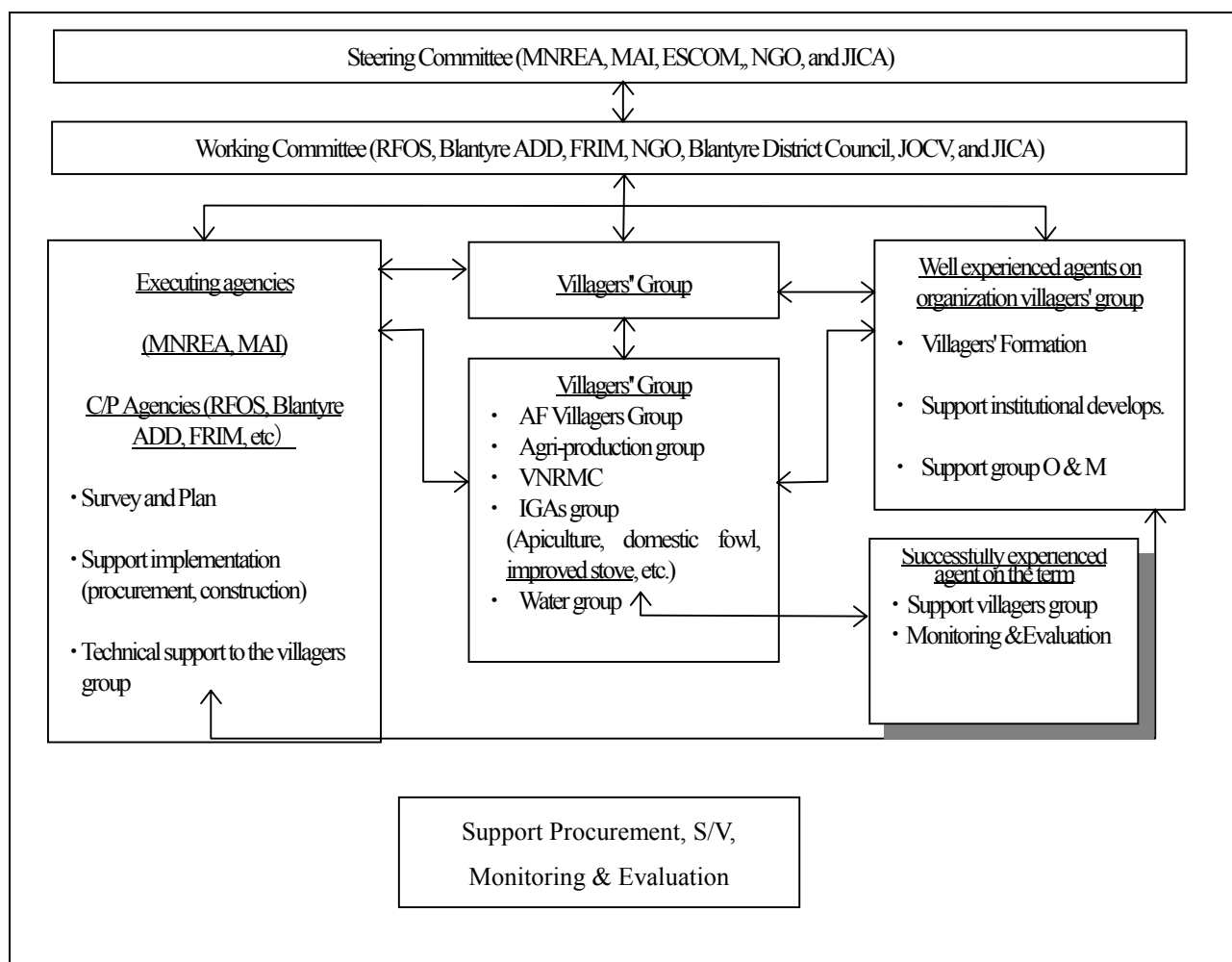
- Participatory models have been implemented in and around the MA for single purpose of AF trial, income generation, establishment of community forests. However, these have been found hardly sustainable, and no comprehensive project has yet been proved successful in and around this area..

Considering the above noted reasons, it was advised to launch a short-term trial scheme for village development that is composed by comprehensive component, with a view to ultimately seeking for sustainable environment conservation in the area selected as the MA.

(b) Proposed Organization for Implementation

The following is a proposed organization for implementation of the short-term scheme. The steering and working committees leads the scheme, which will be composed of the members shown in the figure. The verification survey will be implemented in a participatory way with the village people in the MA. NGO employed under the JICA Welfare Supporting Project is charged to formation of villagers and supporting the villagers' group regarding accounting, institutional development, management, and/or operation based on the PRA (4<sup>th</sup> and 5<sup>th</sup> year of the scheme, this TOR will be shifted to the C/P agents. C/P agents will receive technical transfer from the NGO about the TOR). The executing agencies and C/P agencies are charged to surveying, planning, monitoring, and evaluation of the scheme and supporting villagers' group for implementation the schemes.

**Figure 13.2 Organization Plan for Implementation of the Short Term Scheme**



(c) Selection of Target Villages to the Scheme

This scheme aims at a gradual watershed rehabilitation in the Middle Shire through the following, phased process:

- conducting a verification scheme in the MA for demonstrating, educating and diffusing village-level, comprehensive rehabilitation activities, for a span of five years,
- evaluating annual performance of verification trial in order to get feed back and extend the evaluation results to the successive verification plans,
- creating a sustainable and extendable chain model readily applicable to the neighbors.

The verification scheme is to be carried out on village basis, where the following villages are covered by the scheme as the first-year batch. The area in these three villages amounts to 657 ha, equivalent to approximately a fifth of the hectareage of the whole MA.

In the subsequent next year, adjacent villages can be selected as the second-year batch to extend the scheme for further verification. Similarly, just like a wave spreading over water surface, the scheme of verification

trials will cover all the villages that desire to join the scheme in the MA in five-year term.

Within this five-year term, annual monitoring and evaluation are applied to the villages under verification trials as needs arise, with relevant technical and financial support. The lessons learned during the process are fed back into the trials of the foregoing plan. The villages to conduct the scheme are selected based on the identification of villagers' willingness of joining it prior to the implementation of the scheme planned in the next year. See Table 13.2

**Table 13.2 Proposed Target Villages for the Scheme by Year**

Year	Village name	Area (ha)	Population	Year	Village name	Area (ha)	Population
1 <sup>st</sup>	1. Kaumbata	316	489	4 <sup>th</sup>	15. M. Ngondo	107	493
	2. Nanjiwa	234	714		16. Lemu	349	2,316
	3. Ndemanje	144	235		17. Teula	127	493
	Subtotal	694	1,438		18. Manjelo	69	408
2 <sup>nd</sup>	4. Kam'mata	171	1,513	19. Kamwendo	315	353	
	5. Kumanda	127	258	Subtotal	967	4,063	
	6. Tamvekenji	36	501	5 <sup>th</sup>	20. Peter Bilila	129	435
	7. Daniel Mbedza	70	154		21. S.Mpombe	54	327
	8. Chilangali	51	258		22. K. Chigumula	102	782
Subtotal	455	2,684	23. Kumponda		190	1,584	
3 <sup>rd</sup>	9. Chakana	49	200	24. Kateyo	15	92	
	10 Mdala	801	1,289	Subtotal	490	3,220	
	11. Siyamdima	119	899	<b>Total</b>	<b>4,017</b>	<b>15,168</b>	
	12. Makanokaya	164	251				
	13. Chikoja	233	748				
	14. Maluwa	45	376				
Subtotal	1411	3,763					

Note 1: June, 2000, JICA Study team Survey

Note 2: Village areas are estimated based on the map which is villagers and village headmen delineated.

The target villages where the proposed verification scheme is initiated are selected according to the following criteria

- the villages where exploitable land and other natural resources are available,
- those with nearly average population and land area in the MA,
- those with eager and willing villagers and headmen to rehabilitate living environment,
- those located at distant place to one another in the MA
- those with different distance from trading markets handling agricultural products, and
- those with different potential of village development. See Table 13.3

**Table 13.3 Summary of Target Villages**

year	NO	T.A.	Village name	Area (ha)	Population	Pop. Density (prsn/km <sup>2</sup> )	No of household	Family member	Area located in the MA (ha)
1	1	Kuntaja	Kaumbata	316	714	2.3	112	6.4	316
	2	Kuntaja	Nanjiwa	234	489	2.1	120	4.1	197
	3	Kapeni	Ndemanje	144	235	1.6	38	6.2	144
	Subtotal			694	1,438	2.1	270	5.3	657
2	10	Kuntaja	Kam'mata	171	1,513	8.8	244	6.2	87
	11	Kuntaja	Kumanda	127	258	2.0	46	5.6	102
	12	Kuntaja	Tamvekenji	36	501	13.9	56	8.9	18
	13	Kuntaja	Daniel Mbedza	70	154	2.2	41	3.8	70
	14	Kuntaja	Chilangali	51	258	5.1	40	6.5	51
Subtotal			455	2,684	5.9	427	6.3	328	
3	4	Kuntaja	Chakana	49	200	4.1	50	4.0	49
	5	Kuntaja	Mdala	701	1,289	1.6	306	4.2	362
	6	Kuntaja	Siyamdima	119	899	7.6	168	5.4	119
	7	Kuntaja	Makanokaya	164	251	1.5	56	4.5	164
	8	Kuntaja	Chikoja	233	748	3.2	169	4.4	233
	9	Kapeni	Maluwa	45	376	8.4	62	6.1	45
Subtotal			1311	3,763	2.7	811	4.6	972	
4	15	Kuntaja	M. Ngondo	107	493	4.6	82	6.0	98
	16	Kuntaja	Lemu	349	2,316	6.6	496	4.7	349
	17	Kuntaja	Teula	127	493	3.9	142	3.5	127
	18	Kuntaja	Manjelo	69	408	5.9	67	6.1	69
	19	Kapeni	Kamwendo	315	353	1.1	59	6.0	315
Subtotal			967	4,063	4.2	846	4.8	958	
5	20	Kapeni	Peter Bilila	129	435	3.4	72	6.0	45
	21	Kapeni	Simon Mpombe	54	327	6.1	65	5.0	54
	22	Kapeni	K. Chigumula	102	782	7.7	160	4.9	45
	23	Kapeni	Kumponda	190	1,584	8.3	264	6.0	51
	24	Kapeni	Kateyo	15	92	6.1	23	5.5	15
Subtotal			490	3,220	6.6	584	5.5	210	
Total				3,816	15,168	-	2,938	-	3,125
Average				159	632	3.8	122	5.2	130

Targeted villages are automatically selected based on the each village area where more than 60 % are in the MA. Also, villages with on-going or planned project by other donor country are excluded. No of total targeted villages are 24, total area of targeted village is 4,017ha, population of those targeted village is approx. 15thousands. Summaries of inventory data of targeted village are presented in table 13.3.

Though targeted villages are provided to each year, necessary monitoring, evaluation, supporting activities are planned to villages which have completed trial plan. Also, final selection will be carried out prior to scheduled year through PCM or PRA for grasp and confirmation of villagers' intention.

#### (d) Activity Schedule

##### Entire schedule of the short term project

Five years entire activity schedule on the short-term project is shown in Table 13.4. Component of the villagers organization includes whole 5 years activity plan and other components are appearing 1<sup>st</sup> three years activity plan. Every year, at new villages, villagers' formation will be tried for implementation of two years verification scheme at each village.

##### Activity schedules by the components

Prior to initiate verification scheme at villages, villagers formation and enlightenment programme will be provided for confirmation of villagers' intention. Then necessary survey will take place i.e. socio-economic condition for grasping benchmark, evaluation, and natural condition for planning implementation of the verification scheme. Immediately, procurement and construction will commenced after completion of the plan. AF nursery will produce various seedlings at 1<sup>st</sup> year and transplanted at the beginning of 2<sup>nd</sup> years.

##### Verification

Scheme is planned to take place for two years at each village and monitoring and evaluation activities are continued during 5 years for every village. Required supporting activities to the villagers group will be provided based on the results of the monitoring and evaluations.

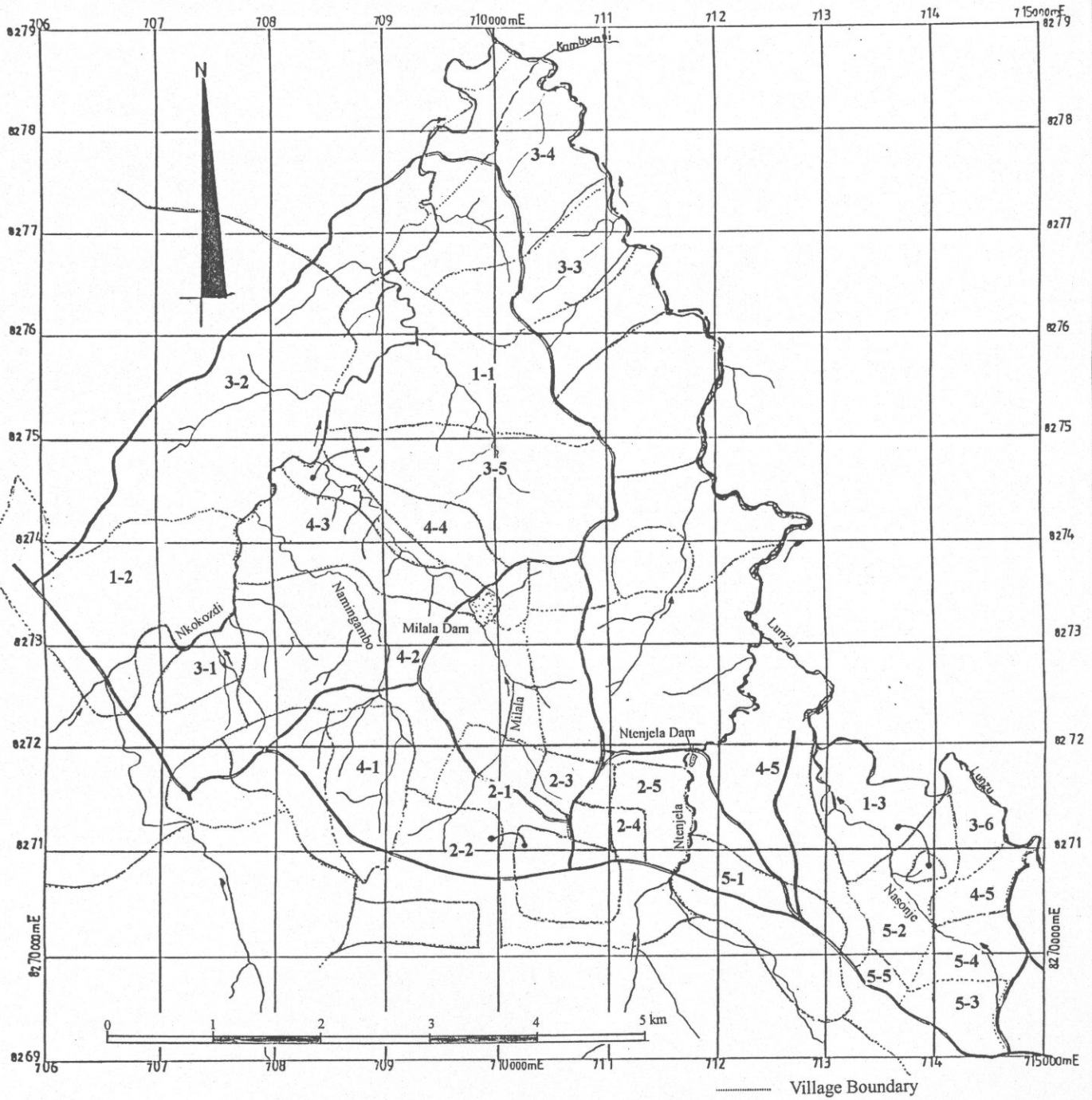


Table 13.4 Activity Schedule

Activity / 年次	Month				
	1	2	3	4	5
A 基本インフラ改修及び整備 ・ 農業用水資源の開発 ・ 生産物出荷など道路及び橋の改修	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■
	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■
B アグロフォレストリー高木の建設及び苗木の生産 ・ アグロフォレストリー高木建設 ・ アグロフォレストリー高木の運営、維持管理	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■
	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■
C アグロフォレストリー植栽 ・ アグロフォレストリー資材の植樹、植栽 ・ アグロフォレストリーと輪作、多様化による農業増産	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■
	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■
D 村営造林事業 ・ 戸別林、向幹、水源林の造成 ・ 村営林生樹種導入試験造林 ・ 荒地自然林の復旧、拡張造林 ・ 荒廃天然林の復旧造林	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■
	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■
E 生計向上事業の拡充および整備 ・ 既存農業生産物貯蔵、加工技術開発、施設整備、普及 ・ 伝統技術による生計向上事業の改良、強化、及び整備 ・ 改良かまどの普及	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■
	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■
F 事業実施住民組織の形成 ・ 事業実施住民組織の形成(対象村落の決定) ・ 住民組織の制度的開発 ・ 住民組織の運営、維持管理体制の確立 ・ 事業実施住民組織への支援体制の確立	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■
	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■
G 教育、普及、啓蒙 ・ 実証調査参加住民組織支援機関への技術移転 ・ 実証調査参加住民組織メンバーの啓蒙、教育、普及 ・ モデルエリア外への普及方法、方式の確立 ・ 子供の環境教育	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■
	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■
H モニタリング、評価 ・ モニタリング ・ 評価	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■
	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■

注 調査・計画■■■■、設計調査■■■■、実施■■■■  
注 事業実施住民組織の形成は、5年間の活動を含む、その他は、当初の3年間の活動。

Fig.13.3 Location Map of Villages in the Pilot Scheme



Year	No.	Village Name	Area	Year	No.	Village Name	Area	Year	No.	Village Name	Area
1st	1-1	Kaumbata	316	3rd	3-1	Chakana	49	5th	4-4	Manjelo	69
	1-2	Nanjiwa	234		3-2	Mdala	801		4-5	Kamwendo	315
	1-3	Ndemanje	144		3-3	Siyamdima	119		Sub Total	967	
	Sub Total	694	3-4		Makanokaya	164	5-1		Peter Bilila	129	
2nd	2-1	Kam'mat	171		3-5	Chikoja	233		5-2	Simon Mpombe	54
	2-2	Kumanda	127		3-6	Maluwa	45		5-3	Kumisati Chigumula	102
	2-3	Tamvekenji	36	Sub Total	1411	5-4	Kumponda	190			
	2-4	Daniel Mbedza	70	4-1	Magombo Ngondo	107	5-5	Kateyo	15		
	2-5	Chilangali	51	4-2	Lemu	349	Sub Total	490			
Sub Total	455	4th	4-3	Teula	127	Total	24	4017 ha			

## 13.2 Project Component and Approximate Cost

### (a) Exploitation of the AF and Approximate Cost

#### 1) Flow of the AF exploitation

Table 13.7 shows the implementation flow of the component of the AF exploitation and some other component activities. The component is not independent to one another among several component of the integrated village natural resource management plan. This flow is just reference for execution of the exploitation of AF activities.

**Table 13.5 Major Flow on AF Exploitation Activities**

Subject	Reference
1. Formation of AF Farmers Group	Sub contract to NGO (see a captioned subject
2. Enlightenment activities to villagers' group of the targeted villages	Bus tour for successful AF farm
3. Confirmation of AF exploitation plan of the AF farmers' group	Land with intention to adopt AF, species to be employed, etc.
4. Survey: AF nursery land, farm land planed to practice AF, soil, and other natural condition, socio-economic condition	Delineation of village border and planned AF practice farmland by GPS, etc. bench mark survey
5. Survey on water resources to AF nursery	water resources survey
6. Planning	AF nursery construction plan AF nursery seedling production plan AF practicing plan etc.
7. Procurement	Construction equipment and materials, AF nursery and AF operation equipment and materials, etc
8. Implementation	AF nursery construction: construction by AF farmers' group and other villagers group that will produce seedling at the nursery Production seedling: AF farmers group Land preparation for AF: ridging, weeding, etc Transplanting AF seedling: use mark rope
9. Monitoring	Seedling production at AF nursery by species Land area practicing AF by farmer Number of transplanted AF seedling by farmer and species etc.
10. Evaluation and analysis	Seedling production AF practicing Agricultural production in farm land practicing AF Sales of farm production

#### 2) Draft AF exploitation plan at the 1<sup>st</sup> year targeted three villages

Tables 13.8 and 13.9 shows land distribution by gradient and current land use of the villages selected as 1<sup>st</sup> year batch.

**Table 13.6 Land Distribution by Gradient (First year targeted villages) (Unit: ha)**

Village / Gradient (%)	0	< 2	4	6	8	10	12	14	16<	Total
Kaumbata	0	9	44	32	30	35	20	5	0	175
Nanjiwa	0	0	39	13	10	10	5	0	0	77
Ndemanje	0	5	7	35	11	8	10	5	8	89

In accordance with the above data, Farmland of those three villages can be divided into the following categories of A - D of AF type. (see Annex II-B-1)

**Table 13.7 Distribution of Farmland by AF Type (1<sup>st</sup> year targeted villages, Unit: ha)**

Village	Type of farmland	Area by type
Kaumbata	A & B	53
	C & D	62
	Exceeding 8 degree	(60)
Subtotal		115
Nanjiwa	A & B	39
	C & D	23
	Exceeding 8 degree	(15)
Subtotal		62
Ndemanje	A & B	12
	C & D	46
	Exceeding 8 degree	8
		(31)
Subtotal		58
Total		235

The farmland area for exploitable AF in each village is 115, 62, and 58 ha respectively. AF is planned to be practiced by AF type of A to D. Also it is estimated to exploit 10 ha of AF annually by village.

### 3) AF seedling production plan

AF seedling plan will be concluded by the survey that will take place prior to the project implementation. Estimated species and number of seedlings are listed in Table 13.10 as per information collected through RRA. The table also includes production plan of tree and vegetable seedling that are scheduled to be produced at AF nursery. Based on the list, it is planned to produce approximately 150 thousands of seedling annually in total. Tree seeds will be obtained from FRIM through RFOS. AF propagation materials, i.e. scions, rhizocarp, seed, etc, will be procured from ICRAF.

**Table 13.8 Seedling Production Plan by 1<sup>st</sup> Year Target Villages**

<b>Kaumbata</b>	<b>Purpose</b>	<b>Species</b>	<b>Number / Annual</b>
	AF	Unit (see break down at following table)	75,000
	Other AF seedling	Vetiver grass	5,000
		Sisal hemp	2,000
		Guava	1,000
		Papaya	1,000
		Vegetable	Pumpkin
		Chili (Capsicum)	10,000
	Forestry	<i>Melia azedarach</i>	9,000
		<i>C. apiculatum</i>	9,000
		<i>P. angolensis</i>	9,000
		Eucalyptus ( <i>E. Camadulensis</i> )	9,000
		Acacia ( <i>A. auriculiformis</i> )	9,000
		<b>TOTAL</b>	<b>149,000</b>
<b>Nanjiwa</b>			
	AF	Unit (see break down at following table)	75,000
	Other AF seedling	Vetiver grass	5,000
		Sugar cane	5,000
		Improved mango	2,000
		Tamarind ( <i>Tamarindus indica</i> )	2,000
		Vegetable	Paprika
		Green peper	10,000
	Tree seedling	Eucalyptus ( <i>E. Camadulensis</i> )	9,000
		Senna ( <i>Senna siamea</i> )	9,000
		Acacia ( <i>Faidherbia albida</i> )	9,000
		Afzelia ( <i>Afzelia quanzensis</i> )	9,000
		<b>TOTAL</b>	<b>145,000</b>
<b>Ndemanje</b>			
	AF	Unit (see break down at following table)	75,000
	Other AF seedling	Vetiver grass	5,000
		Sugar cane	5,000
		Mexican apple	2,000
		Papaya	1,000
		Tangerine	1,000
		Lemon	1,000
		Vegetable	Leaf vegetable
		Tomato	5,000
		Amaranthus	5,000
	Tree seedling	Eucalyptus ( <i>E. Camadulensis</i> )	5,500
		Acacia ( <i>A. albida</i> )	5,500
		Casia ( <i>C. auriculata</i> )	5,500
		Molinga ( <i>Molinga Oleifera</i> )	5,500
		Anona ( <i>A. senegalensis</i> )	5,500
		<b>TOTAL</b>	<b>137,500</b>

**Table 13.9 Breakdown of AF Seedling by Type**

Village	Type	Spacing (m)	No of seedling /m2	Area cover m2	No of seedling 20mx20m	Area cover ha	No of seedling
Kaumbata	1	0.5x5.4	2.70	63,180	158	6.3	23,400
	2	0.9x1.5	1.35	18,900	47	1.9	14,000
	3	1.0x1.0	1.00	7,800	20	0.8	7,800
	4	1.0x1.5	1.50	9,750	24	1.0	6,500
<b>Subtotal</b>				<b>99,630</b>	<b>249</b>	<b>10.0</b>	<b>51,700</b>
Nanjiwa	1	0.5x5.4	2.70	64,800	162	6.5	24,000
	2	0.9x1.5	1.35	17,010	43	1.7	12,600
	3	1.0x1.0	1.00	9,000	23	0.9	9,000
	4	1.0x1.5	1.50	9,000	23	0.9	6,000
<b>Subtotal</b>				<b>99,810</b>	<b>250</b>	<b>10.0</b>	<b>51,600</b>
Ndemanje	1	0.5x5.4	2.70	60,750	152	6.1	22,500
	2	0.9x1.5	1.35	21,600	54	2.2	16,000
	3	1.0x1.0	1.00	5,000	13	0.5	5,000
	4	1.0x1.5	1.50	12,750	32	1.3	8,500
<b>Subtotal</b>				<b>100,100</b>	<b>250</b>	<b>10.0</b>	<b>52,000</b>

Note 1: Type 1- Alley cropping, 2-Intermix cropping, 3-Improve short term fallow, 4-Reley cropping

#### 4) Construction, equipment and material plan

Table 13.12 shows the specification on the AF nursery construction plan including forest component. Kaumbata, Ndemanje and Ndemanje villages are planned as 1<sup>st</sup> year batch. Second year batch is planned at the Kam'mata and Chilangali, while 3<sup>rd</sup> 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).

**Table 13.10 Standard Specification of the AF Nursery Construction, Equipment and Material Plan**

Item	Contents	Unit	Q'ty	Reference
AF nursery construction	whole nursery area	m2	1000	
	area of seedling bed	-do-	450	Excluding aisle, 400/m2, max 180K/yr
	scion nursery	-do-	200	
	Germination bed	-do-	100	approx 1000/m2
	nursery office	-do-	20	floorage, none burning type brick, galvanized iron sheet roof, adjust floorage with a number of villagers groups
	Residence for extension officer	-do-	30	Floorage, burning type brick, galvanized iron sheet roof
	Warehouse cum workshop	-do-	40	Floorage, burning type brick, galvanized iron sheet roof, adjust floorage with a number of villagers groups
	manure storage	-do-	20	for pot media
	fence	m	140	h: 1.5m, two gates with locks
Weir	weir construction	unit	1	(see _____)
Equipment (AF)	tread pump	pc	2	
	drum for water tank	-do-	3	200 little
	wheel barrow	-do-	5	
	watering pot	-do-	20	20 little
	bucket	-do-	20	20 little
	how	-do-	20	including improved how
	shovel	-do-	20	
	agri-knife	-do-	20	
	hand axe	-do-	20	for remove old stock, stone, rock, etc
	rake	-do-	20	
	sickle	-do-	20	
	measuring tape (30m)	-do-	2	
	Lining tape (100m)	-do-	10	
	nail	kg	10	
	leveling rake	pc	2	
	コ̄	-do-	5	
Equipment (Forestry)	bush sickle	-do-	20	
	machete	-do-	20	
	saw	-do-	20	
	shovel	-do-	20	
	hand axe	-do-	20	dig up old stock
Materials (AF & forestry) for two years	vinyl pot	1000 pc	300	
	seeds, AF propagation materials (scion, rhizocarp, etc)	kg	10	
	vegetable seed	-do-	1	seed under the project
	agri-chemical	Kg	20	
	fertilizer	10kg	100	
	shade (reed)	m2	20	aprox. 2 x 2m by bundle

5) Trial on increase of farm production by relay cropping and crop diversification

Development concept

It is proposed to establish a new cultivation system through rational crop rotation as well as to improve hitherto practiced mixed cropping. Since mean land holding per farm house- hold is as small as as 0.7 ~ 0.8 ha, practice of crop rotation is advised to be organized on a group of ten households (desirably belonging to the same clan to form a rotation farming group) so that the group can accumulate a tract of five hectare on which either one of the four rotation types can be grown.

Crop diversification is also proposed for avoiding any competition at market and selection of crops should be carefully considered about villages location, natural condition, etc. Table 13.13 shows candidate crops for each village production. Pumpkin, chili peppers, and those crops which can be stored long, are planned for Kaumbata village which is located far away from markets. Nanjiwa village is planned to produce paprika and green peppers. Some citrus variety, lemon, tangerine, etc, are planned at Ndemanje, considering its rainfall.

**Table 13.11 Candidate Crop Variety for 1<sup>st</sup> Year Batch Villages**

Village		Variety	Number of seedling (pc)
Kaumbata	Fruit	Guava	3,000
		Papaya	1,500
	Vegetables	Pumpkin	20,000
		Chili (Capsicum)	10,000
Nanjiwa	Fruits	Improved grafted mango	6,000
		Tamarind ( <i>Tamarindus indica</i> )	6,000
	Vegetables	Paprika	20,000
		Green pepper	20,000
Ndemanje	Fruits	Papaya	1,500
		Tangerine	1,500
		Lemon	1,500
	Vegetables	Leaf vegetables	20,000
		Tomato	10,000
		Amaranth	10,000

Cropping pattern

Also at the farmland of the AF farmers' group, new cropping pattern will be tried for production of marketable farm production which at the same time will avoid competition through adoption of soil-fertility improvement AF technology. Farming trial will be planned by farmers and predicted in such way that maize production will be November to February, or earlier and late harvest of the leafy vegetables will take place any time other than April to June.

6) Approximate cost estimation for AF exploitation plan

Following tables provide approximate cost estimation for AF exploitation plan and also forest expansion plan.



**Table 13.12 Summary of Approximate cost for AF Exploitation and Forest Extension Plan**

(Unit: US\$, MK/US\$=50/1)

Item / year	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	Total
A: AF nursery	42,852	28,568	28,568	14,284		114,272
(Number of target for construction of nursery)	(3)	(2)	(2)	(1)		(8)
B: AF exploitation and forest extension plan	13,076	26,153	21,794	21,794	21,794	104,611
(Number of targeted villages per annual)	(3)	(6)	(5)	(5)	(5)	(24)
<b>Total</b>	<b>55,928</b>	<b>54,721</b>	<b>50,362</b>	<b>36,078</b>	<b>21,794</b>	<b>218,883</b>

**Table 13.13 Breakdown of Cost Estimation for AF Exploitation and Forest Expansion Plan**

Item	Facility, equipment, material	Q'ty	Unit	Unit price	Total	Total
				(MK)	(MK)	(US\$)
<b>A: AF nursery construction cost</b>						
	Entire acreage of AF nursery	1000				
	seedling bed	450	m <sup>2</sup>	500	225,000	
	Nursery office	40	m <sup>2</sup>	4,000	160,000	
	residence for extension officer	30	m <sup>2</sup>	4,000	120,000	
	warehouse cum workshop	40	m <sup>2</sup>	4,000	160,000	
	manure storage	20	m <sup>2</sup>	1,500	30,000	
	fence	150	m	200	30,000	
	Tread pump	2	Unit	4,350	8,700	
	Drum for water storage	3	pc	1,500	4,500	
		5	pc	200	1,000	
Subtotal A (AF nursery construction cost)					739,200	14,284.00
<b>B: AF exploitation and forest expansion project cost / village</b>						
Equipment (AF)	wheel barrow	5	pc	5,000	25,000	
	watering pot	20	pc	300	6,000	
	bucket	20	pc	350	7,000	
	how	20	pc	130	2,600	
	shovel	20	pc	700	14,000	
	agri-knife	20	pc	500	10,000	
	hand axe	20	pc	700	14,000	
	rake	20	pc	200	4,000	
	sickle	20	pc	300	6,000	
	measuring tape (30m)	2	pc	1,350	700	
	Lining tape (100m)	10	m	200	2,000	
	nail	10	kg	120	1,200	
	leveling rake	2	pc	220	440	
Equipment (Forestry)	bush sickle	20	pc	250	5,000	
	machete	20	pc	250	5,000	
	saw	20	pc	200	4,000	
	shovel	20	pc	700	14,000	
	hand axe	20	pc	750	15,000	
	wheel barrow	20	pc	-	-	
Materials (AF & forestry) for two years	vinyl pot	30,000	1000	500	15,000	
	seeds, AF propagation materials (scion, rhizocarp, etc)	20	kg	1,000	20,000	
	vegetable seed	1	kg	-	-	
	agri-chemical	20	unit	500	10,000	
	fertilizer	100	10 kg	400	4,000	
	shade (reed)	400	m <sup>2</sup>	20	8,000	
Sub total (B: AF exploitation and forest expansion project / village)					217,940	4,358.80
Total (A + B)					932,140	18,642.80
Total (A+B)x 3 (first year batch targeted 3 villages)					2,796,420	55,928.00

(b) Forest Extension Plan and its Estimated Cost

1) Target reforestation area

Village forest extension activity is planned according to the 4 types of forestry and those are;

- individual woodlot, river side, watershed reforestation and
- AF nursery model forest as village forest" including trial on rapid growth species,
- public area's reforestation i.e. graveyard forest, church or clinic forest, road, well (borehole), etc and
- rehabilitation of degraded natural forest

Individual woodlot reforestation is extension of tree planting in the already allotted land to farmers. Remaining three types of reforestation will take place at mostly public land or customary land.

Firewood demand of the 1<sup>st</sup> year targeted villages are estimated in Table 13.16 and necessary area of forest for production for those requirement are 80 ha of Kaumbata, 78 ha of Nanjiwa and 26 ha of Ndemanje village respectively. Thus, if the three villages will be able to accomplish the area of reforestation, further degradation of natural vegetation in these villages will be halted and restored because the areas are already targeted for reforestation .

**Table 13.14 Forest Area Satisfying Demand of Firewood at 1<sup>st</sup> Year Targeted Villages**

Village name	Area (ha)	Population	Demand firewood (m <sup>3</sup> / person)	Required forest area (ha)	Reforestation area (ha/annual)
Kaumbata	316	714	314	80	10
Nanjiwa	234	489	215	54	7
Ndemanje	144	235	103	26	4

Note 1: Demands are calculated as population times 0.44 m<sup>3</sup> of demand per person

Note 2: Required forest area is calculated; demand firewood times 0.34 of avg. growth of village forest

Note 3: Required forest area is divided by population for reforestation area per person

#### Reforestation of individual woodlot, riverside and watershed forest

Individual woodlot reforestation is aimed at subsistence production by each farmer who participates in the VNRMC at their farmland or homestead area. Riverside forest and watershed forest are targeted at improvement of environmental condition. It is expected that establishing subsistence woodlot cultivation at each homestead will lead to decreased working hour of women. Annual target area of reforestation at each homestead are provided in Table 13.17.

**Table 13.15 Annual Reforestation Target Area by Homestead**

Village	Village forest target area (ha)	Reforestation Target area ha/homestead	Annual forest target area (ha)	Village area (ha)	Population	No of homestead
Kaumbata	80	0.089	10	316	714	112
Nanjiwa	54	0.058	7	234	489	120
Ndemanje	26	0.105	4	144	235	38

Tree species for reforestation of individual woodlots will be selected from FRIM seed supply stock list in accordance with villagers' demands. For future villagers' sustained management of forestry, collection of seeds or scions material will as much as possible be made from their forest. Also species of riverbank and watershed forest will be obtained from the transplanted trees and selection will be based on both increasing agricultural productions at "dimba" and the land to be protected against soil erosion. See Table 13.18

**Table 13.16 FRIM Recommended Species in the SA and those Retail Prices**

	Species	Unit	Price
1.	<i>Acacia polyacantha</i>	1kg	300
2.	<i>Azadirachta indica</i>	"	300
3.	<i>Albizia lebbbeck</i>	"	350
4.	<i>Azadirachta indica</i>	"	500
5.	<i>Bauhinia thonningii</i>	"	450
6.	<i>Cedrela toona</i>	"	500
7.	<i>Colophospermum mopane</i>	"	400
8.	<i>Eucalyptus camaldulensis</i>	"	650
9.	<i>Eucalyptus cloeziana</i>	"	800
10.	<i>Eucalyptus grandis</i>	"	850
11.	<i>Eucalyptus saligna</i>	"	750
12.	<i>Faidherbia albida</i>	"	350
13.	<i>Khaya anthotheca</i>	"	350
14.	<i>Leucaena leucocephala</i>	"	500
15.	<i>Melea azedarach</i>	"	350
16.	<i>Moringa oleifera</i>	"	400
17.	<i>Pinus kesiya</i>	"	850
18.	<i>Pinus patula</i>	"	-
19.	<i>Sesbania sesban</i>	"	400
20.	<i>Terminalia ivorensis</i>	"	450
21.	<i>Terminalia sericea</i>	"	300

Village reforestation for trial on rapid growth species

Both Ndemanje and Kaumbata villages have strong intention for development of village forest and in fact have concrete plan on construction nursery, reforestation and land procurement. Therefore, it is proposed to develop village forest at both villages. The forest development should include trial of rapid growth species, collection forest propagation materials, mixed forest, etc, as a model project of reforestation. Table shows an annual reforestation area of village forest by 8 years rotation.

**Table 13.17 Annual Village Forest Reforestation Area at 1<sup>st</sup> Year Target Villages**

Village	Total area forest development area (ha)	Annual reforestation area (ha)
Kaumbata	20	3.2
Nanjiwa	5	0.8
Ndemanje	30	4.7

Reforestation on public sites i.e. graveyard, church or clinic, road, well (borehole), etc

Some villages have an intention to rehabilitate or protect graveyard forest. Some graveyard forests are fast deteriorating due to increased digging of graves which has necessitated expansion of the area. Therefore, villagers intend to establish graveyard reforestation by creating green belts around the graveyards and along access roads etc. [ by pitting grave high density and there is a necessity to expand the area. Therefore villagers intend to graveyard reforestation by belt circling the area or access road greening by trees, etc.] delete green and replace with red. As well as graveyards, water resources surroundings area such as shallow well, boreholes have a space for tree transplanting. School, churches, clinic such as public facility have a space for tree planting also. Villagers group who takes part in activities of such public facilities should consider greenization of those facilities. See Table 13.20

These reforestation plan can be coordinated by VNRMC for materials or equipment supply.

**Table 13.18 Reforestation of Public Areas**

Village	No of Graveyard <sup>1)</sup>	Other area <sup>2)</sup>	Greening target area (ha)
Kaumbata	1	16	3.0
Nanjiwa	0	2	0.4
Ndemanje	1	0	1.0

Note: Area of graveyard is varying so far. Average area is estimated as 1 ha.

: Other area can be referring current land use. 20 % of other land is planned as target area of greening.

#### Rehabilitation of degraded natural forest

Nanjiwa village is located almost at the riverhead stream of Mkokodzi river and there are gentle slope area towards to the river. Among such sloppy area, arable areas are allocated and already cultivated after slashing and clearing vegetation and stones. The remaining natural vegetation under the customary land are degraded so far by illegal cutting of trees for firewood mainly for home consumption and other for sale.

This reforestation is targeted to rehabilitate 30 ha in total or 5 ha annually. Enrichment planting measures are recommended to rehabilitate the area to accelerate natural regeneration instead of clear-cutting all vegetation. Also fire protection species and firebreak lines will be introduced. Seedlings will be raised at AF nursery by VNRMC. See Table 13.21

**Table 13.19 Target Area of Rehabilitation of Degraded Natural Vegetation in Nanjiwa**

Village	Total target area (ha)	Annual target area (ha)
Nanjiwa	30	5

Table 13.22 summarizes target area of forest extension plan at 1<sup>st</sup> year batch villages.

**Table 13.20 Summary of Forest Target Area at 1<sup>st</sup> Year Batch Villages (ha)**

Type of reforestation	Village	Total target area	Annual target area
Individual woodlot	Kaumbata	80.0	10
	Nanjiwa	54.0	7
	Ndemanje	26.0	4
Rapid growth trial village forest	Kaumbata	20.0	3.2
	Nanjiwa	5.0	0.8
	Ndemanje	30.0	4.7
Reforestation at public space	Kaumbata	3.0	3.0
	Nanjiwa	0.4	0.4
	Ndemanje	1.0	1.0
Rehabilitation degraded natural vegetation	Nanjiwa	30	5
total	Kaumbata	103	16.2
	Nanjiwa	60	13.2
	Ndemanje	57	9.7

The Table 13.23 shows annual seedling production plan that are extracted from the AF nursery seedling production plan.

**Table 13.21 Annual Seedling Production Plan for Forest Extension Plan for 1<sup>st</sup> Year Batch Villages**

Village	species	No of seedling
Kaumbata	Melia azedarach	9,000
	C. apiculatum	9,000
	P. angolensis	9,000
	E.Camadulensis	9,000
	A..auriculiformis	9,000
Sub total		45,000
Nanjiwa	E.Camadulensis	9,000
	Senna siamea	9,000
	Faidherbia albida	9,000
	Afzelia quanzensis	9,000
Subtotal		36,000
Ndemanje	E.Camadulensis	5,500
	A. albida	5,500
	C. auriculata	5,500
	Molinga Oleifera	5,500
	A. senegalensis	5,500
Subtotal		27,500

2) Flow for implementation of forest extension plan is shown in Table 13.24.

**Table 13.22 Flow of the Implementation of Forest Extension Plan**

Subject	Reference
1. Formation of VNRMC	Sub contract to NGO (see a captioned subject)
2. Enlightenment activities to villagers' group of the targeted villages	Bus tour for successful reforestation project site
3. Confirmation of forest extension plan of VNRMC	Land intends to take place reforestation, species to be employed, object, etc.
4. Survey: Planned forest area, soil and other natural condition, socio-economic condition	Delineation of village border and planned AF practice farmland by GPS, etc. bench mark survey
5. Planning	AF nursery construction plan (Coordination w/ AF farmers group) Seedling production plan Reforestation plan (land preparation, transplanting, O & M, patrol, etc.
6. Procurement	Reforestation practicing and seedling production equipment and materials, etc
7. Implementation	Construction (cooperation w/ AF farmers' group) Seedling production at AF nursery Land preparation: weeding, ridging, etc. Transplanting O & M (weeding, ridging, patrol, etc.)
8. Monitoring	Seedling production at AF nursery by species Transplanted area and number of seedling by species by farmer
9. Evaluation and analysis	Seedling production Survival rate, etc.

3) Equipment and material plan for forest extension

The equipment and material plan for forest extension project will be finalized based on size of forest plan,

number of participants to the VNRMC, etc. Through the survey that will take place prior to the implementation of the project.

(c) IGA Development Plan

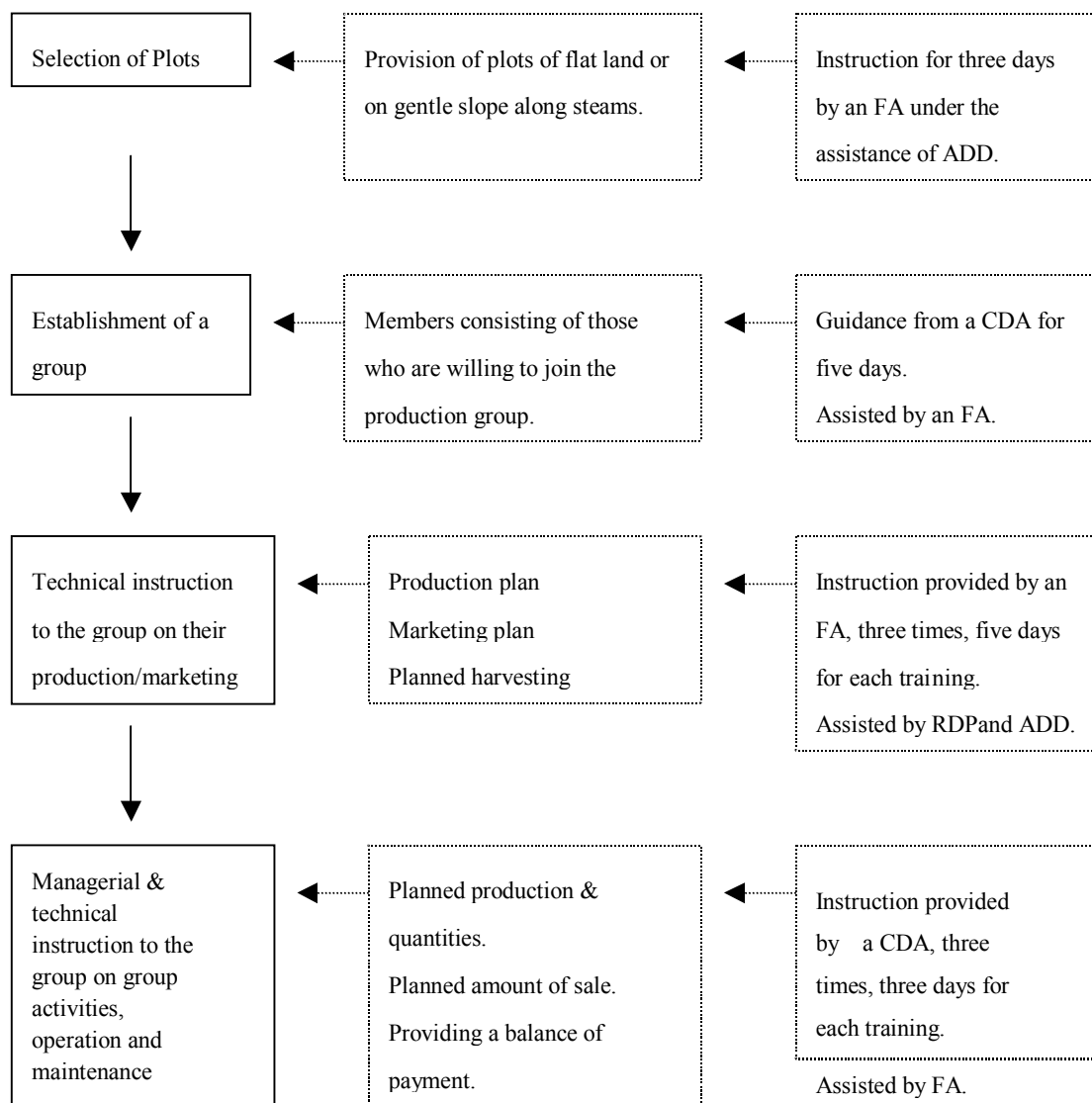
Vegetable production and sale

Small land-owners groups are organized on plot holders along perennial streams so that they can increase and diversify vegetable production and sell their produce in an organized way. Diversification of vegetable species is tried to adopt Chinese rape, onion, rape, spinach, pumpkin, tomato, cabbage, carrot, mustard etc. so that the organized groups can market as a group in compliance with the changing demand in the retail markets. Groups are organized through a promoter, the role of which can be played by NGOs, extension workers or volunteers concerned.

- 1) Site selection: suitable sites for developing year-round vegetable production are desirable. So, it is advised to develop farm plots along perennial streams where irrigated farming with simple type pumps can be introduced. If the site has natural standing surface water (often found in dambos), such site is ideal to develop improved vegetable production.
- 2) Selection of farm households: the promoter can choose those who are willing to participate in the planned group among the farm households with their plots located along the streams or other water sources.
- 3) Procedure for the agreement: the promoter will explain the role and function of the proposed group to those who have interest, then the applicants who can agree with the affiliation into the proposed group accept their role and responsibility and sign the proposed note of agreement. Then, all the members discuss production and marketing system they will follow as a group, and mutually agree and sign the membership list.
- 4) Role and responsibility of each member are mutually consulted, agreed and summarized into by-law of the group.
- 5) Market research in nearby markets is performed to grasp the propensity of consumption including species and varieties marketed, quality and quantity.
- 6) Cropping plan with a rotation plan should be agreed in the group.
- 7) Technical instruction shall be provided by an FA on planting, production control / management and planned harvesting.
- 8) A CDA shall provide the group members with the technical guidance as to how the group should be well operated and maintained in a sustainable way.

These activities will be deployed under the instruction of the FA in charge, while FA or CDA gives advice on the establishment of a group and its management. ADD under the MOAL and RDP provide technical assistance thereon.

**Figure 13.4 Illustrative Concept of Group Activities of Vegetable Production and Marketing**



The group member(s) in charge of sale / marketing should regularly conduct(s) market survey to grasp market situations /commodity trends, and the results of analysis should be applied to the determination of the following rotation plans with the assistance of the FA in charge. The production plan should regularly be reviewed for necessary revision based on the opinions of all the members and approval should be obtained from them on the decision of the said plan.

The extension shall be provided step by step. It is advised to start from the most relevant villages, for example, those where RRA survey was conducted by the study team. The extension shall follow a feed-back system comprising “planning - practicing - reviewing/evaluation” to bring about performance-based gradual improvement in their activities. A group can experience a few cropping throughout a year through a rotation of vegetable species with the growth period ranging a few months, only if water source is perennially



available. So, it can practice the above-cited feed-back system of planning, practicing and evaluation within a year since its establishment by the group's own efforts, saving the burden of the FA in charge who has a lot of extension programs in addition to the group instruction. The group shall make effort to expand the size of participation under the auspice of the VDC concerned. An FA should accumulate his own experience year after year through the regular monitoring of these groups covering few villages so that he can cover the development of the planned 24 villages in the MA within five years. In case that villages are catered by a different FA, it is desirable that the FA should have chance to observe the forerunner villages where this system has already been applied to, and be trained with the application of the system. Whenever need arises, another experienced FA shall help him with pertinent advice and assist him in monitoring the group activities.

The estimate inputs necessary to carry out the above mentioned plan are as follows (per village basis), assuming that 20 farm households hold 2.4 hectare of dimba in 17 villages in the MA.

1) Farm inputs:

* Seed (ten different species / varieties of vegetable)	200 packets
* Chemical fertilizer ( 23-21-+4S, CAN, uria)	12 bags (50kg)
* Agricultural chemicals (nematosides, etc)	6 bottles

2) Farm implements:

* Hoes	20 units
* Sickles	20 units
* Treadle pumps	20 sets
* Watering can	40 pieces

3) Harvesting and carriage containers:

* Bamboo basket	40 pieces
* Cargo baskets	40 pieces
* Bicycles	3 units

4) Retail stall:

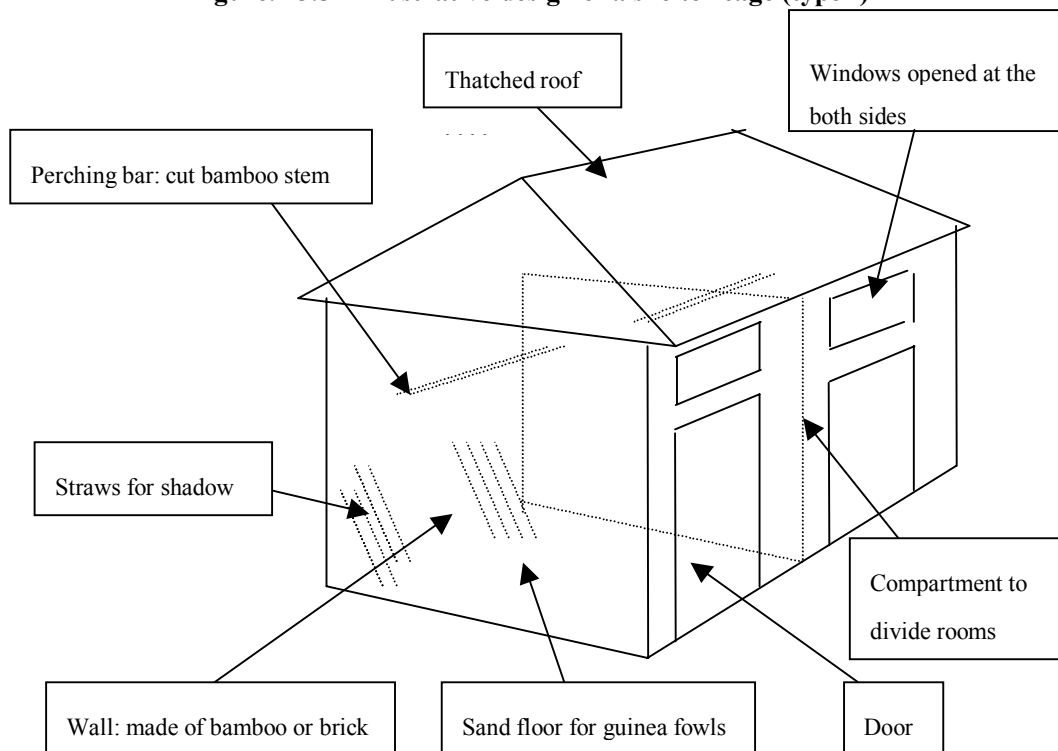
* Pole and roofing material (for three stalls)	6 poles
* Material for wall and displaying stall table	18 sheets
* Mat	2 sheets

Small-scale fowl rearing

Rearing of chicken and Guinea fowl is planned here. The establishment of a rearing group is oriented selecting those who are willing to be engaged from among farmers. The organized group purchases feeds, preventive vaccines and envisages planned sale as a group, but rearing is individually practiced in each household. The members rear fowls by free barn system but it is recommended to build a cage house per household to protect fowls from their predators at night. It is advised to start the rearing with a small flock. Experienced NGOs recommend small scale rearing with chicken (1 rooster with 4 hens) mixed with Guinea fowl (1 male bird with 3 female birds), sheltered with a cage of either one of the following:

- 1) Type I : Accommodating both chicken and Guinea fowls  
Size; width 1.5 meter, length 3 meter and height 2 meter,
- 2) Type II : Accommodating separately chicken with Guinea fowls  
Size; two cages with the size of width 3 meter, length 3 meter and height 2 meter
- 3) Type III : The same as given above, but with fenced yard  
The size of the cage is the same as given above, and a yard fenced with wire net width 3 meter, length 3 meter and height 1.5 meter attached to each shelter cage.

**Figure. 13.5 Illustrative design of a shelter cage (type I)**



1) Selection of priority villages:

Since almost all villagers have experience of rearing chicken, it is advised to initiate with the villages with some experience of group activities, if any.

2) Selection or recruitment of the group members:

A group is organized selecting those who are willing to join a group for rearing activity among village households.

### 3) Organizing group activities:

Role of each member belonging to the group is explicitly specified, while each member shall understand and agree with his role and responsibility. In particular, solidarity shall be affirmed for group purchase of input materials to reach a unanimous agreement.

4) A by-law shall be provided in which agreed contents of the group are stipulated.

### 5) Marketing plan:

A marketing plan is formulated under the guidance of the FA in charge. Nearby markets can be selected at the initial stage. At a developed stage, the group will be able to affiliate in a cooperative assisted by ADD, or a new cooperative can be established among the groups of adjacently located villages.

### 6) Instruction:

The FA in charge instructs the group such technical and managerial skills as how to procure input materials, to rear fowls, to plan marketing and to maintain group activities etc.

Group rearing of fowls can be extended from a village to others step by step. Initially, it is advised to start with the three villages where RRA survey has been carried out because these represent the character of the MA. The extension staff shall adopt a feed-back system comprising planning – practicing - reviewing/evaluation aiming at gradual improvement in their activities by feeding the results obtained from their practices. As such the group can experience twice a year on rearing judging from turnover period of rearing. The group shall make efforts so that it acquires capacity of self-planning, practicing and evaluating its performance in a year or two, thus saving the norm of the FA. The group can expand its members through the assistance of the VDC concerned. The FA in charge shall learn from the NGO how to diffuse the techniques and transfer them towards the group and regularly monitor the performance and practices of the group, thus obtaining his own experiences. He shall cover a few target villages to diffuse the group rearing so that 24 selected villages in the MA can be covered in the five-year term. If the group rearing is further extended into a group of villages where another FA takes charge of, the FA shall have opportunity of observing forerunner villages prior to his extension activities of group rearing in his jurisdiction. Whenever need arises a well-experienced FA shall assist him in diffusing techniques. ADD and RDP shall provide pertinent assistance and oversee the extension activities by the FA concerned.

Input materials required for developing group rearing of fowls in the MA:

(covering 24 villages, accounting for 10 farm households as the group member) example of type I per farm household

#### 1) Input materials:

* Chicken	5 heads
* Guinea fowl	4 heads
* Feeds (three kinds)	200 bags(10kg)
* Disinfecting chemicals (three kinds)	1 bottle (1/3 x3)

#### 2) Material of shelter cage:

* Brick and plaster	1,000 pieces
* Thatching grass	5 bundle

* Wooden door	2 doors
* Windows	4 units

### Storage and primary processing

It is planned to extend food storage methods that are readily practiced by farm households, and to diffuse the methods of conventional primary processing to provide dried mango, dried sweet potato chips, steamed and dried sweet potato, boiled and dried beans dressed with cane syrup. As to food storage, long-term storage of sweet potato shall be diffused since acreage under this crop is now increasing. These two techniques are simultaneously extended to the same group following the method as shown below:

As to food storage and primary processing

#### 1) Selection of target site:

Starting with the villages where materials are produced (sweet potato is planted) and the villagers have experience of group activities, if any.

#### 2) Selection of group members:

Recruiting villagers who are willing to join groups and participate in the group activities.

#### 3) Agreement of group function:

Role of each member is clearly agreed and the members should accept and agree their role and responsibility.

#### 4) Provision of by-law of the group:

What are agreed shall be printed and signed in a by-law.

#### 5) Survey to be conducted by the members:

Marketing intelligence shall be collected from nearby markets to study kinds, quantities and quality of the marketed commodities, consumption propensity / trends to formulate storage and processing plans. At the beginning, currently available crops in villages are adopted in the storage and processing plan taking full account of the marketability of the produce.

#### 6) Agreement on the fixed plan:

Storage and processing plans to be implemented as group activities are agreed among the members, and

#### 7) Training:

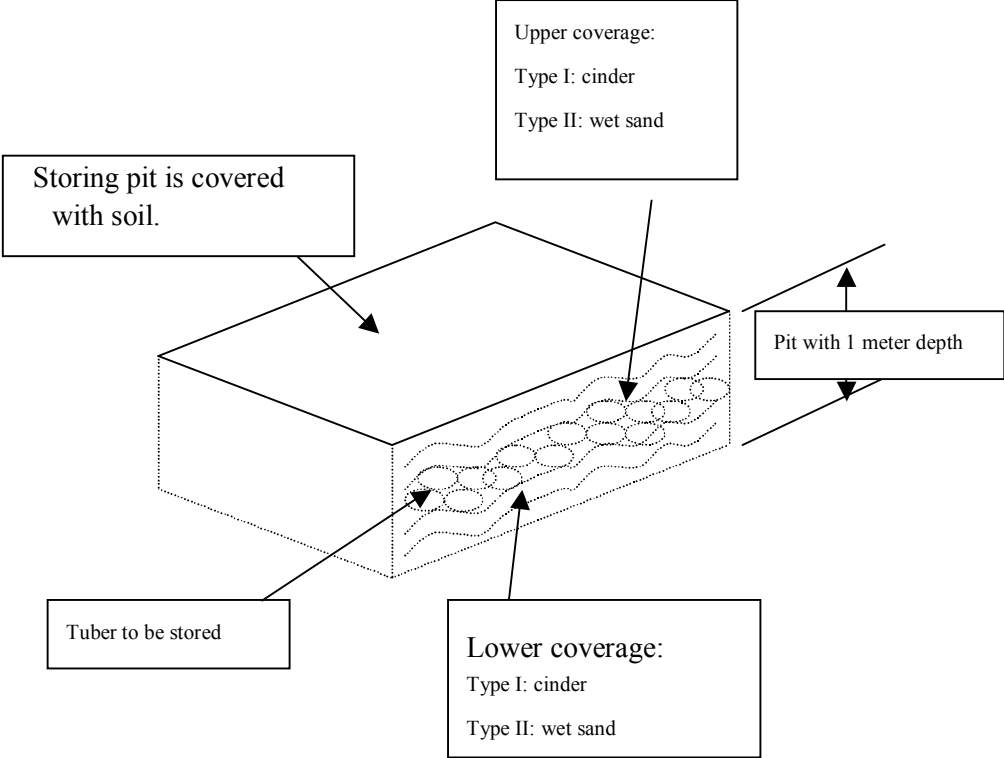
FHA in charge of the villages concerned shall instruct the techniques through a training on the methods of storage and processing, management and control thereof and sales plan.

Material to be stored shall be provided by the trainee farmers themselves. The following shows proposed methods of storing raw tubers of sweet potato

Type I: storage pit packed with wood-ash; storing tubers for about three months

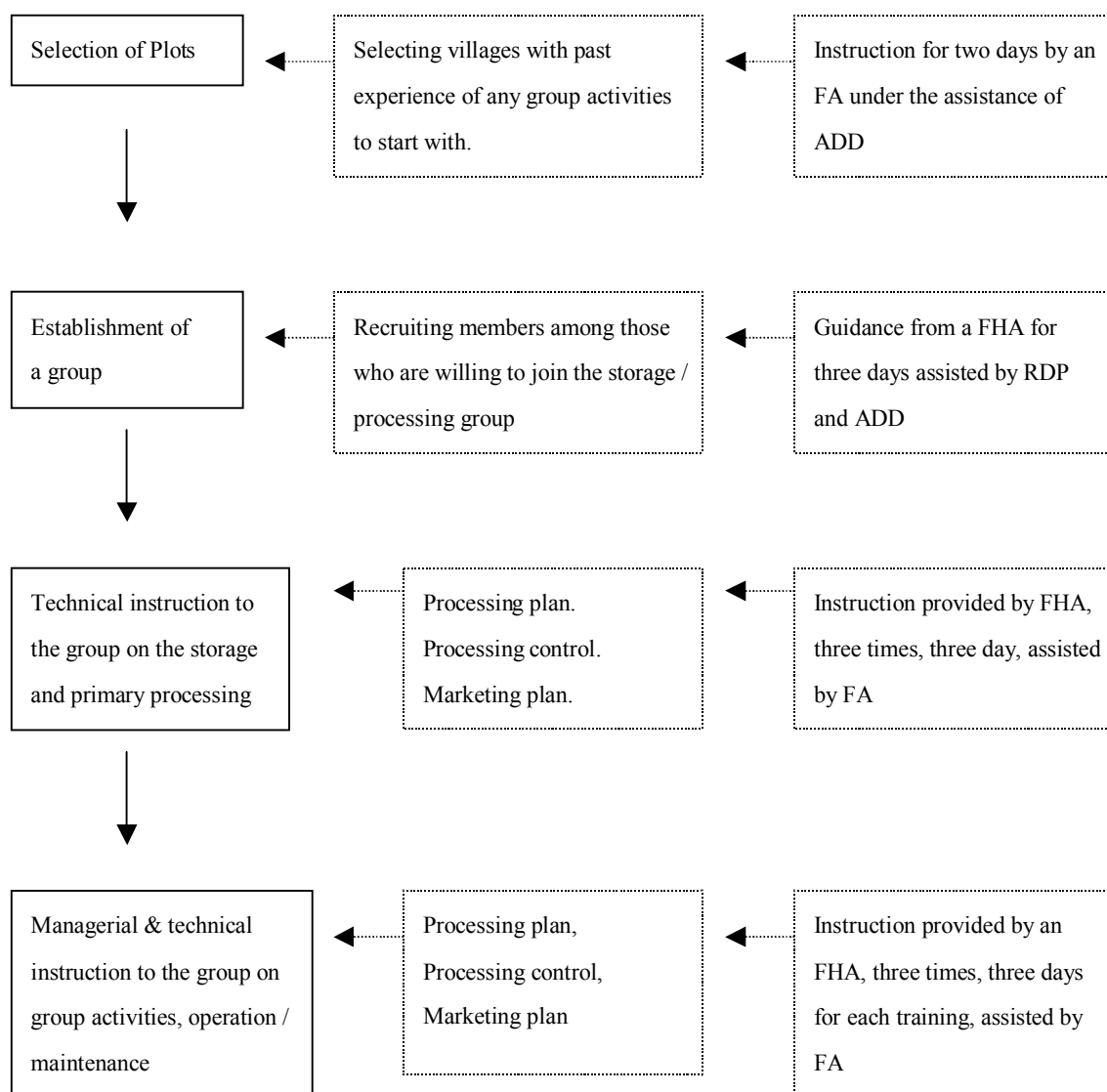
Type II: storage pit packed with sand; storing tubers for about six months

**Figure 13.6 Conventional Method of Storing Sweet Potato**



The group activities shall be sustained under the instruction of FA and FHA in charge. ADD and RDP concerned shall grant necessary technical assistance for sustaining the group activities.

**Figure 13.7 Illustrative Procedures of Group Activities on Food Storage and Primary Processing**



The member taking charge of sale shall regularly survey market trends and analyze what he has observed with technical help of FA in order to apply the analysis to storage and processing plans. The plan shall be brushed up and adjusted in compliance with opinions of all the members to get unanimous agreement among the members.

The extension of storage and primary processing by a group can be extended from a village to another step by step. Initially, it is advised to start with the three villages where RRA survey has been carried out because these represent the character of the MA. Since a group of women has already started the activities in Ndemanje village, it can be targeted to select the very group only if they adopt the proposed plan. The extension staff shall adopt a feed-back system comprising “planning - practicing - reviewing/evaluation” aiming at gradual improvement in their activities by feeding the results obtained from their practices. As such the group can experience several times a year on storage and primary processing of the materials available in the village. The group shall make efforts so that it acquires capacity of self-planning, practicing and evaluating its performance in a year or two, thus saving the norm of the FHA and FA. The group can expand its members through the assistance of the VDC concerned. The FHA in charge shall acquire experience

through his extension activities transferring them towards the target groups and regularly monitor their performance and practices. He shall cover a few target villages to diffuse techniques among the groups so that 24 selected villages in the MA can be covered in the five-year term. If the group rearing is further extended into a group of villages where another FA takes charge of, the FA shall have opportunity of observing forerunner villages prior to his extension activities of group rearing in his jurisdiction. Whenever need arises a well-experienced FA shall assist him in diffusing techniques. ADD and RDP shall provide pertinent assistance and oversee the extension activities by the FA concerned.

Materials and implements required for developing the proposed storage and primary processing are given below as per village

<u>1) Implements and equipment:</u>	<u>No.</u>
* Hoes	20 units
* Sickles	20 units
* Shovels	20 units
* Drying mats	40 sheets
* Peeling knives	20 units
* High pressure boiling pans	4 sets
* Molasses concentrating pan	4 sets
* Roller type cane squeezers	4 units
* Polyethylene bags	10,000 sheets
* Cellophane tapes	200 rolls
* Cooking utensils	4 sets
<u>2) Tools for harvesting and carrying:</u>	
* Baskets made of bamboo	40 pieces
* Cage baskets	40 pieces
* Bicycle	2 units
<u>3) Building materials for retail stool (2 sites):</u>	
* Supporting poles	4 sticks
* Wooden board for wall / table	12 sheets
* Mat for covering table	4 sheets

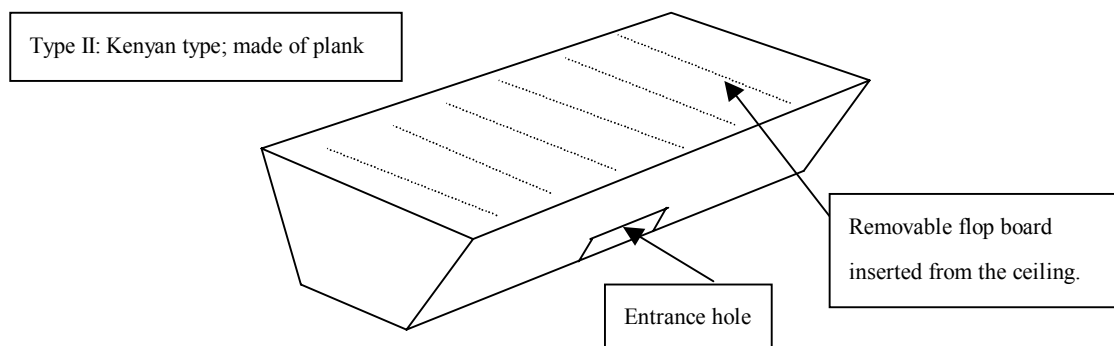
### Apiary

It is advised to organize a group for bee-keeping by recruiting those who are willing to join it. The objectives of organizing it lie in group purchasing of inputs and selling of the produce. Fixed type beehive boxes are installed as a group. It is recommended to start with a limited scale, with ten boxes or so per village (due to limited sources of nectar, or honey-plants). Initial introduction shall be entrusted to an NGO with ample experiences of keeping bee. The following beehive boxes can be recommended:

- Type I :           Traditional type; made from boards of pine tree  
                           Size; width 20 cm, length 90 cm and height 20 cm
- Type II :           Kenyan type;  
                           Size; width 20.4 cm, length 48.6 cm and height 40 cm

Type III : Modern type ;  
Size; width 37 cm, length 48.6 cm and height 24.2 cm with two stories

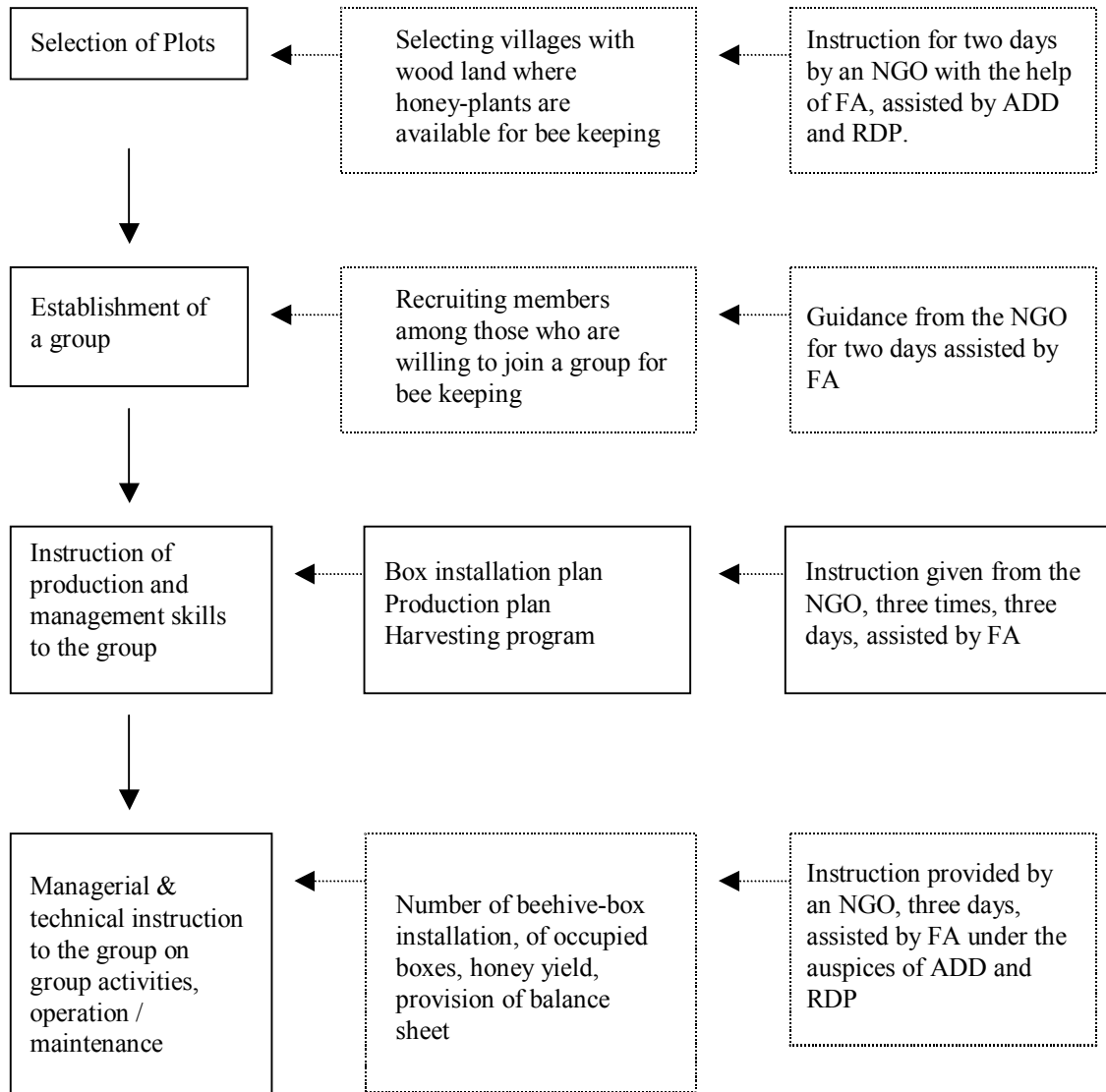
**Figure 13.8 Beehive Box**



- 1) Selection of sites: At present very limited areas have honey-plants available for source of nectar (refer to the map of bee-keeping development areas). Among these, it is advised initially to select villages where villagers have experience of any group activities, or if none, those where villagers have positive attitudes towards mobilization of group activities.
- 2) Recruitment of group members: Among those farm households which are located in or around wood land where honey-plants like acacias still remain, it is advised to recruit those who have positive will to participate in group activities as members.
- 3) Agreement of group function: Role of each member is clearly agreed and the members should accept and agree their role and responsibility.
- 4) Provision of by-law of the group: What are agreed shall be printed and signed in a by-law.
- 5) Planning: Plan of honey production is elaborated under the guidance of an NGO until all the members have come to an agreement. In this agreement, input purchase in a group shall be identified among the members of the group.
- 6) Training of the techniques: Techniques including procurement of input material and equipment, production management and planned sale of the products are provided by FA in charge after learning from the NGO, and
- 7) Sale of produce: The activities are gradually developed into larger scale, and the produce is planned to market to nearby retail markets. In the case that bee-keeping activities are grown into a substantial size, it is recommended to organize a cooperative among several villages engaged in bee keeping. So access to the largest market such as Blantyre and Limbe will be able to be secured through the expanded group sale with technical support by ADD and RDP.



**Figure 13.9 Illustrative Procedures of Group Activities on Bee Keeping**



The extension of apiary by a group can be extended from a village to others step by step. Initially, it is advised to start with the three villages where RRA survey has been carried out because these represent the character of the MA. Three villages are located to be able to obtain the nectar and clean water resource around the near areas. The extension staff shall adopt a feed-back system comprising “planning - practicing - reviewing/evaluation” aiming at gradual improvement in their activities by feeding the results obtained from their practices. As such the group can accumulate experience so that the group can manage bee keeping by themselves within a year or two after the establishment through the cycle suggested above. The group shall make efforts so that it acquires capacity of self-planning, practicing and evaluating its performance in a year or two, thus saving the norm of the FA. The group can expand its members through the assistance of the VDC concerned. The FA in charge shall acquire experience through his extension activities of transferring techniques towards the target groups and regularly monitor their performance and practices. He shall cover a few target villages to diffuse techniques among the groups so that the selected potential villages in the MA can be covered in the five-year term. If the group apiary is further extended into a group of villages where another FA takes charge of, the FA shall have opportunity of observing forerunner villages prior to his

extension activities of group rearing in his jurisdiction. Whenever need arises a well-experienced FA shall assist him in diffusing techniques. ADD and RDP shall provide pertinent assistance and oversee the extension activities by the FA concerned.

Materials and implements required for developing the proposed storage and primary processing are given below as per village:

1.) <u>Input materials:</u>	<u>No.</u>
* Beehive boxes	10 boxes
* Honey harvesting wears	2 sets
* Harvesting knives	2 nos.
* Wax	5 kg
* Cable wire	50 merer

2.) <u>Box assembling kits:</u>	
* Wood cutting saw	5 saws
* Metal scale	2 nos.
* Wooden ink containers	2 nos.
* Plumb	2 nos.
* Hand borer	2 sets
* Metal hammer	2 sets
* Nail	5 kg
* Chisels	2 sets
* Measuring tapes	2 units.

The above items are proposed for the evaluation of the pilot scheme, in which monitoring indicators of the components can be extracted from the ledgers of managing village organizations. As to setting of benchmarks, particular levels are proposed at the first year of the pilot scheme.

Cost at each year is shown in Table 13.25 which amounts to 142,700 U\$ in total.

**Table 13.23 Rough Cost Estimation for IGAs Unit :US\$**

Item	1 <sup>st</sup> year	2 <sup>nd</sup> year	3 <sup>rd</sup> year	4 <sup>th</sup> year	5 <sup>th</sup> year	Total
Sale of vegetables	10,640	17,730	7,130	10,620	14,230	60,350
Small scale fowl resring	3,580	7,130	5,960	5,960	5,960	28,590
Storage/ primary processing	5,870	11,830	9,810	9,810	9,810	47,130
Bee-keeping	2,210	2,210	0	2,210	0	6,630
Total estimated cost	22,300	38,900	22,900	28,600	30,000	142,700

(d) Rehabilitation and Expansion of Basic Infrastructure

Current socio-infrastructure conditions and proposed minimized but necessary rehabilitation/expansion infrastructures in the MA are described in Chapter 12.6. Taking into consideration of the effects which will appear at an early stage by minimum investment and construction of small scale facilities which will be participated by beneficiaries, construction of the weirs (Type A at Lunzu and Nkokodzi rivers, width 10 m, height 2.5m, Type B at perennial flow tributaries, widhe 6 m, height 2.5m), installation of pipe culverts crossing the streams and rehabilitation/expansion of Milala dam are proposed in the verification scheme.

Implementation schedule at each year are summarized in Table 12.26. (See Annex Phase II Stage J.)

**Table 13.24 Implementation Schedule of Rehabilitation**

Component	1 <sup>st</sup> year	2 <sup>nd</sup> year	3 <sup>rd</sup> year	4 <sup>th</sup> year	5 <sup>th</sup> year	Total
Weirs(Gabion Net)						
-Type A	4	0	2	2	0	8
-Type B	1	2	2	2	1	8
Road Crossing Culvert						
RC $\phi$ 600 mm	1	1	2	3	1	8
Rehabilitation of Milala DAM						
Increase of Dike				1		1
Dreging				1		1
Intake Facilities				1		1

Construction cost at each year is shown in Table 12.27 which amounts to 168,300 US\$ in total.(Detail is shown in Annex Phase II Stage J.)

**Table 13.25 Construction Cost at Each Year**

Unit : US\$

Component	1 <sup>st</sup> year	2 <sup>nd</sup> year	3 <sup>rd</sup> year	4 <sup>th</sup> year	5 <sup>th</sup> year	Total
Weirs (Gabion Net)						
-Type A	32,200	0	16,100	16,100	0	64,400
-Type B	5,700	5,700	11,400	17,100	5,700	45,600
Sub Total	37,900	5,700	27,500	33,200	5,700	110,000
Road Crossing Culvert						
RC $\phi$ 600 mm	2,400	2,400	4,800	7,200	2,400	19,200
Rehabilitation of Milala Dam						
Increase of Dike				12,000		
Dreging				20,000		
Intake Facilities				600		
Miscellaneous				6,500		
Sub Total				39,100		39,100
<b>Total</b>	<b>40,300</b>	<b>8,100</b>	<b>32,300</b>	<b>79,500</b>	<b>8,100</b>	<b>168,300</b>

(e) Establishing Community Organizations and Cost Estimation

1) Implementation plan for establishing community organizations

Villager groups charged for executing VNRMP are planned to be formed at the last session of the PCM or PRA that will be carried out prior to the project commencement. Villagers will initiate to design concrete implementation plan at each village on the way of the PRA and community organization expert or extension officers will support their planning. The implementation plan designed through PRA at its final stage, will be finalized in accordance with selection of VC member, formation of villagers organization for implementation of VNRMP.

Need for analysis and planning by the community

The first year's target villages are Kaumbata, Nanjiwa and Ndemanje where the community's needs were discussed and counter measures were identified through the RRA conducted during the Study period. Therefore, in these three villages, a workshop is planned to confirm and summarize the outcomes of the RRA and then the PCM will be conducted to draw a basic plan according to the proposed measures. See Table 13.28.

**Table 13.26 Plan of PRA and PCM**

	No. of Villages	Method	Days Required
Year 1	3	Summary of RRA and PCM	5 days
Year 2	6	PRA and PCM	ditto
Year 3	5	ditto	ditto
Year 4	5	ditto	ditto
Year 5	5	ditto	ditto

In the first year PRA is conducted separately in three target villages. The 6 target villages for the second year consist of a cluster of 4 small villages, which are close to one of the first year target village, and two fairly large villages. For the former, PRA will be conducted jointly as a trial as other components of the project will also tried as a group. The result of this group trial will be fed back to the following years' implementation plan.

For the PRA and PCM the community organization expert will act as a moderator and record keeper. In order to reach a consensus of the whole community, the expert will ensure that villagers from all the clans be invited to the session and that the session be conducted in a fair and open manner. For the first three years of the project the community organization expert will organize PRA and PCM sessions and take a leading role in facilitating the villagers for formulating the VNRMP. In the fourth and fifth year, the C/P organization, whose staff have acquired knowledge and skills in community organization by taking part in the above sessions and OJT training during the previous three years, will resume the task.

#### Sensitization of the community

A series of demonstrations and discussions will be organized in order to sensitize the community over the issues discussed and activities planned through the PRA and PCM. Due to limited transport and communication means, which also makes it difficult for extension staff to visit the villages, most of the villagers have few opportunities to see the life beyond their immediate village life. Therefore, this sensitization process will expose the villagers with new ideas and techniques, which will help them in formulating more concrete plans for the project. The subjects will be chosen based on the community's interest and relating to the activities planned under the VNRMP. Relevant experts such as CDA, FA, forest extension worker, NGO, etc. will be invited to discuss the issues with the community. The experts' concrete experiences with some community projects will be valuable together with information such as procedures of launching projects, available credit sources, supporting systems of relating agencies, etc.. Table 13.29 shows the examples of subjects:

**Table 13.27 Candidate Subjects for Community Sensitization**

Subject	Candidate Expert
Usage and management of natural resources	Forest extension staff
Benefit and techniques of AF	FA, NGO
Agriculture (Crop diversification, Promotion of local products, Rotation cropping, etc.)	NGO
IGA (poultry, bee-keeping, food processing, etc.)	NGO
Improved fireplace	Expert in introducing improved fireplace

It is also planned to give a lecture in community organization or group about its effects, benefit, and measures through all other lectures, aiming to obtain and strengthen villagers' understanding about advantage of group activities.

#### Formation of VC and other community organizations

Following the problem and needs analysis through the PRA and PCM, formulation of the VNRMP and

sensitization of the community, the community organization expert, in co-operation with the C/P agencies, will start forming community organizations to implement VNRMP. Thus community organization activity of villagers is supported by both technically and administratively by those specialist.

The procedure of forming community organizations is as follows: selection of village representatives to the VC; selection of members/participants of each organization; study tours for community organizations; preparation of operational framework and project plan; and preparation of work plan. From the project components of the VNRMP, the following community organizations are expected to be formed. Among such organizations 2-3 relevant organizations will be formed per village. The total of 15 days (3 weeks) is expected for the formation of VC and other community organizations, preparation of operational framework and work plan. See Table 13.30.

**Table 13.28 Community Organizations Expected to be Formed for VNRMP Implementation**

Components	Community Organizations
A. Rehabilitation and Maintenance of Basic Village Infrastructure	
▪ Development Agri-Water Resources	Agri-Water Committee
▪ Construction village bridge (culvert)	VC
B. Construction, Operation and Maintenance of AF Nursery	
▪ Construction of AF Nursery	AF Nursery Committee
▪ Operation and Maintenance of AF Nursery	-do-
C. Agriculture and AF exploitation project	
▪ Practice AF	AF Nursery Committee,
▪ Practice combined AF and Diversification of cropping (Rotation and species)	Farmers' group -do- / Sales Committee / Rotation Cropping Group
D. Forest extension project	VNRMC
E. IGAs	
▪ Improvement of existing agri-products storing, processing, etc	Agro-products processing & Sales Club / Domestic Fowls Club / Women's Club
▪ Improvement of traditional IGAs technology	
▪ Improvement of Oven	
F. Support & management organization of villagers group	VC

(d) Leadership Training for VC Members

The community organization expert will organize a 5-day leadership training course for VC members. See Table 13.31. The training course will include subjects relating to leadership, gender, problem solving, project management, etc.. Practical skills such as preparing a work plan, recording minutes and simple accounting will also be taught during the course. As representatives from each community organizations are VC members, who will take part in the training course, this training course will directly serve as capacity building of these community organizations. The number of VC members will depend on the number of community organizations in the village. An estimation of 2-3 community organizations per village, excluding the VC, will lead to 7-9 VC members per village. The training will be held at Lunzu Residential Training Centre (residential capacity of 30 people<sup>54</sup>) near the MA.

<sup>54</sup> For the first year, the course can be organized for all the VC members from the three target villages.

**Table 13.29 Plan of Leadership Training for VC Members (estimate)**

	No. of Villages	No. VC Members / Village	No. of Participants	No. of Groups Participating the Training
Year 1	3	7-9	21-27	9-12
Year 2	3(6)	ditto	ditto	ditto
Year 3	5	ditto	35-45	16-21
Year 4	5	ditto	ditto	ditto
Year 5	5	ditto	ditto	ditto
Total	21	35-45	147-189	66-87

Note 1: Of the 6 target villages for the second year, 4 small villages will be grouped together.

Note 2: VC members include 2 members from each of the community organizations

## 2) Study tour

To enable villagers and extension staff to visualize their goals, study tours will be planned for visiting projects in surrounding areas. The study tours will be organized based on the project activities defined during the PRA and PCM. Two or three villages will jointly organize a study tour and three study tours are planned for each village. 8 villagers from each village and forestry and agriculture extension staff in charge of the village will take part in the study tour. See Table 13.32.

**Table 13.30 Implementation Plan of Study Tour**

	No. of Villages	No. of Groups / Village	No. of Tours / Village	Total No. of Tour Participants
Year 1	3	2-3	6-9	48-72
Year 2	3(6)	ditto	ditto	Ditto
Year 3	5	ditto	10-15	80-120
Year 4	5	ditto	ditto	Ditto
Year 5	5	ditto	ditto	Ditto
Total	21(26)	10-15	42-63	366-504

## 3) Preparation of work plan

After the leadership training to the VC members, the VC and each of community organizations will prepare its work plan. Necessary inputs such as land, skills, equipment and materials should also be identified and their methods of procurement should be defined. For the activities, which will bring financial profits, such as IGAs, an equitable manner of sharing duties and proceeds should be agreed upon by the members.

## 4) Technical support and training to community organizations

Relevant extension staff, such as CDA, FA and forest extension staff, will visit the group regularly and provide technical support and advice according to the progress of activities.

## 5) Monitoring of the performance of community organizations

Monitoring should be conducted on the performance of community organizations, which are part of the comprehensive project aiming at natural resources management and forest rehabilitation through improvement of people's livelihood. The method of monitoring is described in the next section (f). The following monitoring indicators, other than technical indicators, are considered to be applied. See Table 13.33

**Table 13.31 Candidate Monitoring Indicators for Community Organizations**

Indicator	Monitoring Items	Objective
Benefit	Benefit and profit of groups	Achievement of objectives set by the group
Effect	Income of participants	Evaluation of equitability among participants
	Living standard of participants	Evaluation of project impact
Sustainability	Participation of group members	Evaluation of community participation to group activities
Ripple Effect	Change of participant numbers	Degree of interest among non-participants
	Number of visitors to the group	

6) Cost estimation

Estimated cost for formation and capacity building of community organizations are shown in table 13.34

**Table 13.32 Estimated Cost for Formation and Capacity Building of Community Organizations**

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Formation						
PRA / PCM	954,000	2,544,000	2,120,000	-	-	5,618,000
Capacity Building						
Leadership Training	228,500	345,000	343,500	-	-	917,000
Study Tour	108,000	216,000	216,000	-	-	540,000
Total	1,290,500	3,105,000	2,679,500	-	-	7,075,000

Unit: MK

(f) Implementation Plan and Estimate on Capacity Building and Extension

1) Implementation plan on capacity building and extension

Capacity building and strengthening of extension staff

Prior to start of activities in the villages is capacity building and strengthening of extension staff by technical training to meet the demand of community. Even though the target area for first five year is in the MA, other extension staff covering whole study area will be invited for the training. Training is provided at Lunzu Residential Training Center (RTC), which is close to the MA. All of the following training courses should be provided in the first year of implementation. See Table 13.35

Training on Forest Guard and Patrol Man should come first.

**Table 13.33 Training Courses for Forestry Guard and Patrol Man in the SA**

Year	Course	No. of participants	Trainer	Period
1 <sup>st</sup> year	1) Basic knowledge on forestry	17 Forestry Guard 70 Patrol Man	Regional Forestry Officer	5 days
1 <sup>st</sup> year	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.

After Forestry Guard and Patrol Man are equipped with basic techniques and methodology of extension, technical training on agroforestry is provided to all forestry and agriculture extension workers. The extension workers who cover the same villages should be in the same class (one class is consisted of about 30

trainees), and they discuss about extension system and working plan to work together in their area. This training course is held at Lunzu RTC.

**Table 13.34 Agroforestry Training for Forestry and Agricultural Extension Workers**

Year	Course	No. of participants	Trainer	Period
1 <sup>st</sup> Year	Agroforestry	98 forestry staff 47 agriculture staff	International organization	5 days

Even though extension workers attend intensive training course for one week, they have not learned practically but only theoretically. Therefore, trainers are invited to village in the first year of implementation to three villages and they will teach agroforestry techniques directory to farmers together with extension workers. In such way, extension workers can obtain practical techniques.

In addition to that, the trainers are constantly invited; at least once in two months, to monitor the activities and provide technical know-how to support villagers and extension staff through on-the-job training.

In the second year, forestry and agriculture workers provide extension service based on the experience of first year. After the construction of agroforestry demonstration farm in eight villages, they can be fully utilized to extend agroforestry technologies.

Besides agroforestry, newly introduced forestry, agriculture and IGA techniques are taught separately at each training course as followings.

**Table 13.35 Training Course in Each Field**

Year	Course	No. of participants	Trainer	Period
1 <sup>st</sup> year	1) Forestry	98 Forestry extension workers	RFO(S)	5 days
1 <sup>st</sup> year	2) Agriculture	28 agriculture FA	ADD	5 days
1 <sup>st</sup> year	3) IGA			
	Bee keeping	28 agriculture FA	ADD	3 days
	Guinea fowl rearing	-do-	-do-	2 days
	Vegetable growing	-do-	-do-	3 days
	Food processing	-do-	-do-	3 days

Though during the initial stage, extension workers should concentrate on obtaining technical matters, they have to act as a moderator or trainer on RRA and PCM workshop or leadership training. Therefore, they have to learn the concept and techniques of participatory approach through on-the-job training during the first three years by the staff of NGOs.

#### Monitoring activities

Three kinds of monitoring activities should be implemented by villagers to achieve targets by removing and solving identified obstacle or difficulties and to extend activities to other areas. They are 1) self-monitoring, 2) inter-monitoring by the village with project implementation and 3) inter-monitoring by the village without project.

#### - Self-monitoring

Monitoring sheet should be prepared (refer to Table 12.27 in 12.8.3) when each organized group discuss about action plan, and group members evaluate their activities at each stage. Indicator and frequency of monitoring should be discussed by the members of each group. If the result of evaluation is not satisfactory, the reason should be analyzed if it came from the internal or external reason, and discuss about countermeasures.



In addition to that, the evaluation result should be summarized in a form of graphs or tables with the assistance of extension workers (bar graph or simple way of presentation should be used considering about low literacy rate), and they are hung on a bulletin board. Number of planted trees, increase of agricultural production or amount of harvested honey will be shown to other community members, so that the achievement can be seen or experience can be shared among them. It will help to extend activities. Installation of bulletin board will be proposed in the PCM workshop. Only materials are provided and villagers construct it and decide where to install or who to maintain.

#### Inter-monitoring by the village with project implementation

Inter-monitoring by the village with project implementation is proposed to monitor activities each other and share and discuss their experienced difficulties and countermeasures for them.

The period of inter-monitoring for one village with project is two years, so first year, three villages will be participating monitoring tour, in the second year, six villages with previous three villages, and third year, the first three villages are graduating from this tour. Participants from each village is about eight people and four times of tour is organized per year. See Table 13.38.

**Table 13.36 Inter-monitoring by the Village (with project implementation)**

	No. of village	No. of tour/season	No. of tour/village/year	Total No. of tour	Total Participants
1 <sup>st</sup> year	3	1	4	4	96
2 <sup>nd</sup> year	9	3	4	12	288
3 <sup>rd</sup> year	11	4	4	16	352
4 <sup>th</sup> year	10	4	4	16	320
5 <sup>th</sup> year	10	4	4	16	320
Total	43	16	-	64	1,376

Note: Participants from each village is considered as eight people.

#### - Inter-monitoring by the village without project

Objective of this monitoring is to extend on-going activities to other villages. The villages in which activities will take place in subsequent year, are going to join this tour. Participants are about eight villagers, and they could be committee members of existing organization or selected people. For the fifth year, target villages should be decided considering the implementation of 6<sup>th</sup> year. See Table 13.39

**Table 13.37 Inter-monitoring by the Village (without project)**

	No. of target village	No. of tour group	No. of tour/village	Total No. of tour	Total participants
1 <sup>st</sup> year	6	2	3	6	144
2 <sup>nd</sup> year	5	2	3	6	120
3 <sup>rd</sup> year	5	2	3	6	120
4 <sup>th</sup> year	5	2	3	6	120
5 <sup>th</sup> year	-	-	-	-	-
Total	43	16	-	64	1,376

Note: Participants from each village is considered as eight people.

#### Environmental education for children

Environmental education is going to be provided at the school nearby the nursery which will be established by VNRMC. Nursery management and tree plantation should be practiced with adults. See Table 13.40

**Table 13.38 Environmental Education for Children**

		Location (village)	No. of student	Name of village to work with
1 <sup>st</sup> year	Monekere PS (std 4)	Siyamdima	210	Siyamdima
2 <sup>nd</sup> year	Nasonjo PS (std 5)	Simon Mpombe	390	Ndemanje
3 <sup>rd</sup> year	Kachere PS (std 8)	Mdala	735	Mdala
4 <sup>th</sup> year	Milala PS (std 8)	Lemu	234	Lemu
5 <sup>th</sup> year	Ntenjera PS (std 8)	Kumisati Chigumula	350	Kumisati Chigumula

## 2) Cost estimation

Cost estimation for capacity building and extension is shown in Table 13.41

**Table 13.39 Rough Estimate for Capacity Building and Extension**

	1 <sup>st</sup> year	2 <sup>nd</sup> year	3 <sup>rd</sup> year	4 <sup>th</sup> year	5 <sup>th</sup> year	Unit: MK Total
Capacity building and strengthening of extension workers	1,796,160	-	-	-	-	1,796,160
Extension activities						42,000
- Agroforestry extension	42,000	-	-	-	-	42,000
Monitoring activities						2,124,000
- Self-monitoring	15,000	30,000	25,000	25,000	25,000	120,000
- Inter-monitoring (with project)	84,000	252,000	336,000	336,000	336,000	1,334,000
- Inter-monitoring (without project)	126,000	126,000	126,000	126,000	126,000	630,000
- Monitoring by trainers	30,000	-	-	-	-	30,000
Environmental education for children	71,000	-	35,500	35,500	35,500	106,500
<b>Total</b>	<b>2,164,160</b>	<b>408,000</b>	<b>522,500</b>	<b>522,500</b>	<b>522,500</b>	<b>4,068,660</b>

**13.3 Rough Estimate of Verification Scheme**

Estimated cost of each components mentioned above is summarized in Table 13.35. Total cost during 5years amounts to about U\$ 800,00.0 (See Annex II-J. Cost Estimation)

**Table 13.40 Rough Estimate Cost of Verification Scheme (unit: US\$)**

	1 <sup>st</sup> Year	2 <sup>nd</sup> Year	3 <sup>rd</sup> Year	4 <sup>th</sup> Year	5 <sup>th</sup> Year	Total
AF/Reforest	55,900	54,700	50,400	36,000	21,800	218,800
Livelihood Improvement	22,300	38,900	22,900	28,600	30,000	142,700
Infrastructure	40,300	8,100	32,300	79,500	8,100	168,300
Villager's Organization	25,800	62,100	53,600	-	-	141,500
Enlightenment/Extension	43,300	8,200	10,500	10,500	10,500	83,000
<b>Total</b>	<b>187,600</b>	<b>172,000</b>	<b>169,700</b>	<b>154,600</b>	<b>70,400</b>	<b>754,300</b>