

5 Operational plan

The main operational plan of the Mang La FE over the 10 years from 2003 to 2012 is described in this chapter on timber production, afforestation, the development of forestry infrastructure and villager support.

5.1 Timber production plans

Mang La FE's timber production using selective cutting over the next 10 years includes the cutting volume per cutting site, skidways required for skidding, and other related operations. These operations are described in the following sections. The forest roads and spur roads are described in part of the forestry infrastructure development plan (described later), since these roads are utilized for not only timber production but also silviculture activities and forest management in general.

5.1.1 Cutting plans

(1) The cutting operational plans are being implemented under the following conditions.

- 1) Stumpage sale is adopted (companies that purchase the timber must carry out the logging).
- 2) The amount of designated cutting volumes should be decided on a log volume basis (the volume per ha and the total volume shown in forest inventory books are decided on a stem volume basis. Log volume is 65% of stem volume as shown in Vol.1 Part II 3.8.1. Therefore, the cutting volumes to be designated are designed on the basis of 65% of the volume given in the forest inventory books).
- 3) The amount of annual cutting volumes should be determined based on the necessary volume in line with the operational costs that Mang La FE should cover (which is discussed later in the Section 5.1), within the range of 2,684 m³ - 6,270 m³ as shown in the master plans.

(2) Selection of the cutting sites (designated cutting sites)

As shown in the Section 4.3, the cutting sites are designated as follows. The cutting cycle is established at 35 years. Cutting should be performed in natural forests for selective cutting other than the aforementioned forests, where cutting is prohibited within the production forests under the jurisdiction of Mang La FE. Natural forests targeted for selective cutting in the next decade are those of the first and second implementation periods among the seven periods formed by dividing the 35 years cutting cycle into five year periods, which are taken as one cutting period.

Based on the cutting areas established in Section 4.2, the upper limit of the cutting potential

over a 35-year cutting cycle including the amount of growth increment is shown in Section 4.3 (in order to ensure sustainability of the forests). With regard to the amount of cutting in this plan, the annual amount of cutting is decided within this range, while at the same time taking into consideration the demand and financial requirements. Therefore, cutting sites have been selected from among forest stands that have a relatively high stand volume (higher than the target average stand volume of 270 m³/ha) in the sub-compartments of the first and second implementation periods, or those which combine forest type A, B1 and B2, and these forest types with P1 and P2 which are another category of forest type showing proportion of *podocarpus* spp. In the selection of these sites, consideration has been given to the efficiency of cutting operational management and impacts on the forest environment at the same time. The sites of the forest type A, P1A and P2A were designated as cutting sites because these types fulfilled the requirements for the amount of cutting.

The designation of cutting sites is being made on a sub-compartment basis. Since there are a variety of forest types from A to E in the sub-compartments, the designated cutting areas are shown as the inner area of sub-compartments (the area equivalent to the A forest stands). Therefore, the amount of the designated cutting volumes is also calculated based on the yield percentage for the volume of A type forest that are subject to cutting among the sub-compartments that have been designated for cutting.

The yield percentage has been estimated to be 25% for the volume of the trees marked for cutting, and for the amount of cutting of trees excluding those marked such as the trees that are cut because they are an obstacle to the trees marked for cutting operation and/or they are in the path of road construction, the yield percentage has been estimated to be 5%; a total of a 30% yield percentage has therefore been adopted. In addition, a clear distinction has been made between the cutting volume for marked trees and the cutting volume for non marked trees and both have been separately entered in the cutting and silviculture planning book. In planning and implementing the cutting operations in each year, tree selection must be made independently in both cases.

Table II-5.1.1 Amount of designated cutting by implementation period

Implement- ation periods	Blocks	Compartment- ments	Sub- Compartment- ments	Sub- compartment areas (ha)	Forest types	Areas for cutting (ha)	Stand Volumes (stem basis) (m ³)	Stand Volumes (log basis) (m ³)	Yield percentag es (%)	Cutting volumes (m ³)
The first period (the first five years)	502	6	f01	32.92	A	2.16	570	370	30	111
	502	6	f03	27.78	A	25.72	6,782	4,408	30	1,322
	502	6	f04	42.14	A	18.34	4,836	3,143	30	943
	502	9	f01	25.02	A	5.19	1,368	889	30	267
	502	9	f05	32.71	A	22.71	5,988	3,892	30	1,168
	502	9	f06	25.50	A	10.41	2,745	1,784	30	535
					A	0.13	34	22	30	7
	502	11	f02	33.46	A	25.03	6,600	4,290	30	1,287
	502	12	f02	53.12	A	23.99	6,325	4,111	30	1,233
	502	12	f04	55.99	A	52.05	13,725	8,921	30	2,676
	502	12	f05	30.63	A	21.08	5,558	3,613	30	1,084
					P2A	6.58	1,735	1,128	30	338
	502	12	f06	26.49	P2A	23.46	6,186	4,021	30	1,206
					A	3.03	799	520	30	156
	502	14	f02	68.48	A	2.88	760	494	30	148
					A	26.92	7,099	4,614	30	1,384
					A	1.67	440	286	30	86
					A	5.46	1,440	936	30	281
	502	14	f03	26.74	A	15.09	3,979	2,586	30	776
	502	14	f04	49.79	A	4.22	1,113	723	30	217
					A	2.80	738	480	30	144
	502	15	f02	35.70	A	18.00	4,746	3,085	30	926
	502	15	f04	62.08	A	38.42	10,131	6,585	30	1,976
					P2A	5.78	1,524	991	30	297
					A	0.43	113	74	30	22
	502	15	f05	19.21	P2A	0.11	29	19	30	6
					A	3.41	899	584	30	175
					P2A	4.00	1,055	686	30	206
					A	11.69	3,082	2,003	30	601
	Subtotal				647.76		380.76	100,399	65,259	
The second period (the second five years)	503	7	f03	34.74	A	34.71	9,902	6,436	30	1,931
	503	9	f02	61.40	A	49.92	14,241	9,257	30	2,777
	503	11	f01	46.56	A	31.11	8,875	5,768	30	1,731
	503	13	f01	89.37	P2A	0.78	223	145	30	43
					A	76.35	21,781	14,158	30	4,247
					P2A	2.59	739	480	30	144
	503	13	f02	67.81	A	57.62	16,438	10,684	30	3,205
	503	16	f02	70.12	A	54.57	15,567	10,119	30	3,036
	503	16	f03	65.61	A	59.21	16,891	10,979	30	3,294
	503	19	f01	59.87	A	22.71	6,479	4,211	30	1,263
					A	8.95	2,553	1,659	30	498
	503	19	f02	41.09	A	35.27	10,061	6,540	30	1,962
Subtotal				536.57		433.79	123,749	80,437		24,131
Total				1,184.33		814.55	224,148	145,696		43,709

As a result, the sub-compartments of designated cutting forests and the amount of designated cutting volumes per implementation period are shown in Table II-5.1.1. As can be seen in this table, the total designated cutting amount in the first implementation period is 19,578 m³ and annual designated cutting amount is 3,916 m³ using simple averaging. In the second implementation period, the amounts of the total designated cutting and annual designated cutting are 24,131 m³ and 4,862 m³ respectively. The total for the 10 years is 43,709 m³ and 4,371 m³ a year on average respectively. Furthermore, with regard to the detailed location and condition of land and forests, see the cutting and silviculture planning book and the forest management planning maps supplied independently as the results of this survey.

The stand volume for cutting (stem basis) shown in this table is the volume of the stand volume per ha corrected according to the altitude and the topography (described in the Sub-section 3.3.4), multiplied by the target cutting areas, and supplemented by the amount of growth increment (2.5 years for the first implementation period, 7.5 years for the second implementation period).

(3) Standards for the selection of trees for cutting (Marking)

Standards for the selection of trees for cutting contribute to the judgment of tree cutting. The standards for selecting trees are stipulated by Decision 2, the “Decision of Minister of Agriculture and Rural Development on Issuing Regulation on Exploitation of Wood and Forest Products” and the “Guideline on Silviculture Techniques for Wood Production,” and tree selection is implemented basically in accordance with these stipulations. In addition, the following points are also included in the standards for selecting trees.

- 1) For single tree selection cutting, the soundness of the forest stands, the promotion of natural regeneration, and the raising of the succeeding trees should be taken into consideration, thus tree selection should be made with the priority given to the trees to which the following conditions are applicable.

Trees with a large diameter that are approaching their cutting period and for which future growth cannot be expected should be selected. However, if there is no succeeding tree present, whose diameter at breast height is approximately 20 – 40 cm and which is subject to designation as a tree for cutting in the next cutting cycle after the current 35 year period, and which is standing *within* a circle with a radius of the height of the tree for cutting that is at the center of the circle, the cutting of the relevant tree is prohibited as a target cutting tree.

- 2) In addition, an important point to note is that the yield percentage should be applied evenly to the target cutting areas. Application using a high yield percentage to a part of the target cutting areas to fulfill the amount of designated cutting should be strictly avoided from the perspective of sustainable forest management. Therefore, tree selection should be conducted so that the yield percentage is applicable to areas in units of 1 - 2 ha.

5.1.2 Skidway construction plans

With regard to skidways, companies that purchase timber should construct skidways in the process of logging. Skidways are roads for skidding that extend from public roads, forest roads and spur roads. There are no clear quantitative plans for skidways. However, the construction of spur roads has been planned in such a way that the skidding distance of skidways should not exceed 500 m (as discussed later), so in actuality skidding skidways should also be constructed taking this maximum distance into account.

With regard to standards for constructing skidways and for skidding work using tractors, in the case of stumpage sales, since the companies that purchase the timber conduct the skidding operations, it is important for FEs to oversee whether or not the working standards are being observed. Therefore, supervision should be carried out before and during the logging concerning whether these companies are strictly observing the standards. Advisory recommendations are made to the companies, if they do not faithfully observe the standards.

Standards for constructing skidways and the tractor skidding work are shown below.

(1) Standards for the construction of skidways

In the surveying for skidways, it is necessary to prepare drawings and basic information and survey the topography of the skidding areas, the proposed lines of skidways, gradients, the location and area of timber yards. The width of skidways should be more than 1.2 times the width of the tractor ground contact, and the curved part of skidways should be widened to accommodate the length of the skidded logs, if necessary.

The gradient of the skidways should be determined as follows.

- 1) The gradient of the skidways should not exceed 25 degrees.
- 2) Skidways that extend for more than 50 m with a gradient close to 25 degrees should not be constructed.
- 3) With before and after skidways at a gradient close to 25 degrees, slow grade zones should be constructed.

In constructing skidways, the following work should be brought forward.

- 1) Immediate recovery of the vegetation after skidding should be considered. Unlike forest roads and spur roads, development by digging into the surface of the earth should not be carried out.
- 2) Consideration should be given to the prevention of forest landslides or earth movement.
- 3) Skidways with a gradually increasing gradient should be constructed where possible. In addition, changes in the gradient should be minimized and sharp bends should be avoided.
- 4) In constructing skidways that cross hillsides, benching road surfaces should be adopted in principle, while, where possible, banking road surfaces should not be used.
- 5) Appropriate drainage measures should be taken at sites where there is spring water, for example.
- 6) In parts where there are sharp bends, the falling of the timber being skidded should be prevented by leaving the trees uncut.

(2) Working standards for tractor skidding

General working standards, including the safety of tractors working are as follows:

- 1) Skidding utilizing the skidways is conducted with a tractor or a skidder in principle (Yellow Bulls are permitted to advance up as far as the spur roads). Skidding should be performed on the condition that the forest floor vegetation remains as it is where possible.
- 2) When there is a danger of the tractors falling or turning over, or there is the possibility of an accident whereby a moving tractor comes into contact with a worker, guides should be positioned to direct tractors.
- 3) Take care not to make a fire in the vicinity of the tractors and fuel. In addition, fire extinguishers effective against oil fires should be installed in case of emergencies. Furthermore, inspection and cleaning should be regularly performed to prevent contamination of the tractor body with fuel and oils (oils and fats) or to prevent loosening of the wiring.
- 4) Forbid workers to enter the following work areas and dangerous areas
 - a) Two or more workers must not work at the same time on the same slope, for example performing tractor skidding and logging operations, or tractor skidding with two tractors. Operations up and down slopes are strictly prohibited. This is a common strict rule in all work on slopes.
 - b) Forbid workers to enter a site within or near the operating line of skidding, and in the direction or vicinity where there is a danger that the log that is being pulled may fall to

- a lower part of the slope during skidding work.
- c) Forbid workers to enter a site where there is a danger that they can come in contact with tractors in motion.
- 5) Do not allow a worker to sit anywhere on the tractor except in the seat when the tractor starts moving.
- 6) Tractor drivers must observe the following when they leave the driving position for loading and unloading logs, regardless of the duration or the reason: i) lower operating equipment, such as a bulldozer blade, onto the ground; ii) make sure that the engine has been turned off and apply the brake; iii) stop the tractor on flat land where possible.

5.2 Silviculture plans

Silviculture plans consist of the afforestation plans and forest stand improvement plans to be implemented by Mang La FE over the next ten years. In this section, the method of designating sites where silviculture is to be implemented is clearly described and designated. Silviculture sites based on the unit of sub-compartments and their areas are presented. In addition, with regard to the designated afforestation sites and their location, see the cutting and silviculture planning book and the forest management planning maps supplied separately as a result of this survey.

5.2.1 Afforestation plans

Afforestation over the next 10 years will be implemented in areas that are currently covered in grassland and where the recovery of the vegetation is most urgent among the target areas for plantation and rehabilitation shown in Section 4.4. Far isolated grasslands, nearby grasslands with poor access and sub-compartments of grassland included in areas assumed for the villager support program have been excluded from these. Far isolated grasslands are excluded because they are not considered as land for rehabilitation operations; natural regeneration is expected on such land. On the other hand, nearby grassland with poor access has been excluded from this afforestation plan for the next 10 years. Afforestation will be implemented in such areas if access has improved after 2012. As a result, the planned afforestation areas that are divided into production forests and protection forests are shown in Table II-5.2.1. Planned afforestation areas are 60.49 ha for production forests and 102.01 ha for protection forests; there are more afforestation areas in protection forests. This is because replanting in protection forests is more urgently required due to the need for their functions. As a result, afforestation of protection forest has been planned even for sites with poor access. In addition, for afforestation in production forests, it is necessary for the FE to find the means to raise operational funds from its own operational income, while for afforestation in protection forests, it is possible to procure outside sources of funds from program 661.

In the implementation of the operation, priority should be given to sub-compartments that include areas with public function and so on that are allocated for watershed, soil and land conservation, steep slope, and the protection of water sources security for village people. Furthermore, with regard to grassland extending to the west of the 502 Block, since the forest in the vicinity of the land is designated as a cutting forest and forest roads are to be constructed for logging of the forest, the afforestation of this area will be implemented after the construction of the spur roads.

Table II-5.2.1 Planned afforestation areas over the 10 year period

Afforestation functions	Planned afforestation areas (ha)	Sub-compartment areas including zones with public functions and so on among the planned areas (ha)
Production forests	60.49	13.22 (Zones for watershed, soil and land conservation)
Protection forests	102.01	5.19 (Zones for watershed, soil and land conservation) 20.22 (Zones for water source security) 25.41 (Subtotal)
Total	162.50	38.63

Various silviculture standards currently adopted in Vietnam apply to afforestation plans in terms of silviculture techniques. In addition, it is also necessary to disseminate silviculture techniques in the villager support program in order to ensure that afforestation is implemented by observing the silviculture standards and following the silviculture methods at the field. Afforestation is implemented under the control of the Mang La FE under employment contracts with the villagers. This is one of the forms of support for villagers for raising their income levels. After the promotion of capacity building, such as the systematization of the skills of residents under the villager support program, the aim is to make contracts with the villagers for comprehensive implementation of afforestation by villagers.

With regard to planting of species, *Pinus kesiya* and *Acacia auriculiformis* have been adopted within the jurisdiction of the Mang La FE. However, according to field surveys, since *Acacia auriculiformis* grows poorly, it is appropriate to plant *Pinus kesiya* as the main species.

5.2.2 Forest stand improvement plans

Forest stand improvement plans are carried out with the objective of promoting the growth of useful trees by clearing the areas surrounding these trees in the bush. Therefore, the forest stand improvement plans are carried out based on the premise that the target sites are currently covered in bushes. In the selection of sites planned for forest stand improvement, like the afforestation plans, remote areas of bushes, nearby areas of bushes with poor access and sub-compartments of bush included in areas assumed for the villager support program are excluded. As a result, the areas of the forest stand improvement plans amount to 28.14 ha for forest stand improvements in production forests and amount to 18.33 ha in protection forests, giving a total of 46.47 ha; there are more forest stand

improvement areas in production forests. The planned areas for forest stand improvement are small compared to those of the afforestation plans. The reason for this is that there are large areas of bushes in the southeast part of Block 440 and in the northeast part of Block 495, but in these areas natural regeneration is expected since they are located in far isolated areas.

With regard to the implementation of forest stand improvements, unlike the afforestation plans, no areas require urgent implementation, so there are no sites to which priority should be given. Therefore, forest stand improvements will be implemented steadily over the 10 years.

In this forest stand improvement plan, like the afforestation plans, it is necessary for the FE to raise operational funds from its own operational income for forest stand improvements in production forests, while for forest stand improvements in protection forests, it is possible to procure outer funds from the program 661. In addition, this operation is implemented through an employment contract with villagers, as in the afforestation plans.

As a concrete approach to implementing forest stand improvements, a circular area is cleared with a radius of the height of the useful tree within the bush; areas with a radius of a minimum 2 m should be cleared.

5.3 Forestry infrastructure development plans

Forestry infrastructure development plans consist of the plans for road network construction such as the forest roads and spur roads and the plans for the construction and development of a field office.

5.3.1 Plans for road network construction such as the forest roads and spur roads

The forest roads and spur roads are constructed by outside companies using the funds of the Mang La FE. Firstly, it is necessary to judge which type should be chosen for the required roads; forest roads or spur roads. Therefore, the judgment should be made considering the following: i) whether year-round use is possible for forest management; ii) whether there is other forest management involved in the area such as afforestation, not just logging operations; iii) whether there is a public utility such as for use by people in local communities; iv) whether the road network consists of loop roads, rather than dead-end roads. In addition, with regard to the standards for forest roads and spur roads, follow the standards shown in Vol.1.1, Part II, 4.8.2 (1).

The plan for the road network is shown in Fig 5.3.1. Considering the conditions mentioned above, other than public roads, only spur roads have been adopted as roads to be constructed under this plan. The other solid lines on the drawing with numbers from 1 to 10 are the routes for the spur roads.

In addition, public roads should be designed based on the routes shown in Vol.1, Part II, 4.8.2 (1). Not all public road routes are to be newly constructed. Some of the existing logging roads should be repaired and upgraded to public roads. The solid red line (number 11) indicates public road to be newly constructed, the dotted red line (number 12) indicates the area for upgrading to a public road through repair of the logging roads, and the solid dark brown line indicates existing public roads, which are subject to repair. Consequently, the length of roads to be newly constructed is 4.7 km, while the length of roads requiring repair is 2.3 km. Furthermore, with regard to the length of the public roads of two routes that require repair, the length of the public road running through Kon Plong Village is 8.7 km, and the length of the public road running through Dak Xo Village is 2.7 km, giving a total of 11.4 km.

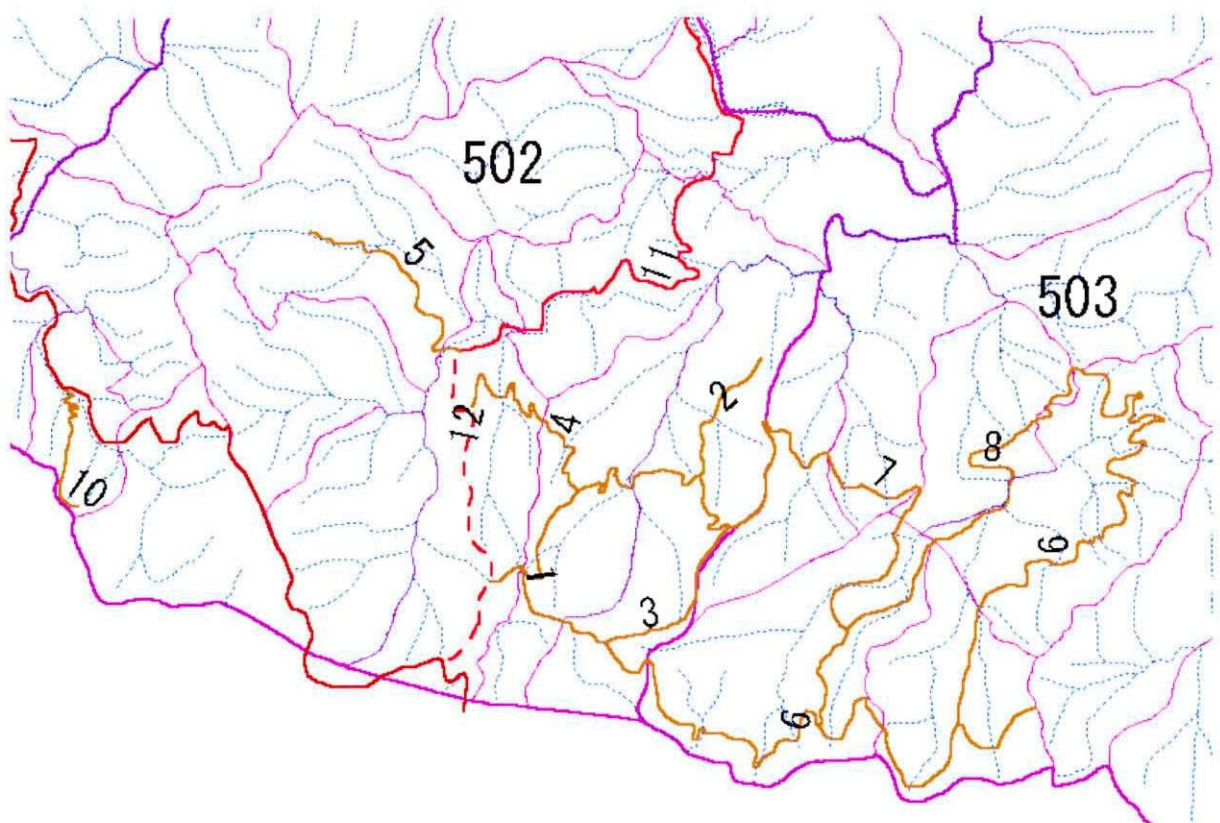


Figure II-5.3.1 Road network plans

According to these road network plans, the new plan for spur roads is as shown in Table II-5.3.1.

Table II-5.3.1 Planned length of spur roads

Route numbers	First implementation Period (m)	Second implementation period (m)
1	1,390	
2	2,829	
3	1,688	
4	1,621	
5	1,500	
10	1,044	
6		4,209
7		3,348
8		6,324
		1,631
Total	10,072	15,512

Secondly, the design standards for the forest roads and spur roads should be based on QPVN25-83, the “Design Standards for Forest Roads” (based on Decision 95/QD-LB) issued by the Vietnamese Government. With regard to other points besides these standards, roads should be constructed considering the following as well as the actual local conditions.

(1) Items common to both forest roads and spur roads

- 1) In order to minimize sediment outflow, roads should be designed to be constructed on moderate slopes. Therefore, in the case of sloping land, bear in mind the need to develop curved forest roads with a low gradient wherever possible. The development of forest roads extending directly up to the upper part of slopes should be avoided.
- 2) For the conservation of riparian environments, the development of forest roads should be prohibited along river banks with a width of 20 to 50 m in principle.
- 3) In areas where the vegetation density is high, amendments to the direction of the road development should be reviewed as appropriate by considering the means of reducing cutting for obstructing trees overhanging these routes.

(2) Items specific to the forest roads

- 1) In forest roads, in order to reduce sediment washout, be sure to install side drains along the edges of road ridges. In addition, when a road crosses valleys or rivers, the burial of corrugated tubes (construction of culvert) and the installation of gabions with stone should

be considered to ensure that water runoff flows smoothly at all times. In addition, in rivers where fish are present, corrugated tubes or overflow bridges should be installed.

(3) Items specific to spur roads

- 1) In developing spur roads for the logging areas, it is important to avoid steeply sloping land that can easily cause sediment washout and damage to roads and natural vegetation. If the passage of a road through such places is inevitable, design the gradient so that it does not exceed 12%. The road width should be approximately 3.5 m.
- 2) Graveling and side drains are not necessary basically, but consideration should be given to environmental conservation by graveling and installing side drains according to the topography and circumstances of the site. In order to minimize damage to the roads and sediment washout, the center part of the roads should be raised to provide a slope to either side to prevent the accumulation of rainwater on the road surface.

In addition, with regard to the collapse of the forest roads and spur roads, it is necessary to stipulate in the timber sales contract that the companies that purchase standing trees are responsible for the repair if the collapse of forest roads or spur roads occurs during logging work by the companies.

5.3.2 Construction and development of a field office

Considering the fact that the sites designated for cutting during the next 10 years are located on the east of Block 502 and on the west of Block 503, as well as the distance of the sites from the main office of the Mang La FE, there appears to be no need to construct a field office. Therefore, the construction and development of the field office will not be implemented in the next 10 years. Since it is assumed that cutting will be conducted in remote areas such as Block 501 in the third and fourth implementation periods, the need for the field office should be reviewed at that time.

5.4 Villager support program

Sections 5.4.1 – 5.4.3 below present the methods and processes that have been adopted in this Study to design the villager support program (VSP) for Mang La FE. The same could be applied for designing the VSP by other forest enterprises in Kon Plong district in their respective forest management plans, with modifications or adjustments as required to suit the local contexts. The contents of the VSP for Mang La FE is presented under section 5.4.4.

5.4.1 Planning process

(1) Participation of multiple stakeholders

Participation of people, groups and organizations that are likely to have a stake in the project is critical in the process of designing development projects. They should be involved in the process of project formulation from the outset, instead of being brought in at a later stage. Beneficiaries' participation in problem identification and project formulation ensures the relevance of project objectives, outputs and activities. Involvement of technical departments and local authorities would contribute to improving technical feasibility. Local ownership of the project will be enhanced by formulating the project together instead of external experts or higher authorities designing it on their own. A transparent project formulation process will contribute to reducing potential tension, misunderstanding or unrealistic expectations. The participatory process also plays an important role in verifying the information from secondary sources and those compiled through other surveys.

In the context of the VSP, stakeholders include beneficiaries (local people), community leaders, local authorities (e.g., commune PC and district PC), technical departments (e.g., ED-DARD, cadastral office, poverty alleviation monitoring unit, etc.), as well as the supporting groups (e.g., Forest Development Branch), and implementing agencies (e.g., FE and other organizations who may collaborate in project implementation).

(2) Process adopted in this Study

The following table summarizes the main tools used in this study to formulate the VSP. The process of the formulation is indicated in Figure II-5.4.1. Participation of local people was enhanced through the application of RRA methodologies, as well as the participatory planning workshops, which were conducted as part of the socio-economic survey. Participation of local authorities, technical departments, supporting groups, and FE was also assured through key informant interviews and their participation in the district and commune level workshops. Results of the RRA survey and participatory workshops were used to verify the data compiled from secondary sources, as well as the findings from the village profile and household survey, which focused mainly on collecting quantitative information. Information was consolidated and analyzed together with other surveys of the Study, such as the forest inventory and agroforestry surveys, to design the VSP.

In developing the VSP for Mang La FE, the menu of projects presented in the Master Plan was used as the guideline. Specific objective, outputs and activities of the Mang La VSP were determined based on the analysis of the survey results, within the project areas recommended in the Master Plan for the entire district.

In this Study, the overall framework (objective, outputs, and activities) of the Mang La VSP is proposed. As a next step, detailed planning should take place to develop village level plans of project operation. This process, which requires a series of commune and village workshops, should be initiated at the time of project inception.

Table II-5.4.1 Survey tools adopted to design the VSP and the target groups²⁴

Village level		
Household Survey (18 villages)		Sample households
RRA Survey (7 villages)	Key informant interview	Village chief, Traditional leader, Ex-soldier, Retired government officer, Leaders of village organizations
	Venn diagram	Village chief, Traditional leader, Ex-soldier, Retired government officer, Leaders of village organizations
	Village history	Village chief, Traditional leader, Elderly persons
	Resource map	Knowledgeable persons on local land use
	Transect walk	Knowledgeable persons on local land use
	Wealth ranking	Villagers (men and women)
	Problem ranking	Villagers (men and women)
Agroforestry Survey (15 villages)	Interview / Site survey	Village chief, Traditional leader, farmers
Commune level		
Key informant interview		Chairman of commune PC, Commune officers, Leaders of unions, Teachers, Healthcare staff of commune health care center
Participatory workshop		Chairman of commune PC, Chairman of commune people's council, Representative of commune Father Front, Secretary of commune communist party committee, Commune officials, Village chiefs, Traditional leaders, Representative of Mang La FE, District officials from key departments
District level		
Key informant interview		Department of agriculture and rural development (DARD), Cadastral office, Poverty alleviation monitoring unit
Workshop		Chairman of district PC, Representative of district people's council, Representative of district communist party, Representative of district Father Front, District officials from key departments, Representative of Mang La FE, Chairman of commune PC, Secretary of commune communist party committee

Note: Details of the RRA Survey, Village profile and household survey, Agroforestry survey, and the Participatory workshops are presented in the Appendix.

²⁴ While a specific study on gender issues was not conducted as part of this survey, efforts were made to ensure that viewpoints of both men and women are rightly reflected. More specifically, the group work on problem ranking and wealth ranking, conducted as part of the RRA Survey, was done in two separate groups. One group consisted of men and the other of women, to provide an atmosphere that would allow women to freely express their needs. The results from the two groups were then discussed together by all participants to come up with an overall village ranking (the original results from the group work by men and women are included in Volume III 12). Informal interviews of men and women in the village regarding their daily work (daily calendar) were also made in order to analyze the different roles and responsibilities of men and women (results included in Volume III 12).

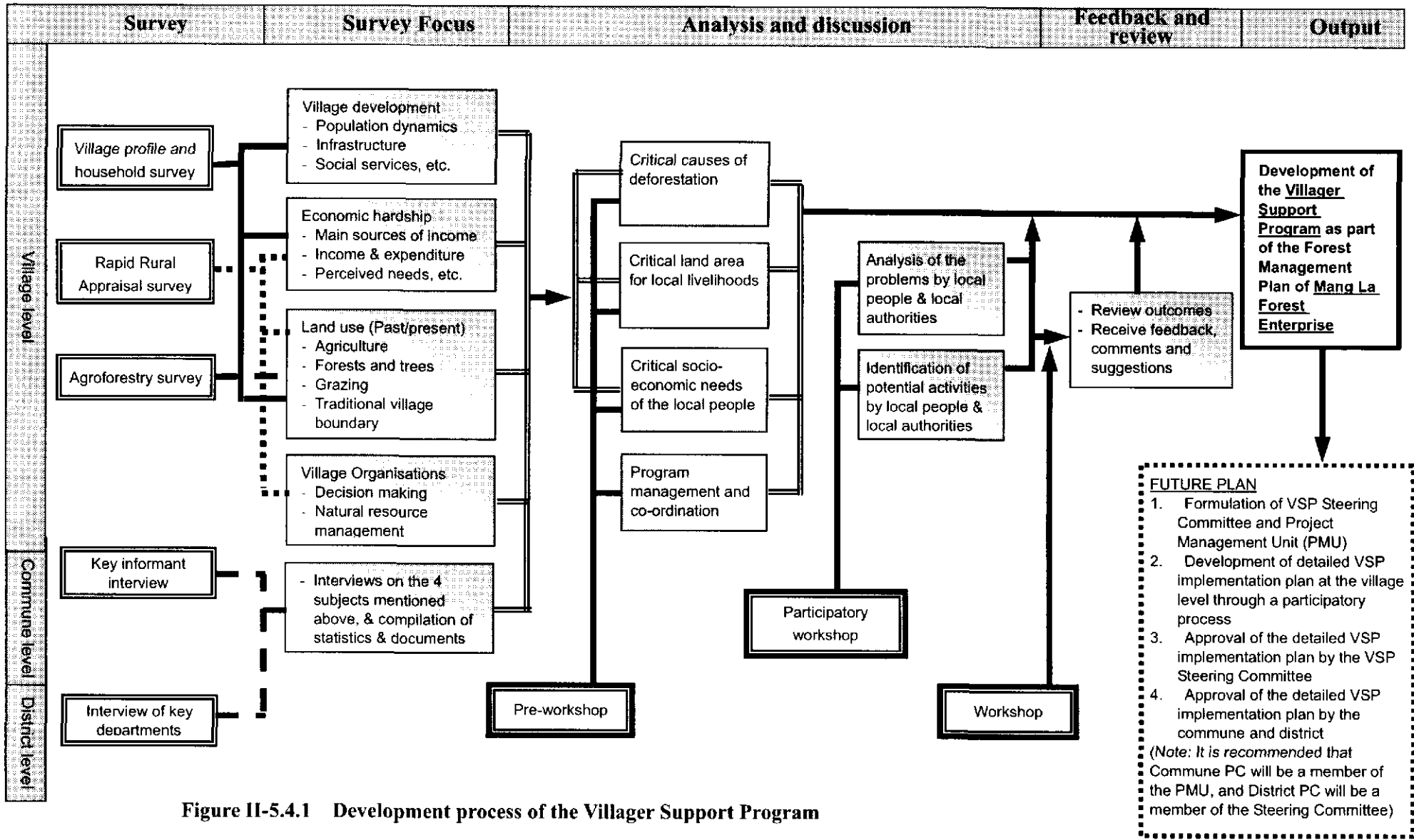


Figure II-5.4.1 Development process of the Villager Support Program

5.4.2 Village boundaries and land conflicts

(1) Survey methods

Table II-5.4.2 summarizes the main tools used in the Study to understand local recognitions of village boundaries, and land conflicts.

Table II-5.4.2 Survey tools adopted to understand village boundaries and land conflicts

Subject in concern	Survey methods
Village boundaries	<ul style="list-style-type: none"> • Resource mapping • Key informant interview (village, commune and district)
Land conflict	<ul style="list-style-type: none"> • Key informant interview (Village, commune and district)
Land use	<ul style="list-style-type: none"> • Secondary data (district statistics) • Resource mapping • Key informant interview (Village, commune and district)

The Master Plan recommends that some land should be excluded from the industrial forestry zone, and should be allocated for activities aiming at improving local livelihoods. In this context, it is important to understand how and where the village boundaries are recognized in the 2 communes, so as to identify suitable areas for the VSP activities in the respective villages. It is also important to take into consideration any land conflict or disputes that may exist, in order to ensure that the land set aside can be utilized without any obstacles.

(2) Situations in Hieu and PoE

The results of the survey are presented under section 3.2.5 (3). As mentioned earlier, there is no gap or overlap between the village boundaries in the 2 communes. Assessing from the village resource maps, land within a village boundary can be categorized further into 2 zones: (a) area where cultivation activities are relatively concentrated; and (b) areas where forestland remain relatively undisturbed. A GIS layer was developed delineating these two areas (Figure II-5.4.2). Land required for VSP implementation will be identified within this boarder line, and allocated to the target beneficiaries as per the process explained in the next section. The exact location of the plots will, however, be identified at the time of project implementation, through the process of village level land use planning.

In the 2 communes, conflicts concerning land use are normally settled by the parties directly involved. The issue is brought to village authorities for settlement when the parties concerned cannot solve the problem themselves. The commune PC becomes involved only when village authorities cannot solve the conflict. While every effort should be made to ensure that there is no dispute on the land allocated for the VSP, existing local mechanisms of conflict resolution should be followed if any conflicts emerge in the future.

5.4.3 Procedures of land use rights allocation and compensation

(1) Existing land allocation procedure, its problems and constraints

As explained under section 3.2.2 (1), land use certificates (RBCs) have only been issued for paddy fields in the 2 communes. For forestland, RBC is not applied, instead Forest Protection Contracts (FPCs) are signed between the FE and households for protection forests.

Under the official procedure, land must be categorized as agricultural land²⁵ in the district land use plan, for the issuance of the RBC. In the process, measurements of paddy fields are conducted by the survey team consisting of the district and commune cadastral officer, village representatives, a 3rd party contractor, and the user of the respective paddy fields, after which the villagers submit the application document to the cadastral office. The same procedure applies for the issuance of RBCs for newly reclaimed land, both paddy fields and upland farms, except when the land is categorized under forestland. In the latter case, additional steps are required prior to the issuance of the certificate, including a survey involving forestry authorities, followed by the change of land categorization. However, the official procedures for issuing RBCs for newly reclaimed paddy fields, as well as for for

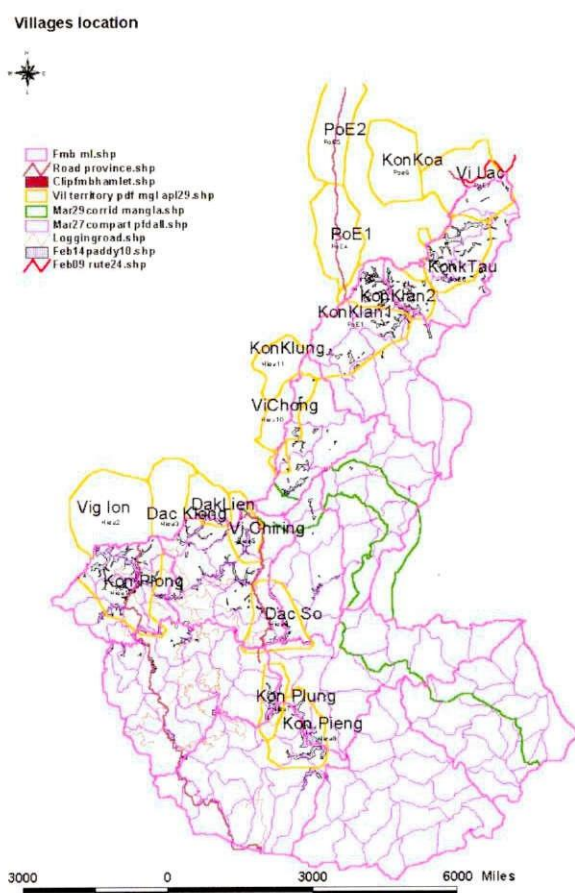


Figure II-5.4.2 Zoning of areas where human activities are most concentrated

²⁵ Includes both existing and potential areas for paddy field, and is managed by the People's Committee (as compared to forestland managed by FE).

upland farms, has not been followed strictly in reality.

Survey findings reveal that there have been incidences of inaccurate measurements and recording of RBCs, and that there are cultivated lands within the communes where RBCs are yet to be issued. These problems are caused primarily by the limited financial resources and human capacity of the district cadastral office and the commune cadastral officers. The district cadastral office only has 5 staff and 1 motorbike to cover the entire district, and their annual budget is also very limited. Commune officers' educational qualification is also low, at around grades 8 and 9.

(2) Conditions that must be met in order to allocate land under the VSP

As detailed under section 5.4.4, the VSP of Mang La FE includes provisions of agricultural land allocation to local people, both for paddy fields and upland farms (for agroforestry). Reclamation and allocation of new paddy fields should follow the existing official procedure as explained above. For the allocation of upland farms, it is recommended that the FE should enter contractual agreement with households, as is the case for the FPCs. In this way, forestland will remain as forestland by category, therefore the administrative procedure of changing the land status can be avoided. Furthermore, households' rights and responsibilities on the usage of upland farms can be stipulated in the contract, thereby assuring minimum disturbance to the forest. The preconditions for smooth implementation of land allocation are explained below.

1) Legal and administrative support

First and foremost, the concept of the VSP must be accepted, and the use of land for the purpose of the VSP must be approved by provincial and district authorities. Without such approval, the district cadastral office cannot enter the official procedure. The process of receiving formal approval can be a time consuming process. Furthermore, if a new system is to be introduced to enable the FE to enter contractual agreement with households (to use forestland for agroforestry), issuance of a special decision for the model area might be necessary. To obtain official support of this kind may also take some time²⁶.

2) Organizational capacity building requirements and the costs

Limited human resources and capacity of the district and commune cadastral office could hinder smooth implementation of land allocation for VSP activities. Securing a sufficient number of staff with adequate technical skills is critical to strengthen the capacity of the cadastral office. The direct cost required for land allocation is mostly related to fieldwork, consisting of labor cost, material cost (e.g., maps, stationery, and measurement equipment), and cost for transportation.

²⁶ For example, in the case of the pilot project of forest land allocation in Easol commune, Eahleo district, Dak Lak commune, the process took more than 1 and a half years (January 1998 to September 1999) involving nearly 6 full time staff and required 9 workshops over the period, to receive the official approval on the proposed plan for forest land allocation.

The level of financial resources available for the district cadastral office on the above budget items may also affect the timely implementation of land allocation for VSP²⁷.

5.4.4 The villager support program of the Mang La Forest Enterprise

(1) Summary of the program and its objective

Overall objective of the Model Management Plan of Mang La FE is the economically, ecologically and socially sustainable management of forest resources, which is implemented with due consideration on biodiversity conservation and improvement of local livelihoods. The villager support program (VSP) is proposed as an integral part of the Model management plan, focusing on the aspects of improving local livelihoods. It is recommended that the budget of the VSP should primarily be borne by Mang La FE's revenue.

The purpose of the VSP is to improve the living standard of local people in Hieu and PoE communes²⁸. The goal has been determined on the understanding, based on the survey findings, that low standard of local livelihoods is one of the critical factors influencing the situation of forest resources in the model area. Human pressure on forest resources would be reduced if the local living standard were improved. The VSP has two components: (1) Food security component; and (2) Income generation component. As the VSP is an integral part of the Model forest management plan, it is also planned in a 10-year financial framework.

It is important to emphasize the key constraints presently faced by the local people that hinder their advancement. One of the critical constraints, which is a cross-cutting issue among different sectors, is the lack of technical knowledge. This is primarily due to the difficulty in transferring knowledge from government technical officers to the local people, due to limited human resources, limited technical capacity of commune officers, and the few opportunities of technical training and on-site guidance at the village level. The VSP will take the above into consideration, and will put a high emphasis on improving capacity of commune and village level technical staff, so as to improve the efficiency and effectiveness of technical transfer at the local level and the sustainability of the extension mechanism.

²⁷ According to the interview, the budget of the district cadastral office is at around 12million VND per officer per year, inclusive of salary expenses and operational cost.

²⁸ As explained under section 3.2.1(1), the jurisdiction of Mang La FE covers a part (but not all) of Hieu and PoE communes. In other words, there are villages in the 2 communes that are located outside of Mang La FE's jurisdiction. However, the VSP has been designed to cover all the 18 villages within Hieu and PoE, for the following reasons. Firstly, the national socio-economic development programs in this area are conducted having the commune as the operational unit. Therefore, it would be preferable for VSP to have the same modality, to avoid unnecessary confusion and to facilitate smooth co-ordination and co-operation at the operational level. Secondly, it is worth noting that the local people's use of forest resources is not restricted to one's village boundary. This implies that there exist some people who reside in villages just outside of Mang La FE's jurisdiction, who could be using the forest resources under Mang La FE's jurisdiction. The VSP will be more effective if it includes them in its scope.

(2) Target beneficiaries

The overall number of target beneficiaries is 598 households (3,581 persons) of Hieu and PoE communes. Details of the target beneficiaries of the respective components are explained in the respective sections.

(3) Food security component

1) Background

The Study revealed that food shortage is one of the most critical difficulties faced by local people. Food shortage is attributed to several causes, among which the low yield of lowland rice is the most critical and commonly perceived constraint in the communes. As explained in section 3.2.7 (3), the two major underlying causes of low yield are low productivity and shortage of paddy fields. The VSP will prioritize these areas.

2) Objective

The objective of the food security component is to improve food sufficiency in Hieu and PoE communes. It aims at increasing the annual rice yield per capita from the current level of 138 kg/capita/year to 300 kg/capita/year, taking into consideration the natural population growth rate. This will be achieved by increasing productivity to 3.5 t/ha, and also by opening approximately 1.5 ha of new paddy field per village to cater for households that do not have sufficient land for cultivation.

3) Scope

The proposed outputs and activities under the food security component are summarized in Table II-5.4.3.

4) Major inputs

The main inputs required for this component are listed in Table II-5.4.4.

5) Roles of local communities and supporting groups

Local communities will provide labor for land reclamation and construction of irrigation system as their in-kind contribution. The communities may also contribute locally available and affordable material, such as bamboo and stone for irrigation construction. Other costs, including costs for long and short-term specialists, local allowance, materials and tools, and operational cost will be borne by the project. It is recommended that the activities should be conducted jointly with the relevant district departments to the extent feasible and appropriate, so that the limited financial resources are utilized efficiently.

Table II-5.4.3 Outputs, activities, and target beneficiaries of the food security component

Outputs and activities	Target beneficiaries
1. All households in the commune have sufficient size of paddy field.	
<ul style="list-style-type: none"> ➤ Conduct village land use planning ➤ Identify potential areas for opening new paddy field ➤ Design and construct small scale irrigation system (gabions and gravity pipeline system) ➤ Establish and strengthen irrigation management groups ➤ Conduct training and provide follow up guidance on management and maintenance of irrigation systems at the village level 	<ul style="list-style-type: none"> ➤ 155 households (26% of total households) over 10 years (On average, 8.6 households per village). ➤ Training on management and maintenance of irrigation systems can be extended to all farmers.
2. Productivity of lowland rice is improved.	
<ul style="list-style-type: none"> ➤ Establish village level agricultural extension network (one extension worker in each village) ➤ Build capacity of commune agricultural extension officer and village extension worker on: <ul style="list-style-type: none"> (a) Disease prevention and eradication (b) Advanced techniques on cultivation (c) Extension skills ➤ Conduct training for local farmers on subjects (a) and (b) and provide follow-up guidance (by commune extension officer and village extension worker) ➤ Study local soil and climate conditions to identify suitable crop variety and cropping pattern ➤ Introduce suitable crop variety and cropping pattern <ul style="list-style-type: none"> ◇ Establish model demonstration plot ◇ Expand models for application 	<ul style="list-style-type: none"> ➤ 598 households plus new households that will be established during the project period. ➤ While training is envisaged for all farmers, priority will be given to households that are facing food shortage (65% - approx. 390 households, or 21 households per village on average).

Table II-5.4.4 Major inputs required for the food security component

Type of input	Details
Specialist (full time)	➤ Community development and extension specialist
Specialists (short-term)	<ul style="list-style-type: none"> ➤ Local land use planning ➤ Small scale rural irrigation ➤ Community empowerment / organizational strengthening ➤ Agronomist ➤ Crop disease and pest control ➤ Soil scientist
Local allowance	➤ Allowance for village extension worker
Materials and tools	<ul style="list-style-type: none"> ➤ Irrigation (gabions, pipelines) ➤ Demonstration tools (disease and pest control) ➤ Seeds
Operational costs	➤ Local travel costs, training costs, stationery, etc.
Labor	➤ Land reclamation, construction of irrigation system

(4) Income generation component

1) Background

Low income, another critical difficulty commonly observed in the 2 communes, is mainly attributed to low animal husbandry productivity and limited income earning opportunities.

Presently, local people's cash income relies heavily on livestock. Income from livestock sales is limited, and it is also vulnerable to epidemic outbreak and climatic conditions. It is therefore important for the local people to diversify their source of cash income, while improving the return from livestock husbandry.

Table II-5.4.5 Outputs, activities, and target beneficiaries of the income generation component

Outputs and activities	Target beneficiaries
<p>1. Productivity of animal husbandry is improved.</p> <ul style="list-style-type: none"> ➤ Establish/strengthen village level animal husbandry extension network (one extension worker in each village) ➤ Identify animal cage materials and design that are affordable by local people ➤ Train commune veterinary officer and village level husbandry extension worker on: <ul style="list-style-type: none"> (a) Caging construction methods (b) Animal feeding methods (c) Extension skills ➤ Conduct training for local farmers on subjects (a) and (b) and provide follow-up guidance (by commune veterinary officer and village level husbandry extension worker) 	<ul style="list-style-type: none"> ➤ Approximately 480 households who are engaged in livestock husbandry (80% of the total households).
<p>2. Productivity of upland farms is improved.</p> <ul style="list-style-type: none"> ➤ Train commune agricultural extension officer and village extension worker on: <ul style="list-style-type: none"> ✧ Organic and composting fertilizers ✧ Agroforestry methods (tree garden, hedgerow intercropping, alley cropping, silvopastoral, agrosilvopastoral, agrosilvo fishery, and aquaforestry) ✧ Soil erosion control methods ➤ Conduct training for local farmers on the above subjects and provide follow-up guidance (by commune agricultural extension officer and village level extension worker) ➤ Introduce contractual agreement between the FE and households that guarantees user rights (and responsibilities) of upland farms 	<ul style="list-style-type: none"> ➤ Approximately 420 households who are engaged in upland farming (70% of the total households). <p>Note: Assurance of user right will contribute to strengthening farmer's sense of ownership of the land, thereby encouraging permanent cultivation and higher investment on their farms.</p>
<p>3. Alternative income earning opportunities are introduced.</p> <ul style="list-style-type: none"> ➤ Identify crops, perennials, and trees that have potential market, and are suitable for local climate ➤ Identify livestock (species and breed) that have potential market, and are suitable for local climate ➤ Identify other income earning sources (e.g., beekeeping, handicraft, etc.) that have potential market, and are suitable for the local conditions ➤ Identify model villagers and conduct trials ➤ Introduce successful activities to local villagers ➤ Assist local villagers in managing small scale income-earning activities (budgeting, saving, marketing, etc.) 	<ul style="list-style-type: none"> ➤ Initially 10 to 20 households (model villagers), and later expanded at village level.

2) Objective

The objective of the income generation component is to increase and stabilize income of local people in Hieu and PoE communes. It aims at increasing the average cash income from the current level of approximately 32,000 VND/month/capita to 55,000 VND/month/capita or above. This will be achieved by improving productivity of livestock husbandry, improving productivity and introducing marketable crops for upland cultivation, and by introducing new income earning

opportunities. By reducing incidences of livestock loss due to animal epidemics, and by diversifying income-earning sources, local people's cash income should become higher and more stable.

3) Scope

The proposed outputs and activities under the income generation component are summarized in Table II-5.4.5.

4) Major inputs

The main inputs required for this component are listed in Table II-5.4.6.

5) Roles of local communities and supporting groups

Local communities will provide labor for building animal cages as their in-kind contribution. The community will also contribute locally available and affordable material for animal caging, and for other income earning activities introduced. Other cost, which includes costs for long and short-term specialists, local allowance, materials and tools for demonstration, and operational cost will be borne by the FE or any other relevant organizations. As mentioned under the food security component, it is recommended that the activities should be conducted jointly with the relevant district departments.

Table II-5.4.6 Major inputs required for the Income generation component

Type of input	Details
Specialist (full time)	➤ Community development and extension specialist
Specialists (short-term)	➤ Livestock husbandry ➤ Agroforestry ➤ Apiculturist ➤ Small business advice and marketing
Local allowance	➤ Allowance for village husbandry extension worker
Materials and tools	➤ Demonstration materials and tools (animal caging, animal feeding, bee hives, beekeeping equipment, etc.) ➤ Seeds and seedlings
Operational costs	➤ Local travel costs, training costs, stationery, etc.
Labor	➤ Building animal cages.

(5) Annual plan

The 10-year activity schedule of the VSP is shown in Figure 5.4.3. It is proposed that the project should adopt the 'village cluster' approach, in which activities are concentrated in one village cluster at a time (2–4 villages) over a 2-year period, except for training activities and follow-up support that will cover all the villages throughout the 10-year duration. The village cluster approach is proposed under the assumption that the VSP will be funded mostly on Mang La FE's own revenue. Should any additional financial, human, or technical support become available, the number of villages in one

cluster, as well as the activity schedule, should be modified to the appropriate scale.

The first two years of the VSP should be considered as the pilot phase, for which one village is selected from each of the 2 communes. Selection should be done at the commune level, involving representatives of the villages and mass organizations, based on clear and transparent criteria. While the criteria should be identified and agreed upon at the commune level, the Study recommends that the following criteria may be considered for village selection: (a) proportion of households that suffer food shortage; (b) percentage of most disadvantaged households; (c) shortage of lowland cultivation area; (d) relative reliance on upland cultivation; and (e) level of average cash equivalent income. The data compiled and analyzed by the Study provide important information in prioritizing the villages (refer to section 3.2.7 (1), Table II-3.2.20).

For the income generation component, two alternative approaches can be considered for conducting its activities. The first approach is to identify model farmer(s) who will conduct trials on production and sales. Successful models will then be extended to other farmers. The other approach is to establish a farmer’s group, who will jointly produce and market their products. They will begin on a small scale, and then expand their membership and the scale of production as they gain experience over the years. Under the VSP, activities related to agriculture (e.g., introduction of marketable crops, fruit trees, etc.) will follow the first approach, while the other income generation activities may follow either the first or the second approach depending on the nature of the specific activities. For example in the case of apiculture, a farmers’ group will be formed, who will collaborate in bee keeping and marketing of honey. These groups will receive technical guidance on apiculture, as well as capacity building support for group formation and strengthening, and on marketing.

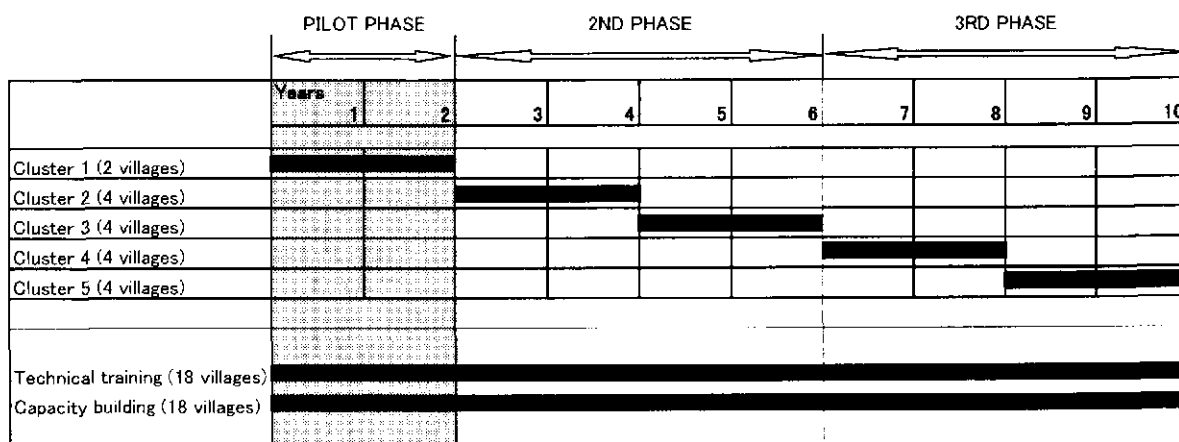


Figure II-5.4.3 The 10-year activity schedule of the VSP based on the village cluster approach

(6) Formulation process for village level plan of project operation

For the implementation of the VSP at the village level, a village level plan of project operation (PO) must be developed. The commune and village level planning process should begin with a commune

level workshop, in which the objective of the VSP is shared, and the management mechanisms are confirmed and agreed upon by Mang La FE, Commune PC, and village representatives. Following the commune workshop, a village level planning workshop should be conducted in each village, facilitated by the VSP Project Management Unit (refer to sub-section 5.4.4 (8)) to develop village level PO. It is important that the workshop is conducted adopting a participatory approach, ensuring that the village level PO is developed by villagers themselves, assisted by the facilitators. For practical reasons, the workshop could be conducted by a group of villagers (not by the entire village). However, careful consideration must be made to ensure that the workshop participants represent a wide range of socio-economic backgrounds, including disadvantaged households. It is also important to ensure that women and youth, who tend to have a weaker voice in the community, are rightly represented. The draft village level PO, developed by the workshop participants, should be presented at the village meeting (i.e., the whole village), to receive feedback from the village for finalization.

(7) Capacity building for extension

1) Strategies for strengthening local capacity

Limited technical capacity of commune officers was one of the critical constraints highlighted at the participatory workshops, and in the district and commune level interviews. The VSP will address this issue by integrating capacity building of commune level technical officers, such as the commune agricultural extension officer and commune veterinary officer, into its activity plan. Technical training activities will be conducted first at the commune level involving these officers, then brought down to the village. This mechanism serves not only to provide on-site training for the villagers, but also to improve capacity of commune officers by providing practical training on extension work. It is expected that the commune level technical officers will gain sufficient knowledge and experience so that they could become effective extension agents in the long term.

Another important focus of the VSP is to strengthen the capacity at the village level. RRA survey revealed that the institutional capacity at the village level is weak. While there are a number of village organizations and the mechanism of village meetings, their role in socio-economic development is limited, and the village's involvement in development activities is passive in nature. In order to advance their living standard, it is important to raise awareness of the local people, build their capacity and encourage them to become actively involved in their own socio-economic development efforts. The VSP will support this aspect by stationing two community development and extension specialists over the project duration (one specialist in charge of one commune). They will work at the village level on awareness raising and on establishment and/or strengthening of village institutions.

2) Strengthening the district-commune-village extension network

The VSP will place high emphasis on the sustainability of the extension mechanism, by

strengthening the extension network between district, commune and village level, specifically regarding agricultural extension. The VSP will strengthen the existing extension structure by introducing village level extension workers, who will act as the focal point of extension work at the village level. Extension activities will be coordinated with the district ED-DARD extension activities, to avoid duplication of efforts and to improve effectiveness. In the long run, it is expected that the extension workers are trained to have sufficient capacity to provide village level support to the farmers, backed up by the commune and district level extension offices.

(8) Project management mechanism

While the VSP is designed as part of the Model management plan of Mang La FE, it is important to take into consideration that the scope of the project is highly relevant for the overall socio-economic development of the 2 communes. As such, it is necessary that the VSP is placed and implemented giving due consideration to the existing commune and village level institutional framework on socio-economic development. In this context, the following project management mechanism is proposed for the VSP.

Firstly, it is proposed that a steering committee should be established, which would be given the responsibility to supervise the implementation of the VSP. This idea was recommended by the district level workshop conducted in April/May 2002, although there were some alternative views as to whether such a committee should be established at the provincial level, or whether it should be established at both provincial and district levels (i.e., 2 committees). A series of workshops will be needed to reach a consensus regarding the committee's level, structure, membership, and specific responsibilities. The details should be agreed upon prior to the initiation of the VSP.

Under the steering committee, the Project Management Unit (PMU) should be established, which will be responsible for the implementation of the VSP as per its work schedule. The PMU should consist of one managerial officer each from Mang La FE and Commune PCs²⁹ (from Hieu and PoE), who will supervise the two commune development and extension specialists stationed in the PMU.

In each village, there should be a committee established as the focal point for the VSP. It should be headed by the village chief or the traditional leader, and include the village extension worker as one of its members. This committee will work closely with the community development and extension specialist, and act as the management unit of the VSP at the village level. It will also be directly involved in the project monitoring and evaluation, as explained in section (9).

²⁹ It is recommended that the Director of Mang La FE, and the Chairman of the People's Committee of Hieu and PoE take up this role.

(9) Recommendations on the implementation of the VSP in the model area and beyond

1) VSP within the Model area

Securing external support

The financial resources required for fully-fledged implementation of the VSP in all villages of the 2 communes may exceed the level feasible for Mang La FE to support on its own (especially the costs concerning infrastructure development). Hence, it is important for the VSP to co-ordinate with existing programs and to secure additional support in order to realize successful implementation. The VSP budget is calculated assuming that the financial resources required in certain areas, such as the cost for infrastructure development (e.g., small-scale irrigation and rural clean water) could be channeled through existing government programs such as Program 135. The continuous support of the government programs in these areas will be critical for the VSP's success.

In terms of additional support, the most critical input which could boost project effectiveness, which may not be fully funded by Mang La FE's own budget, is the short term technical expertise required on specific subjects such as local land use planning, agronomy, soil science, apiculture, etc. While the VSP will allocate some funds for short-term experts, it will not be able to secure the level of financial resources that fully meets the local demand. There are a number of options that could be explored to secure such support, which may include nationally executed programs, donor agencies (projects, international volunteers, etc.), and NGOs. It is recommended that these options be explored at an early stage, so that necessary support is secured prior to project initiation. If the VSP can secure long-term support on capacity building by stationing volunteer workers or NGOs in the communes, it would substantially enhance the program's effectiveness.

Securing support from relevant authorities

It is also important for the VSP to receive full support from relevant government authorities, so that it will not encounter any legal, political, or technical obstacles in implementing its activities. Especially on the activities that require government decisions or approval, such as land allocation or issuance of contracts, it is important that the relevant authorities are made fully aware of the VSP and its objectives, so that necessary documentation and support is received in a timely manner.

Expansion from pilot phase to full phase

The purpose of the pilot phase is to implement the VSP on a relatively small scale, in order to learn whether its framework and strategy works out in practice. The program's relevance, effectiveness, and efficiency must be studied, in order to improve the program prior to its fully-fledged implementation. It is therefore recommended that the VSP should have a built-in

mechanism of monitoring and evaluation. It is proposed that a mid-term review (at the end of the 1st year) and terminal evaluation (at the end of the 2nd year) should be conducted for the pilot phase. The VSP's framework, strategy, objectives, outputs, and activities should be modified or restructured if needed, in view of the lessons learnt from the pilot phase.

2) VSP in other Forest Enterprises and communes

Program design

As mentioned earlier, the VSP presented in this report is the program specifically designed for Mang La FE, based on the social, economic, and natural conditions of the local area. Therefore, it cannot be applied directly by other Forest Enterprises. However, the *methods* and *processes* used in this Study to design the VSP can be applied for designing the VSP for the other Forest Enterprises. It is recommended that the process explained under 5.4.1 should be applied, with modifications or adjustments as necessary, in order to design the VSP which caters for the specific needs identified in the respective locations. It is important that the VSP is designed based on the good understanding of the local situation.

Involvement of multiple stakeholders

It must be emphasized that involvement of the stakeholders from the outset is critical for smooth project implementation. When designing the VSP, the Provincial Forest Development Branch and the Forest Enterprises must consult closely with local authorities (e.g., commune PC and district PC) and the district departments (e.g., ED-DARD, cadastral office, poverty alleviation monitoring unit, etc.) so as to raise awareness and assure necessary support and collaboration. The community leaders and the beneficiaries (local people) should also be involved in the planning process. Consultation and planning is a lengthy process, which normally require a series of workshops and meetings.

Timing of implementation

While the timing of the VSP planning and implementation in other FEs may not be restricted by the status of the VSP in Mang La, it will be useful for the other FEs to learn from the earlier experiences in order to design an effective program. It is therefore recommended that the implementation of the VSP in other FEs should be initiated following the completion of the pilot phase of the Mang La FE. However, the planning of the VSP could begin at any time, and it may better be initiated early, in order to allocate sufficient time for consultation and participatory planning.

(10) Monitoring and evaluation mechanism

1) Establishing a monitoring and evaluation system

Commune and village level M&E plan

At the inception of the VSP, a short-term expert will be recruited to assist the designing of the VSP Plan of Operation (PO). S/he will assist the PMU (Mang La FE and Commune PC) to work with the villages to develop village level PO through a participatory process. The commune level PO will be developed building upon the village level POs, which will become the PMU's plan of operation. The participatory monitoring and evaluation (M&E) mechanism should be built in as part of the PO, and the roles and responsibilities of the PMU and the local people should be clearly identified and agreed upon. The beneficiaries, represented by the village project management committee (refer to section (7)), should be involved in monitoring the process and impact of the VSP at the village level, while the commune development and extension specialist should be monitoring the progress of the VSP by commune.

Importance of periodic village meetings

Since not all the villagers will be directly involved in the monitoring, it is recommended that periodic village meetings, for instance every 6 months, are convened to share information on the progress of the VSP with the local people, and to receive feedback. The same meeting can serve for other equally important purposes, such as to share the findings of mid-term and final evaluations of the VSP with the community. The village meeting can also be a venue for the Mang La FE to inform the local people on its plans and progress of the Forest Management Plan, especially regarding its logging and afforestation activities in the 2 communes. The village meetings should involve both men and women from the villages, to ensure information is shared equally among the villagers.

2) Evaluation

As explained under section (4)- 1), it is recommended that the achievements of the pilot phase should be evaluated to provide feedback to the VSP, in order to improve its framework for the future years. A mid-term review at the end of the 1st year, and terminal evaluation at the end of the 2nd year is proposed. A similar mechanism is recommended for the full phase, including a mid-term and terminal evaluation at the 5th and 10th year respectively.

5.4.5 Application of agroforestry

In the VSP plan of income generation, agroforestry is the most important tactic for realizing income generation as well as conserving forest functions for a long focus, nevertheless, in the Model Area, there are few activities defined as agroforestry³⁰ found as villagers as well as agricultural and forestry extensionists are not familiar with agroforestry practices. In this section, measures and technical aspects to reinforce agroforestry are discussed.

(1) Existing agroforestry systems and practices

1) VAC system

The VAC system is a combination of activities in Vietnamese (V: vuon-garden, A: ao-fish pond, C: chuong-piggery) and is defined as one of the agrosilvopastoral systems or other systems (agrosilvo fishery or aquaforestry). The system is characterised by the energy circulation among activities of crop production, fish farming and pig farming; as leaves and fruits of cassava, banana and taro, rice chaff, and dung of pigs and buffaloes are used for feed of fishes. On the other hand, crops such as banana and sugar cane are grown on the banks of fishponds and those crops protect the bank as well as provide shade for fishes.

2) Home garden

In general, the home garden is classified as a practice of the agrosilvopastoral system according to its characteristics and pattern of composed factors but the system found in the Model Area does not include a factor of animals and thus it is judged that the practice belongs to the agrisilvicultural system. Home garden is practised by almost all households with trees such as boi loi and cinnamon, and crops such as taro and cassava. However, it is only practised in a extensive way.

There are a number of households which are fenced with live trees. As described later, establishment of a live fence is one of the practices of the silvopastoral system but this case cannot be regarded as agroforestry as there is no use for fodder.

³⁰ The word 'agroforestry' is defined as: 'Agroforestry is a collective name for land-use systems in which woody perennials (trees, shrubs, etc.) are grown in association with herbaceous plants (crops, pastures) and/or livestock in a spatial arrangement, a rotation, or both, and in which there are both ecological and economic interactions between the tree and non-tree components of the system (Young, 1989)'

3) Shifting cultivation

Shifting cultivation is generally defined as a part of agroforestry as mentioned in 3.2.3 and it is practised in the Model Area.

On the other hand, there is a rare case of an agrisilvicultural system in which fallen trees are applied for terracing to control soil erosion in the slash-and-burn farms. Mainly coffee and cinnamon are grown in the terraced farms.

(2) Guidelines for agroforestry application

In view of the current conditions of agriculture and forestry addressed in the previous section, the following aspects would be considered for application of agroforestry chiefly from technical and economic viewpoints.

Considerable numbers of local people face lack of food or unbalanced diet, making poverty a significant factor. In accordance with this situation, the primary objective of agroforestry application in the Model Area shall be to develop countermeasures for establishing food security and sustainable livelihood and secondly to present measures for income generation.

In application of agroforestry, significance is indicated from the following 6 cross-cutting issues.

Cross-cutting issues	Description
<input type="checkbox"/> Policy aspect	Promotion of forest conservation by decreasing shifting and slash-and-burn cultivation, and enhancing fixed cultivation would coincide with the national forest policy.
<input type="checkbox"/> Technological aspect	Applied techniques would be revised by local farmers, and appropriate local techniques would be established and disseminated to other areas.
<input type="checkbox"/> Environmental aspect	As mentioned in 'policy aspect', as fixed cultivation is encouraged, forest conservation would be promoted. Furthermore, soil improvement, and soil and water conservation would be expected since afforestation would be promoted in post shifting cultivation farms.
<input type="checkbox"/> Socio-cultural aspect	As productivity of staple and supplemental food would be strengthened, it is expected that food security would be established and livelihood would be enhanced.
<input type="checkbox"/> Institutional and management aspect	Local people's unity would be strengthened through technology transfer and information exchange on marketing and this will contribute to establish the base of institutional arrangement in the communities.
<input type="checkbox"/> Economic and financial aspect	Income sources would be enhanced through the sale of woody plants (fruits and others), vegetables and NTFPs.

(3) Procedure of application of agroforestry

Although 6 agroforestry practices stated in the next section are recommendable for the application of agroforestry in the Model Area, it is not realistic that all the households apply all the activities at the same time. As those are just examples of applicable practices, it is important for local people to judge and select appropriate practices taking account of bio-physical conditions of the cultivation; e.g. location, topography, original vegetation, current land use, and socio-economic conditions; e.g. labor input and capital.

An example of implementation procedure can be summarized below.

Stage	Description	Practices
I. Development of agroforestry farmland	1. Establishment of live fence	Live fence
	2. Establishment of hedgerow	Alley cropping
	3. Plantation of light-demand fruit trees	Home garden, tree garden
	4. Mixed planting with crops	Home garden, alley cropping
II. Development of multi-storeyed farmlands	1. Plantation of shade-tolerant fruit trees	Home garden, tree garden
	2. Plantation of cover crops	Tree garden, Agrosilvo fishery
III. Intensive management of agroforestry farm	1. Appropriate management of planted fruit trees (trimming, etc.)	Home garden, tree garden
	2. Application of manure and compost, and establishment of irrigation system	Home garden, tree garden
	3. Production of high quality and high productivity fruit seedlings	Home garden, tree garden

5.4.6 Advisable agroforestry systems and practices

In accordance with the guidelines mentioned in the previous section, details of agroforestry practices recommended in the Model Area are described by system as follows.

(1) Agrisilvicultural system

1) Tree garden

a. Objectives and method of application

The tree garden would basically be practised in the upper area of alley cropping but it should be flexibly considered to be practised around the area of the home garden. Major production

in the tree garden are trees for cash income and fuelwood trees.

As most of the area of the tree garden shall be sloped land, terracing using fallen trees, hedgerow and cover crop would be adopted from the viewpoints of soil conservation.

b. Applied tree species

Coffee, cinnamon and boi loi (*Machilus* spp., *Litsea* spp.) are to be recommended for this practice. Regarding boi loi, a number of local farmers identify the effect of soil improvement and this is one part of the little indigenous knowledge collected through the survey.

2) Hedgerow intercropping or alley cropping

a. Objectives and method of application

This practice mainly focuses on plantation of staple food in between hedgerows planted along the contour. Hedgerows help mitigate rain flow on the sloping lands, maintain humidity in the soil and control soil erosion. As time goes by, soil would be intercepted by the hedgerow and it would be possible to establish the land as terracing cultivation. The hedgerow needs to be regularly trimmed and the trimmed leaves and branches would be ploughed into the soil as green manure. This will contribute to improve soil fertility and physical characteristics, and increase productivity. The trimming is also significant so as not to provide shade to planted crops. On the other hand, the removed leaves and branches will help conserve surface soil as mulching particularly in the dry season. Fodder trees would help promote cut-and-carry (stall) feeding. Live fence would make it possible to protect the tree garden from livestock.

b. Applied tree species and crops

The criteria of applied tree species and crops are stated below:

a) Tree species

- Leguminous species, if possible and those which have nitrogen fixing function
- Easy to propagate with seeds and cuttings
- To be fast-growing trees
- Easy to regenerate from sprout
- To be multi-functioned such as fodder, food, medicine
- To be tolerant of dryness, over humidity, acid soil
- To be tolerant of damage by diseases and insects

According to the criteria above, recommended tree species and their characteristics are shown in the Table II-5.4.7.

b) Crops

Recommended crops are maize and cassava which are generally grown in the area. With regard to maize, adoption of hybrid should be examined when the soil becomes fertile.

Table II-5.4.7 Attribute of trees applied for alley cropping

	Ecological sites							Growth characteristics	Major purposes							
	Altitude	Rainfall	Alkaline	Acidity	Dryness	Salt	Nitrogen fixing		Fodder	Construction	Food	Fuelwood	Green manure	Pulp	Soil conservatio	Log
<i>Cajanus cajan</i>	1-3	2-4			A	A	A	5 m, shrub	A		A		A		A	
<i>Flemingia macrophylla</i>	1-2	3-4		A	A		A	below 3 m, shrub, sprout	A				A		A	
<i>Tephrosia candida</i>	1-2?	?		A	A		A	5 m, shrub	A				A		A	
<i>Leucaena diversifolia</i>	2-3?	2-4	A?	A?	A		A	20 m, high-medium tree, sprout, fast	A	A		A	A	A	A	A

Source: adapted from Nair (1993), Bansh (1992)

Note) A – applicable

Altitude – 1: low area (below 500 m), 2: medium area (500-1,500 m), 3: high area (over 1,500 m)

Rainfall – 1: annually below 500 mm, 2: 500-1,000 mm, 3: 1,000-1,500 mm, 4: over 1,500 mm

? – Ones with different results according to conditions

(2) Silvopastoral system


1) Live fence

a. Objectives and method of application

Live fence is also included in activities in alley cropping and home garden. The major objectives are windbreak for homesteads and cultivation, protection from livestock, and provision of fodder. Indirectly, live fence would work to reduce wood consumption for fuelwood.

b. Applied tree species

In application of live fence considering windbreak and other multi-functions, different species would be more effective to establish three-storied fences.

	Species	Remarks	 <p>Storeys: Upper Middle lower</p>
Upper	Cinnamon	Cash crop	
	Boi loi	Cash crop	
Middle	<i>Erythrina indica</i>	Fodder (leaves)	
	Cassava	Fodder (leaves, fruit) and food	
Lower	Tea (Shan)	Home consumption	

(3) Agrosilvopastoral system

1) Home garden

a. Objectives and method of application

Although most of the households in the Model Area own home gardens around the homestead as already mentioned, they are managed in an extensive way and need some improvements. Since labour input and management are easy in home gardens due to distance, the home garden is one of the most effective practices to establish food security and enhance sustainable livelihood which are the main objectives of agroforestry application.

As the method of application, basically annual crops and trees, mainly fruit trees, would be combined. Pigs and poultry shall be major livestock, and the feed shall be leaves of cassava and taro. Although some crops such as taro and chayote prefer shade, principally spatial allocation of trees and crops are considered so as not to provide crops with shade.

Regarding soil improvement and conservation, combination of home gardens with the aforementioned alley cropping and live fence shall be examined. Furthermore, cut-and-carry feeding of livestock should be enhanced to collect dung for compost production.

b. Applied tree species and crops

The combination of applied trees, crops and livestock is proposed as follows.

Tree species	Citrus (orange, mandarin, grapefruit), persimmon, jackfruit, guava, banana, etc.
Crops	Cassava, sweet potato, taro, chayote, beans (soy bean, peanut), etc.
Livestock	Buffalo, pig, poultry

(4) Other systems

1) Agrosilvo fishery or Aquaforestry

Improvement and extension of fishponds are becoming more vital to ensure a source of protein since epidemics of livestock are getting serious. However, as there are some villages with no fishpond, it is necessary to initiate action to secure a water source for fishponds. Regarding the establishment or improvement of fishponds, it is important to adopt a drainage dam as some local people have already done, and to circulate water.

Cassava, banana and taro would be planted on the banks of fishponds, and piggeries are to be constructed in accordance with the VAC system. Crop production on the banks is very efficient and effective to provide shade for fishes, and help to protect the banks. For the same purpose, a cover crop shall be adopted to protect the banks. On the other hand, duck feeding in the fishponds is also efficient in terms of the system.

2) Apiculture

Apiculture is an activity that would be practised in the most upper area close to natural forests. As apiculture depends on natural resources, various effects are expected in the Model Area: i) to increase income by honey sales, ii) to improve nutritional conditions by home consumption, iii) to promote natural regeneration of forests through pollination by honeybees, iv) to conserve forests as local people protect sources of honey. Particularly from an economic point of view, as the price of natural honey is high relative to its low input, it is expected that apiculture might be an opportunity to reduce poverty.

The District Agriculture and Rural Development Department has recently initiated its extension in low regions in the district with the distribution of beehives. In the target area for apiculture, leguminous trees mentioned in the section on 'alley cropping' and pines (*Pinus kesiya*) are to be planted.

The above 3 agroforestry systems and 6 practices are summarised in Table II-5.4.8 and a model land use with agroforestry practices is indicated in Figure II-5.4.4.

Table II-5.4.8 Components and functions of proposed agroforestry practices

Systems	Practices	Major components	(1) primary and (2) potential functions
Agrisilvicultural	Tree garden	W: cash crop (coffee, cinnamon, boi loi)	(1) Income increase, diversification of income source (2) Fuelwood security, soil conservation
	Alley cropping	W: leguminous fast-growing species H: maize, cassava	(1) Food security (2) Soil improvement and conservation, fuelwood security
Silvopastoral	Live fence	W: cash crop (cinnamon, boi loi, <i>Erythrina indica</i> , cassava, tea)	(1) Cultivation protection (2) Income increase, diversification of income source, fodder security
Agrosilvopastoral	Home garden	W: citrus, persimmon, jackfruit, guava, banana H: cassava, sweet potato, taro, chayote, beans A: pig, poultry	(1) Improvement of nutritious conditions, food security (2) Income increase
Others	Agrosilvofishery	H: banana, sugar cane, sweet potato, taro A: fish, duck	(1) Improvement of nutritious conditions, food security (2) Income increase, diversification of income source
	Apiculture	A: honey bees	(1) Income increase, diversification of income source (2) Forest protection and conservation

Note: W = woody species, H = herbarium species, F = fodder, A = livestock

	Lowland		Permanent upland fields				Forest	
Land use type	Paddy	Fish pond	Annual horticulture	Upland field crops		Tree horticulture	Complex-agroforest	Natural forest
Agroforestry practice		Agrofishery	Home garden	Live fence	Alley cropping	Tree garden	Beekeeping	
Tree species			Citrus, persimmon, jackfruit, guava, banana	Cinnamon, bô loi, <i>Erythrina indica</i> , tea	Leguminous trees / shrubs	Coffee, cinnamon, green bô loi	Leguminous trees / shrubs, pines	
Crop		Banana, Sugarcane, sweet potato, taro	Cassava, sweet potato, taro, chayote, beans	Cassava,	Maize, cassava, taro, upland rice			
Animal, etc.		Fish+duck	Buffalo, Pig, chicken, etc.				Bees	
Others		Cover crop				Cover crop		

Figure II-5.4.4 Model land use with agroforestry practice