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DEPARTMENT OF FORESTRY

Manual
for Preparation of Feasibility Study Reports

for production forest/agroforestry
development projects in Vietnam

Book 2: F/S Manual

Volume IV : Technical Guide

THE DEVELOPMENT STUDY ON CAPACITY BUILDING
FOR PREPARING FEASIBILITY STUDIES AND IMPLEMENTATION PLANS
FOR AFFORESTATION PROJECTS IN THE SOCIALIST REPUBLIC OF VIETNAM

---FICAB---

- March 2008 -

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PART I. TECHNICAL KNOW-HOW

Chapter 1. Method for Pre-site-assessment of Project Area Selection for F/S of Forestation Project

1.1 Objective of pre-site-assessment of project area selection for F/S

Pre-site-assessment of project area selection for F/S in forestation project is executed to enhance the efficiency of the F/S by eliminating projects that may be difficult to implement and selecting those whose implementation appears promising at the stage of project area selection using a simple method. Such pre-site-assessment is also expected to contribute to the effective execution of Project Option Evaluation.

1.2 Types of forestation project

The types of forestation project for this pre-site-assessment are as follows:

1) Production forests: Forests for the production of wood products
2) Protection forests: Water conservation forests, windbreak/sandbreak forests, environmental conservation forests
3) Agroforestry: Forests for production combining wood products and non-wood forest products, farm products, livestock or aquatic products on production forest land or protection forest land

1.3 Evaluation items

1.3.1 Indispensable conditions

Projects that do not satisfy these conditions are candidates for elimination in project area selection

1.3.2 Aptitude conditions

The suitability/adequacy of the project is evaluated using these conditions

(see the Attachment's 'Criteria of pre-site-assessment for forestation projects').

1.4 Evaluation procedure

1.4.1 Form entry

The following forms should be completed (see Attachment):

- Synopsis sheet of the proposed forestation project

- Profile of PST members and other potential participants in the OJT program

- Forestation project pre-site-assessment form

1.4.2   Indispensable conditions

Evaluation items by forestation type (production forest, protection forest, agroforestry) should be examined using the forestation project pre-site-assessment form.

Project that do not satisfy the indispensable conditions are candidates for elimination.

1.4.3   Aptitude conditions

The adequacy of the project should be evaluated and allotted to score between 0 and 4   using the forestation project   pre-site-assessment form.

Projects that score 2 or more arecandidates for acceptance

1.4.4   Synthesis judgment

Final decisions/conclusions on project area selection should be made from a comprehensive standpoint by reexamining the indispensable conditions and aptitude conditions, as well as by examining the synopsis sheet and the profile of PST members and other potential participants.

<<<Attachment>>>

Code

Synopsis sheet of the proposed forestation project

No.	Item	Contents			
1	Project name				
2	Competent Authority (name of the DARD that controls the project)				
3	Type of forestation for the proposed project	Protection forest ☐ Production forest ☐ Agroforestry ☐			
4	Purpose of the project				
5	Location of the project area	Province: District: Commune:			
6	Project area (ha)				
7	Project component				
8	Forest demarcation area in the project area (ha)				
9	Forest area by function in the project area	Protection forest: _____ ha Special use forest: _____ ha Production forest: _____ ha Total: _____ ha			
10	Actual land use and proposed land area for forestation in the project area (ha)		Type of actual land use	Area (ha)	Proposed land area for forestation (ha)
		Inside forest demarcation area			
		Outside forest demarcation area			

3

11	Elevation in the project area (m)	Min.: Max.:				
12	Monthly average temperature in the project area	Min : Max.: Ave.:				
13	Annual precipitation in the project area (mm)					
14	Duration of dry season in the project area	Start month of dry season: End month of dry season:				
15	Geography in the project area					
16	Soil type in the project area					
17	Main rivers in the project area					
18	Main roads in the project area					
19	Population in the project area					
20	Number of ethnic groups in the project area					
21	Target beneficiaries in the project area	Who are the target beneficiaries?				
		How many target beneficiaries are there?				
22	Rare species in the project area					
23	Others					

Profile of PST members and other potential participants in the OJT program

No	Name	Age (as of xx 20xx)	Current office	Current position	Number of years at current office	Main responsibilities at tcurrent office	Expertise	Education (major and degree)	Previous work 1 (name of office and number of years there)	Previous work 2 (name of office and number of years there)	Previous work 3 (name of office and number of years there)	Previous work 4 (name of office and number of years there)	Microsoft EXCEL skill (good, fair, poor)	Microsoft WORD skill (good, fair, poor)	Reason for participating in the OJT program (relevance to the current works and future roles of the participant)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	**(15)**
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16															
17															
18															

Note: If participants have previously worked at more than four offices, please include the details on a separate sheet.

Ppre-site-assessment criteria for forestation projects

	Item		Necessary condition	Type of project*		
				Production forest	Agroforestry	Protection forest
	1. Indispensable condition					
1)	Participation of PST		Positive participation of PST can be expected	X	X	X
2)	Objectives		Objectives of proposed project should be clear	X	X	X
3)	Candidate site area for plantation		Candidate site area for plantation should be more than 1000ha	X	-	-
4)	Implementation body		A suitable implementation body should be expected	X	X	X
5)	Products		Suitable products should be expected	X	X	-
6)	Financial sourcing		Suitable financial sourcing should be expected	X	X	X
7)	Market		A suitable market and access for the proposed products should be expected	X	X	-
8)	Trees and site		Proposed tree species should be fit for the land	X	X	X
9)	Productivity		High productivity of proposed products should be expected	X	-	-
10)	Land use		Project site should be unstocked forest land (bareland, grassland, bushland)	X	X	X
11)	Forest land allocation		Land use rights should be clear	X	X	X
12)	Negative environmental impact		No critical negative impact on the environment should exist	X	X	X
13)	Inhabitants		No issues should exist between inhabitants and the proposed implementation body/financial source organization	X	X	X
14)	Map		A topographical map on a scale of more than 1/50,000 should be available	X	X	X
			An actual forest type map on a scale of more than 1/25,000 should be available	X	X	X
			An actual land use map on a scale of more than 1/50,000 should be available	X	X	X
			A soil map on a scale of more than 1/100,000 should be available	X	X	X

	Item		Necessary condition	Type of project*		
				Production forest	Agroforestry	Protection forest
15)	Subject to be protected		Subject to be protected should be clealy identified	-	-	X
	2. Aptitude condition					
1)	Market	Area size of candidate site for plantation	Ther candidate site for plantation has a large area	X	-	-
		Demand	There is a high demand for the target products	X	X	-
		Access to market	There is easy access to market	X	X	-
		Distance between candidate site for plantation and roadway	Distance between candidate site for plantation and roadway is short	X	X	-
		Distance between candidate site for plantation and nursery	Distance between candidate site for plantation and nursery is short	X	X	-
		Distribution of candidate sites for plantation	Candidate sites for the proposed project show concentrated distribution	X	X	-
2)	Land condition	Unstocked forest land	Most of the proposed project area is covered with unstocked forest land	X	X	X
		Inclination	Slope inclination is gentle	X	X	-
		Soil	Soil is fertile	X	X	-
		Aptitude of proposed tree species for soil	Proposed tree species has aptitude for soil	X	X	X
		Productivity of proposed tree species	High productivity of proposed tree species is expected	X	-	-
		Former condition of land	Candidate site for plantation is not covered with forest for at least 5years	X	X	X
3)	Disasters	Forest fires	There are no forest fires around the proposed project area	X	X	-
		Storms	There are no storm-related disasters	X	X	-
4)	Sustainability	Consistency with policy	Proposed project is consistent with policy	X	X	X
		Administrative structure of local government	Administrative structure of local government is good	X	X	X
		Silviculture technique	There are no technical obstacles on silviculture that are difficult to overcome	X	X	X

	Item		Necessary condition	Type of project*		
				Production forest	Agroforestry	Protection forest
		Incentive of implementation body	Implementation body has an incentive to carry out forestation	X	X	X
		Incentive of inhabitants	Inhabitants have an incentive to carry out forestation	X	X	-
		Procurement of labor	Labor for forestation activity is readily available	X	X	X
		Number of beneficiaries	There are great number of beneficiaries from the proposed project	X	X	X
		Profitability	High profitability is expected from the project	X	-	-
		Improvement of livelihood	Improvement of inhabitants' livelihood is expected	-	X	-
5)	Social factor	Shifting cultivation	There is no shifting cultivation in the proposed project area	X	X	X
		Grazing	There is no overgrazing in the proposed project area	X	X	X
		Illegal occupants	There are no illegal occupants in the proposed project area	X	X	X
		Conflict between inhabitants	There is no conflict between inhabitants in the proposed project area	X	X	X
		Destitute people	There is large number of destitute people who need suppot in the proposed project area	-	X	-
6)	Environmental impact	Negative impact on the natural environment	There is no critical negative impact on the natural environment from the proposed project	X	X	X
		Negative impact on the social environment	There is no critical negative impact on the social environment caused from the proposed project	X	X	X

* 'X' represents a necessary cindition for the type of project under which it appears.

◱ Forestation project pre-site-assessment form

1. Production forest

(1) Indispensable conditions

		Evaluation item	Contents		Supplementary explanation	Judgment		Note
	1)	Can positive participation from the PST be expected in preparation work for F/S and IP?	Yes	No		Approval	Disapproval	Disapproval if 'No'
	2)	What are the objectives of the proposed production forest project?				Approval	Disapproval	Disapproval if indistinct
	3)	What is the area of the candidate site for plantation?		ha		Approval	Disapproval	Disapproval if less than 1000ha
	4)	Who is the assumed implementation body?				Approval	Disapproval	Disapproval if indistinct
	5)	What are the assumed products?				Approval	Disapproval	Disapproval if indistinct
	6)	Who are the assumed finance sources?				Approval	Disapproval	Disapproval if indistinct
	7)	Where is the assumed market?				Approval	Disapproval	Disapproval if indistinct
	8)	Are the proposed trees fit for the site?	Yes	No		Approval	Disapproval	Disapproval if indistinct
	9)	How much productivity is expected from the proposed products?	m^3/ha/year '			Approval	Disapproval	Disapproval if indistinct
	10)	Are the land-use rights of the plantation candidate site area clear?	Yes	No		Approval	Disapproval	Disapproval if 'No'
	11)	Is there a high risk of critical negative impact on the environment?	Yes	No		Approval	Disapproval	Disapproval if 'Yes'

	Evaluation item	Contents		Supplementary explanation	Judgment		Note
12)	Are there any issues between inhabitants and the implementation body?	Yes	No		Approval	Disapproval	D-isapproval if 'Yes'
13)	Is a topographical map on a scale of more than 1/50,000 available? If so, what is the map scale?	Yes	No		Approval	Disapproval	Disapproval if 'No'
14)	Is an actual forest type map on a scale of more than 1/25,000 available? If so, what is the map scale?	Yes	No		Approval	Disapproval	D if 'No'
15)	Is an actual land-use map on a scale of more than 1/50,000 available? If so, what is the map scale?	Yes	No		Approval	Disapproval	Disapproval if 'No'
16)	Is a soil map on a scale of more than 1/100,000 available? If so, what is the map scale?	Yes	No		Approval	Disapproval	Disapproval if 'No'

(2) Aptitude conditions

		Evaluation item	Score for each category					Applicable score	Supplementary explanation
			4	3	2	1	0		
1)	Market	Area size of candidate site for plantation	10000ha<	50000-10000ha	2000-5000ha	1000-2000ha	<1000ha		
		Demand (market availability)	very active	active	less active	not active	non		
		Access to main road/waterway for timber transport (minimum distance from the edge of proposed site to main paved road/waterway)	<100m	100-500m	500-1000m	1000-5000m	5000m<		
		Distance between candidate site for plantation and roadway	<50m	50-100m	100-200m	200-500m	500m<		
		Distance between candidate site for plantation and nursery	<10km	10-30km	30-50km	50-100km	100km<		
		Distribution of candidate site for plantation	extreme concentrated distributed	concentrated distributed	medium	scattered distributed	extreme scattered distributed		
2)	Land condition	Percentage of the area of unstocked forest land in the proposed area	70%<	50-70%	30-50%	10-30%	<10%		
		Inclination	<8°	8°-20°	20°-30°	30°-40°	40°<		
		Soil	extremely fertile soil	fertile soil	medium	poor soil	extremely poor soil		
		Aptitude of proposed tree species for soil	extremely high	high	medium	low	extremely low		
		Productivity of proposed tree species	extremely high	high	medium	low	extremely low		
		Coverage of candidate site for plantation by trees for at	not covered	-	-	-	covered		

		Evaluation item	Score for each category					Applicable score	Supplementary explanation
			4	**3**	**2**	**1**	**0**		
		least the past 5 years							
3)	Disasters	Forest fires around the proposed project area	none	rare	not many	many	very many		
		Storms	none	rare	not many	many	very many		
4)	Sustainability	Consistency with policy	extremely high	high	medium	low	extremely low		
		Administrative structure of local government	very good	good	medium	bad	very bad		
		Establishment of silviculture technique for the proposed tree species	established	-	-	-	not established		
		Incentive of implementation body	extremely high	high	medium	low	extremely low		
		Incentive of inhabitants	extremely high	high	medium	low	extremely low		
		Procurement of labor	very easy	easy	medium	difficult	very difficult		
		Number of beneficiaries	very many	many	not many	few	none		
		Profitability	extremely high	high	medium	low	extremely low		
5)	Social factors	Slash-and-burn agriculture	none	rare	not many	many	very many		
		Grazing	none	rare	not many	many	very many		
		Illegal occupants	none	rare	not many	many	very many		
		Conflict between inhabitants	none	rare	not many	many	very many		
6)	Environmental impact	Negative impact on the natural environment from the proposed project	none	minimal	small	much	very much		
		Negative impact on the social environment from the proposed project	none	minimal	small	much	very much		

Total score	

Average score	
Judgment	Approval (score>=2)
	Disapproval (score<2)

2. Agroforestry

(1) Indispensable conditions

	Evaluation item	Contents		Supplementary explanation	Judgment		Note
1)	Can positive participation from the PST be expected in preparation work for F/S and IP?	Yes	No		Approval	Disapproval	Disapproval if 'No'
2)	What are the objectives of proposed agroforestry project?				Approval	Disapproval	Disapproval if indistinct
3)	Who is the assumed implementation body?				Approval	Disapproval	Disapproval if indistinct
4)	What are the assumed products? a) Wood products b) Non-wood forest products c) farm products d) livestock e) aquatic products f) others				Approval	Disapproval	Disapproval if indistinct
5)	Who is the assumed finance source? (e.g. self-capital, bank loan, international donor etc.)				Approval	Disapproval	Disapproval if indistinct
6)	Where is the assumed market?				Approval	Disapproval	Disapproval if indistinct
7)	Are the proposed trees fit for the site?	Yes	No		Approval	Disapproval	Disapproval if indistinct
8)	What percentage of unstocked land is there in the proposed forest land?	%			Approval	Disapproval	Disapproval if less than 50%

		Evaluation item	Contents		Supplementary explanation	Judgment		Note
9)		Are the land use rights of the candidate site for the plantation clear?	Yes	No		Approval	Disapproval	Disapproval if 'No'
10)		Is there a high risk of critical negative impact on the environment?	Yes	No		Approval	Disapproval	Disapproval if 'Yes'
11)		Are there any issues between inhabitants and the implementation body?	Yes	No		Approval	Disapproval	Disapproval if 'Yes'
12)		Is a topographical map on a scale of more than 1/50,000 available? If so, what is the map scale?	Yes	No		Approval	Disapproval	Disapproval if 'No'
13)		Is an actual forest type map on a the scale of more than 1/25,000 available? If so, what is the map scale?	Yes	No		Approval	Disapproval	Disapproval if 'No'
14)		Is an actual land-use map on a scale of more than 1/50,000 available? If so, what is the map scale?	Yes	No		Approval	Disapproval	Disapproval if 'No'
15)		Is a soil map on a scale of more than 1/100,000 available? If so, what is the map scale?	Yes	No		Approval	Disapproval	Disapproval if 'No'

(2) Aptitude conditions

		Evaluation item	Score of each category					Applicable score	Supplementary explanation
			4	**3**	**2**	**1**	**0**		
1)	Market	Demand (market availability)	very active	active	less active	not active	none		
		Access to main road/waterway for timber transport (minimum distance from the edge of proposed site to main paved road/waterway)	<100m	100-500m	500-1000m	1000-5000m	5000m<		
		Distance between candidate site for plantation and nursery	<10km	10-30km	30-50km	50-100km	100km<		
		Distribution of candidate site for agroforstry	extreme concentrated distributed	concentrated distributed	medium	scattered distributed	extreme scattered distributed		
2)	Land condition	Percentage of the area of unstocked forest land in the proposed area	90%<	70-90%	50-70%	30-50%	<30%		
		Inclination	<8°	8°-20°	20°-30°	30°-40°	40°<		
		Soil	extremely fertile	fertile	medium	poor	extremely poor		
		Aptitude of proposed tree species for soil	extremely high	high	medium	low	extremely low		
		Coverage of candidate site for plantation by trees for at least the past 5 years	not covered	-	-	-	covered		
3)	Disaster	Forest fires around the proposed project area	none	rare	not many	many	very many		
		Storms	none	rare	not many	many	very many		
4)	Sustaina bility	Consistency with policy	extremely high	high	medium	low	extremely low		
		Administrative structure of local government	very good	good	medium	bad	very bad		

		Evaluation item	Score of each category					Applicable score	Supplementary explanation
			4	3	2	1	0		
		Establishment of silviculture technique for the proposed tree species	established	-	-	-	not established		
		Incentive of implementation body	extremely high	high	medium	low	extremely low		
		Incentive of inhabitants	extremely high	high	medium	low	extremely low		
		Procurement of labor	very easy	easy	medium	difficult	very difficult		
		Number of beneficiaries	very many	many	a few	few	none		
		Improvement of inhabitants' livelihood	very strongly expected	strongly expected	expected	not strongly expected	cannot be expected		
5)	Social factor	Slash-and-burn agriculture	none	rare	not much	much	very much		
		Grazing	none	rare	not much	much	very much		
		Illegal occupant	none	rare	not many	many	very many		
		Conflict of inhabitants	none	rare	not much	much	very much		
		Destitute people	very many	many	not many	few	none		
6)	Environmental impact	Negative impact on the natural environment caused from the proposed project	none	minimal	small	much	very much		
		Negative impact on the social environment from the proposed project	none	minimal	small	much	very much		

Total score	
Average score	
Judgment	Approval (score>=2)
	Disapproval (score<2)

3. Protection forest

(1) Indispensable conditions

	Evaluation item	Contents		Supplementary explanation	Judgment		Note
1)	Can positive participation from the PST be expected in preparation work for F/S and IP?	Yes	No		Approval	Disapproval	Disapproval if 'No'
2)	What are the objectives of the proposed protection forest project?				Approval	Disapproval	Disapproval if indistinct
3)	Who is the assumed implementation body?				Approval	Disapproval	Disapproval if indistinct
4)	Who is the assumed finance source?				Approval	Disapproval	Disapproval if indistinct
5)	Are the proposed trees fit for the site?				Approval	Disapproval	Disapproval if indistinct
6)	What percentage of un-stocked land is there in the proposed forest land?				Approval	Disapproval	Disapproval if less than 50%
7)	Are the land-use rights of the candidate site for the plantation clear?	Yes	No		Approval	Disapproval	Disapproval if 'No'
8)	Is there a high risk of critical negative impact on the environment?	Yes	No		Approval	Disapproval	Disapproval if 'Yes'
9)	Are there any issues between inhabitants and the implementation body	Yes	No		Approval	Disapproval	Disapproval if 'Yes'
10)	Is a topographical map on a the scale of more than 1/50,000 available? If so, what is the map scale?	Yes	No		Approval	Disapproval	Disapproval if 'No'

11)	Is an actual forest type map on a scale of more than 1/25,000 available? If so, what is the map scale?	Yes	No			Approval	Disapproval	Disapproval if 'No'
12)	Is an actual land-use map on a scale of more than 1/50,000 available? If so, what is the map scale?	Yes	No			Approval	Disapproval	Disapproval if 'No'
13)	Is a soil map on a scale of more than 1/100,000 available? If so, what is the map scale?	Yes	No			Approval	Disapproval	Disapproval if 'No'
14)	Is the subject to be protected identified clearly?	Yes	No			Approval	Disapproval	Disapproval if 'No'

(2) Aptitude conditions

		Evaluation item	Score of category					Applicable score	Supplementary explanation
			4	3	2	1	0		
1)	Land condition	Percentage of the area of unstocked forest land in the proposed area	70%<	50-70%	30-50%	10-30%	<10%		
		Aptitude of proposed tree species for soil	extremely high	high	medium	low	extremely low		
		Coverage of candidate site for plantation by trees for at least the past 5 years	not covered	-	-	-	covered		
2)	Disasters	Forest fire around the proposed project area	none	rare	not many	many	very many		
3)	Sustainability	Consistency with policy	extremely high	high	medium	low	extremely low		
		Administrative structure of local government	very good	good	medium	bad	very bad		
		Establishment of silviculture technique for the proposed tree species	established	-	-	-	not established		
		Incentive of implementation body	extremely high	high	medium	low	extremely low		
		Procurement of labor	very easy	easy	medium	difficult	very difficult		
		Number of beneficiaries	very many	many	not many	few	none		

4)	Social factors	Shifting cultivation	none	rare	not much	much	tvery much		
		Grazing	none	rare	not much	much	very much		
		Illegal occupant	none	rare	not many	many	very many		
		Conflict of inhabitants	none	rare	not much	much	very much		
5)	Environmental impact	Negative impact on the natural environment from the proposed project	none	minimal	small	much	very much		
		Negative impact on the social environment from the proposed project	none	minimal	small	much	very much		

Total score	
Average score	
Judgment	Approval (score>=2)
	Disapproval (score<2)

Chapter 2. Method of Project Option Evaluation

2.1   Basic Idea of Project Option Evaluation

The project option evaluation is part of the feasibility study process to screen various project options and then select the most feasible one. Such evaluation helps project planners to identify the most feasible option from a number choices in the early planning stage of the project. It will also be conducted in a less costly manner; under the FICAB Study, the Study Team has been trying to develop a simple method for project option evaluation, which should be well adopted into the project formulation method in the Vietnamese forest sector.

Initially, a long-list of project options is formulated in consideration of the natural and socio-economic conditions of targeted areas. Based on this list, a short-list of project options is prepared. Short-listed options are examined from economic, financial, technical and environmental viewpoints, and the most feasible project option is then selected based on the results of this examination. The F/S for a development project is undertaken over two phases: the first involves the preparation of an original project plan, while the second incorporates the preparation of a project plan. The project option evaluation is carried out in the first phase of the F/S for selecting the most feasible project option to be further developed into the original project plan.

2.2   Method of Project Option Evaluation

The project option evaluation is undertaken in accordance with the following four steps:

Step 1: Identification of possible key project components through
data collection and analysis

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Step 2: Preparation of a long-list of project concept alternatives

⇩

Step 3: Preparation of a short-list of project options

⇩

Step 4: Option assessment and selection of the most feasible option
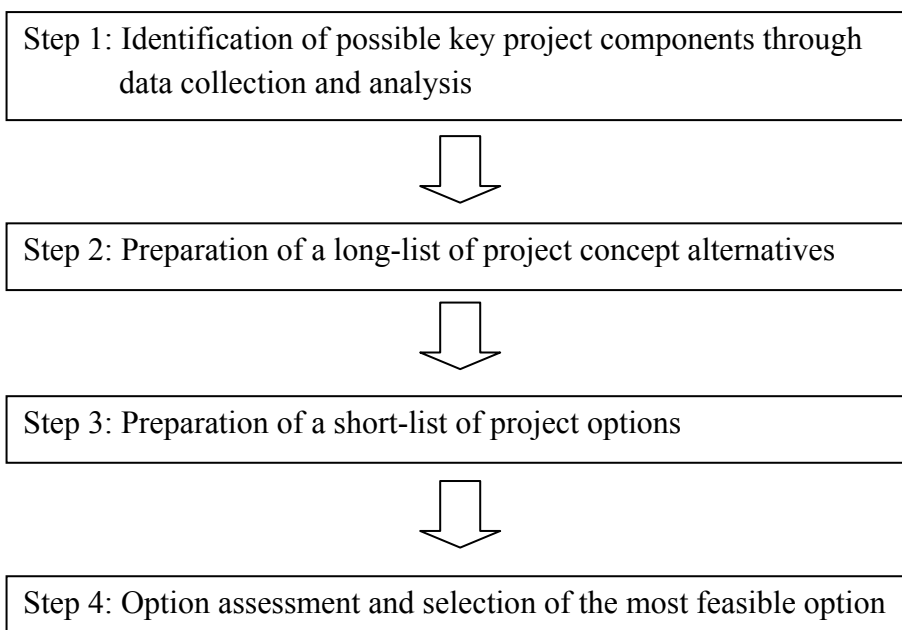
Each of these four steps is described below.

2.2.1 Step 1: Identification of possible key project elements through data collection and analysis

Data collection and analysis are initiated to identify possible key project elements (e.g. the implementing agency, type of product and financing source) at the proposed project sites. The analysis will be conducted on various aspects of the natural and socio-economic settings. The following aspects are studied:

o Current situation of forest (distribution of forest and forest resources)

o Land holding status of forest zone

o Accessibility

o Macro-natural settings (climate, soil type, land productivity, topography)

o Increment of existing and possible trees and agro-forestry species

o Macro-market potential and local market

o Local enterprises in forest-related industry and trade

o Political and institutional environment (social organization, social network structures)

o Population and demographic characteristics of related people

o Financial arrangements for potential implementing agencies

Based on analysis of the natural and socio-economic settings, possible and specific combinations of the three key project elements are identified as project concept alternatives. An example of how these key project elements are combined is shown in the table below.

Implementing agency	I-A Vinafor	I-B People (farmer)	I-C ○○○○	I-D ○○○○
Product	P-A Chip wood	P-B Furniture wood	P-C ○○○○	P-D ○○○○
Financing source	F-A DAF	F-B Private Bank	F-C ○○○○	

2.2.2   Step 2: Preparation of a long-list of project concept alternatives
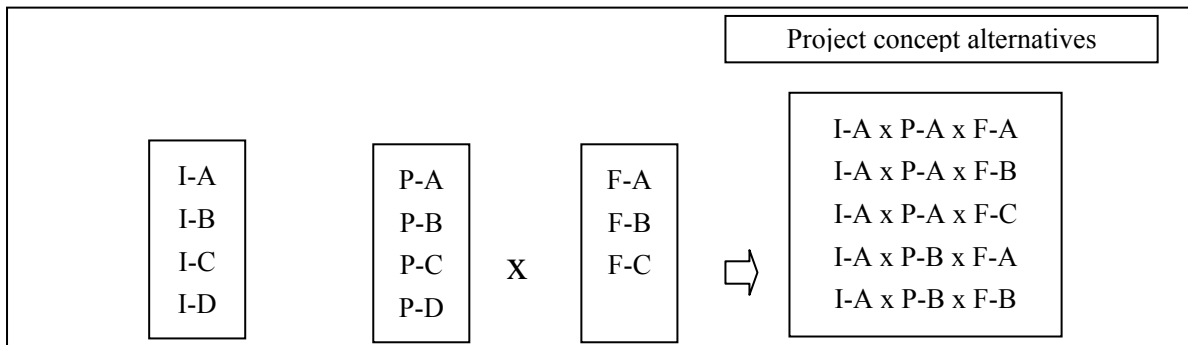
A long-list of project concept alternatives is initially prepared by identifying selected possible and specific combinations of the three key project elements. The long-list of alternatives is then further studied in terms of the physical possibility of implementation. The mechanism for preparing the initial long-list is illustrated below.

2.2.3   Step 3: Preparation of a short-list of project options

Based on the long-list of project concept alternatives, a short-list of project options is prepared taking into consideration the viability of technical, institutional and economic aspects.

2.2.4   Step 4: Option assessment

1) Criteria and indicators for the following categories will be established for assessment:

(a) Policy consideration

(b) Silvicultural technology

(c) Market potential

(d) Economic and financial evaluation

(e) Environmental impact

(f) People's opinion

(g) Social impact

(h) Comparison with similar afforestation projects in the past

2) The short-listed project options will be assessed in accordance with the criteria and indicators. If a project option highly satisfies the criteria and indicators, (**A**) is placed in the corresponding box of the table. If a project option simply satisfies, (**B**) is entered. If

it does not satisfy, (**C**) is used, and project options that do not satisfy at all receive a (**D**) rating. The following table illustrates an example of how each option is evaluated by applying different criteria.

	Option I-A x P-A x F-B	Option I-A x P-A x F-B	Option	Option
(a) Policy consideration				
(b) Silvicultural technology				
(c) Market potential				
(d) Economic and financial evaluation				
(e) Environmental impact				
(f) People's opinion				
(g) Social impact				
(h) Comparison with similar afforestation projects in the past				
Merit or demerit	1 A, 5 Bs, 2 Cs, 0 Ds	0 As, 3 Bs, 4 Cs, 1 D		
Result of assessment	Viable	Not viable		

Project options are assessed synthetically taking into consideration the number of (A), (B), (C) and (D) evaluations. The most viable project option is thus selected and a possible original project plan is prepared for the option selected.

(3) After selecting the most feasible project option, consultation with local government (such as provincial and/or district people's committee) is recommended to establish whether the option is consistent with local policy or not.

2.3 Example of Project Option Evaluation conducted in Thai Nguyen Province

In Thai Nguyen Province, project option evaluation has been conducted for two types of project, i.e. a production forest project and an agro-forestry project in Phu Binh District.

2.3.1 Step 1: Identification of possible key project elements through data collection and analysis

Based on data collection and analysis of the natural and socio-economic settings in the project area, possible key project elements have been identified.

2.3.1.1 <u>Production forest</u>

1) Possible implementing agency

Two possibilities are identified for the implementing agency of the production forest project. These are (a) a state-owned enterprise (SOE) and (b) people including private enterprises. The specific features of these possible implementing agencies are as follows:

(a) SOE (Dong Phu Forest Enterprise)

o In the five communes of Phu Binh District, SOE claims user rights over 2,000 ha of the forest land that can be used for the production forest project.

o SOE has a wide range of experience in afforestation.

o SOE has technical and institutional knowledge of afforestation.

o SOE is responsible for the provision of raw materials to VINAFOR.

(b) People (Private Sector)

o People (private sector) have forest lands.

o People (private sector) have motivations for afforestation.

o People (private sector) have labor forces for afforestation

2) Possible product types

(a) Examination of possible products in terms of natural conditions and silvicultural technology.

o Products expected to grow reasonably in consideration of natural condition such as soil type, altitude, and inclination of land: Acacia, Eucalyptus and Pine

o Products for which a wide range of technical experience for production has been accumulated in the project area: Acacia, Eucalyptus and Pine.

(b) Examination of possible products from a socio-economic viewpoint

o Products demanded in light of the situation of local people's life and local industry: resin, furniture wood

o Products preferred by local people for production due to high market demand: chip wood, furniture wood

o Products whose production is encouraged by the local authority: wood for industry (chip wood, particle-board wood)

o Products demanded by processing factories, located in and around the project area : particle-board wood

o Products convenient for transportation due to the short distance to a port for export: chip wood

3) Possible financing sources

The following financing sources have been identified:

(a) Self capital from people (private sector)

(b) Bank loan (Vietnam Bank for Social Policies) for people (private sector)

(c) Preferential loan (DAF) for SOE

(d) State budget (773 program) for people (private sector)

The key project elements identified for production forest project are shown in Table 1 below.

Table 1   Project elements for production forest project

Project element	
Implementing agency	People (private sector)
	State-owned enterprise
Products	Household wood
	Particle-board wood
	Chip wood
	Household wood + particle board
	Household wood+ chip wood
	Pine resin
Financing sources	Self capital
	Bank loan
	Preferential loan
	State budget

2.3.1.2 *Agro-forestry*

1) Possible implementing agency

Agro-forestry is conducted with the aim of harmonizing protection function of forests with agricultural production activities carried out mainly by farmers. It is therefore considered that the implementing agency will be a farmer.

2) Possible product types

Agricultural and forestry products are selected in consideration of the following points:

a) combination of products that have actually been observed in the project area;

b) products for which a firm demand is expected deriving from the conditions of local people's life and local industry;

c) products that local people prefer to plant because of good market demand.

The possible combination of agricultural and forestry products is examined in light of the prevailing natural conditions and silvicultural technology.

3) Possible financing sources

It is learned that loans from banks such as the Vietnam Bank for Social Policies (VBSP) are being utilized, with some agro-forestry projects also being assisted by international donor institutions. VBSP and international donor institutions are therefore considered as possible financing sources for agro-forestry. In addition, because incomes are also expected annually from agricultural products in the case of agro-forestry, the self-capital of people (farmers) is also considered as financing source.

The key project elements have been identified for agro-forestry project as in Table 2 below.

Table 2 Project elements in agro-forestry project

Implementing agency	Local people fFarmer)
Products	Agricultural products (tea, maize etc.) + forest products (short-term wood species)
	Agricultural products (tea, maize etc.) + forest products (long-term wood species)
	Agricultural products (tea, maize etc.) + forest products (pine resin)
	VAC-R system (garden + pond + livestock – forest)
Financing sources	Self-capital
	Bank loan
	Assistance from international donors

2.3.2 Step 2: Preparation of a long-list of project concept alternatives

A long-list of project concept alternatives has been prepared by combining the three key project elements. As combinations of the elements are created mechanically, project concept alternatives, that are not likely to be implemented, are also included. Project concept alternatives for the long-list are therefore examined from the viewpoint of physical feasibility. Consequently, for production forest projects, fourteen (14) possible project concept alternatives have been selected as shown in Table 3 below. For agro-forestry project, twelve (12) project concept alternatives have been set up as shown in Table 4.

Table 3   Long-list of project concept alternatives for production forest

	Implementing agency	Products	Financing sources
5	People	Particle-board wood	Self-capital
6	People	Particle-board wood	Bank loan
9	People	Chip wood	Self-capital
10	People	Chip wood	Bank loan
13	People	Household wood + particle board wood	Self capital
14	People	Household wood + particle board wood	Bank loan
17	People	Household wood + chip wood	Self-capital
18	People	Household wood + chip wood	Bank loan
30	SOE	Particle-board wood	Bank loan
31	SOE	Particle-board wood	Preferential loan
34	SOE	Chip wood	Bank loan
38	SOE	Household wood + particle-board wood	Bank loan
39	SOE	Household wood + particle-board wood	Preferential loan
42	SOE	Household wood + chip wood	Bank loan

Table 4   Long-list of project concept alternatives for agro-forestry

No	Implementing agency	Products	Financing source
1	People	Agricultural products (tea, maize etc.)+ forest products (short-term wood species)	Self-capital
2			Bank loan
3			International donor
4		Agricultural products (tea, maize etc.)+ forest products (long-term wood species)	Self-capital
5			Bank loan
6			International donor
7		Agricultural products (tea, maize etc.)+ forest products (pine resin)	Self-capital
8			Bank loan
9			International donor
10		VAC-R system (garden + pond + livestock – forest)	Self-capital
11			Bank loan
12			International donor

2.3.3   *Step 3: Preparation of a short-list of project options*

Project concept alternatives on the long-list are examined for feasibility in terms of their institutional, technical and economic aspects. Government policy directions, local socio-economic situations, and natural conditions are also taken into consideration as outlined below.

2.3.3.1   *Technical aspect*

1) As short-rotation forestry has been applied for confirmation in many provinces and in silvicultural technologies such as planting, tending and harvesting, there are no specific problems on this technical aspect.

2) Silvicultural technology has not been confirmed for long-rotation forestry such as production of furniture wood, which requires a period of more than 20 years.

2.3.3.2   *Economical aspect*

1) It is considered that production of furniture wood and resin, which require more than 20 years for harvesting, would not be economically feasible due to the long investment period involved.

2) Products with a high market price are selected as specific case for key project elements.

2.3.3.3   *Institutional aspect*

1) SOE (Dong Phu F.E) is a subsidiary of VINAFOR and is expected to provide raw materials to a particle board factory.

2) Farmers do not qualify for preferential DAF loans.

3) The state budget is allocated mainly for protection forest.

4) The possibility of introducing finance from international donors is low. This is because international donors have guidelines for assistance such as poverty reduction and environmental protection, meaning that the priority for assistance by international donors in the case of Thai Nguyen Province is not so high.

Short-listed project options for production forest and agro-forestry project are shown as in Tables 5 and 6 respectively.

Table 5 Short-list of project options for production forest project

	Implementing agency	Products	Financing source
17	People	Chip wood + household wood	Self-capital
18	People	Chip wood + household wood	Bank loan

| 39 | SOE | Particle-board wood + household wood | Preferential loan |

Table 6 Short-list of project options for Agro-forestry project

	Implementing agency	Products	Financing sources
1	Farmer	Agricultural products (tea, maize etc.) + forest products (short-term wood species)	Self-capital
2	Farmer	Agricultural products (tea, maize etc.) + forest products (short-term wood species)	Bank loan
9	Farmer	Agricultural products (tea, maize etc.) + forest products (pine resin)	Self capital

2.3.4   Step 4: Option assessment and selection of the most feasible project option

In order to select the most feasible one from the short-listed project options, assessment criteria are set up as in Table 7.

Table 7 Assessment criteria for selecting the most feasible option

Category	Criteria	Indicator
Policy consideration	Balance among key policy considerations (economic efficiency, environmental sustainability and social equity)	Whether or not the project option takes into account three key policy considerations
Silvicultural technology	Appropriateness of operations	Whether or not the operations of the project option satisfy technological rationality
Market potential	Accessibility to market	Whether or not the targeted market accepts the products - market location - transportation network
Economic & financial evaluation	Profitability Rough estimate of profitability (cash inflow and outflow) based on the unit benefits and costs	Whether or not the project option yields profit - project cost - sales -terms and conditions from financial sources -project schedule
Environmental impact	Sensitive activity	Whether or not the operations of the project option affect environment such as river, soil and atmosphere
People's opinion	Priority of the people, people's need	Is the priority of the project option high among the people?
Social impact	Sensitive activity	Whether or not the operations of the project option affect people's lives, and if so how ? - changes in traditional land tenure and land use - widening of the socioeconomic gap - negative impact on poverty, gender and ethnic minority
Comparison with similar afforestation projects in the past	Comparison with past practices good or bad cases)	Whether or not the project option contain any lessons learned or bad practices from past projects

The project options of the short-list are examined in terms of the extent to which they satisfy the criteria in Table 7. The result of assessment are indicated by the four grades of satisfaction level shown below, and synthetic examination to establish the most

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feasible is carried out. Project option No.39 for the production forest project and option No.2 for the agro-forestry project are selected respectively as the most feasible options. The results of assessment are shown in Table 8 and 9 using the following symbols:

A for criteria being highly satisfied

B for criteria being satisfied

C for criteria not being satisfied

D for criteria not being satisfied at all

Table 8 The result of Project Option Evaluation for production forest project

Category	Project option no.		
	17	18	39
Policy consideration	B	B	B
Silvicultural technology	C	C	B
Market potential	C	C	B
Economic & financial evaluation	D	B	A
Environmental impact	B	B	B
People's opinion	C	B	C
Social impact	C	B	C
Comparison with similar afforestation projects in the past	C	C	A

Project option No.39 is a project in which the implementing agency is SOE (Dong Phu F.E), financing source is a preferential loan from the DAF and the products is wood for particle board for the Thai Nguyen Particle Board Factory. To ensure the smooth implementation of the project, it is necessary to reconsider the terms and conditions of contracts between SOE and farmers in the F/S, over which concerns were raised at the communal consultation meeting (CCM) held in August 2005. Despite the concerns of farmers, however, it is considered that project option No.39 is the most feasible because satisfies the criteria concerning natural and socio-economic conditions and the direction of local government policy.

Table 9 The result of Project Option Evaluation for agro-forestry project

Category	Project option no.		
	1	2	9
Policy consideration	B	B	C
Silvicultural technology	B	B	B
Market potential	C	C	C
Economic & financial evaluation	C	B	C
Environmental impact	B	B	B
People's opinion	D	B	C
Social impact	C	B	C
Comparison with similar afforestation projects in the past	C	C	C

Project option No.2 is a combination of agricultural products (tea, maize etc.) and forestry products (chip wood from short-term species) and financing source is a loan from VBSP. This is considered feasible as farmers with insufficient self-capital can obtain low-interest loans from the VBSP. It is possible to manage the planting site using the income from agricultural products during the seven year period until the harvesting of forestry products. However to ensure smooth implementation it is necessary to examine the terms and conditions of loans from the VBSP, as concerns were raised by participants of CCM about the repayment of loans.

Chapter 3. Overview of Field Survey and Analysis (Natural Environmental Outline Survey, Forest Resource Assessment, Mapping and Survey on Landownership and its Use)

3.1 Introduction

3.1.1 Background of know-how

The field survey and analysis in the first level of afforestation planning are for the preparation of base maps and other basic data/information for selection of a suitable project area, tree species, techniques and management system etc. Field surveys include natural environmental outline survey (soil survey), forest resource assessment, a survey on landownership and use and mapping.

This field survey know-how is aimed at detailing and modifying these surveying techniques, forest classification and land-use planning etc. to better reflect reality on the ground and prepare a basis for more feasible afforestation planning (preparing base map and basic data) by applying the methodologies and perspectives/considerations analyzed/suggested in HIF[1] exercise results (see Table 1-1) such as the Forestry Sector Manual. This expertise will contribute to the standardization and streamlining information collection while better reflecting the ground reality on land issues.

3.1.2 Flow and relationship of surveys

Each survey process is simple but direct and detailed process involving the participation of internal/external target groups in the project areas. A hey point in this process the efficient use of existing data/information/tools.

The relationships between each field survey are shown in figure below (Figure1-1). Data/information from natural environmental outline survey, assessment of forest resources and survey on landownership and its use are applied to modify the various existing maps in the mapping process. Modified and overlaid maps (base map) and other data from field survey are the basic items for afforestation project planning.

The detailed process of and relationship between each survey are described in the following section.

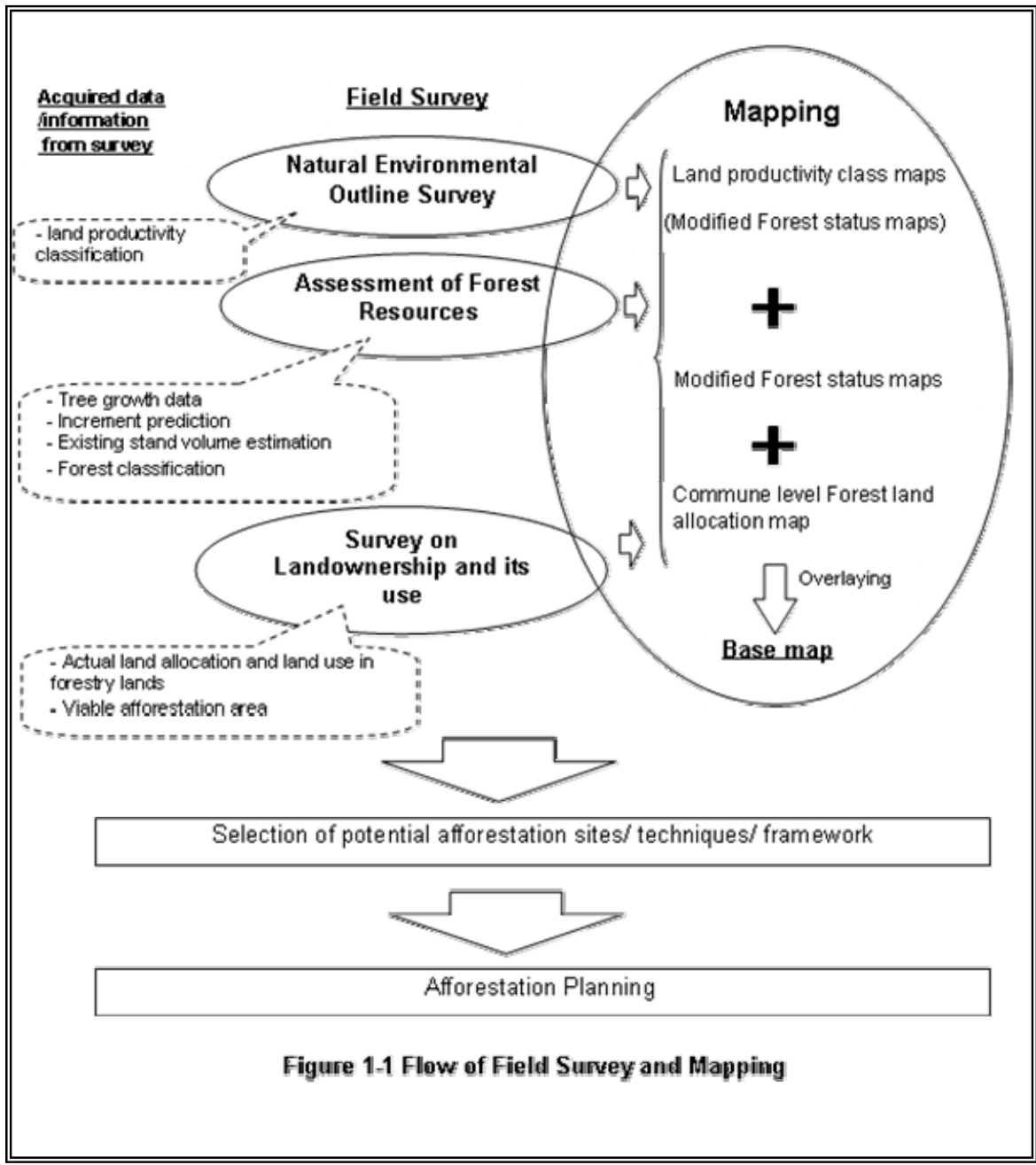[1] Harmonization of Investment Procedures and Project Implementation Frameworks in the Forestry Sector

Figure 1-1 Flow of Field Survey and Mapping

Table 1-1 Needs Matrix for Development of Know-how for Field Survey and Analysis on Natural Conditions and Land ownership and its use in Socio-economic conditions from the HIF Exercise Results

HIF exercise results Relevant issues raised in the analyzed shortcomings and suggestions (FSSP 2005[2])		Relevant category/ sub-category/ work items of required capacity/ Curriculum Code	Needs/ considerations for know-how development for each capacity
1. Project design, preparation (2.4): (a) Slow disbursement (Para. 66) (b) Realistic planning (Suggestion 3. (vi))	**2. Investment preparation (2.6)**		**Generals for natural conditions and landownership and its use in socio-economic conditions** o Standardized information collection and analysis by demanding minimum quantity but satisfactory quality for identification of potential investment activities and M & E of the project impact o Detailing and modifying official database available to better reflect the reality on the ground for criteria for selection of project areas and technical standard /cost norms for tree planting according to the decentralized/ variations of natural conditions with a kind of bottom-up approach, while preventing the risk that project databases may not sustained after end of project due to large differences from the official database.
1.1 Physical and institutional data base (2.4.2): (a) Ambiguousness of official physical data (Para. 71) o Inaccurate information o Overestimated disbursement rates (b) M & E system to satisfy project specific information needs (Suggestion 5. (vii))	**2.1 Commune Selection (2.6.1)** (a) Disputed issues on commune selection (Para. 131) (b) Criteria for selection of project communes (Suggestion 26. (1)) o Remaining natural forest o Minimum area available for forest plantations o % of population depending on forest	o Assessment of forest resources/4-a-i) o Landownership and its use/4-b-ii) o Mapping/4-a-iii)	
	2.2 Collection and analysis of basic physical and socio-economic data (2.6.2) (a) PRA[3] is a rather time-consuming and costly exercise (Para. 133) (b) Time-consuming information process (Para. 135) o Not standardized formats o Large amount of information requested o Unsatisfactory quantity and quality of collected information (c) High importance of the quality and relevance of data collected and analyzed as the basis for o Identification of potential investment activities (in planning) o M & E of the project impact (Para. 136) (d) A standardized format for databases and training on information collection and processing (Suggestion 27)	o Soil/ 4-a-i) o Assessment of forest resources/4-a-ii) o Landownership and its use/4-b-ii) o Mapping/4-a-iii)	**4-a-i) Soil** o For detailed and modified forest classification and land use planning using a landscape approach and to better reflect the reality on the ground o For technical standard/ cost norms for tree planting according to the decentralized/ variety of natural conditions
1.2 Priorities, objectives, tasks, timeframe (2.4.3)	**2.3 Forest zoning and classification (2.6.3)** (a) Different features (Para. 137)	o Assessment of forest resources/4-a-ii)	

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[2] Inter-ministerial HIF Working Group, 2005: Scope and Options for a Harmonization of Investment Procedures and Project Implementation Frameworks in the Forestry Sector, Part 1: Main Report

[3] Participatory Rural Appraisal methods

(a) At least 2 years to prepare due to time-consuming activities such as land use planning and land allocation (Para. 77) (b) Land and forest resource inventory, land use planning and land allocation before implementation (Suggestion (iv))	(b) Protection level o Categorized three type of forest o Further detailed and modified to better reflect the reality on the ground o Forest classification compulsory step (Para. 138) (c) To decide potential land use planning and investment planning o Considerable effort into land use and activity planning village level and aggregated results to commune level o Detailed classification from such bottom-up approach different from the official database available, create the risk that project databases may not be sustained after the end of the project (d) On regional level, support forest classification in line with government regulation using a landscape approach (Suggestion 28 (1))	o Landownership and its use/4-b-ii) o Mapping/4-a-iii)	**4-a-ii) Assessment of forest resources** o For selection of project areas and M & E of the project impact such as remaining natural forests and forest plantations o For detailed and modified forest classification to better reflect the reality on the ground to decide project sites, potential land use planning and investment planning
	2.4 Land use inventories and land use planning (LUP) (2.6.4) **2.5 Land allocation (LA) (2.6.5)** (a) LUP and LA for planning and ensuring the sustainability of project investments (Para. 140-142) o Complicated multi-sector approaches of guidance of the MONRE/DONRE in the course of socio-economic development as well as staff qualification and equipment available in remote districts not yet sufficient	o Landownership and its use/4-b-ii) o Mapping/4-a-iii)	**4-a-iii) Mapping** (a) To aid countermeasure against issue 2) of generals above by combining information on soil and land ownership and its use in forest classification (b) For managing/monitoring a large number of individual plots scattered over a wide area with limited staff

o No local participation and multi-sectoral approach in LUP for 661 program (only to choose the areas for forest plantation and forest regeneration zoning) and no effective use by other sectors o Detailed LUP with active participation of local people different from official database o No clear mechanism to link regional, macro LUP with community-based micro LUP and no close cooperation with DONRE in the course of LUP which was often done by FIPI (b) In line with the new Land Law (effective since 1/7/2004) and the revised Forest Protection and Development Law (to be issued in Nov. 2004) (Suggestion 29) o To ensure (i) participation of relevant authorities, technical agencies, land users and other interested parties and (ii) application of improved technologies such as GIS o LUP in remote communes to be prioritized prior to start investments (c) Low unit prices for LUP and LA that caused further delays in the implementation speed (Par. 144) (d) LUP and LA for forest land rather complex and time-consuming (Para. 145) o Strenuous fieldwork for identifying boundary lines and measuring the fields o Faced conflict among villagers, and villagers themselves, over land issues (e) Not so much contribution from LA to individual households in support of sustainable forest management (Para. 146) o Neglecting to provide for traditional land management features (e.g. rather long-standing traditions of collective forest utilization by ethnic minorities in the mountainous areas in North and Central Vietnam) o LA to individual household not adequate to facilitate sustainable management of permanent natural forests (f) Village communities allowed for LA in the new Land Law and the revised Forest Protection and Development Law (Para. 147) o Possible LA in forest land to villagers, whole communes, without demarcating border lines between villagers, which is a normal procedure for Kinh-Vietnamese, but is not available for most ethnic minorities o Process of LA must be linked with the introduction of appropriate forest inventory, forest management planning, and forest harvesting techniques (g) Starting with investment implementation after preparation of commune proposals for LA to avoid administration delays in the issuance of land certificates affecting the speed of investment implementation (Suggestion30 (ii))	**4-b-ii) Land ownership and its use** (a) For preparing information on land use inventory and land use planning as well as land allocation with the application of improved technologies such as GIS before starting investment implementation for o selection of project areas and M & E of the project impact such as minimum area for forest plantation and population depending on forests planning o ensuring sustainability of project investments o avoiding delays in implementation by reducing strenuous field work for identifying boundary lines and preventing conflict (b) For detailed and modified official database available with a kind of bottom-up approach substituting for PRA (participation of local people); o to better reflect the reality of local people (e.g. self-awareness, volunteer spirit, and commitment) focusing on group of households to contribute to sustainable forest management o to better plan land-use activities bound to weather seasons

1.3 Procedural basis (2.4.5) (a) Still new to local governments such as environmental impact assessment (Para. 85) (b) Safeguard policies (environmental impact assessment) enclosed with procedures (Suggestion 10. (ii))	**2.6 Technical designs and contracting** (a) Field design taking a lot of time to visit individual plots and slowing down speed of implementation (Para. 155) o Small jobs and scattered over large areas in agricultural/agroforestry and forestry works o The success of investment implementation depending on the self-awareness, volunteer spirit, and commitment of the local people (Para. 158) (b) Farm households being the majority of contractors for agriculture/agroforestry and forestry investments which is an advantage since any profit margins go to the farmers, but also a disadvantage as it is not easy to manage and administer a large number of households over a wide area or to monitor the work with limited staff (c) Good results seen from forest protection and development contracts made with groups of households, while simplifying administrative work (Suggestion 33)	o Landownership and its use/4-b-ii) o Mapping/4-a-iii) o Evaluation of environmental & social aspect/ 6-b	**6-b) Evaluation of environmental & social aspect** o For planning and securing safeguard polices and procedures of environmental impact assessment in preparation and implementation of the project o For preparing information on baseline for environmental impact assessment
1.4 Financial management aspects (2.4.6) (a) Process of decentralization, and the great variety of natural resources (Para. 88) (b) A framework for technical standards and cost norms and actual investment costs according to provincial polices (Suggestion 11. (iii))	**3. Financial management (2.8)** **3.1 Financial planning (2.8.2)** Most activities bound to certain seasons (e.g. tree planting in wet season) making it often impossible to finalize activities in such a way as to ensure final acceptance checks and subsequent payments by end of the fiscal year (i.e. by December) (Para. 176) Most activities delayed de to slow bidding and/or their dependence on weather seasons (Suggestion 38 (v))	o Landownership and its use/4-b-I)	
	3.2 Cost norms (2.8.3) Many cost norms similar to 661 program, prepared many years ago (outdated and still in use) (Para. 180) Cost norms for tree planting to be reflect the silvicultural management objective of the plantation whether with investments phased over several years or not (Suggestion 39. (iv))	o Soil/ 4-a-I)	

3.2 Field survey

3.2.1 Natural Environment Outline Survey

The purpose of natural environment outline survey is to prepare data/information of general natural environment conditions in F/S and land productivity classification. This survey process involves the collection of existing data for macro-natural environments and a land evaluation process consisting of land capability evaluation and land suitability evaluation, and standardized information collection (see Figure 2-1) is used for this purpose. The analysis demands only minimum quantity of work, but the quality must be high enough to enable identification of potential investment activities (see the sources
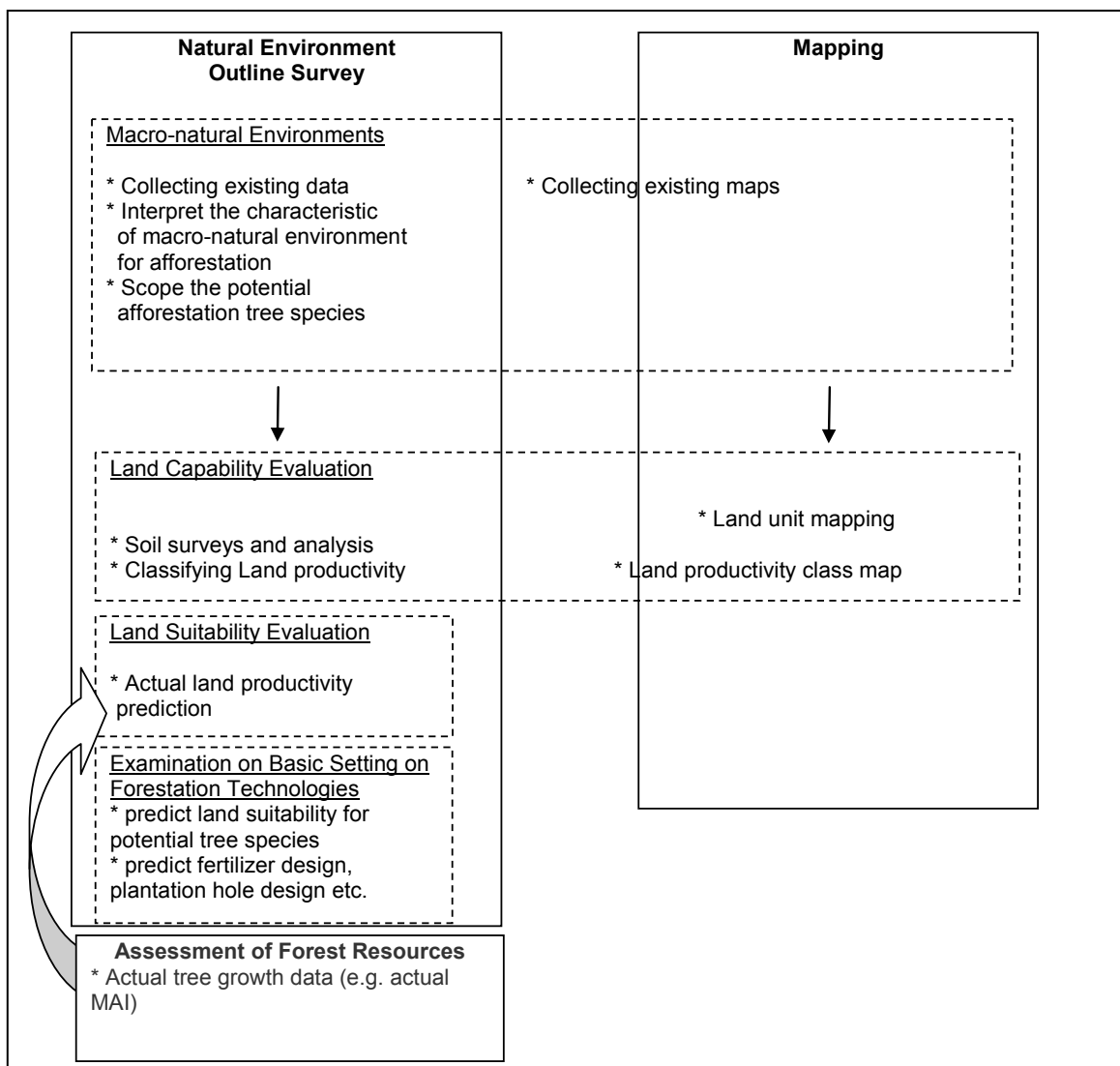
shown in Table 2-1).

Figure 2-1 Structure of Natural Environment Outline Survey

3.2.1.1 1.2 Methodologies

- Macro-natural Environments

(1) Collect existing information on macro-natural environments as described the main volume of the F/S manual

(2) Interpret the characteristics of macro-natural environments for afforestation by tabulation and/or diagramming or figuring the current status in and around the project area

(3) Scope the potential afforestation tree species according to eco-zone correlated site conditions for planting priority species defined by information on altitude and such climatic conditions as annual precipitation, length of dry season and annual temperature as well as soil type

(4) Predict risk of <u>damages derived from typhoon or strong wind</u>[4]. Ascertain potential water source sites for nurseries utilizing metrological data as well as possible rives or channels for water transportation of harvest or primary product utilizing topographic maps and other ground information on potential rivers/channels.

Table 2-1. Target Level Alternatives on Information Accuracy on Land Capability Evaluation

Natural environment		Potential investment activity	
		Growth characteristics/ potential rotation of afforestation tree species	
Potential land productivity	Data availability on actual soil properties (soil field survey results/ laboratory analysis data	Fast-growing/ short-term rotation	Non-fast-growing/ long-term rotation
Fertile	Available	Level 3	Level 2
	Only field survey results/ Only laboratory analysis data	Level 2	Level 2
	No available	Level 2	Level 1
Poor	Available	Level 2	Level 3
	Only field survey results/ only laboratory analysis data	Level 1	Level 2
	No available	Level 1 (CoP)	Level 1

Level 1: Need to conduct soil field surveys and obtain laboratory analysis data from the project area to better reflect the reality on the ground

Level 2: Need to check by conducting only soil field surveys or laboratory analysis in the project area to reflect the reality on the ground

Level 3: Existing information only can be used without field checking

- Land Capability Evaluation

The activities involved in land capability evaluation are aimed at evaluating current land productivity and identifying the allocation by each productivity class.

Land capability evaluation includes (1) land unit mapping indoor, (2) soil surveying in the field and (3) classifying land productivity. The field survey (soil survey) level for

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[4] *Some tree species such as A.hybrid are particularly vulnerable to wind damage*.

land capability evaluation depends on the natural environment conditions in project areas. It is possible to save time on surveying if the field condition is Level 2 or 3. Table below shows the ecessary level for each field condition. It is better to select the soil survey level according to the condition of the project areas before starting the survey.

(1) Land unit mapping

Land unit mapping forms the base of the land productivity class map.

o Overlay topographic maps, soil maps and the other thematic maps collected after adjusting the scale to that of the target mapping scale (see know-how in "Mapping")

o Delineate land units by hand using standardized land units identified by five major factors[5] in Vietnam and the criteria for classifying site at Level I and II for afforestation design and forest land-use planning (FIPI, 1984) as shown in Table 2-2.

Table 2-2 Example Classification on Land Unit in the CoP

Factor	Class				
Topography	T: Valleys	D2: Flat	D: Hilly terrain		
Slope	I: Less than 8 degree	II: 8-15 degree	III: 16-25 degree	IV: 26-35 degree	V: More than 35 degree
Bed rock	dl: Valley based –accumulated soil	o: Ancient alluvium	q: Sandstone	s: Shale	
Soil type	dl: Accumulated soil distributed in valleys	P: Ancient alluvium	F: Feralite		
Thickness of layer	Mark -(above bed rock symbol): over 80cm	No mark -(above bed rock symbol): 30-80cm			

(2) Soil surveys and analysis

o Procure/ collaborate with an outside specialist or organization to assess land capability evaluation by checking actual soil properties

o Plan/Perform soil profile observation and description and/or referring the existing data in or near project site, focusing on the important physical properties

- to check actual conditions of factors for land unit classification such as actual soil type and thickness of layer and to classify soils for plantation hole design issues such as gravel contents;

- to select suitable afforestation tree species based on appropriate site conditions for the species such as humus content/topsoil depth, soil color, soil texture, hardness or drainage/moisture (for further improvement of field judgment and sampling for laboratory analysis using the technical equipment for soil surveys as shown in Table 2-3)

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[5] "Altitude above sea level", "Soil type (or soil group)", "Thickness of soil layer", "Slope" and "Rainfall"

o Plan/perform laboratory analysis and/or refer to the existing data in or near the project site focusing on the important physical and chemical properties to select suitable afforestation tree species based on appropriate site conditions for the species such as drainage and soil acidity (for further improvement of in-office laboratory analysis using the technical equipment for soil surveys as shown in Table 2-3)

(3) Classifying Land productivity

o Arrange land productivity class specific the project area by classifying and/or grouping the land units according to the soil properties above

Table 2-3 Example of Suitable Site Selection Factors and Technical Equipments for Soil Surveys and Analysis to Improve Information Accuracy

Suitable site condition factor for selection of appropriate tree species	Equipment	Purpose	Remarks
Soil profile observation			
Soil color	Standard soil color chart	For defining soil color to compare with other sites	
Soil hardness	Soil hardness tester	For measuring hardness and predicting drainage	More than approximately 27mm indicates too hard for root distribution
Drainage	Soil sampler and soil sample cylinders	For sampling to use in laboratory analysis of drainage	
Laboratory analysis			
	Electric balance	For measuring precise weight for laboratory analysis	
Soil moisture	Soil moisture meter	For measuring moisture in the crushed sample	
Soil acidity/pH	pH meter (portable type)	For measuring pH more precisely than litmus pH testing paper	Referring Annex of Forest Tree Species Selection for Planting Programs in Vietnam (GTZ-MARD/FSSP)
	pH meter (fixed type)	For measuring pH more precisely than portable-type pH meter	
Major elements for nutrition (nitrogen, phosphorus, potassium)	Soil nutrient tester	For classifying the contents of three elements (fertile or poor)	

(See "Handbook for Operating Equipment Donated by JICA (FICAB JICA Study Team, 2006)

| Soil nutrient analysis using portable measurement equipment (Soil Nutricient Test Kit) | Soil profile |
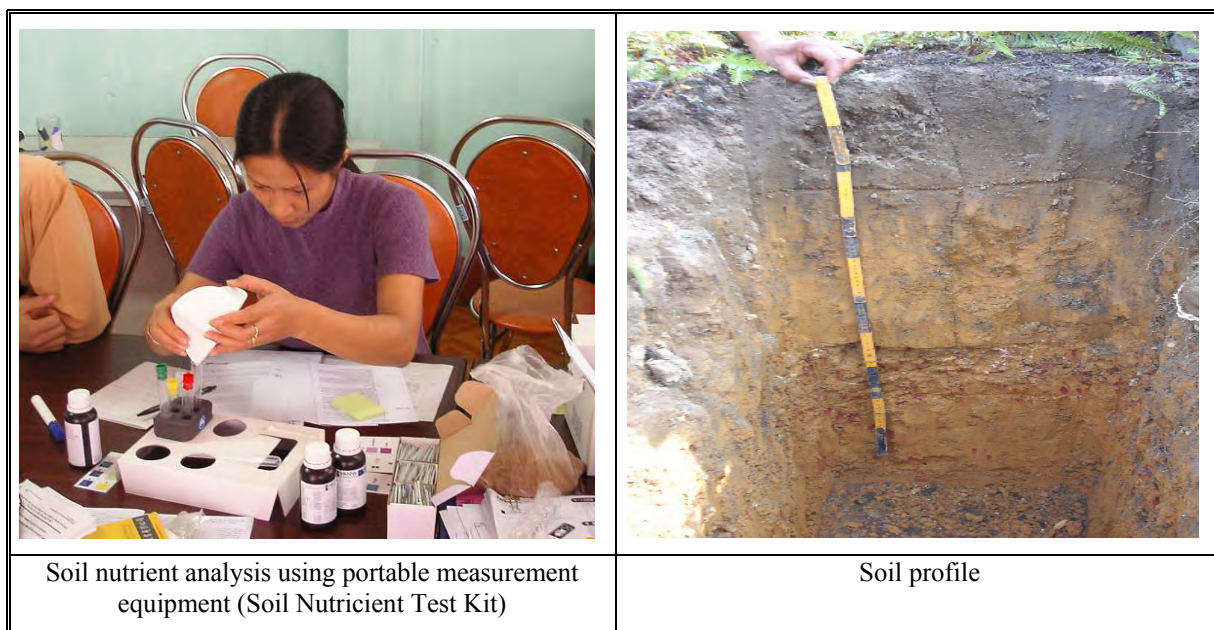
Photo 2-1 Soil surveys and analysis

- Land Suitability Evaluation

Land suitability evaluation is to predict actual land productivity for proposed tree species.

(1) Sort the actual tree growth data (such as MAI) predicted for similar sites located in the same eco-zone correlating site conditions for planting priority species according to the land productivity classification derived from the land units and the soil properties above to correlate the existing data

(2) Sort the actual results of forest inventory surveys for assessment of forest resources in each land productivity classification and re-arrange the land productivity classes by classifying and/or grouping the land productivity classification derived from the land units and the soil properties above

- Examination of Basic Situation on Forestation Technologies

(1) Predict the suitability of site conditions for each potential afforestation tree species, comparing information on the physio-ecological characteristics of planting priority species with the actual land productivity classification rearranged as above

(2) Predict the requirements for plantation hole design and fertilizer design applied in past plantation projects or the existing technical standard

3.2.1.2 *Issues to be examined from experience in the CoP for application and further development to better reflect the reality on the ground*

- Application according to ground reality

(1) Prediction of potential land productivity in the project area to set target level of information accuracy

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Model F/S in the CoP required time-consuming soil-profile surveys to identify the actual soil properties. This was because the potential land productivity for commercial plantation was estimated to be low due to the poor fertility of soil types and shallow effective soil depths as well as mostly flat to slightly hilly terrain with little undergrowths in the project areas. Application in PPs and other provinces will need precise estimation of potential land productivity before designing field surveys, and will also require analysis by field visit to observe factors such as outcrops and cutting along roads to check potential productivity.

(2) Estimating the correlation of land capability with stand volume increment

o   Land productivity classification

Land productivity classification according to land units and soil properties has little correlation to the actual increment data collected in the project area, such that the classification has been re-arranged for better correlation with the actual increment in terms of land suitability boundaries of A.hybrid and A.mangium. Soil profile survey sites will be better selected at or near plot survey sites for forest inventory in the assessment of forest resources, and observation will be necessary to estimate the correlation of soil properties with stand conditions in the field.

o   Land suitability for planning (see further discussion in "assessment of forest resources")

Model F/S in the CoP applied hypothetical prediction using data on increment outside the province and a formula using coefficient of tree tapering (F=0.5) commonly applied nationwide in increment prediction according to the land productivity class (,although the actual increment data collected in the project area implies the prediction of lower increment that applied for planning). Application in PPs and other provinces will require examination how to use the actual increment data for land suitability classification to be applied to planning.

- Further development to better reflect the reality on the ground

(Technical design improvement to better reflect the actual land productivity)

Model F/S in the CoP has applied the technical standard/cost norms commonly applied nationwide without reflecting actual soil properties although these norms are requested to be decentralized or applied according to variation in natural conditions. Fertilizer design will be improved according to the actual soil's chemical properties to save on the cost of site preparation and to secure actual increment if possible in preparing IP.

3.2.1.3 Data on Estimated Stand Growth (Mean Annual Increment) in Several Areas (JST Collected/Sorted Data in Vietnam)

Scientific name	Family name	Vietnamese name	Location	Site class	Volume prediction (m3/ha) 3	4	5	6	7	8	10	12	15	20	35	40	Annual increment (m3/ha/yr) 5	8	10	Mean	Sources
Acacia auriculiformis	Mimosaceae	Keo Bong Vang		I						129.0000	188.0000						25.0000	28.0000	30.0000	27.6667	
				II						113.0000	132.0000						—	25.0000	21.0000	23.0000	
				III						74.0000	86.0000						—	16.0000	14.0000	15.0000	
				IV						44.0000	65.0000						—	10.0000	11.0000	10.5000	
				Mean						90.0000	117.7500						25.0000	19.7500	19.0000	19.0417	
			Thai Nguyen						53.0000											7.5714	*2
			Quang Nam							97.0000										12.1250	*1
Acacia hibrid	Mimosaceae		Thai Nguyen							150.0000										18.7500	*1
			Thai Nguyen			72.0000														18.0000	*2
			Son La							160.0000										20.0000	*1
			Quang Nam							150.0000										18.7500	*1
			Lam Dong							165.0000										20.6250	*1
			Ha Tay (Ba Vi)		17.3100															5.7700	*3
			Hoa Binh (Binh Thanh)		41.2000															13.7333	*3
			Hoa Binh (Binh Thanh)					263.4000												43.9000	*3
			Tuyen Quang (Ham Yen)		55.2900															18.4300	*3
			Tuyen Quang (Ham Yen)					274.8000												45.8000	*3
			Vinh Quang (Ham Yen)		16.7600															5.5867	*3
			Quang Tri (Dong Ha)		43.5600															14.5200	*3
			Quang Tri (Dong Ha)					263.4000												43.9000	*3
			Mean																	22.1358	
Acacia mangium	Mimosaceae	Keo Tai Tuong		I						172.3000	225.8000						30.2000	28.2000	26.3000	28.2333	
				II						142.1000	187.6000						25.9000	23.9000	22.3000	24.0333	
				III						116.1000	154.5000						22.1000	20.2000	18.8000	20.3667	
				IV						93.5000	128.1000						17.3000	18.0000	17.1000	17.4667	
				Mean						131.0000	174.0000						23.8750	22.5750	21.1250	22.5250	
			Thai Nguyen							95.0000										11.8750	*1
			Son La							110.0000										13.7500	*1
			Quang Nam							800.0000										100.0000	*1
Cinnamomum cassia	Lauraceae	Que		I						32.0000	52.0000						—	10.0000	19.0000	14.5000	
				II						23.0000	26.0000						—	-1.0000	-7.0000	-4.0000	
				III						16.0000	21.0000						—	—	-2.0000	-2.0000	
				IV						—	—						—	—	—	—	
				Mean						23.6667	33.0000							4.5000	3.3333	3.9167	
Conninghamia lanceolata	Taxodiaceae	Sa Moc/ Sa Mu		I						32.8000	62.6000						6.2000	12.6000	17.6000	12.1333	
				II						15.8000	35.1000						2.4000	6.7000	9.5000	6.2000	
				III						7.0000	19.4000						—	3.2000	7.4000	5.3000	
				IV						4.3000	12.2000						—	2.0000	4.7000	3.3500	
				Mean						14.9750	32.3250						4.3000	6.1250	9.8000	6.7458	
Diptercarpus alatus	Dipterocarpaceae	Dau Rai/ Dau Con Rai/ Dau Nuoc		I																	
				II						—	—						—	—	—	—	
				III						—	—						—	—	—	—	
				IV						—	—						—	—	—	—	
				Mean						—	—						—	—	—	—	

Species	Family	Local name	Class									
Diptercarpus sp.		Quang Nam						270.0000				7.7143 *1
		Lam Dong						320.0000				8.0000 *1
Eucalyptus camaldulensis	*Myrtaceae*	Bach Dan Trang (Nghia Binh)	I		171.1000	199.5000			39.0000	22.0000	13.9000	24.9667
			II		127.6000	149.4000			14.8000	19.9000	10.5000	15.0667
			III		90.5000	109.6000			9.6000	16.8000	7.4000	11.2667
			IV		—	—			—	—	—	—
			Mean		129.7333	152.8333			21.1333	19.5667	10.6000	17.1000
		Thai Nguyen		80.0000								16.0000 *2
		Thai Nguyen					130.0000					10.8333 *1
		Son La				120.0000						12.0000 *1
		Quang Nam					163.0000					13.5833 *1
		Lam Dong						300.0000				15.0000 *1
		Lang An			100.0000							12.5000 *1
Eucalyptus urophylla	*Myrtaceae*	Bach Dan	I		201.4000	248.9000			40.2000	28.4000	22.4000	30.3333
			II		153.8000	196.5000			26.7000	24.8000	20.9000	24.1333
			III		104.0000	145.6000			16.7000	22.1000	18.8000	19.2000
			IV		78.7000	116.8000			12.5000	17.9000	19.4000	
			Mean		134.4750	176.9500			24.0250	23.3000	20.3750	24.5556
Eucalyptus sp.	*Myrtaceae*	Thai Nguyen		55.0000								11.0000 *2
Manglietia conifera	*Magnoliaceae*	Mo	I		29.5800	168.0300			14.6000	27.9000	34.7000	25.7333
			II		70.8000	115.9000			8.8000	19.1000	24.2000	17.3667
			III		47.0000	79.0000			10.2000	15.9200	17.1700	14.4300
			IV		27.5700	52.3100			—	10.1200	9.0500	9.5850
			Mean		43.7375	103.8100			11.2000	18.2600	21.2800	16.7788
Pinus caribaea	*Pinaceae*	Quang Nam					130.0000					10.8333 *1
		Lam Dong						250.0000				12.5000 *1
Pinus kesiya	*Pinaceae*	Thong Ba La	I		65.0000	120.0000			10.1000	24.2000	31.1000	21.8000
			II		45.0000	85.0000			7.0000	17.1000	22.2000	15.4333
			III		30.0000	58.0000			4.7000	11.7000	15.5000	10.6333
			IV		19.0000	36.0000			2.8000	7.4000	9.9000	6.7000
			Mean		39.7500	74.7500			6.1500	15.1000	19.6750	13.6417
Pinus massoniana	*Pinaceae*	Thong Duoi Ngua/ Thong Tau	I		59.3000	102.6000			—	20.1000	25.1000	22.6000
			II		35.9000	67.5000			—	12.7000	14.9000	13.8000
			III		20.9000	44.1000			—	7.6000	13.0000	10.3000
			IV		—	—			—	—	—	—
			Mean		38.7000	71.4000			—	13.4667	17.6667	15.5667
		Thai Nguyen						53.0000				2.6500 *2
Pinus merkusii	*Pinaceae*	Thong Nhua/ Thong Hai La	I		38.1000	69.2000			—	11.5000	16.4000	13.9500
			II		21.0000	41.9000			—	7.5000	10.8000	9.1500
			III		9.3000	22.1000			—	4.3000	6.9000	5.6000
			IV		—	—			—	—	—	—
			Mean		22.8000	44.4000			—	7.7667	11.3667	9.5667
Styrax tonkinensis	*Styracaceae*	Bo De/ Canh Kien Trang	I		0.2891	0.3795			0.0501	0.3351	0.0444	0.1432
			II		0.1674	0.2300			0.0330	0.0330	0.0297	0.0319
			III		0.1408	0.1768			0.0286	0.0262	0.0145	0.0231
			IV		0.0800	0.0990			0.0175	0.0131	0.0070	0.0125
			Mean		0.1693	0.2213			0.0323	0.1019	0.0239	0.0527
Tectona grandis	*Verbenaceae*	Tech	I		208.0000	262.0000			—	25.0000	27.0000	26.0000
			II		148.0000	196.0000			—	26.0000	23.0000	24.5000
			III		92.0000	126.0000			—	18.0000	17.0000	17.5000
			IV		—	—			—	—	—	—
			Mean		149.3333	194.6667			—	23.0000	22.3333	22.6667

Sources:

No mark: Nha Xuat Ban Nong Nghiep(2003) Tieu Chuan Nganh 04-TCN-66-2003 Bieu Dieu Tra Kinh Doanh Rung Trong Cua 14 Loai Cay Cheu Yeu (Ban hanh Kem theo Quyet dinh so 433/QD-BNN-KHCN, ngay 18 thang 2 nam 2003)

*1: Data supported by ANCODEC/VIVA

*2: FIPI-JICA (2005) Report on the Outcome of the First Stage of the Option Evaluation

*3: FSIV (2005) Synthesizing Productivity of the Acacia Hybrid Plantation in Some District in Vietnam

3.2.1.4 *Proposed Format Examples for Field Surveys and Analysis in Natural Environment Outline Surveys*

1) Field Note for Soil Profile Observation and Description

Sheet for Soil Profile

Date —————————
Surveyor —————————

Province ————————— District ————— Commune —————————

Soil Class	Type of Soil	Component	Depth (cm)	Structure	(Color chart)	humidity	% of mix stone

2) JST In-office Laboratory Analysis Sheet

Sheet for chemical analysis of soil

Date —————————
Surveyor —————————

No. of Sample	pH value	Content of N	Content of P	Content of K

Soil samples are analyzed with pH meter (fixed or portable) and Soil nutrient tester.

The value of N/P/K is described as "trace", "low", "medium" or "high".

3.2.2 *Survey on Land Issues (Forest Resource Assessment/ Survey on Land Ownership and its Use/ Mapping)*

The purpose of the survey on land issues is to detail and modify:

(1) forest classification to better reflect reality on the ground in selecting the project area and M & E database for project impact as well as deciding project sites, potential land use planning and investment planning

(2) the official database available for preparing the information on land ownership and its use or land use inventory and land use planning (LUP) as well as land allocation (LA) with a kind of bottom-up approach substituting for PRA (participation of local people) as much as possible. This is needed for implementation and management/monitoring of a large number of individual plots scattered over a wide area with limited staff in the project implementation

To this end, the following must be performed:

(1) To reflect reality on the ground: modification of the forest status maps to be incorporated into base maps and utilization actual forest inventory data or reference to field inventory data on:

o   existing tree species and land-use: according to the actual/current situation as shown by ground truths surveys (see "Mapping")

o   stand growth for yield prediction and/or existing stand volume for existing forest resource estimation in each forest status: <u>mean annual increment (MAI)</u>6 and/or average stand volume per hectare in or near project areas (see "Assessment of forest resources")

(2) To prepare information on LUP as well as LA: combination of commune-level land allocation status maps into the modified forest status maps for preparing base maps. This include the application of GPS to correct geometric distortion/ deviation between forest status maps and commune-level land allocation status maps in base maps as well as afforestation plan maps and implementation plan maps (see "Mapping")

(3) To apply a kind of bottom-up approach substituting for PRA (participation of local people): combination of:

o   semi-structured or semi-official questionnaire surveys with semi-participatory drawing of the land used, or mock-ups (illustrated land-use maps with interviews and transects) for forest land-use planning (see "Land ownership and its use") to estimate more viable potential planting site, and

interviews for consultation in ground truths surveys for correcting geometric distortion/ deviation between forest status maps and commune-level land allocation status maps for implementation mapping (see "Mapping") to reflect the opinions of local people such as land allocation officers, village elders and landholders in land-use planning

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[6] MAI and/or average stand volume per hectare are recommended for application valuing factors for forests at the F/S stage. This enables the standardization of information to a satisfactory level of accuracy to reflect ground reality but easy to estimate in a limited period of time, such as in a F/S to apply financing from World Bank (MARD(2003) Project Preparation Report, Forestry Sector Development Project; Annex 3a)

Base Map for Afforestation Plan

Commune level land allocation status of forestry lands maps

Check Items

To prepare LA information: Land holding status
e.g.
- Boundaries of land use right registration certificate (Red book)
- Register number
- Registered land holder name

Interviews for consultation to reflect local people opinions for preparation of information on LUP and LA

Landownership and its use

Existing data (e.g. in CoP)
Each commune/district (1999/2000): Commune level forest allocation status of forestry lands maps, 1:5,000-1:10,000

Check Items

Assessment of Forest

Modified Forest status maps

Existing data (e.g. in CoP)
a)Forest Monitoring Maps, 1:25,000, DoFP (2004)
b)Revised Forest Status Maps, 1:25,000, DoFP (every 5 years)
c)Forest Status Monitoring Maps, District FP station (every year)

Basic forest classification: Forest land boundaries by status type
e.g.
- Tree species, Stand age class, Number of blocking

GPS surveying for ground truths surveys for correcting geometric distortion/deviation between the forest status maps and commune level land allocation status of forestry lands maps

Ground truth surveys
-Current tree species and land-use in forestry lands
-Actual land-use in the forestry lands without forest cover
-Current road conditions (e.g. width)

Check Items

Land Productivity Class Maps

Soil maps

To reflect ground reality: Recent topographic feature e.g.
- Counter line
- Rivers and ponds
- Settlement and other district places
- Administrative boundaries including commune

Existing data (e.g. in CoP)
a)Soil Maps, 1:25,000, FIPI (level II)
b)Soil Maps, 1:100,000, DONRE(1965)

Check Items

Natural Environmental Outline Survey

Topographic maps

Existing data (e.g. in CoP)
a)1:25,000, Prime Minister's office (2005)
b)1:50,000/1:25,000, DONRE

Land productivity class maps: Based on land unit(hand-written) e.g.
- Altitude and topographic class
- Slope class
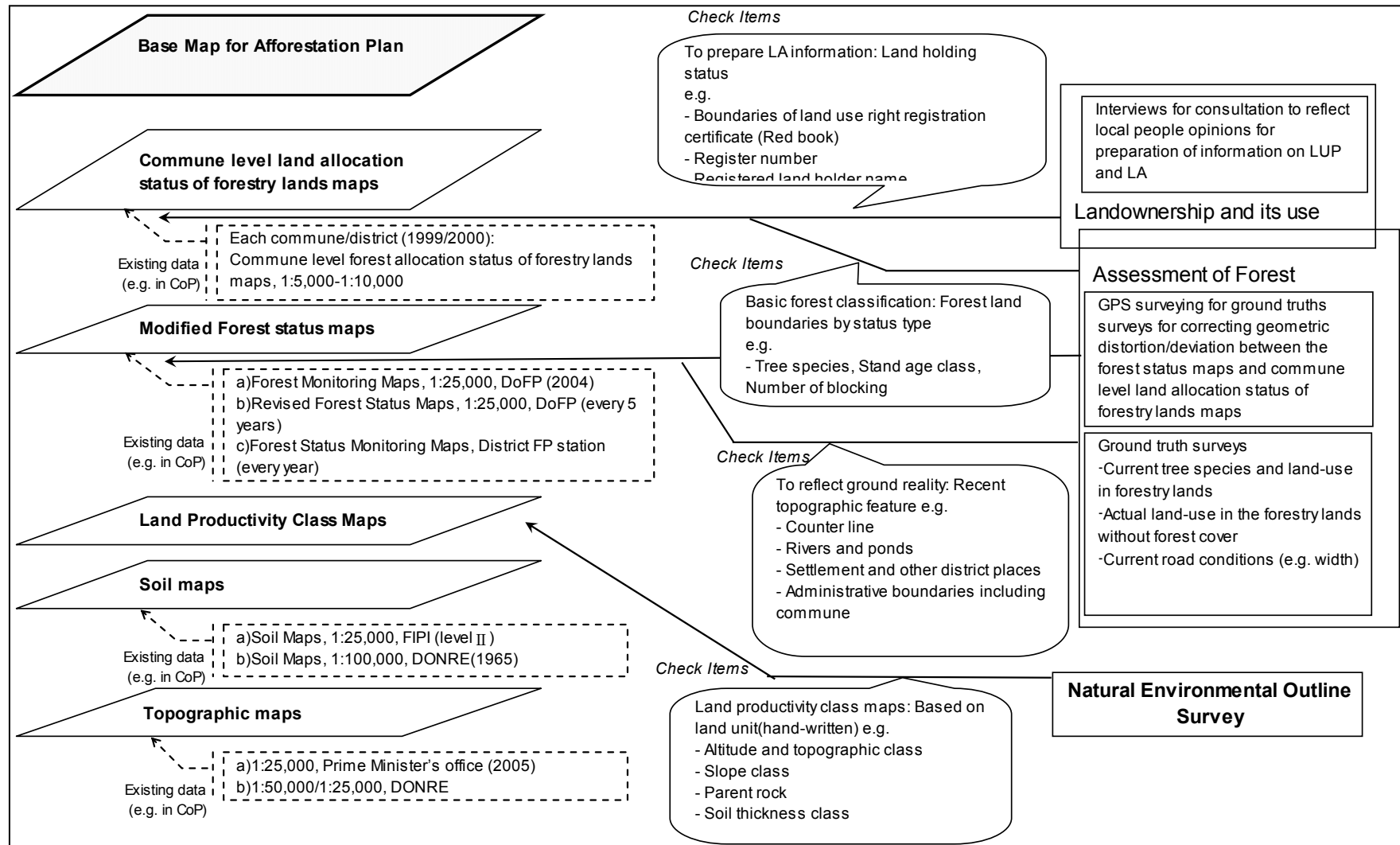- Parent rock
- Soil thickness class

Figure 2-2 Correlation between Forest Resource Assessment, Survey on landownership and its use and Mapping (Maps to be Collected for Preparation and Modification of Draft Base Maps)

Table 2-4. Reference sources for the know-how on Forest Resource Assessment/ Land-use and Land-use Right Surveys/ Mapping

FICAB Training	FSSP Technical reference (Forestry Sector Manual (Draft version, GTZ/ MARD-FSSP))/FICAB Training Package		
Training Code (Training Plan)	**Related chapters**		**Related articles/ pages**
WU1 Code 4-b-i Land ownership and its use	Land Use Classification, Planning and Allocation of Forest Land (Draft)	Part 1:Classification of Forest Land Use	1. Legal background for forest land use
		Part 2: Forest Land Use Planning	1. Legal bases for land use planning for investment objectives; 2. Present approaches to forest land-use planning
		Part 3: Allocation of forest land	1. State legal regulations on allocation of forest land; 2. Organizations and agencies taking main responsibility on land; 3. Overview of allocation of forest land at various levels; 4. Guidelines on allocation of forest land
	Forest Plantation	Part IV: Management of Afforestation Activity and Planted Forests	1. Forest activity management (1.1. Legal framework for forestation establishment)
Manual for F/S	3.2 Land use and forest resources		To be developed
	Annex		TableI-1 Land-use classification
Model F/S (Production forest)	3.2 Current land and forest resource use in the project area		(1) Total land in the project area; (2) Current land-use status by land holders in 5 communes of the project area;
	Annex		Table 1.1.5 Situation of land and forest resource tenure
WU1 Code 4-a-ii Assessment of forest resources	Land Use Classification, Planning and Allocation of Forest Land (Draft)	Part 1:Classification of Forest Land Use	2. Forestland use classification
		Part 3: Allocation of forest land	4. Description of existing forest resource assessment method
Manual for F/S	3.2 Land use and forest resources		To be developed
	Annex		Table I-2 Forest land use classification
Model F/S (Production forest)	3.2 Current land and forest resource use in the project area		(3) Standing-timber volume of forests in the project area; (4) Growth rate and performance of existing plantations with various planting species; (5) Increment prediction of species on different land unit productivity classes
	Annex		Table 1.1.3 Plantation growth and development in landforms; Table 1.1.4 Prediction of growth for forest tress planted in landform
WU1 Code 4-a-iii Mapping	Land-Use Classification, Planning and Allocation of Forest Land (Draft)	Part 1:Classification of Forest Land-Use	2. Forest land-use classification
		Part 2: Forest Land Use Planning	3. Land use planning system for the macro and micro level; 4. Standards and technology of mapmaking for forest land-use planning
		Part 3: Allocation of forest land	4. Description of existing forest resource assessment method (4.3. Desk survey)
	Forest Plantation	Part III: Afforestation techniques	4.2 Reforestation and approval

Manual for F/S	3.2 Land-use and forest resources	To be developed
	Annex	Table I-2 Forest land-use classification
Model F/S (Production forest)	3.2 Current land and forest resource use in the project area	(1) Total land in the project area; (2) Current land-use status by land holders in 5 communes of the project area; (3) Standing-timber volume of forests in the project area;
	Annex	Table 1.1.3 Plantation growth and development in landforms; Table 1.1.5 Situation of land and forest resource tenure
	Attributed data log book	

3.2.3   Comprehensive Methodologies of Surveys and Analysis

- Comprehensive steps

Work items related to land issues have mutual relationships in carrying out surveys and analysis as shown in <u>Fig 2-2</u>

(1) Geographic information arrangement (<u>Mapping</u>) is commenced first to produce draft base maps for ground truths surveys.

(2) After satep (1) above, simple sampling for forest inventory surveys towards actual forest resource assessment (<u>Assessment of Forest Resources</u>) is conducted by applying typical sample site selection methods (for standard plot sampling) when the target level of information accuracy corresponds to Level 1 of target inventory level.

(3) The results of (1) above is used to modify the base maps for area calculation as well as volume estimation by utilizing actual resource assessment results (<u>Mapping</u>).

(4) The compiled base maps is used to produce land classification data (<u>Land ownership and its use</u>) and to select potential planting sites (<u>Mapping</u>).

(5) Investigation on actual conditions of land use and land allocation contributes to the estimation of viable sites from among the potential planting sites (<u>Land ownership and its use</u>)

- Setting the target level of information accuracy

(1) Target level classification

Reflecting ground reality in the know-how consists of actual forest resource assessment focusing on increment prediction in assessment of forest resources, and ground truths surveys for checking existing tree species and land-use as well as GPS surveying to correct geometric distortion/deviation of commune-level land allocation status maps with interviews for consultation to reflect the opinions of local people on mapping.

The target level of information accuracy to better reflect the reality on the ground is depending on land data availability (e.g. current forest status and land allocation status) and socio-economic conditions (e.g. land use intensity in the forest land) or potential investment activity (e.g. potential afforestation tree species) and the natural environment (e.g. potential land productivity and the availability of data on it) as shown in <u>Table 2-1</u> and <u>2-2.</u>

Mapping: depending on land data availability (e.g. current forest status and land allocation status) and socio-economic conditions (e.g. land-use intensity in the forest land) (see Table 2-5.)

Actual forest resource assessment: depending on potential investment activity (e.g. potential afforestation tree species) and the natural environment (e.g. potential land productivity and the availability of data on it) (see Table 2-6)

Table 2-5 Target Level Alternatives on Information Accuracy on Mapping

Data availability		Land-use intensity in the forest land by local people	
Land allocation status (availability of overlapping land allocation status on forest status maps)	**Current forest status** (availability of past years from revising forest status maps)	High/ living on forest land	Low/ no living on forest land
Available	Less than 2 years	Level M3	Level M3
	2 years or more	Level M2	Level M3
No available	Less than 2 years	Level M2	Level M2
	2 years or more	Level M1 (CoP)	Level M2

Level M1:

- Preferable scale of map: 1/25,000

- Preferable smallest indicting unit: less than 5ha

- Assumptive inventory target level: Level 1

- Need for ground-truths surveys to check the actual/current situations of existing tree species and land-use as well as GPS surveying to correct geometric distortion/ deviation of commune-level land allocation status maps with interviews for consultation to reflect the opinions of local people in the project area and better reflect reality on the ground

Level M2:

- Preferable scale of map: 1/10,000

- Preferable smallest indicting unit: less than 2.5ha

- Assumptive inventory target level: Level 2

- Need for ground-truths surveys to check the actual/current situations of existing tree species and land-use as well as GPS surveying to correct geometric distortion/ deviation of commune-level land allocation status maps with interviews for consultation to reflect the opinions of local people in the project area and better reflect reality on the ground

Level M3: Utilizing only existing information without field checking

Table 2-6 Target Level Alternatives on Information Accuracy on Actual Forest Resource Assessment

Natural environment		Potential investment activity	
		Growth characteristics/ potential rotation of possible afforestation tree species	
Potential land productivity	Data availability on existing stand volume (actual stand volume/ha in each forest status) and increment (MAI)	Fast-growing/ short-term rotation	Non-fast-growing/ long-term rotation
Fertile	Available	Level F3	Level F2
	Only existing stand volume/ha in each forest status/MAI	Level F2	Level F2
	No available	Level F2	Level F1
Poor	Available	Level F2	Level F3
	Only existing stand volume/ha in each forest status/MAI	Level F1	Level F2
	No available	Level F1 (CoP)	Level F1

Level F1:

- Preferable inventory level: Level 1(utilizing field checking data)

- Need for forest inventory surveys to analyze increment prediction in the project area and better reflect reality on the ground

Level F2:

- Preferable inventory level: Level 2(utilizing existing information with field checking)

- Need for forest inventory surveys for existing stand volume estimation in project area to better reflect reality on the ground

Level F3: Utilizing only existing information without field checking

2) Improvement of increment prediction in reflecting ground reality

Stand volume estimation and stand volume prediction are performed through a simple method using basal area and form (timber tapering) factor (0.5 in Vietnam) per sample. However, the average stand volume or MAI is re-calculated in each classification to reflect the ground reality of actual survival status of each piece of land used by local people/field practice by local people (e.g. tree numbers variations) in valuing especially in predicting stand volume increments.

3.2.3.1   *Assessment of forest resources*

The Forest Resource Survey is indispensable in determining the planting site, cutting period, harvest volume, forest classification etc. However the situation of forest resource surveying in Vietnam is inadequate, as mentioned in HIF Report "While forest classification is a compulsory step for any forestry project because it decides the potential land-use planning and investment planning, it has so far been done in some provinces only,

and nationwide just on a regional or sub-regional level" (p34 HIF Report, Jan. 2005). Insufficient forest classification will result from poor forest resource surveying.

The forest resources assessment method is applied in the forestry sector to undertake Instruction Nr. 286/TTg dated 2/5/1977 of the Prime Minister on inventory and monitoring forest resource progress throughout the whole country (p95 Land-Use Classification, planning and allocation of Forest Land, Forest Sector Manual (Draft), MARD-FSSP). A description of this method is given in "Land-Use Classification, planning and allocation of Forest Land, Forest Sector Manual (Draft)" prepared by MARD-FSSP.

The following methodology for forest resource assessment is more precise technique (flow) than that outlined in the above-mentioned Forest Sector Manual.

- Actual forest resource assessment by simple sampling and forest inventory surveys

(1) Collect forest status maps and the latest existing forest inventory data for the project site and make a list of the collected maps and data

(2) Decide the number and size of plot

Sample site are selected with typical forest land conditions in each forest classification focusing on increasing the number rather than the size of sample plots in order to select as many samples as possible from the large variation of forest conditions, which mainly results from the following social factors[7].

o Current forest classification in Vietnam is based on forest status derived from dominant tree species and stand age class, and does not reflect factors affecting resource quality and quantity (e.g. diameter, tree height and tree density or forest coverage).

o Forest plantations in Vietnam are still dispersed and fragmented.

o No land and forest allocation schemes have been developed, which makes land area fragmented.

o The price of unprocessed wood is low and the products runs through complex trading cycle, including trading units, thereby reducing people's attraction to forestation (e.g. Eucalyptus sp. in the CoP)

The total area of sample plots will preferably 0.01% or more of the total target areas to streamline forest inventory surveys at the F/S stage, below the lowest target sampling 0.5% according to the regulation to be applied at the design stage.

(3) Find the approximate proposed sample plot area and mark it on the 1/25,000-scale forest status map

(Complete enumeration takes a long time and costs a lot as the project area becomes bigger. In this case, the sample plot method is more useful and efficient in estimating forest volume.

Before going into field, it is better to estimate the location of sample plots though for most typical forests sample plot will be found in the field by a surveyor.)

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[7] Forest Plantation (MARD-FSSP)

(4) Prepare field notes (see the proposed format for forest inventory)

☞ Survey

(5) Find the location of the proposed and sample plots, set the plot in the most typical area in the forest to mark the location and note the date and number of the plot on the map

(6) Survey forest resources (species, number, height, MAI, coverage etc. of trees) with technical equipment such as that shown in Table 2-7 and enter the data in the field note

Table 2-7 Examples of Forest Resources Assessment Factors and Technical Equipments for Forest Inventory Surveys and Analysis to Improve Information Accuracy

Forest Resources Assessment Factors	Equipment	Purpose	Remarks
	Precise plot setting (locations and area)		
Plot area	Pocket compass with tripod and measuring tapes	For surveying angle accurately to set more precise target area for the sample plot	
Locations	GPS	For measuring latitude and longitude to locate the sample plot precisely	
	Laboratory analysis		
Tree height	Hypsometer	For measuring tree height easily without ascertaining precise distance using a measuring tape	
Forest coverage/tree crown density	GRS densitometer	For measuring forest coverage easily using the line point transect method	
Annual rings	Increment borer	For measuring actual tree diameter increment to estimate growth	

(See "Handbook for Operating Equipment donated by JICA (FICAB JICA Study Team, 2006)

☞ Analysis

(7) Input data in an Excel sheet

(8) Calculate the existing stand volume estimation and increment prediction

o   Equation for calculation of volume

Volume (m^3/ha) = (Total basal area) x (Average of height) x (0.5 as Form factor)

o   Format for data analysis

This format includes data of soil condition as well as forest inventory. Preparation for site selection, selection of forest species, afforestation plan, harvesting plan etc. are based on this table.

Forest status							Inventory sample						Site class	
Symble	Difinistion		Dominant species		Age class		Commune	Cirial No.	Compartment No.	Section No.	Age	Age class	Soil class	Soil type
	Scientific	Local	Scientific	Local						*Modification : Not yet				

Forest inventory results												Remarks	
Location	Total	Mean				Volume (m3/ha)			Mean Annual Increment(MAI)			Index	
	N/ha (trees)	DBH (cm)	H (m)	Commercial H (m)		Caluculated from stand total and averege (factor)	Calculated from each tree (volume table)	Average	Total height (m/yr)	Total volume (M3/ha/yr)		Survey date	No.
Flat													
Average													
Lower Middle Upper													
Average													

- Proposed Formats for Forest Inventory Surveys for Actual Forest Resources Assessment

(1) Field notes for Forest Inventory Surveys

Date _____
Surveyor _____

No. of plot and position (lower, middle or upper on the slope) _____
Name of Commune: _____
Section number: _____
No.of Compartment: _____
Dominant tree species: _____
Agro forest: _____
Direction: _____
Slope: _____

No. of tree	Species	DBH	Height	Commercial height	Class	Remarks

3.2.3.2   *Land ownership and use*

Land-use inventories, land-use planning (LUP) and land allocation (LA) play an important role in project planning and ensuring the sustainability of project investments (p34, HIF report Jan.2005). For more realistic and feasible afforestation plan, LUP should be applied to field base planning with the participation of local people. However, LUP has taken a top-down approach, so it can not reflect local people's needs. With LA, if a lower level such as a district, commune or village makes a land allocation map based on the Red Book (i.e. the land-use certificate), it often fails to match actual land use and allocation due to old data and unsatisfactory surveying. It is therefore important to carry out field surveys on land use and land allocation to ascertain the actual situation and enable more feasible plans from the beginning of afforestation project preparation. The Forest Sector Manual prepared by MARD/FSSP introduces some example methodologies for forest land-use planning (pp31-32, Land use classification, planning and allocation of Forest Land (Draft), Forest Sector Manual). Moreover, the Training Manual for Participatory Land-Use Planning prepared by the Social Forestry Development Project (SFDP), which was carried out by MARD/GTZ, also introduces a technical preparation flow for land-use planning and land allocation (pp13-20, Training Manual for Participatory Land-Use Planning, SFDP_MARD/GTZ, May 1999). This is helpful in considering how to prepare and carry out surveys. The methodologies below combine the techniques outlined in the Forest Sector Manual.

- Investigation of actual land allocation and land use in forest land and estimation of viable planting site

☞ Before survey preparation

(1) Check the legal documents on land and other land related documents (Refer to Land use classification, planning and allocation (Draft), Forest Sector Manual).

It is necessary to ascertain the legality of land use and land allocation stipulated by legal documents such as law, regulations, decrees etc. to examine the feasibility of an afforestation project. If there is any discrepancy between the legal situation and the reality in the field, the risk caused by such differences must be considered.

The report on Land-use classification, planning and allocation of forest land (Draft), which is part of the Forest Sector Manual, describes the legal background for forest land use and allocation concisely and comprehensively. It is convenient for planners (F/S report writers) to refer this report and update on new legal information and documents at that time when writing the legal background of land use and allocation in the F/S report. The real situation of land use and allocation is clarified by field survey.

☞ Preparation of field survey for land allocation and land use

(2) Determine the survey area (district, commune, village).

(3) Obtain basic maps covering the survey area such as topographic maps, existing land allocation maps, forest and forest status maps etc. (refer to Land-use classification, planning and allocation (Draft), Forest Sector Manual).

(4) Determine the number of expected respondents and make a list (the more the better, although the number will depend on the survey area and its population).

(5) Prepare the semi-official questionnaire sheet and sheet for mock-up (refer to Land-use classification, planning and allocation (Draft), Forest Sector Manual).

(6) Announce the survey to the district/commune/village.

☞ Survey

(7) find the house of the respondent/household and mark dots and the number at its location on the map.

(8) Draw simple current land-use map by hearing from local people (respondents) and visiting the location for confirmation (see Fig. 2-3 - Image of mock-up for land allocation and land use).

It is better to include information such as boundaries, how land is used, future plans for its use, land size, whether there is Red Book or not for each piece of land and etc. in the mock-up for land allocation and use.

The picture below is a sample of how to draw mock-up for land allocation and use.

Included in the information on the mock-up picture is confirmation of the size and area of the forest land determined by the DoF.
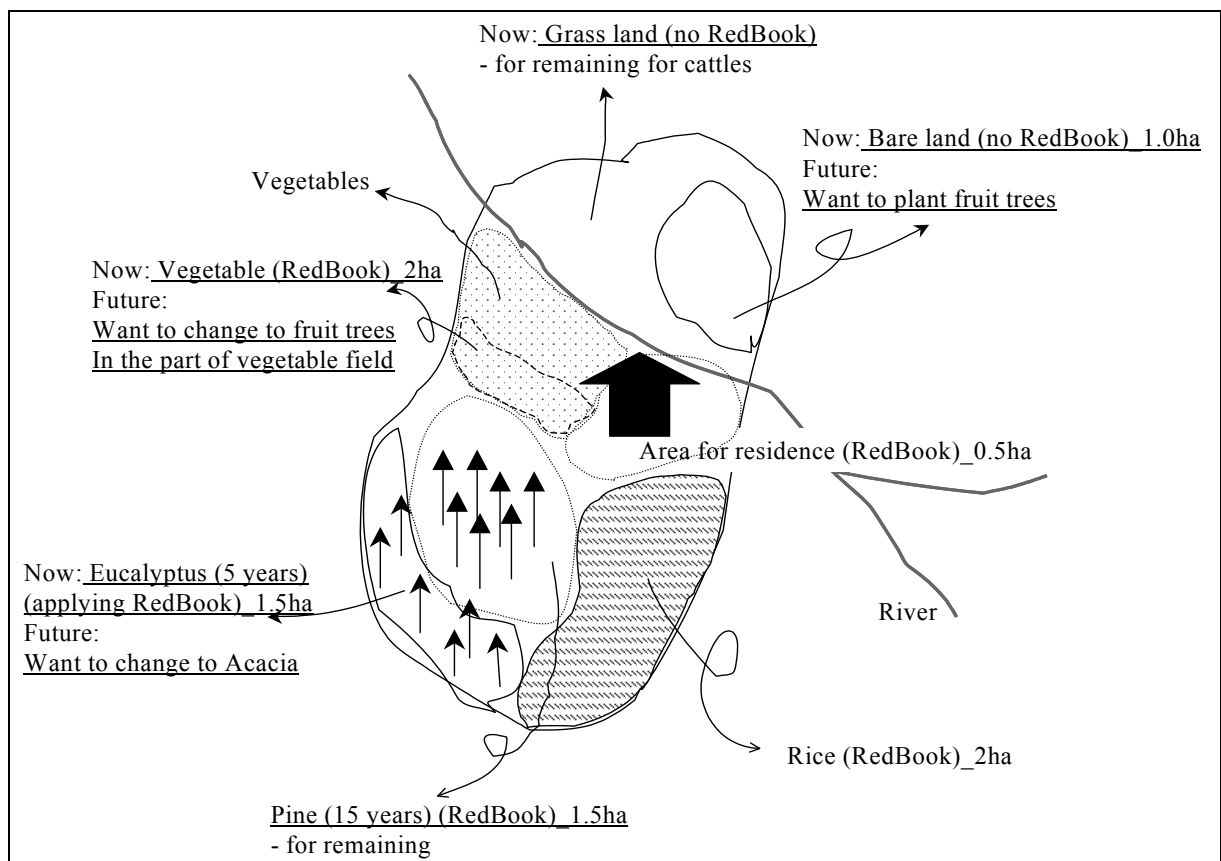
Figure 2-3 Image of Mock-up for land allocation and land use

(9) Hear from the respondent using the semi-official questionnaire and cross-check between the above-drawn map and the questionnaire answers.

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(10) Note and/or modify the current land use on the map.

(11) Measure the viable planting site and note i.t

(12) Measure the cross-point of boundaries of land owned by interviewed households using GPS or pocket compass

☞ Analysis of data

(13) Input all field survey data and create a table (see proposed format (6) for land ownership and use) and estimate the viable planting site using the steps shown below.

- Estimation of viable planting site

The sample table for analysis below shows data from a survey in Thai Nguyen Province. The analysis process using this table (the original is proposed format (6) for land ownership and use) is as follows.

o **Making a table with data collected from a survey on land ownership and use**

Step 1. Enter the size of each area in the blanks

(Classification between the forestry area and outside it is determined by interviewing local people and/or officers in the province, district and commune. Data input for land use is only for the forestry area.)

Step 2. Enter the size of the planting potential area in "other use in forestry area" and "forest land in forestry area" on the second line of the respondent's/household's lines.

(Measure, interview and/or confirm with the Red Book for the planting potential area in the forestry area.)

Step 3. Note the ideas of local people next to "sub-total of planting potential site" if they intend to change the land use to plant trees.

o **Calculation of prior potential planting site (weighted average)**

Step 4. Calculate "Total potential area for planting in forestry area_ (C)".

(Add potential planting site in "forestry area for other use" and the sub-total of planting sites in "forestry area for forest land")

Step 5. Calculate percentage of (C) compared to the forestry area per respondent_ (D)

((C) / total forestry area of respondent or household x 100)

Step 6. Calculate the weighted average of (D)

((D) x total forestry area of respondent or household/total forestry area of all respondents or households. Calculate each household and add all value)

o **Calculation of second prior potential planting site (weighted average)**

This area reflects local people's actual land use and their intent more than weighted average of the above prior potential planting site.

Step 7. Calculate the total potential site including local people's ideas for planting in forestry area_ (F)

(Add potential planting sites in "forestry area for other use" and planting potential sites from local people's ideas in "forestry area for forest land".)

Step 8. Calculate the percentage of (F) compared to the forestry area per respondent_(G).

Step 9. Calculate the weighted average of (G).

((G) x total forestry area of respondent or household/total forestry area of all respondents or households. Calculate each household and add all values.)

Table 2-8   Table for Analysis

		total area (I)	total area in forestry area (II)	total area outside of forestry area (III)	Other use in forestry area								sub-total of afforestation potential area (A)	Note (villagers' idea)
					residence and garden around house	agriculture	fruit tree	rice field	tea	grassland	pond	sub-total		
1	TH	3	2	1	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0	0	
2	BD	0.67	0.27	0.4	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0	0	
3	TT	2	2	0	1.3 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	1.3	0	
4	TH	1.3314	1.3314	0	0.1 / 0	0 / 0	0.2614 / 0	0.27 / 0	0 / 0	0 / 0	0 / 0	0.6314	0	
5	TH	1.0772	1.0772	0	0.3772 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0.3772	0	
6	TM	0.3	0	0.3	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0	0	
7	TM	2.5	2.2	0.3	0 / 0	0.0968 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0.0968	0	
8	TM	3.7911	2.75	1.0411	0 / 0	0 / 0	0 / 0	0 / 0	0.0033 / 0	0 / 0	0 / 0	0.00328	0	
9	TM	1.3453	0.56	0.7853	0 / 0	0.323 / 0.2	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0.323	0.2	cassava→KL
10	TK	3.4	3.4	0	0.04 / 0	0 / 0	0.3708 / 0	0.15 / 0	0 / 0	0 / 0	0.51 / 0	1.0708	0	
11	TK	0.7864	0.7864	0	0.04 / 0	0.3 / 0.3	0.2464 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0.5864	0.3	cassava (include a little bit litchi) → KL
12	BD	1.91	1	0.91	0	0	0	0	0.33	0	0	0.33		
13	BD	3.6657	2.5	1.1657	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0	0	
14	TT	4.22	4.22	0	0.72 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0.72	0	
15	TT	4.39	3.74	0.65	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0	0	
16	TK	1.4383	0.84	0.5983	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0	0	
17	TK	2.6073	1.6529	0.9544	0 / 0	0 / 0	0 / 0	0 / 0	0.1076 / 0	0 / 0	0 / 0	0.1076	0	
18	TT	1.79	1.79	0	0.09 / 0	0.6 / 0	0 / 0	0 / 0	0 / 0	0.15 / 0	0 / 0	0.84	0	
19	TT	5.195	5.195	0	1.195 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	1.195	0	
20	TT	7.385	7.385	0	0.5854 / 0	0 / 0	0.4 / 0	0 / 0	0.7 / 0	0 / 0	0 / 0	1.6854	0	
total		52.8027	44.6979	6.7048					0.42		0.15	9.26688	0.5	

Bd	K	KL	Thong	BL	bareland	for fuelwood	sub-total (B)	sub-total of afforestation potential area(villagers' idea) (E)	Note(villagers' idea)	Total potential area for afforestation in forestry area (A)+(B) =(C)	total potential area(C)/Forestry area(Ⅱ)*100 =(D)	weighted average of (D)	Total potential area by villagers' idea for afforestation in forestry area (A)+(E) =(F)	total potential area(F)/Forestry area(Ⅱ)*100 =(G)	weighted average of (G)
									Use for forest land in forestry area		% of (C)			% of (F)	
1	1	0	0	0	0	0	2			2	100	4.47			
1								*1*	*Bd→K*				*1*	*50*	*2.24*
0.27	0	0	0	0	0	0	0.27			0.27	100	0.6			
0.27	*0*	*0*	*0*	*0*	*0*	*0*		*0.27*	*Bd→K*				*0.27*	*100*	*0.6*
0	0	0.7	0	0	0	0	0.7			0.7	35	1.57			
									KL→tea				*0*	*0*	*0*
0.6013	0	0	0	0	0	0.0987	0.7			0.7	52.58	1.57			
0.6013						*0.0987*		*0.7*	*Bd→K*				*0.7*	*52.58*	*1.57*
0.2	0.5	0	0	0	0	0	0.7			0.7	64.98	1.57			
0.2								*0.2*	*Bd→K*				*0.2*	*18.57*	*0.45*
0	0	0	0	0	0	0	0			0	0	0			
								0					*0*	*0*	*0*
0	0	2.1032	0	0	0	0	2.1032			2.1032	95.6	4.71			
								0					*0*	*0*	*0*
0	0	2.7172	0	0	0	0	2.7172			2.7172	98.81	6.08			
								0					*0*	*0*	*0*
0	0	0.207	0	0	0.03	0	0.237			0.437	78.04	0.98			
								0					*0.2*	*35.71*	*0.45*
0.25	0	1.9292	0	0	0.15	0	2.3292			2.3292	68.51	5.21			
0.25	*0*	*0*	*0*	*0*	*0.15*	*0*		*0.4*					*0.4*	*11.76*	*0.89*
0.2	0	0	0	0	0	0	0.2			0.5	63.58	1.12			
0.2	*0*	*0*	*0*	*0*	*0*	*0*		*0.2*	*Bd→KL*				*0.5*	*63.58*	*1.12*
0.3	0.37	0	0	0	0	0	0.67			0.67	67	1.5			
0.3	*0.37*							*0.67*	*Bd, K→KL*				*0.67*	*67*	*1.5*
2.5	0	0	0	0	0	0	2.5			2.5	100	5.59			
2.5	*0*	*0*	*0*	*0*	*0*	*0*		*2.5*	*Bd→K, KL*				*2.5*	*100*	*5.59*
0	0	1.5	2	0	0	0	3.5			3.5	82.94	7.83			
0	*0*	*0*	*0*	*0*	*0*	*0*		*0*					*0*	*0*	*0*
1.2	0	1.44	0.8	0	0.3	0	3.74			3.74	100	8.37			
0	*0*	*0*	*0*	*0*	*0.3*	*0*		*0.3*	*Bareland→KL*				*0.3*	*8.02*	*0.67*
0.4	0.44	0	0	0	0	0	0.84			0.84	100	1.88			
0.4	*0*	*0*	*0*	*0*	*0*	*0*		*0.4*	*Bd→KL*				*0.4*	*47.62*	*0.89*
1.5453	0	0	0	0	0	0	1.5453			1.5453	93.49	3.46			
1.5453	*0*	*0*	*0*	*0*	*0*	*0*		*1.5453*	*ALL→K, KL*				*1.5453*	*93.49*	*3.46*
0	0.5	0.45	0	0	0	0	0.95			0.95	53.07	2.13			
0	*0*	*0*	*0*	*0*	*0*	*0*		*0*					*0*	*0*	*0*
0	0	3	0	0	1	0	4			4	77	8.95			
0	*0*	*0*	*0*	*0*	*1*	*0*		*1*	*Bareland→ KL/K, BdLai*				*1*	*19.25*	*2.24*
4.7	0	1	0	0	0	0	5.7			5.7	77.18	12.75			
4.7	*0*	*0.6*	*0*	*0*	*0*	*0*		*5.3*	*Bd→K, BdLai,*				*5.3*	*71.77*	*11.86*
13.5666	2.81	15.047	2.8	0	1.48	0.0987	35.402	14.4853		35.9019	75.39	80.34	14.99	36.97	33.53

- Issues to be examined from experience in CoP for application and further development to better reflect reality on the ground

- Interview skill

The interview for land allocation and land use is a simple way to obtain information and data from participants, but, it is necessary for surveyors to have good interviewing skills to extract the relevant knowledg.

- Selection of targeted household

It is better to select target household that own and/or use forest land.

Based on the answer to whether a household owns and/or uses forest land in the advanced questionnaire distributed at the Communal Consultation Meeting, select target households to interview regarding land allocation and use.

If the proposed planting site is unused land, interview not only households that own and/or use forest land but also residents who live around the proposed planting site.

The more target households for interview the better, but the number should be considered depending on the population and size of the project area. In the case of poor capacity for the survey, it is efficient to select households from a characteristic area (e.g. average household for forest use, households that own/use large area of forestland ets.

- Making mock-up for interviewed households

Answers to the semi-official questionnaire and those for making the mock-up will often differ due to memory discrepancies between local people. Cross-checking between answers to the questionnaire and those for the mock-up is therefore necessary to obtain more accurate information. It is better to ask local people in different ways on same theme/question.

- Proposed Formats for Land Ownership and Use

(1) List of Collected Legal Documents on Land Allocation and Land Use

Type of document (Law, Decree, Decision, Regulations, Guidelines, others)	Title of document	Summary (2 ~ 3 sentences)

(2) List of Collected Data on Land Ownership

Type of data (Red Book, Land register, Resident register, others)	Published date	Owner of data (Name) (DARD, Sub-DoF, Forest Protection, DONRE, Peoples Committee, Commune PC, private sector, local people)

(3) List of Target People or Target Organizations for Information Collection on Land Allocation and Land Use

Target area (Name) (District, Commune, Village, others)	Name of target participant	Features of participant with possible advanced information (Farmer, Forester, Officer, others)

(4) Sheet for Mock-up

A sample of how to draw a mock-up is outlined above in Figure 2-3. It is better to draw this after hearing from and visiting sites with local people. Cross-checking with the semi-official questionnaire while drawing the mock-up will also results in more correct information. If there are differences between questionnaire information and that of the mock-up, confirm with local people (differences in area size can be checked with measuring tape as far as possible). For potential planting site where local people want to plant tree/change tree species and for bare land, the size should be confirmed with measuring tape. If possible, check the correct size in Red Book

Date of survey:
No. of respondent
Name of surveyor:
Name of respondent, commune and village:

Drawing owned/used area by respondent

(5) Field Sheet for Semi-official Questionnaire on Land Allocation and Land Use

The items in the format should be modified and more items added in accordance with the features of the survey area.

Date:_____

Number:_____

Surveyor:_____

Name of interviewer:_____

Commune:_____

Village name & no. of position on the land allocation map based on Red Book:_____

Lon & lat of house:

Red Book for forestry (○orX)	Red Book for agriculture, rice field and residence (○orX)	Total area in Red Book (ha) *(Both forest land and others)*	Forest land in Red Book		Actual Forest land			Other land (ha) (both in Red Book and actual)					Tree species	Age of trees (each species)
			Forest area in Red Book (ha)	Bare land in Red Book (ha)	Actual total area (ha) *(Including land without Red Book)*	Actual Forest area (ha) *(Including land without Red Book)*	Actual bare land (ha)	Rice	Fruit	Agriculture	House	Other		

Note: Check the name registered in the Red Book.

Check each piece of land determined by whether it is inside or outside the forestry area.

Do you want to plant trees/others in current non forest land?	Where	What	Why
Do you want to change other trees/vegetations from existing trees?	Where	What	Why

Other information

(6) Summary Sheet for Semi-official Questionnaire on Land Allocation and Land Use

No	Name of commune or village	Total area (I)	Total area inside forestry area (II)	Total area outside forestry area (III)	Other use in forestry area									Use for forest land in forestry area								
					Residence and garden around house	Agriculture	Fruit tree	Rice field	Tea	Grass land	Pond	Sub-total of afforestation potential area (A)	Note (Villagers' idea)	Bd	K	KL	Thong	BL	Bare land	For fuelwood	Sub-total (B)	Sub-total of afforestation potential area (villagers' idea) (E) / Note (villagers' idea)

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Total potential area for afforestation in forestry area (C) = (A) + (B)	% of (C)		Total potential area by villagers' idea for afforestation in forestry area (F) = (A) + (E)	% of (F)	
	Total potential area(C)/forestry area (II) * 100 = (D)	Weighted average of (D)		Total potential area(F)/forestry area (II) * 100 = (G)	Weighted average of (G)

3.2.3.3 *Mapping*

Mapping includes the outputs of field survey and the analysis outlined above, as one of the main purposes of the field survey is base-map preparation. The flow for preparing base maps is described in Figure 1-1 and 2-2.

- Methodology

✍ Preparation of draft base maps with existing maps

(1) Collect exiting geographic information on land issues that is available at relevant provincial authorities such as Department of Natural Resources and Environment (DONRE), the Department of Forest Protection (DoFP) and the district Forest Protection (FP) station, as described the main volume of the of F/S manual.

(2) Procure/ collaborate with an outside specialist or organization to carry out data processing in mapping with GIS software[8] application as shown below

o Scanning maps

o Geometric correction and conversion to standard coordination system[9]

o Scanned data processing (object classification, layer digitizing, object correction)

o Attribute data input and editing

o Area calculation and calculation of data by combining layers

o Design of map layout and printing

✍ Ground truths surveys to check current forest distribution and land-use for modifying base maps

(1) Conduct ground truths at least two days for each commune by observation and amendment of draft base maps along main roads and using binocular from elevated areas such as ridges and accessing forest land without forest cover (Legend "I "[10] on the forest status map) on:

o Locations and boundaries of existing forests

o Existing dominant tree species in forests

o Land use in forest land

o Main road alignments and widths

2) Procure/collaborate with an outside specialist or organization to carrying out modification for draft base maps with GIS software application

✍ GPS survey

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[8] E.g. Arc View, Micro Station Mapinfo

[9] Usually using Projection UTM coordinate. Vietnamese Data 2000 (VN2000) is not an international geographic data, its parameters have to be entered or GIS software has to be used for data conversion.

[10] Classification of forest land use by natural status-naturally classification system (Designing Norm for Forest-based Business issued by the former Ministry of Forestry attached to Decision No. 682 B/QDKT dated August 1, 1994 and reprinted in May 2000)

GPS surveying should be carried out along with interviews for preparation of information on LUP and LA to save time and obtain more accurate data.

(1) Overall process

This process aims to correct the geometric distortion of usually hand-made commune level land allocation/status of forest land maps and to consult with local people for their opinion on the preparation of information on LUP and LA:

o Identify area with/without Red Book in the forestry area;

o Consult with local people and examine risk/obstacles/difficulties in afforestation by asking their opinions on potential planting sites

This process consist of interviewing officers concerned with land allocation and forest management at the commune PC, small workshops/group discussion with key participants in villages and sample surveying locations of sample points of actual land-holding status boundaries using GPS.

(2) GPS surveying and consultation at People's Committee in commune

o Prepare and ask advices on small workshops in survey areas

o Ask the opinions of officers who know the forest areas, land use or maps on why forest production plantation planning maps (agroforestry maps in Tan Hoa) and land allocation maps based on Red Books differ from each other (reason, method for improvement, demands etc.)

o Confirm how to make and modify land allocation maps based on the Red Book

o Measure the position of PCs with GPS

o ask advice on measuring positions in each survey area with GPS

(3) GPS surveying and consultation in village and the project area

o Ask key participants in village (village head, those in managerial positions, elder people, who know land use/land location well etc.) about holding small workshops/group discussions in their houses or their land and which is better for them

o Start discussions by telling participants the objectives of the survey (1: modification of draft base maps and/or afforestation project plan maps (F/S stage), implementation plan maps (IP stage) by confirmation of land use of the villagers in forestry area, 2: collection of local people's opinions how to improve such maps etc.)

o Explain the geometric distortion/deviation between the land allocation status of forest land maps and forest status maps and the necessity to modify them (explain why the maps differ by introducing the opinions of officers in PCs (if any) and the risk of using maps without correcting such distortion/deviation)

o Discuss with participants on the real location of forest and boundaries by the Red book (draw real location on the map and record the opinions of villagers in the field notes)

o Confirm location and area with/without Red Book in forest land (colored area) (draw on the maps and record opinions in the field notes)

o Ask about risks, problems, difficulties or desire for an afforestation project tobe carried out in their area (record opinions in the field notes)

(4) GPS surveying at sample points of actual boundaries of Red Book registration

o Survey at least three suitable positions per village (where to measure more easily, where to identify positions accurately)

o Identify measurement positions (where to mark with accurate points on the map, where to overlap between the positions on the map and in the field, to select three points evenly in the village, to use clear boundaries as commune or lake demarcations etc.)

o Record data in field note

Photo 2-2 GPS surveying and interviewing of local people

☞ Modification of draft base maps/compilation of base maps and forest inventory book/ attributed data logs

(1) Procure/collaborate with an outside specialist or organization to carry out modification of data or draft base maps and/or the relevant afforestation planning maps (afforestation project plan maps at the F/S stage and implementation plan maps at the IP stage) with GIS software to correct geometric distortion by relative adjustment using the surveyed site's location data on land allocation status and other attributed data and/or by improvement of geographic information and the relevant planning information using the opinions collected from local people in order to compile the final base maps and/or the relevant afforestation planning maps

(2) Prepare forest inventory book/ attributed data logs containing important data for each block (section) on current conditions and planning data as shown in the example of Mapping (1)

(3) Prepare tables with area and/or volume totals as shown in the examplse of Mapping (2) and (3) to provide the summarized values necessary to describe the project area situation in reports.

Photo 2-3 Modification of map information in the field

- Examples of Mapping

(1) Example of attributed data log format in CoP

District	Commune	Compartment	Section	Forest status	Soil class	Soil type	Red Book	Land user	Area	Volume estimate		
										Average (M/ha)	Total (M/Sec)	Commercial
Sum of commune									1,659.2		16,113.6	8,432.9
Phú Bình	Bàn Đạt	242	1	BĐCII	III-1	D2P	Yes	Household	7.2	24.5	176.4	123.5
Phú Bình	Bàn Đạt	242	2	BĐCI	III-1	D2P	Yes	Household	1.4	16.5	23.1	
Phú Bình	Bàn Đạt	242	3	BĐCI	III-1	D2P	No	Household	1.3	16.5	21.5	
Phú Bình	Bàn Đạt	242	4	BĐCII	III-1	D2P	Yes	Household	3.2	24.5	78.4	54.9

(2) Example of totaling tabulation on area by soil and forest status in CoP

Forest status	Soil class	Soil type	Area
Grand Total			10,723.0
IIA	II-2	ĐIIIFs	5.0
IIA Total			5.0
BĐCI	I-1	ĐIfo	21.2
	I-1	ĐIfs	63.2
	I-1	TIIFdL	8.0
	Total I-1		92.4
	I-2	ĐIIFo	63.1
	I-2	ĐIIFs	213.7
	Total I-2		276.8
	II-1	ĐIIIFo	11.4
	II-2	ĐIIIFs	81.0
	III-1	D2P	40.8

(3) Example of totaling tabulation on area and volume by forest status and land holding status in CoP

No.	Forest status	Sum		Resident		Forest Enterprise	
		Area	Volume	Area	Volume	Area	Volume
	Total	4709.74		2552.48		2157.26	
A	Forest land	4297.27	157046.94	2152.40	57199.42	2144.87	99847.52
I	Plantation	4292.26	157046.94	2152.40	57199.42	2139.86	99847.52
1	Eucalyptus spp	2397.05	61614.55	1807.92	46685.56	589.13	14928.99
-	Eucalyptus spp I	502.25	8287.13	368.91	6087.02	133.34	2200.11
-	Eucalyptus spp II	1772.35	43422.58	1355.97	33221.27	416.38	10201.31
-	Eucalyptus spp V	122.45	9904.85	83.04	7377.28	39.41	2527.57

- Proposed Formats for Mapping

(1) List of Collected Geographic Information

Type of map *(topographic map, land use planning map, land allocation map, forest status map, others)*	Scale of map	Owner of map (name) *(DARD, sub-DoF, Forest Protection, DONRE, Peoples Committee, Commune PC, private sector, local consultant)*

(2) Proposed Interview Sheet for Consultation to Reflect People Opinion for Preparation of Information on LUP and LA

Format (2)-1)

Surveyor: _____

Date of Survey: _____

Commune: _____

Resource persons and their position in PC:

-

-

Speaker	Opinion on the draft maps

Format (2)-2)

Speaker	Opinion/idea on how to modify the commune level land allocation status maps of forest land based on the Red Book

Format (2)-3)

Speaker	Advise / wishes / opinion on the afforestation project plan

Format (2)-4)

Speaker	Opinion in discussion of the positions of real location of forests and boundaries in draft base maps/ commune level land allocation status maps of forest land

(3) GPS Surveying Sheet

No.	Place	Section No.	No. of Red Book	Longitude	Latitude