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DEPARTMENT OF FORESTRY

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**Model Feasibility Study Report**  
**for smallholder production forest**  
**development project in Thai Nguyen Province**

**Book 4-1: Model F/S Production Forest**

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

---FICAB---



## Preface

“Model Feasibility Study Report for smallholder production forest development project in Thai Nguyen Province (Book 4-1)” is part of the training package prepared under the development study on capacity building for preparing feasibility studies (F/S) and implementation plans (IP) for afforestation projects in the Socialist Republic of Vietnam (hereinafter referred to as “FICAB”).

The immediate objective of FICAB is to strengthen capacities for the preparation of afforestation projects through practical On-the-Job-Training (OJT), seminars, and workshops. Five provinces have been selected as targeted provinces for FICAB (Thai Nguyen, Son La, Quang Nam, Lam Dong, and Long An Provinces).

FICAB was divided into two phases. Phase I was to prepare Model F/S and IP as well as a training package in Thai Nguyen, a Core Province (CoP). The second phase was to implement technical training for staff members of four other provinces as Participating Provinces (PPs), i.e. Son La, Quang Nam, Lam Dong, and Long An Provinces. The training was implemented using Model F/S, IP and other training materials.

Through conducting FICAB, four forms of output are to be generated. The first is an enhanced capacity for MARD personnel. Selected staff members of MARD develop administrative and coordination capacity for supervising the quality of F/S and IP. The second is an enhanced capacity for CoP and PPs personnel. Selected staff members of CoP and PPs enhance the capacity for preparing F/Ss and IPs. The third is the development of a monitoring and evaluation method for the technical training for preparation of F/S and IP. The fourth is the development of a training package for conducting the technical training for preparing F/S and IP for afforestation projects.

The training package is prepared as one of the four above forms of output of the FICAB. The entire training package comprises the following nine (9) books:

Book 1: Training plan

Book 2: Manual for preparation of feasibility study reports for production forest / agroforestry development projects in Vietnam

Book 3: Manual for preparation of implementation plans for production forest / agroforestry development projects in Vietnam

Book 4: Model F/S of Thai Nguyen Province

Book 4-1: Model feasibility study report for smallholder production forest development project in Thai Nguyen Province

Book 4-2: Model feasibility study report for agroforestry development project in Thai Nguyen Province

Book 5: Model IP of Thai Nguyen Province

Book 6: Monitoring and evaluation report on technical training of PPs

Book 7: Market trend reference book of wood-based and agroforestry products

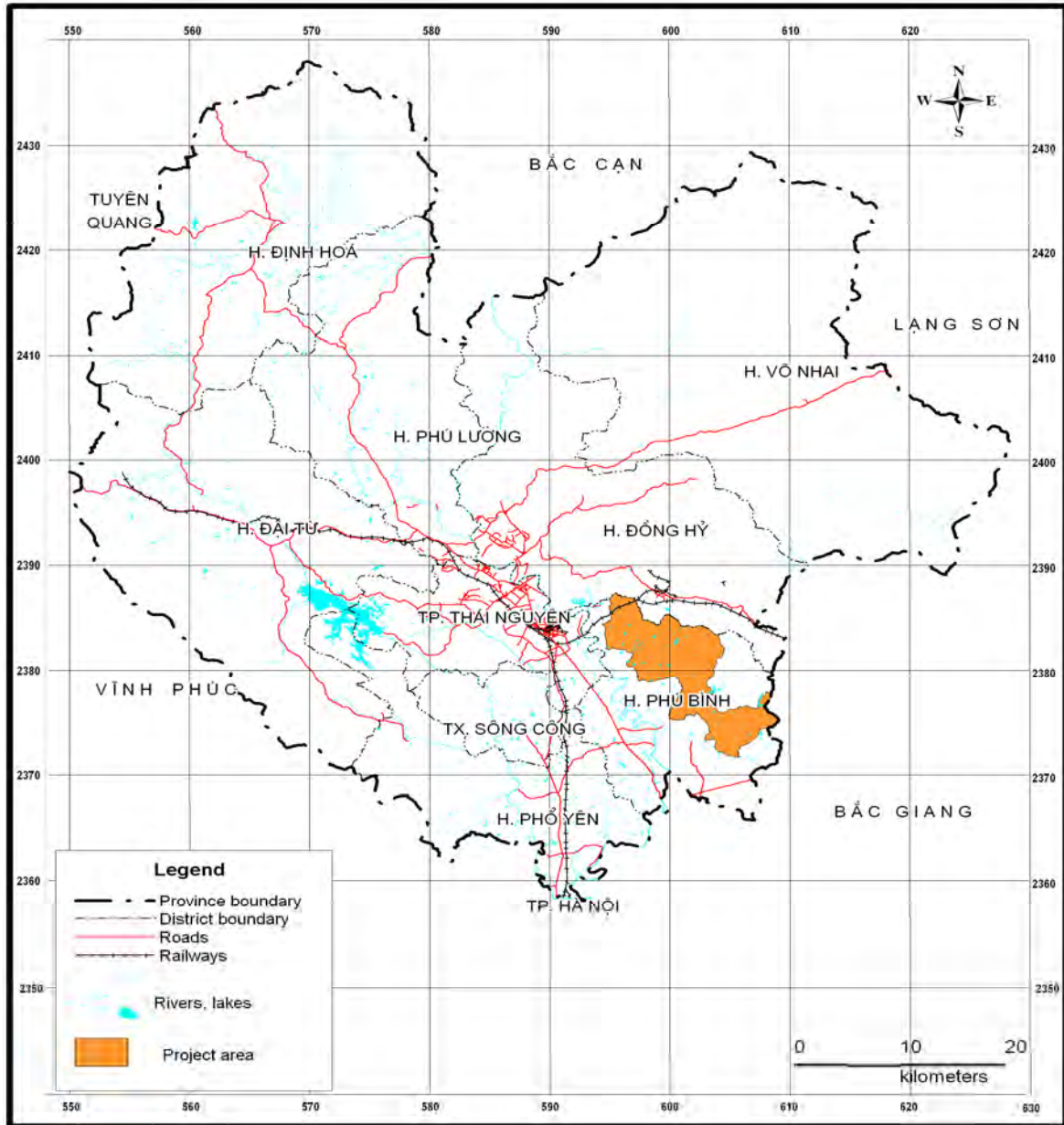
Book 8: F/S reports of Son La, Quang Nam, Lam Dong, and Long An Provinces

Book 9: IPs of Son La, Quang Nam, Lam Dong, and Long An Provinces

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## Currency Equivalent

US\$ 1.00 = 16,000 VND in 2005

## Abbreviation

5MHRP	Five Million Hectare Reforestation Programme
ASEAN	Association of Southeast Asian Nations
B/C ratio	Cost-Benefit ratio
CoP	Core Province
CCM	Communal Consultation Meeting
DARD	Provincial Department of Agriculture and Rural Development
DoF	Department of Forestry
DOF	Department of Finance
DPI	Department of Planning and Investment
EIRR	Economic Internal Rate of Return
FAO	Food and Agriculture Organization of the United Nations
	The Development Study on Capacity Building for Preparing Feasibility Studies and Implementation Plans for Afforestation Projects in the Socialist Republic of Vietnam
FICAB	Feasibility Study
F/S	Feasibility Study
FIPI	Forest Inventory and Planning Institute
FIRR	Financial Internal Rate of Return
FSDP	Forest Sector Development Program
GOV	Government of Vietnam
IP	Implementation Plan
IRR	Internal Rate of Return
JICA	Japan International Cooperation Agency
JST	JICA Study Team
LUR	Land Use Right
LUC	Land Use Right Certificate
MARD	Ministry of Agriculture and Rural Development
MPI	Ministry of Planning and Investment
NPV	Net Present Value
PAM	WFP's Programme Alimentaire Mondial
PC	People's Committee
PFA	Production Forest Association
PFD	Production Forest Development
PFEP	Production Forest Establishment Project
PIP	Project Implementation Plan
PIU	Project Implementation Unit
PMB	Project Management Board
PMME	Project Management, Monitoring and Evaluation
PPs	Participating Provinces
PST	Provincial Study Team
RRA	Rapid Rural Appraisal
SFE	State Forest Enterprise
SFFD	Support for Production Forest Development
SOE	State of Environment
Sub-DoF	Sub-Department of Forestry at province level
VBARD	Vietnam Bank for Agriculture and Rural Development
VBSP	Vietnam Bank for Social Policies
VDB	Viet Nam Development Bank
WTO	World Trade Organization





# Summary

## Part I Project Background

### Chapter 1 Context of Project Formulation

Much of the past efforts by the government have been focused on the protection and special-use forests while production forests have remained less supported. The demand for wood materials and wood products is to continue to grow, reflecting the rapid expansion of the economy. The current wood supply is not able to meet domestic demand. GOV is revising its relevant policies and programs to focus much more on production forests. The new policy is attempting to create a more favorable environment where more stakeholders can play a part in developing forest. In particular a key role is envisaged for both small farmers and rural enterprises.

Demand for wood materials in Thai Nguyen Province is high and rising rapidly. However, insufficient wood supply imposes a serious challenge to wood processing companies. These companies operate below capacity due to the lack of wood materials. The Thai Nguyen provincial government aims to use production forests as one of the instruments to increase provincial economic development and reduce rural poverty. A forestry development plan has been prepared aiming to create 23,000 - 24,000 ha of new production forests.

### Chapter 2 Natural and Socio-economic Conditions

The project area is the entire area of the four communes: Ban Dat, Tan Khanh, Tan Kim, and Tan Hoa of Phu Binh District, Thai Nguyen Province. Phu Binh District is adjacent to Hanoi and the Provincial capital, which create favorable conditions for its development within a market-oriented economy.

The population of the four communes is about 26,000 persons living in 5,500 households. The main household income in the project area is agriculture and off-farm activities. Agriculture is the major activity in the District and the agriculture sector accounts for 70% of the gross output. The role of forestry for the household economy is small but important.

The size of forest land in the project area is 2,992 ha, and of which the forested land is 2,653 ha. 2,473 ha (83%) of forest land has been allocated to individual households. Land productivity ranges from 85m<sup>3</sup>/ha to 164 m<sup>3</sup>/ha of growing stock at eighth year after planting.

The value of provincial wood production is around 40 billion VND. Average stumpage value for logs is assumed at VND 350,000 per m<sup>3</sup> for A.hybrid and VND 400,000 for A.mangium. Thai Nguyen particle board factory is one of the major target markets located closest to the project area.

### Chapter 3 Lessons Learnt

In Phu Binh district, the most significant projects to be noticed are the PAM afforestation project, reforestation project under the 5MHRP, and the plantation project for Thai Nguyen Particle Board Factory. In formulation of these projects, there exist the following constraints: i) basic conditions for the project formulation were not well

surveyed, ii) these projects did not suit the reality of the local conditions, and iii) the organization for implementation was not close to the realistic situation.

#### **Chapter 4 Advantages and Constraints**

The following advantages have been observed: i) forest lands in the four communes have been allocated to households, ii) project areas are close to consuming markets and iii) soils are suitable for production forest. On the contrary, it is difficult for local people to access new afforestation technologies, local people have no money to invest into production forest and loans for development of production forest are not accessible easily for farmers.

### **Part II Project Contents**

#### **Chapter 1 Project Rationale**

The challenge of GOV is to cope with the rapidly rising demand for wood materials and wood products, and to use the forestry sector to improve rural livelihood. For this reason, the GOV policy of encouraging plantation by farmers and the private sector entities in production forest should be supported. There are two major concerns to address when formulating the project. Firstly, not all farmers can establish forest plantations on their own without financial support or provision of seedlings/fertilizer at low cost. Second, there is a lack of a support framework for smallholders such as linkages with financial institutions and markets, and dissemination of silvicultural technologies.

#### **Chapter 2 Project Objectives and Outputs**

The overall goal of the project would be to improve livelihood through development of production forest in the project area. The project objective is to increase the production value of the forest lands. The objective of the assistance is to establish production forest area. And as outputs, establishment of 1,500ha production forest and so on are also set.

#### **Chapter 3 Project Activities**

##### **1.1 Project Components**

Various project activities are grouped into three components such as i) Production Forest Development, ii) Support for Production Forest Development and iii) Project Management, M&E.

##### **1.2 Project Implementation Plan**

1,492 ha of the forest land are selected as planting site and 1,156 ha of it would be planted with A.hybrid and 335 ha with A.mangium over seven years. After planting, tending is implemented from the first year to the third year, and protection is applied right after planting till harvesting. It is planned to harvest in the eighth year after planting. The commercial volume of timber to be harvested during project period is estimated 144,000 m<sup>3</sup>. Training is planned for smallholders and PMB/PIUs staff members. Consulting service is procured in various fields such as financing mechanism development and so on.

##### **1.3 Implementation Schedule**

The assistance period of the project is eight years and this period is divided into the two periods, preparation period in the first year and operation period from the second year

to the eighth year. During the preparation period, activities necessary for the afforestation activities in the field will be carried out and during the operation period, activities directly related to the afforestation will be carried out.

#### **Chapter 4 Project Cost**

Total project cost during assistance period, including physical and price contingencies are estimated at 21.2 billion VND. That of the production forest development component would be 17.7 billion VND, support for production forest development component is estimated at 2.7 billion VND and project management and M&E component is estimated at 0.9 billion VND.

#### **Chapter 5 Financing Plan**

There are three sources of project financing. It is expected that the contribution of farmers to the project cost would be 42%. About 41% would be financed by loan. The government share of the project would be 17% of the project cost during the assistance period.

#### **Chapter 6 Organization of Project Management and Implementation**

Project Management Board (PMB) is established as an implementing agency of the project. It will be responsible for implementing the project and achieving the project objective. At commune level, Project Implementation Units (PIUs) is established to carry out daily field operations as a subordinate organization. As related organizations, MARD, Thai Nguyen PPC, DARD/Sub-DoF, Phu Binh DPC and so on are listed up and explained their roles and responsibilities.

#### **Chapter 7 Monitoring and Evaluation**

In order to monitor and evaluate the achievement of the project objective and overall goal, the development indicators are set and progress indicators are also set for monitoring the progress of the project. These monitoring and evaluation method are shown in the Project Design Matrix.

### **Part III Project Justification**

#### **Chapter 1 Financial and Economic Analysis**

##### **1.1 Financial Analysis**

The project will develop production forests with A.hybrid and A.mangium with a cycle of eight years. The financial analysis was conducted on a one ha production forest model. The net benefits arising from the without-project case are expected to be marginal and the only with-project case is considered for the analysis.

The results of the analysis shows that the production forests with both types of Acacia are viable as the financial internal rates of return (FIRR) show 22% for A.hybrid and 17% for A.mangium in the base cases. The conclusion suggested by the analysis that Acacia plantations are viable is confirmed by farmers' behavior – those who have funds are undertaking plantations on their own.

##### **1.2 Economic Analysis**

The economic analysis of the project shows that the Net Present Value (NPV) is calculated at VND 4.9 billion (at the economic discount rate of 10%) and the Economic

Internal Rate of Return (EIRR) are at 15.8%. The results confirm the feasibility of the project from a view point of the society.

### **Chapter 2 Evaluation of Environmental Impacts**

As for environmental aspects, it is expected that the project would contribute to improving soil and plant diversity under the canopy of new plantations.

### **Chapter 3 Evaluation of Social Impacts**

As for social aspects, some households of ethnic minority groups may require a more focused training on benefits and risks of the project and to promote a sense of mutual assistance. The project may bring about negative impacts on the household economy in the short-and medium-term period due to planting cost. Special consideration will be given in order for women to receive information on the project and participate in the training program.

### **Chapter 4 Sustainability**

The strong demand for wood is expected to contribute to the sustainability of the project. Participating smallholders supposed to gain necessary skills to continue their activities after the end of the assistance period of the project. In addition, soil improvement through establishing new plantations is expected to contribute to the sustainability of land-use. And experiences gained through the project implementation would enable governments to replicate similar projects elsewhere in the future.

### **Chapter 5 Project Risks and Mitigation Measures**

There are a number of project risks that could possibly pose threats to realization of the outputs and project objectives as follows; delayed approval and policy changes, lack of appropriate loan scheme, insufficient staff and budget allocation, maintenance of participant's interest and so on. As mitigating measures, close dialogue with the governments etc are listed up.

## **Part IV Conclusions and Recommendations**

### **Chapter 1 Conclusions**

The project is expected to contribute to the livelihood improvement of participating smallholders and increased production values of the forestry sector. The financial analysis indicates that the investments are viable. The quantifiable economic benefits of the project would include increased domestic supply of wood materials which would reduce imports. In addition, the plantations would improve the environment. The experience of Thai Nguyen should provide lessons to other provinces that would like to develop production forest.

### **Chapter 2 Recommendations**

It is recommended that the provincial government will issue the approval of the PMB at the appropriate timing and also establishment of an innovative loan scheme is fundamental of this project. And related organization, in particular PMB and PIUs is expected to strengthen their institutional capacity in promoting production forests. It is crucial that PMB and PIUs will inform the participating smallholders with a full detail of the project scheme and potential risks that they may face.

# LEGAL FRAMEWORK

## Legal framework for project formulation

The formulation of production afforestation in Phu Binh district, Thai Nguyen province is a step in the concretization process of the national, provincial advocate of socio-economic development. The project is suitable to the development orientation at different levels of government. The project is formulated on the following legal bases:

- a) Socio-economic development plan period 2005-2010, Thai Nguyen province sets up a target of forestry growth at 10-11%/year, newly planting of 23,000-24,000 ha of forest to supply timber to processing enterprises in the province, 100.000 m<sup>3</sup>/Year for paper industry and others.
- b) Based on Decision 199/QĐ-BNN-PTNT dated 22 - 1 - 2002 on the approval of the Forestry Development Strategy of Vietnam period 2001-2010 with the objective of growing 3.52 million ha, of which 1.8 million ha is production forests.
- c) Based on Decision 661/QĐ-TTg dated 29 - 07 - 1998 of the Prime Minister on the objectives, tasks, policy and organization for the implementation of the Five Million Hectare Reforestation Programme (5MHRP)

## Legal documents relating to the application in the project case

Scales and measures that regulate the project are based on regulations for production afforestation, consisting of:

- a) Decision No. 38/2005/QĐ-BNN dated 06 - 7 - 2005 of Minister of MARD on the unit price for a man-day labor for afforestation, tending and afforestation design
- b) Decision No.175/1998/QĐ/BNN/KHCN, dated 04 – 11 - 1998 of MARD, promulgating temporarily on contracts for forest protection, speeding up natural regeneration in connection to additional planting, afforestation and tending of forests
- c) Circulation No. 28/1999/TT-BTC dated 13 - 03 – 1999 of MoF, guidelines for distribution of state funds to 5 MHRP by Decision 661/QĐ-TTg, 29 - 07 - 1998 of the Prime Minister
- d) Technical regulations for intensive afforestation of several species as A.hybrid and A.mangium
- e) Cost norms for different activities relating to afforestation made by Thai Nguyen province

## **Introduction**

This report has been prepared as a model F/S report, which aims to be broadly applicable to the whole country, based on the findings of a feasibility study conducted during the period from July 2005 to March 2006 in Phu Binh District of Thai Nguyen Province, Vietnam.

This feasibility study is conducted as part of the Development Study on Capacity Building for Preparing Feasibility Studies and Implementation Plans for Afforestation Projects in the Socialist Republic of Vietnam which is agreed between the Government of Vietnam and the Japan International Cooperation Agency (JICA) in December 2004.

The target project for the feasibility study is a production forest establishment project in four communes of Phu Binh district. The general outline of the project is as follows;

- The implementing agency is a Project Management Board (PMB) which is established by the Peoples' Committee of Phu Binh district and smallholders who conduct afforestation activities, who have forest land for plantation in four communes.
- In order to promote the economic utilization of degraded forest lands, it is planed to convert Eucalyptus plantations to high productivity Acacia plantations and through converting from Eucalyptus to Acacia plantations, it is also planed to improve the livelihood of smallholders. The target product is wood materials for chip.
- As regarding the financial resource for afforestation activities, the Vietnam Bank of Social Policy (VBSP) provides loans to smallholders, and as for project management, the government of Vietnam provides subsidies to the Project Management Board (PMB).

The Forest Inventory and Planning Institute of Vietnam (FIPI) conducted the feasibility study under the guidance and supervision of the JICA Study Team (JST) and in the process of the feasibility study, technology transfer from JST to FIPI on feasibility study was carried out. The provincial study team of Thai Nguyen province also participated in the feasibility study. In order to enhance the capacity for preparing F/S, OJT for the provincial study team was carried out during the feasibility study.

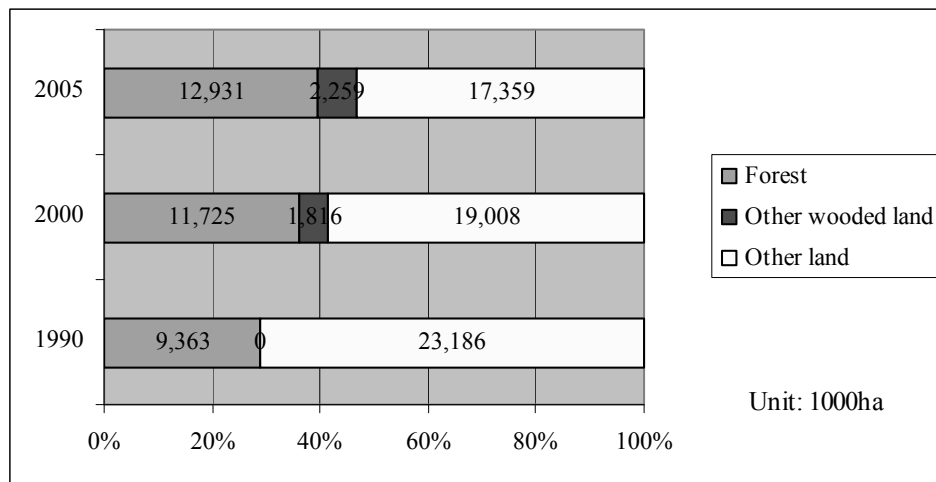
## **PART I. PROJECT BACKGROUND**

# 1. CONTEXT OF PROJECT FORMULATION

## 1.1 National context

The recent revision of the Five Million Hectare Reforestation Plan (5MHRP) aims at the development of sustainable production forestry and wood based-industry, in addition to increasing forest cover. With the strong commitment of the Government of Vietnam (GOV) and support from partners, Vietnam has been able to increase its aggregate forest area. This is an exceptional achievement if compared with other countries, where due to a high demand for wood, forests are declining rapidly. Much of the past efforts by the government have been focused on the protection and special-use forests<sup>1</sup> while production forests have remained less supported by government budgets.

**Figure I - 1 Changes in Forest Areas over 15 Years**



Source: FAO (2005)

The country is endowed with vast areas suitable for forestry, an abundant labor force, and developed forest technology. Nevertheless, the current wood supply is not able to meet domestic demand. Although considerable areas have been planted with fast growing tree species, most forests are still too young to be available for the market. At present Vietnam is experiencing a surge of imports of wood materials and wood-based products. According to the Ministry of Trade, the total amount of imported wood materials and wood products is estimated at around US\$ 667 million in 2005, while the country is exporting US\$ 1.6 billion of wood materials and wood-based products. The demand for wood materials and wood products for construction and furniture is likely to continue to grow, reflecting the rapid expansion of the economy. In addition, the economic growth of China and other neighboring countries is creating a huge regional demand for wood

<sup>1</sup> In Vietnam, the forest land is classified into three functional forest categories including (i) protection forest, (ii) special-use forest, and (iii) production forest.



materials and wood-based products. This has created a bottleneck of wood supply and has resulted in a constant increase of wood prices.

Tax reductions on wood-based products required under the ASEAN's free trade agreement as well as the membership of Vietnam in the World Trade Organization (WTO)<sup>2</sup> is another challenge to the wood-based industry in Vietnam. It is expected that the liberalization of wood materials and wood product markets from 2006 will create tough competition for the domestic wood-based industry and result in large additional flows of imported wood materials and wood-based products. Vietnam needs to maintain its wood processing capacity as a viable unit and this requires a domestic wood supply at reasonable prices.

Protection and special-use forests are for watershed management and for the creation of special habitats. They are not meant for the supply of timber to the market. In the light of an insufficient wood supply and an increase in future demand both domestically and within the region, it will be difficult to protect these forests against illegal and unauthorized logging. GOV is revising its relevant policies and programmes to focus much more on production forests. Until recently, the establishment of production forests had been vested in companies, such as Vietnam Forest Corporation (VINAFOR) and Vietnam Paper Company, both manufacturers of wood-based products. However, the new policy is attempting to create a more favorable environment where more stakeholders can play a part in developing forests. In particular a key role is envisaged for both small farmers and rural enterprises. In quantitative terms, it is planned to establish 1.5 million hectares of production forests by 2010 in suitable areas. The revised policy also proposes to review the categorization of forest land, and where possible, reclassify some of the forest land from protection to production forest, for example in those areas that are not located in priority watersheds. This policy will allow GOV to focus efforts on those activities where public investment is really required and allow the private sector a larger role.

The forest establishment strategy being promoted by GOV also envisages increased participation by farmers in the development of production forests. To this end, lands managed by State Forestry Enterprises are being allocated also to farmers and formal land-use rights are being granted. An objective of this policy is also to use forest development as a means to alleviate rural poverty to achieve the goals of the Strategy for Economic Growth and Poverty Reduction. GOV considers that the forestry sector could substantially contribute to increasing incomes in forest communities.

The strategy of involving farmers and other stakeholders in developing production forestry on a major scale has been endorsed by development partners. However, it is also recognized that farmers, particularly smallholders, face major constraints in developing

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<sup>2</sup> Vietnam joined the WTO in January 2007.

forest lands allocated to them. In particular they have difficulties in raising capital for the long-term investments that are needed; accessing technology and high quality planting materials; and utilizing efficient market channels that allow them a high share of the final price of their products. It is urgent that GOV increases effective participation of farmers in the development of production forest, strengthens land-use rights and access to credit and market linkages.

## ***1.2 Local Context***

Thai Nguyen Province is a rich agricultural area with a favorable climate, generally good soils and abundant water supplies. Important commodities produced include rice, maize, livestock and tea – for which the province is well known. It has a good arterial network of roads and access to markets in Hanoi. The province has a small but important forestry base. Some 190,000 ha are classified as forest land. Most of this has been classified as protection forest (90,000 ha) or special use forest (33,000 ha). There were five State Forest Enterprises (SFEs) that played a key role in the forestry sector. They not only managed the forests but also provided social and economic services such as schools, clinics and roads in the forest areas. In line with national policy, the role of SFEs has been rapidly reduced and most of the forest lands have been allocated to farmers – usually in blocks of 0.5 to 2.0 ha. There are currently only two SFEs left and they manage only 6,000 ha. At the same time, some 45,000 ha of protection forest has been reclassified as production forest and is now available for commercial plantations.

Demand for wood materials in the province is high and rising rapidly. There are important wood processing companies in the province including the Thai Nguyen Particle-Board Factory, Hoang Van Thu Paper Mill, Laminated Board Factory, Forest Joint-Stock Company, Cam Giang Coal Mine, and the Chopstick Workshop. It is estimated that the annual consumption of wood materials by these companies is currently 65,000 m<sup>3</sup>. However, insufficient wood supply imposes a serious challenge to these companies. The Particle Board Factory, for example, operates below capacity due to the lack of wood materials. Similar shortages affect other factories in the province. In addition to the demand from the industrial sector there is also a large private wood trade for construction, furniture making and fuel wood. Better logs, mainly straight trunks of over 10 cm in diameter, are sold at premium prices for construction and planks. Bent trunks and larger branches are sold to the processing units and smaller branches and sticks are sold for firewood.

The wood trade is often handled by middlemen who often buy the standing trees from farmers for a fixed sum of money. Felling and transport is organized by the traders themselves. Usually the trader only takes the main trunk leaving the branches and litter to the labor as full or partial compensation for their work. Transport of timber to the markets is by truck, buffalos or where possible by river.

The Thai Nguyen provincial government aims to use production forests as one of the instruments to increase provincial economic development and reduce rural poverty. A forestry development plan has been prepared for the period 2005 – 2010 aiming to create 23,000 - 24,000 hectares of new production forests and to assist natural regeneration of 11,000 - 12,000 hectares of degraded forests. The plan is to raise the output value of the forestry sector by a factor of 1.8 by 2010 over the levels of 2002. In addition, the provincial government envisages the upgrading of production capacities of some of the above-mentioned companies to make them fit to meet future demand and compete in the global market.

As a step towards achieving its goals the provincial government is establishing a forest nursery in every district and strengthening its agro-forestry extension services, as well as promoting better forest products marketing. Furthermore, the provincial government encourages farmers to adopt farm forestry and agro-forestry to improve their livelihoods while promoting the restructuring of agricultural cooperatives.

Most of the forest in Phu Binh district is in scattered blocks of 1-5 ha. These are predominantly small hillocks or outcrops located near to flat areas. Flat areas are mainly used as paddy lands or for other annual crops such as maize. The lower parts of hilly and sloping lands are used for homesteads, home gardens, livestock, fruit trees, and the higher parts are covered with trees. The traditional primary forests on the sloping lands were removed several decades ago. The land was degrading rapidly, with the top soil and the biological litter washed away by rainfall and/or used for animal grazing and fuel. In the 1990s the World Food Programme (WFP) undertook a plantation programme in the project area under which some 1,900 ha were planted with Eucalyptus under a Food for Work Programme (PAM). These 1,900 ha established under the WFP's programme have been harvested and most of the trees left are the second and/or third generation of coppiced Eucalyptus. Standing stock in these Eucalyptus areas average about 25 m<sup>3</sup>: this is far below that necessary for an economically feasible production forest.

In the project area, there are about 2,000 households who own such plantations with formal land-use rights. Most of these families are eager to replace the old Eucalyptus plantations with fast growing trees of higher value. The main constraint faced by many of the smallholders is lack of capital to invest in long-term productive activities. Other constraints include access to technology and market uncertainties. These are special uncertainties related to the existing wood processing plants. There is a feeling that the processing plants tend to pay low prices for wood materials as they are exposed to foreign competition and are under obligation to show high profits to attract investment.

## 2. NATURAL AND SOCIO-ECONOMIC CONDITIONS

### 2.1 Natural Conditions

#### 2.1.1 *Geographical Location and Area*

The project area is the entire area of the four communes: Ban Dat, Tan Khanh, Tan Kim, and Tan Hoa of Phu Binh District, Thai Nguyen Province. The total area of the four communes (the project area) is about 8,010 ha. In the project area, there are 2,992 ha of the forest land and afforestation activities are conducted in this area.

Agricultural lands comprise about 80% or 6,700 ha of the total area of the four communes, while the forest lands account for 37% or about 3,000 ha. Lands classified under “other” are basically residential areas and ponds. Flat areas are mainly used as paddy lands or for other annual crops such as maize. The lower parts of sloping lands are used for homesteads, home gardens, livestock, fruit trees and forests. (to be revised based on the table below)

Phu Binh District is adjacent to Hanoi, about 25 km from the Provincial capital and linked by good roads to the Song Cong Industry Park of Thai Nguyen Province and many industrial parks of Hanoi. This location provides a geographical advantage in the trade and industrialization of the district. The district has a well-developed internal transport network, including roads, railways and waterways, which create favorable conditions for its development within a market-oriented economy.

**Table I - 1 Land classification by administrative unit**

*Unit: ha*

Administrative unit	Thai Nguyen Province	Phu Binh District	Project area
Land classification			
Total area	354,150	24,936	8,010
1. Agricultural land	261,780	19,853	6,673
(out of which: forest land)	(165,107)	(6,230)	(2,992)
2. Non-agricultural land	39,714	4,539	1,322
3. Un-used land	52,656	544	15

Source: Thai Nguyen Sub-Department of Forestry – 2005

Note: The numbers do not necessarily sum up due to rounding.

#### 2.1.2 *Topography*

The terrain of Phu Binh District is characterized by flat or slightly undulating topography, with the mean elevation being 100 m above sea level (asl). The highest point of the district is 250m asl. The flat areas along the foothills are being used for intensive rice cultivation. The hills are mainly covered by degraded forest.

### 2.1.3 Soils

The soils on the hilly sloping areas in the project area are generally infertile. The capacity to hold water and humidity is low with a low ratio of organic matter content (from 0.5 - 0.7%). The acidity is overall high at a pH range of 4 -5.

As shown in Table I-1 for the detail of the soils types and land classes, the classification of land (based upon a formula using slope and productivity) indicates that the majority of the hill areas are moderately suitable for tree planting. Much of the lands are of low productivity due to infertile soils and thick mother rocks that emerge from thin top soils. The mother rocks are characterized by shale, sandstone and ancient alluvium.

#### 2.1.4 Climate

Annual rainfall in the district over the past ten years ranges from about 1,600 to 2,000 mm. Rainfall is influenced by the annual monsoon cycle, with a wet monsoon season from April to October. Highest precipitation occurs in the period May to August -- bringing more than 80% of the annual rainfall. The dry season, starting around end October and ending in early April, can be devoid of rainfall.

The peak of the hot season occurs around June to September, while the cool and dry season runs from December until March and is under the influence of the north-east monsoon. Mean humidity is around 80% with a maximum humidity in June to August and a minimum in November and December.

#### 2.1.5 Hydrology

There are five major rivers that traverse the district, most of them inter-connected by artificial canals. The level of these water bodies fluctuates with the season and rainfall. Risks of flood from these rivers and canals increase in the highest precipitation period. The rivers and canals are mainly used for irrigation securing the livelihood of the rural population. Some of the water channels are used for transportation.

Ground water in the river basins is believed to be abundant at 5 - 7 m depth and is mainly being pumped up for household use.

## 2.2 Socio-economic Conditions

### 2.2.1 Population, ethnicity and labor

#### (1) Population

The total population of the four communes is about 26,000 persons living in 5,500 households (1999 data), or 4.7 persons per household. The population of the four communes accounts for 20% of the total district population. The population growth rate is estimated at 1%. The sex ratio is balanced, 13,000 persons or 50% of the total population are female. Population density of the four communes is 322 persons/km<sup>2</sup>.

**Table I - 2 Project-targeted Communes**

Items	Phu Binh District	Ban Dat	Tan Khanh	Tan Kim	Tan Hoa	Four Communes Total
Ares (Ha)	24,396	1,857	2,092	2,156	1,905	8,010
Population	133,118	5,294	6,885	6,625	7,366	26,170
Female population	68,016	2,670	3,430	3,345	3,726	13,171
Households (HH)	28,822	1,056	1,457	1,405	1,598	5,516
Poor households (HH)	2,165	64	138	117	151	470
Labor force (persons)	77,513	3,081	4,007	3,856	4,270	15,214
Number of villages (Note)		12	25	14	17	68

Source: Statistics Department of Phu Binh District Office, June 2005 (Year of reference is 1999).

Note: Number of villages is based on the interview at the Agriculture and Rural Development Division of Phu Binh District Office

#### (2) Literacy and Education Level

The literacy rate of Phu Binh District is not recorded. According to the Living Standard Survey 2004, the literate population at age 10 and above is 93% for the whole country. Male literacy is 96% and female literacy 90%. It is plausible to assume that the majority of population of the District is literate and an eventual issue of illiteracy will not pose a serious problem for the project success.

There are 21 primary and 21 middle schools (or junior high schools) and 2 secondary schools (high schools) in the District, with a little over 11,000 pupils at the primary and middle schools, as of the end of 2004. It is considered that most of the young population in the district has received a primary level education.

#### (3) Ethnic Minority Groups

Immigrants from elsewhere constitute the majority of the inhabitants of the project area. The Kinh group accounts for 65.19% of the local population. According to the provincial population census carried out in 2000, there are five main ethnic minority

groups -- Nung (11.14%), Tay (6.54%), San Diu (13.39%), Mong and Hoa (3.73%). The following table shows the distribution of ethnic groups in the four communes according to the Phu Binh District Office. In the four communes, about one-fourth of the population is comprised of ethnic minorities.

**Table I - 3 Ethnic Minority Groups and Composition**

*Unit: Number of persons*

	Ban Dat	Than Khanh	Tan Kim	Tan Hoa	Total	Ratio
Kinh, etc.	3,216	6,968	6,012	5,031	21,227	75%
Nung	4	61	1,141	1,562	2,768	10%
Tay	0	60	34	1,311	1,405	5%
San Diu	2,489	311	5	8	2,813	10%
Mong	4	0	0	4	8	0%
Hoa	0	15	5	0	20	0%
Ethnic Minority Total (a)	2,497	447	1,185	2,885	7,014	25%
Total Population (b)	5,713	7,415	7,197	7,916	28,241	100%
(a)/(b)	44%	6%	16%	36%	25%	25%

Source: Phu Binh district office

A household survey carried out during the project preparation period showed that the major factor in determining the level of income among the population is not ethnicity, but geographical location and natural resource endowment. For example, Tan Hoa Commune, which has relatively fertile soil, good access to markets and well-developed infrastructure compared to other project communes has a higher average household income, even though the share of the ethnic minority is fairly high.

#### (4) Labor Force

According to a recent estimate in 2004, the active labor force of the four communes is estimated to be about 17,000 persons, accounting for 60% of the total population of the four communes. Female labor makes up about one half of the total. It is estimated that labor availability of each household is on average 2.8 persons.

#### (5) Gender

The sex ratio is fairly balanced in the project area. This concerns both the total and active population; female labor is one half of the total. Village level workshops carried out for this study reveal, however, that women's labor share in work at farms and household is somewhat larger than men's, although they have less decision-making power on land use and investment.

#### (6) Health



Serious health threats specific to the project area are not apparent. For example, the infant mortality rate of Phu Binh district is at the same level as that of the national statistics: 17 per 1000 live births for the country in 2004 and 17<sup>3</sup> for the district in 2003. It is noted that the public health of the district is well organized. It is considered that project activities will not be affected adversely by health issues.

### 2.2.2 *Household Economy*

#### (1) Household income

The main household income in the project area is from agriculture. Rice is the most important commodity. A survey carried out during project preparation revealed that the average household gross income is around VND 21 million (about 1300 US\$) annually; the income from agriculture in this figure accounts for about VND 7 million or 35% of the total. Stock raising, such as buffalo, cow, pig and chicken, plays an important part in the household economy, providing cash income to the households.

**Table I - 4 Estimated Household Income**

Item	Gross Income (Note)	
	Million VND	%
Agriculture	7.3	35.2
Forestry	0.8	3.7
Salary (company workers, public servants, etc.)	0.9	4.4
Service (retail, etc.)	3.0	14.6
Others (off-farm, services, etc.)	8.7	42.1
Total	20.7	100.0

Source: The Study Team

Note: Simple average of gross income of 49 respondents to the questionnaire survey.

#### (2) Off-farm Activities

Some farmers are involved in off-farm activities such as retailing businesses while others work on construction sites. A field survey shows that off-farm activities accounts for a larger share of the total gross income.

#### (3) Poverty

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<sup>3</sup> The number for infant mortality is divided by the number of 1000 new born babies in the district based on the district statistics. The statistics for the country is taken from World Development Indicators 2006, the World Bank.

According to the Labor Department of Phu Binh District Office, the poverty rate of the district in 2004 was about 7% and the number of households classified as poor was 2,165 in 2004.<sup>4</sup> If compared with the statistics in 2001, a decreasing trend in poverty is revealed (15.7% and 4,542 households in 2001).

According to the food poverty standard, the percentage of households in poverty in 2004 was 6.9% for the whole country and 9.4% for the north east region. On the other hand, if the government poverty standard is applied, the percentage of poverty household in 2004 was 18.1% for the whole country and 23.2% for the north east region as of January 2004.<sup>5</sup> If the same criterion as the government poverty standard is applied, the poverty rate of Phu Binh district was 31.4 % in 2005, the fourth poorest district in the province.<sup>6</sup> Although the conditions in Phu Binh district have shown improvement over the last four years, the district is still considered poor if compared with other districts in the province and the national average.

**Table I - 5 Ratio and Number of Poor Households in Phu Binh District**

	2001	2002	2003	2004
Phu Binh District	16%	11%	8%	7%
No. of Poor Households	4,542	3,348	2,511	2,165
Ban Dat	11%	10%	5%	5%
Tan Khanh	17%	17%	8%	8%
Tan Kim	15%	12%	8%	8%
Tan Hoa	15%	14%	11%	8%

Source: Labour Department, Statistics Department of Phu Binh District, June 2005

### 2.2.3 *Major economic activities*

#### (1) Agriculture

Agriculture is the major activity in the District and the agriculture sector accounts for 70% of the gross output. Major produce includes rice, sweet potatoes, peanut, maize, and soybeans. Livestock production also plays an important role in the sector. In terms of numbers, about 36 % of the provincial cattle numbers were reported in Phu Binh district in 2004.<sup>7</sup> Livestock mainly comprise of chickens, ducks and pigs, cattle, with some buffaloes for ploughing. Most animals are stall-fed with crop residue, household waste, and some

<sup>4</sup> It is not specified which poverty criterion is used for the calculation. However, it can be assumed that the poverty rate of the district in 2004 will be based on the food poverty standard.

<sup>5</sup> Food poverty standard in 2004 was VND 124,000 per capita per month in rural and VND 163,000 per capita per month in urban. Government poverty standard in period 2006-2010 is VND 200,000 per capital per month in rural and VND 260,000 per capita per month in urban areas.

<sup>6</sup> The data in the district uses per capita average monthly gross income as a base for the calculation. It has not been confirmed that the statistics are based on the government poverty standard.

<sup>7</sup> Thai Nguyen Statistical Yearbook 2004, Thai Nguyen Statistical Office 2005

specialized feeds. The use of forest lands for grazing is limited, especially as little undergrowth is available in the Eucalyptus planted areas.

**Table I - 6 Gross Output of Phu Binh District (current prices)**

Sector	Share
1. Agriculture/Forestry/Fishery	70%
Agriculture	69%
Crops	38%
Livestock	30%
Agricultural services	1%
Forestry	1%
Fishery	1%
2. Construction	12%
3. Other Services	18%
4. Total	100%

Source: Statistics Yearbook 2003 and Phu Binh Phu Binh District Office, June 2004

## (2) Forestry

The role of forestry in the household economy is small but important. Most available land is planted with Eucalyptus trees. The logs from the Eucalyptus plantations have good commercial value and command higher prices than Acacia – one ha of mature Eucalyptus could be worth twice as much as the same area of Acacia. Most farmers say that the reason they want to change to Acacia is not because Eucalyptus is unviable but because of its slower growth, particularly after the first coppice. A few higher income households, who do not need income straightaway state that they prefer replanting with Eucalyptus because of higher returns.

### 2.2.4 *Financial sources*

In Phu Binh District there are two formal financial institutions, where farmers can access loan services for production purposes. They are Vietnam Bank for Agriculture and Rural Development (VBARD) and Vietnam Bank for Social Policies (VBSP).

According to the household socio-economic survey, thirty-seven (37) households, some 70% of the total households surveyed, have obtained loans from VBARD and/or VBSP, including two households that received loans from both banks, in the last five years. Out of 40 households that received loans from any sources in the last five years, loans used for livestock account for 80.0%, agriculture for 37.5%, forestry for 37.5%, handicrafts for 5.0%, and others for 5.0%. Most of these loans are considered to be short- and medium-term loans that need to be repaid within five years (See Annex 3: Socio-economic data for loan characteristics at VBARD and VBSP).

**Table I - 7    Loan use**

Item	Rate out of 40 households (%)
Livestock	80.0
Agricultural development	37.5
Forestry development	37.5
Handicrafts	5.0
Other	5.0

Source: Household socio-economic survey

Note: As it is considered that some loans are used for more than one purpose, the percentages do not add up.

Only three households out of 52 surveyed have received subsidies for livestock raising, agriculture-forestry and handicraft development.

#### *2.2.5 Infrastructure*

##### (1) Transport

A national road passes through Phu Binh District, connecting it to Thai Nguyen City and Hanoi as well as to other provinces. It takes less than a half hour to Thai Nguyen City and one hour to industrial parks in Hanoi. The transportation network within the four communes has been improved recently, and truck transportation is possible in all four communes.

Provincial access to wider markets. The railway routes are (i) Thai Nguyen - Da Phuc (Hanoi), (ii) Thai Nguyen - Nui Hong, and (iii) Luu Xa - Kep.

##### (2) Power and Water supply

All communes in the project area have access to the national electric grid. Currently, power supply is available for all households and small industrial production units in the area.

Water supply for both domestic and irrigation uses is well developed in the district. Phu Binh District maintains 100 reservoirs, 32 pump stations and 227 km of irrigation canals, supplying water to the four communes.

## 2.3 Status of land and forest resource use

### 2.3.1 Current situation of Forest Land

#### 2.3.1.1 Overall situation

The area of forest land in the project area is 2,992 ha and the forest land is classified as a production forest by the forestry law. 89% of the forest land is forested land and these are all plantation. The situation of the forest land is shown in the table below.

**Table I - 8 Area of the forest land by land use situation in the project area**

*Unit: ha*

Legal status Land use situation	Total	Protection forest	Special forest	use	Production forest
Total	2,992	0	0	0	2,992
Forested land	2,653	0	0	0	2,653
Plantation	2,653	0	0	0	2,653
Natural forest	0	0	0	0	0
Un-forested land	339	0	0	0	339

Source: It is estimated by the Study Team base on the data of sub-DoF, Thai Nguyen province.

#### 2.3.1.2 Size of the forest land

Most of the forest land in the project area is in scattered blocks of 1-5 ha. These are predominantly small hillocks or outcrops located near to flat areas. The traditional primary forests on these higher lands were removed several decades ago. The land was degrading rapidly with the top soil and the biological litter washed away by rainfall and/or used for animal grazing and firewood.

The forested land of the forest land is 2,653 ha of which is 89% of the forest land, and un-forested land is 339 ha, 11% of the forest land.

Among forested land, 70% is Eucalyptus plantation which is about 1,870 ha and 60% of forest land. These Eucalyptus plantations are established under former WFP projects. After the establishment of Eucalyptus plantations under the WFP projects, wood has been harvested for timber and firewood several times and therefore most of the Eucalyptus plantations are coppiced second or third generation. 28% of the forested land is Acacia plantations which are 750 ha and 25 % of the forest land. Acacia has been introduced recently in the project area. The ages of the Acacia plantations are still young and most of them are first generation. Pine plantations make up 30 ha, which is only 1% of the forested land. These are planted in Tan Kim and Tan Hoa communes for collecting pine resin. The ages of these plantations are more than 20 years and they are matured enough for collecting resin. Among un-forested land, fruit orchards account for 240 ha, crop gardens for 100 ha and bare land for just 2 ha. Bare land is the only land for afforestation among the un-forested land.

The current land use situation is shown table below.

**Table I - 9 Area of the forest land by land ownership, commune and current land use situation in the project area**

*Unit: ha*

Holders of land ownership by commune		forested land					un-forested land				Total (1) +(2)	
		Plantation				Natural forest	Subtotal (1)	Bare land	Crop	Fruit		Sub-total (2)
		Eucalyptus	Acacia	Pine	Total							
Ban Dat	Farmer	563	71	0	634	0	635	0	5	67	72	706
	SOE	0	0	0	0	0	0	0	0	0	0	0
	total	563	71	0	634	0	635	0	5	67	72	706
Tan Khanh	Farmer	458	155	0	613	0	613	0	52	86	138	751
	SOE	0	0	0	0	0	0	0	0	0	0	0
	total	458	155	0	613	0	613	0	52	86	138	751
Tan Kim	Farmer	242	64	0	306	0	306	0	12	37	49	355
	SOE	61	345	20	426	0	425	1	11	7	19	445
	total	303	409	20	732	0	731	1	23	44	68	800
Tan Hoa	Farmer	546	49	6	601	0	600	1	20	40	60	661
	SOE	0	70	4	74	0	74	0	0	0	0	74
	total	546	119	10	675	0	674	1	20	40	60	735
Total	Farmer	1,808	339	6	2,153	0	2,154	1	90	230	320	2,473
	SOE	61	415	24	500	0	499	1	11	7	19	519
	Total	1,869	754	30	2,653	0	2,653	2	101	237	339	2,992

Source: It is estimated by the Study Team base on the data of sub-DoF, Thai Nguyen province.

Note: The numbers do not necessarily sum up due to rounding.

### 2.3.1.3 Land Tenure

It is estimated that about 2,473 ha (83%) of the total forest lands in the project area has been allocated to individual households while the Dong Phu forest enterprise retains 518 ha (17%). Formal land use certificates (Red Books) have been issued for about 75% of agricultural lands in the project areas but for only about 60% of the forest land.

The proportion of forest land actually owned by individual households varies across the four communes. All forest lands have been allocated to individual households in Ban Dat, Tan Khanh communes. In Tan Kim communes only 44% of forest land has been allocated to individual households, and the Dong Phu forest enterprise retains about 450 ha (56%) of the total forest land. In Tan Hoa commune 83% of the forest land has been allocated to individual households, and the Dong Phu forest enterprise retains about 74 ha (17%) of the total forest land.

Formal land use certificates (Red Books) have been issued to individual households but have not been issued to all individual household who actually own land for various reasons.

### 2.3.1.4 Growing Stock

Although full data on the growing stock of the forest land is not available, it is estimated at about 78,000 m<sup>3</sup> for a total of the 2,653 ha of forested land with an average of 28m<sup>3</sup> per ha. The growing stock of Eucalyptus plantation in the project area is about 49,000 m<sup>3</sup>, about 60 % of the total growing stock. But most of Eucalyptus is coppiced second or third generation and performance is poor. A hybrid plantations are newly planted, with a growing stock of about 24,500 m<sup>3</sup>, around 30% of the total growing stock. A mangium accounts for less than 1,000 m<sup>3</sup>. Acacia are still young and most of the plantations have not yet reached a harvestable age. Pine plantation has 3,500 m<sup>3</sup> of growing stock, 5% of the total growing stock.

**Table I-10 Area and Growing stock of the Forested Land by tree species, age level**

Species and Age Level		Area (ha)	Volume (m3)	Volume per ha (m3)
1. Plantation		2,653	77,534	29
1.1 Eucalyptus	total	1,869	48,853	26
	Age level I	411	6,780	17
	Age level II	1,375	34,696	25
	Age level V	83	7,377	89
1.2 Acacia hybrid	total	713	24,456	34
	Age level I	593	19,537	33
	Age level II	120	4,919	41
1.3 Acacia mangium	total	41	676	17
	Age level I	40	432	11
	Age level II	0	0	0
	Age level IV	1	244	203
1.4 Pine	total	31	3,549	116
	Age level IV	10	1,194	116
	Age level V	20	2,355	116

Source: Estimated by the Study Team base on the data of sub-DoF, Thai Nguyen province.

Note: Age level for Eucalyptus and Acacia I: 1 to 3, II: 4-6 III: 7-9, IV: 10-12, V: 13-15

Age level for Pine I: 1-5, II: 6-10, III: 11-15, IV: 16-20, V: 21-25, VI: 26-30

### 2.3.2 Productivity of the Forest Land

Land units of the forest land are identified by combination of five factors: topography, slope, soil type, mother rock and soil depth.

There are nine land units in the forest land of the project area. Those are DIFs, DIFo, TIIFdl, DIIFs, DIIFo, DIIIFo, DIIIFq, DIIIFs and D2p (Detailed information of land unit is shown in section "Soil and Land unit" of ANNEX 2).

Land productivity of forest land is examined through analyzing the growing stock of existing plantations in the project area taking into consideration land units identified in forest land. Five land productivity classes; I-1 to III-1 are established by grouping the land units which have same land productivity. Table I-11 shows the result of analyzing the land productivity.

Land productivity class I-1 is the highest productivity class; the area is 673 ha, 23% of total forest land. The land unit DIFs, DIFo and TIIFdl are included in this land productivity class. In this land productivity class, A.hybrid is expected to show 164 m<sup>3</sup>/ha of growing stock at eighth year after planting and A.mangium is expected to show 125 m<sup>3</sup>/ha of growing stock.

The area of land productivity class I-2 is about 1,600 ha, 53% of the forest land, and DIIFs and DIIFo are included this productivity class. At the eighth year after planting A.hybrid show 144m<sup>3</sup>/ha of growing stock and A.mangium show 105m<sup>3</sup>/ha.

The area of land productivity class II-1 is about 203 ha, 7% of the forest land, and DIIIFo are solely included this productivity class. At the eighth year after planting A.hybrid show 120m<sup>3</sup>/ha of growing stock and A.mangium show 105m<sup>3</sup>/ha, the same as I-2.

The area of land productivity class II-2 is about 360 ha, and occupies 12% of the forest land. Two land units; DIIIFq and DIIIFs are included in this productivity class. At the eighth year after planting A.hybrid show 120m<sup>3</sup>/ha of growing stock, the same as II-1 but A.mangium just shows 85m<sup>3</sup>/ha.

The land productivity class III-1 is also the highest productivity class. The area is 160 ha and the class occupies 5% of the forest land, with only one productivity class, D2p included. At the eighth year after planting A.hybrid shows 164m<sup>3</sup>/ha of growing stock, the same as I-1.



**Table I - 11 Estimated Performance of Plantations with Various Planting Species**

Land productivity class	Area (ha)	Land unit to be included	Land productivity(m3/ha/year)	
			Acacia hybrid	Acacia mangium
I-1	673 (23%)	DIF <sub>s</sub>	164 m3/ha	125 m3/ha
		DIF <sub>o</sub>		
		TIIF <sub>dl</sub>		
I-2	1,596 (53%)	DIIF <sub>s</sub>	144 m3/ha	105 m3/ha
		DIIF <sub>o</sub>		
II-1	203 (7%)	DIIF <sub>o</sub>	120 m3/ha	105 m3/ha
II-2	357 (12%)	DIIF <sub>q</sub>	120 m3/ha	87 m3/ha
		DIIF <sub>s</sub>		
III-1	163 (5%)	D2 <sub>p</sub>	164 m3/ha	-

Source: Estimated by the Study Team based on the Field survey and the data of sub-DoF, Thai Nguyen province.

Note: ( ) shows the percentage of the respective productivity class area to the total forest land area.

**Table I -12 Productivity Class and Its Description**

Productivity class	Description of Productivity Class								Other description and planted tree recommendation
	Slope	Soil depth	Humus contents	Component	Soil texture	Mutual stones %	Hardness level	Humid level	
I – 1	<15°	40-60 cm	Medium	Mixed sand Limonite clay	Smooth speck	5	Soft	Moist	Flat, wet, soft, fertilizable, easy cultivation, closed to water, good current plantation of A.hybrid.
I – 2	16° -25°	30-50 cm	Little	Limonite clay	Smooth speck	5 -10	Soft	Wet	Light slope, light erosion, moist, soft, less fertility impacted by long term eucalyptus plantation, close to water source, current acacia and eucalyptus
II – 1	26- 35°	40 cm	Little	Limonite clay	Speck	10	Light tight	Wet	Light erosion, thick soil layer, moist along stream, close to water source, adapted to A.mangium, lower yield of A.hybrid
II – 2	26- 35°	30 cm	Very little	Limonite clay	Speck	20	Tight	Dry	Sloped land, thin layer with light moist, heavy erosion, poor fertility, soft soil. Current Pine, A.mangium and eucalyptus
III – 1	>15°	>100 cm	Much	Mixed sand	speck		Soft	Very wet	Rich fertility, wet, flat. Current agriculture.
III – 2	>15°	100 cm and down	Medium	Limonite clay	Smooth speck		Soft	Moist	Accumulate soil, thick layer, rich fertility, moist. Current fruit tree, bamboo and resident.

## 2.4 Sales and Marketing

### 2.4.1 Demand and Supply of Forest Products

According to the provincial government of Thai Nguyen, the total value of provincial wood production is around 40 billion VND. Low-valued fire wood accounts for more than 40% of the total.

**Table I - 10 Production of Wood and Non-Wood Products in Thai Nguyen Province**

Product	Quantity	Estimated Amount of Production
Round Wood	22,700 m <sup>3</sup>	13,620 million VND
Fuel wood	290,140 Stere (Note)	17,408 million VND
Bamboo	1,827,000 Stems	11,327 million VND

Source: Thai Nguyen Province Statistic Yearbook, 2004

Note: Measurement unit of fuel wood in Viet Nam (1 stere=0.7 m<sup>3</sup>).

There are five major wood-based-products manufacturers in the province (see Table I-17). The Thai Nguyen Particle Board Factory is the main consumer of wood materials in the province. Its annual production capacity is about 16,500m<sup>3</sup> of particle boards requiring 30,000 -35,000 m<sup>3</sup> of wood materials. In 2005 the factory could procure only 13,000 m<sup>3</sup> of wood materials and was not able to operate at full capacity due to lack of material supply.

The Thai Nguyen Stock Co Export Paper produces paper from bamboo. It ranked as the second wood consumer with 3,500 tones of bamboo.

Provincial SFEs also consume large amounts of wood materials to produce lumber and construction materials. These are more from natural than plantation forests. In addition, Giap Bat Furniture Enterprise, Cai Lan Chipping Mill and HAITAICO Chipping Mill are potential buyers of wood materials to be produced by the project. Wood-based-products manufacturers in Hanoi and small scale wood traders located along the national roads to Hanoi are also very active, and able to provide markets for wood materials produced in the project area.

**Table I - 11 Wood Consumption of Top Five Wood-Based Products Manufacturers in 2005**

Factory	Round Wood (M <sup>3</sup> )	Timber from Plantation Forest (M <sup>3</sup> )	Scattered Styrax Tonki (M <sup>3</sup> )	Bamboo (t)	Pine Resin (t)
Thai Nguyen Particle Board Factory	0	13,000	0	0	0
Dai Tu Forest Enterprise	200	1,800	0	0	0
Dinh Hoa Forest Enterprise	150	1.5	500	0	0
Vo Nhai Forest Enterprise	150	1,500	500	0	0
Thai Nguyen Stock Co Export Paper	0	0	0	3,500	0
Others	2,650	4,800	3,280	500	120

Total of the Province	3,150	22,600	4,280	4,000	120
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Source: Thai Nguyen DARD

#### 2.4.2 *Prices and Transportation Costs of Forest Products*

There are no major wood traders in the project area who will play an extensive intermediate role for wood materials between smallholders and markets in the province and other nearby markets. However, there are small traders who play a major role in collecting and transporting wood materials on a spot basis. Their logistical means are very limited but low cost. SFEs provide wood materials to the Particle Board Factory. However, their main source of wood materials is their own plantation forests. SFEs have more modern harvesting and transport equipment. The factory rarely buys wood materials from smallholders with land-use rights to the forest land. Factory prices appear to be comparatively low especially if compared with prices of good quality logs that are in demand for construction and furniture.

There is high demand for wood materials in the province for processing, construction and furniture. The price and demand of wood materials depends on the quality of timber. A straight Eucalyptus log of 25 cm diameter may get premium prices of up to VND 800,000. Prices of 1m<sup>3</sup> Eucalyptus wood of 10 to 20 cm diameter can be reportedly as high as VND 500,000 to 700,000 with traders paying this to farmers and taking responsibility for harvesting and transport. In contrast poor timber stands fetch very low prices. Stumpage price for one-cubic-meter of firewood, for example, is reported to be around VND 150,000 to 200,000.

The price that major wood consumption industries pay tends to be low. The Thai Nguyen Particle Board Factory, for example, pays VND 400,000/m<sup>3</sup> at the factory gate, which could be as low as the price of firewood at a farm gate, which does not justify transport to the factory. There appear to be no efforts made by farmers to organize themselves into groups to negotiate with wood traders or with the managers/owners of processing plants or timber yards. This is partly due to the scattered nature of the harvesting sites and partly due to the long-term nature of plantations.

**Table I - 12 Wood Price and Transportation Cost**

Buyers	Wood species	Size		Wood price (VND/m <sup>3</sup> )	Transport cost (VND/m <sup>3</sup> )
		D(cm)	L(m)		
Thai Nguyen Particle Board Factory	Acacia and Eucalyptus	5-16 cm	2.0m	343,000	26,000
		>16cm	2.0m	403,000	
Bai Bang Paper Mill	A.mangium and Eucalyptus	6-15cm		349,000	79,000
		15.1-20cm		415,000	77,000
		20.1-25cm		500,000	77,000
		25.1-30cm		628,000	77,000
Cai Lan chip mill	A.mangium	3-9cm		335,000	64,000
	A.mangium	9.1-12.5cm		404,000	64,000

Buyers	Wood species	Size		Wood price (VND/m <sup>3</sup> )	Transport cost (VND/m <sup>3</sup> )
		D(cm)	L(m)		
	A.mangium	12.6-14cm		521,000	64,000
	A.mangium	>14cm		607,000	64,000
	Eucalyptus	3-8cm		357,000	64,000
	Eucalyptus	8.1-12.5cm		429,000	64,000
	Eucalyptus	>12.5cm		643,000	64,000
Yen Bai Afforestation Coop.	Styrax Toukinensis			308,000	
	Acacia and Eucalyptus			386,000	
Dinh Hoa SFE	A.mangium	>15cm	2.4/2.5	550,000	
	Mangletia gluaca	>15cm	2.0/2.5	480,000	
Vo Nhai SFE	Mangletia gluaca	10-15cm	2/4/6 m	400,000-500,000	
Dai Tu SFE	A.mangium	>12cm	6 m	400,000-500,000	
Wood products	Construction Wood	>30cm	>2 m	800-1.2 million	100,000
	Plywood	8-30cm		0.45-0.7 million	80,000
	Packaging wood			2-7 million	120,000-150,000
Lang cam coal mine	Mangletia gluaca	18-20cm	2.5m	380,000	
		14-16cm	4.0m	450,000	

Source: Interviews by the Study Team

Note: conversion factor used for 1 stere = 0.7 m<sup>3</sup>, and 1 Double Stere (ds) = 1.4m<sup>3</sup>

Transport costs vary depending on the distance to the markets. The Thai Nguyen Particle Board Factory, for example, pays about VND 30,000 per one m<sup>3</sup>, while Bai Bang Paper Mill pays about VND 80,000 per one m<sup>3</sup>.

#### 2.4.3 Target Markets

There is a buoyant demand for Acacia spp. from the project area with the point of first sale being often traders in the case of smallholders of forest land. As mentioned before, traders usually visit the planting sites to buy up entire lots based on their assessment of the stumpage value. Aside from the accessibility to the sites, prices offered depend on the species, size, and conditions of logs.

In terms of processing factories, there are a number of factories located in and outside the province, among which the Thai Nguyen particle board factory is one of the major target markets located closest to the project area.

As for prices, top quality trees, which can be sold for sawn logs, can fetch between VND 0.8 to VND 1.0 million per m<sup>3</sup>. Lower quality wood materials sold for chips can fetch VND250-300,000 per m<sup>3</sup> and branches and offcuts sold for fuelwood. Generally the A.mangium produces a better quality log. More of the total wood materials produced can go for sawn logs and prices are higher. On this basis, average stumpage value for logs is assumed at VND 350,000 per m<sup>3</sup> for A.hybrid and VND 400,000 for A.mangium.

## ***2.5 Lessons learnt from on-going and completed projects***

### ***2.5.1 Related projects formulated***

In Phu Binh district, Thai Nguyen province, a few afforestation projects have been implemented. Among them, the most significant projects were the PAM afforestation project, the reforestation project under the 5 Million Hectare Reforestation Programme (5MHRP), and a wood material plantation project for Thai Nguyen Particle Board Factory. Because these projects were undertaken in the whole district, the four communes where the project was planned are part of the area where projects were undertaken in the past.

In 1987 the district formulated an afforestation project under PAM. This aimed at forest development and the creation of jobs for local people, supplying small size timber and fuel wood to reduce pressure on natural forests. The project was formulated based on the investment of UNDP via the GOV. This project was implemented from 1987 to 1995 and 1,700 ha were planted in the administrative area of the four communes.

In 1996, Thai Nguyen Particle Board Factory formulated an afforestation project to supply wood materials for particleboard production. The forest land area planned for afforestation for the factory is owned by Dong Phu State Forest Enterprise. However, some of the land in the wood material area of the factory had been allocated to households of farmers with Red Books. Therefore, these areas do not belong to the enterprise for its own use.

In 1999, implementing the 5 MHRP, Phu Binh district formulated project 661 within its district. Land for the project was taken from land planned for protection forests and special-use forest. Funds for this project were taken from the GOV.

### ***2.5.2 Evaluation of the formulated projects***

The project formulated in the past satisfied the requirement of forest development in accordance with the orientation of forest development advocated by GOV, which contributed to an increase in the forest cover, the creation of jobs and improvement of life for local people. In formulation of the project, there existed the following constraints:

Basic conditions for project formulation were not well surveyed. In particular, the survey results of the land area for afforestation led to the wrong selection of species for different sites, resulting in low quality of plantations.

These projects were formulated with the GOV budget but did not suit the reality of local conditions. Therefore, it was not possible to mobilize local resources in the project area.

At present, a big part of forestland has been allocated to local people. When the project was formulated, local people's aspirations were not well considered, resulting in the low feasibility of the project. The organization for implementation was not close to the real situation, in particular systems for supervision/monitoring and evaluation of the project implementation were not established. The analysis of financial effectiveness of the project was not well considered. This resulted in less convincing evidence from the project.

## ***2.6 Advantages & constraints during the development of production forest in Phu Binh district***

### ***2.6.1 Advantages***

Forest lands in the four communes have been allocated to households. Those households decide to develop their forest lands in an effective way.

Project areas are close to consuming markets such as Thai Nguyen Particle Board Factory and provide enough to meet with local use. A short distance from the forest lands to the consuming site, about 30 km, remarkably helped reduce transport costs.

Soils are suitable for production forest, in particular for the growth of A.hybrid and A.mangium. Quality of the majority of forest lands is fair and good for maintaining a yield of 120 m<sup>3</sup> of wood in 7 years. This yield is sufficient to assure local people continue in implementing afforestation projects.

As the planting sites are quite close to consuming areas, local people initially familiarized themselves with market-oriented forest production systems by planting Eucalyptus and A.hybrid to produce wood materials. However, while Eucalyptus provided a fair volume of wood materials, A.hybrid was not mature enough for harvesting. However the farmers accept that change from production for self-consumption to market-oriented production is a big change in the minds of the local people.

### ***2.6.2 Constraints***

It is difficult for local people to access new afforestation technologies in order to achieve a high productivity due to their lack of knowledge.

Current income in the area is relatively low, most households are considered poor. In the meantime, according to project design, it takes 7 years from beginning to the time that local people can harvest and sell products. Moreover, local people have no money to invest into production forest except through the labor force.

Currently, loans for development of production forest are not easily accessible. Red book certificates on forest land-use rights can be used as collateral for bank loans: however, this requires lots of other administrative procedures. VBSP is a good source for funding with low interest rates and a long repayment period: however, its capacity is rather limited. Despite of its capacity to provide loans, VBARD is still not attractive to households for borrowing to invest into production forest due to the bank's short repayment period which is not suitable to the long business cycle of tree species.

## **PART II. PROJECT CONTENTS**



## **1. PROJECT RATIONALE**

### ***1.1 Development Issues and Integration of Forest Development with Livelihood Improvement***

The forest sector of Vietnam is undergoing a fundamental change. The Government of Vietnam (GOV) has been restructuring State Forest Enterprises (SFEs). Lands that used to be managed by SFEs and the state are being allocated to farmers as well. Furthermore, GOV has been successful in reversing the trend of declining forest cover. The next challenge is to cope with the rapidly rising demand for wood materials and wood products without jeopardizing the existing and newly planted areas and at the same time, to use the forestry sector to improve rural livelihood.

So far a large part of domestic demand for wood materials and wood products is being met by imports. These became Vietnam's fifth largest import item in 2005 with a total import value of US\$ 667 million. Given that there are substantial areas of degraded and underutilized land suitable for forest plantations, these lands should be developed to meet market opportunities. For this reason, the GOV policy of encouraging plantation by farmers and private sector entities in production forest areas should be supported. At the same time, the opportunity to increase forest plantations for the market is expected to provide income earning opportunities for farmers and generate rural employment.

In some areas, the GOV may wish to promote larger scale commercial plantations with private sector entities. In other areas, the government may wish to encourage smallholders to participate in the development of the forest land, following the reforms of the SFEs and the handing-over of land to farmers. The better off among smallholders may only need support in the fields of marketing, technology, and pest and disease management. However, the poorer segment of the smallholders need further help to access funding to cover the cost of plantations.

### ***1.2 Project Concept of Smallholder Production Forest with Areas to be addressed***

In the project area, most of the trees left under the WFP's program are second and/or third generation of coppiced Eucalyptus. Although farmers in the project area have been granted forest land-use rights to small patches of plantation forests, many of them do not make better use of market potentials for forest products and depend mainly on agriculture for their livelihood. However, the project area has a good timber supply potential. Given its proximity to markets for timber and other wood materials within Thai Nguyen Province as well as Hanoi, the project area in Phu Binh District is considered to be an economically favorable location to implement the smallholder production forest project. Moreover, the project could also serve as a future model for smallholders in the Vietnamese production forestry sector.

Despite the current government policy favorable to the development of the production forests, increasing demand for wood, willingness of smallholders to participate in wood supply to different markets, and the development potential of the project area, there are two major concerns to address when formulating the project.

1. Firstly, not all farmers can establish forest plantations on their own. In the past farmers were offered “food for work” by the World Food Programme. Farmers responded enthusiastically and planted large areas of Eucalyptus. Farmers were also supported by a program where the government provided seedlings at an 80% subsidy. These schemes have now been discontinued. The sale of the Eucalyptus could partially or completely fund the replanting. However, at the present time, it is clear that for most smallholders, there are high priority demands for funds from the sale of the Eucalyptus such as for the paying off debts, education expenses of children, family ceremonies, repair of the homestead and/or purchase of livestock. It is therefore likely that without financial support or provision of seedlings/fertilizer at low cost, they will leave their Eucalyptus to coppice to produce low quality stands. The only existing assistance for farmers is the contract scheme by the Dong Phu SFE. Under this scheme, farmers are provided a cash advance for establishing production forests in return for timber at the time of harvesting. This scheme has proved to be unsuccessful as the price for wood offered by SFEs has been far below the market price while farmers were bound by contracts and unable to make use of alternative market opportunities.

2. Second, there is a lack of a support framework for smallholders, which might aim to create a favorable environment for them to work in. Some of the critical activities for which there is a need for improvement include: (1) linkages between smallholders and the financial institutions; (2) linkages to markets; and (3) dissemination of appropriate silvicultural technologies.

- (1) In Vietnam, there are a number of financial institutions which operate in rural areas, of which the most important are the Vietnam Bank for Agriculture and Rural Development (VBARD) and the Vietnam Bank for Social Policies (VBSP). These banks usually provide loans for a shorter period than the rotation cycle of the trees, either with commercial interest rates (VBARD), or with a policy-based interest rate, but in a relatively smaller amount of a loan to a limited number of eligible borrowers (VBSP). However, for forestry, farmers need a loan repayment period of up to 8-10 years. It is generally accepted that due to positive externalities generated by forests, a lower interest rate is justified. Under the recent World Bank project (Forest Sector Development Project: FSDP) in the central Vietnam, VBSP offers long-term loans with lower interest rates to household-based tree growers. The similar scheme needs to be promoted in other provinces for the development of production forests by smallholders.
- (2) Linkages of the smallholders of the forest land to the markets are promoted by small traders. In the case of these timber merchants, as well as the particle board

factory, purchases take place at the point of merchandising or at the factory gate. Small traders visit farmers with trees that are harvestable and agree purchasing prices for the standing trees. All harvesting and transport is undertaken by the trader. Extra benefits could be retained by the smallholders if they could organize a group and arrange to bulk up supplies. In this way, they could increase bargaining power and reduce transport costs.

- (3) Technology for plantations and management need improvement. Many farmers are eager to move from the current eucalyptus forests to acacia, mainly because of a shorter rotation cycle. However, it is necessary to conduct a more systematic evaluation of species, silviculture practices, and pest diseases control.

In light of the above, the project is formulated to improve the economic utilization of forest lands in order to improve the livelihood of smallholders in the project area, while increasing the production value of the forestry sector. Smallholders of the forest land carry out all the development activities with managerial and technical support from a newly established implementing agency and financial support from the financial institutions.

## **2. PROJECT OBJECTIVES AND OUTPUTS**

### ***2.1 Overall Goal***

The overall goal of the project will be to improve livelihood through the development of production forest in the project area. (See Project Design Matrix, ANNEX I).

### ***2.2 Project Objective and Outputs***

#### *2.2.1 Project Objective*

The project objective is to increase the production value of the forest lands. Harvesting of the planted trees is expected from 2014 onward.

The objective of the assistance is to establish production forest area. It is planned that the objective of the assistance is to be achieved by end of the assistance period (2006 - 2013).

The target beneficiary of the project is smallholders who have Land Use Right Certificates (LUCs) or Red Books for the forest land in the project area. The project area is located in the four communes (Ban Dat, Tan Khanh, Tan Kim, and Tan Hoa) of Phu Binh District, Thai Nguyen Province.

#### *2.2.2 Project Outputs*

The project objective is to be achieved through realization of the following outputs:

1. The project forest land (a total of about 1,500 ha) is planted with species of commercial value;
- 2-1. A model loan scheme is established for production forest development projects;
- 2-2. Collective negotiation capacity of smallholders is enhanced;
- 2-3. Market linkages between smallholders and the markets are promoted;
- 2-4. Smallholders, extension workers, village leaders are trained with appropriate afforestation techniques and management; and
3. Institutional capacity to manage the production forest development project is enhanced.

### **3. PROJECT ACTIVITIES**

#### ***3.1 Project Components***

Various project activities are planned to produce the intended output of the project. These activities are grouped into three inter-related components described as follows:

##### **(1) Component 1: Production Forest Development (PFD)**

The main focus of this component is to create sustainable production forests in the four communes. The rotation cycle of timber production is estimated at eight years. The main outputs of the component will be the establishment of good quality production forests, with a potential of producing about 20,000m<sup>3</sup> of woods annually at full development. This will supply the local wood processing industry and other markets in Thai Nguyen, Hanoi, and elsewhere.

##### **(2) Component 2: Support for Production Forest Development (SFFD)**

This component supports development of an enabling environment for small scale production forestry through (i) studies and negotiations to develop a financing mechanism to provide financial support to smallholders for the establishment of production forests, (ii) facilitating the creation of farmers' groups and a Production Forest Association (PFA) to organize participating smallholders and help link them to the market and to suppliers of new technologies including research stations, (iii) study and promotional efforts to improve the linkages between farmers and markets, (iv) training and capacity building in institutions at District and Commune level to help farmers plant, manage and market their products.

###### ***(i) Component 2-1: Financing Mechanism Development***

The cost of rehabilitating forest lands is estimated at VND 12.0 to 12.4 million per ha. Most of this is expected to be borne by participating smallholders through their own labor. However, it is estimated that an average household needs to also invest about VND 3 to 4 million in cash for design works, seedlings and fertilizer in the initial three years. This is about 20 % of the estimated annual gross income of the average household. For some farmers much of this money may come from clearing and sale of the existing Eucalyptus forest. However, the project will help other farmers cover some of these cash expenses. A proposed lending scheme will be closely modeled on the one agreed between GOV and VBSP for the World Bank's FSDP. The project will provide funds to study the FSDP's loan arrangement with VBSP and to explore alternatives. The details of loan schemes and risk-sharing acceptable to all parties will be negotiated and established at the project inception.

(ii) ***Component 2-2: Support for Production Forest Association***

Individual smallholders have land-use rights to the forest land in the project area and carry out their forestry related activities on an individual basis. It will be important to organize participating smallholders into groups for acquiring technology, buying inputs, and accessing markets. The project will finance items such as organizing communal meetings in forming farmers' groups, providing training to participating smallholders and establishing a network of these farmers' groups as a Production Forest Association (PFA). Funds will also be provided to the PFA to liaise with relevant partners to develop standard specifications of wood materials and organize harvesting and transporting.

(iii) ***Component 2-3: Promotion of Market Linkages***

The project will provide expertise to promote market linkages between smallholders and the markets. Studies will be carried out on marketing margins and ways to reduce these, for example, by setting standards and providing price information. The study will also prepare a harvest and marketing plan for the existing Eucalyptus and future Acacia plantations in the project area and establish purchasing agreements with traders in an attempt to promote marketing. This practice will be carried out by the implementing agency jointly with farmers' groups and/or PFA to enhance the negotiation capacity of farmers, farmers' groups and PFA.

(iv) ***Component 2-4: Training and Institutional Development***

This sub-component will aim to strengthen the capacity of staff at the implementing agency through training and study tours, and the capacity of village leaders and participating smallholders through the training program and extension services.

**(3) Component 3: Project Management, Monitoring and Evaluation (PMME)**

The project will fund the administration costs of a Project Management Board (PMB) at the district level and Project Implementation Units (PIUs) at commune level, as well as the cost of monitoring and evaluation. The PMB and PIU will be responsible for ensuring efficient implementation of the project and carrying out effective coordination with other important stakeholders. Drawing staff from and working closely with Thai Nguyen DARD and Sub-DoF, the PMB is responsible for carrying out the above components as well as facilitating timely supply of seedlings and technical services to participating farmers. PMB and PIUs are scheduled to operate during the project period up to 2020.

## 3.2 Project Implementation Plan

### 3.2.1 Planting Site Selection

There are 1,869 ha of Eucalyptus plantations and 19 ha of bare lands in the forest land: a total of 1,889 ha. These areas are expected to be a possible planting site because of the necessity for afforestation. Of the total area, it is estimated that 1,825 ha (97%) belong to smallholders who are likely to encounter difficulties in undertaking the production forest project. And Dong Phu Forest Enterprise possesses just 64 ha (3%) of the total area.

**Table II - 1 Distribution of Land-Use Rights in the project area**

*Unit: ha*

Possible Planting site	Eucalyptus		Bare Land		Total		Total
	Individual	Dong Phu F.E.	Individual	Dong Phu F.E.	Individual	Dong Phu F.E.	
Ban Dat	564	0	0	0	564	0	564
Tan Hoa	545	0	1	0	547	0	547
Tan Khanh	458	0	14	0	473	0	473
Tan Kim	242	60	0	4	242	64	305
Total	1,809	60	16	4	1,825	64	1,889

Source: Estimated by the Study Team, based on the field survey and the data of sub-DoF, Thai Nguyen province.

Note: The numbers do not necessarily sum up due to rounding.

Out of 1,889 ha, 1,492 ha are selected as planting sites based upon (i) Status of Land, (ii) Natural Condition, (iii) Socio-economic condition, and (iv) Accessibility. The area of the planting site by land productivity class, land use situation and by commune is shown in the table below.

**Table II - 2 The Area of the Planting Site**

*Unit: ha*

Communes and Current Land Use Situation	Land Productivity Class					
	I-1	I-2	II-1	II-2	III-1	Total
Ban Dat Commune	15	385	0	26	12	437
Eucalyptus plantations	15	385	0	26	12	437
Tan Hoa Commune	99	223	198	0	10	530
Eucalyptus plantations	99	221	198	0	10	529
Bare land IA	0	1	0	0	0	1
Tan Khanh Commune	91	139	0	81	45	356
Eucalyptus plantations	90	138	0	79	45	352
Bare land IA	1	1	0	2	0	3
Tan Kim Commune	37	78	0	30	24	168
Eucalyptus plantations	37	78	0	30	24	168
Total of 4 Communes	241	825	198	137	91	1,492
Eucalyptus plantations	240	823	198	135	91	1,487
Bare land IA	1	2	0	2	0	4

Source: Estimated by the Study Team based on the field survey and the data of sub-DoF, Thai Nguyen province.

Note: The numbers do not necessarily sum up due to rounding.

Basic idea for selecting the planting site

(i) Status of Land

- (a) land falls within the jurisdiction of the four communes of Ban Dat, Tan Khanh, Tan Kim and Tan Hoa;
- (b) land should be designated as forest land;
- (c) households should possess “Land Use Right Certificate (Red-Book)” for the forest land to be included under the project;
- (d) land use right is not under dispute;

(ii) Natural Conditions

- (a) land should belong to the following Productivity Classes “I-1, I-2, II-1, II-2, III-1”;

(iii) Socio-economic Conditions

- (a) financial conditions of participating smallholders are acceptable in the light of the criteria set by the financial institution;
- (b) smallholders show intention to join a farmers’ group and the Production Forest Association to be organized under the project; and

(iv) Accessibility

- (a) Access to adequate road and transport facilities is or will be good so that inputs and outputs can be moved at a reasonable cost.

### 3.2.2 *Selection of Tree Species*

The planting sites are covered mainly with Eucalyptus planted in the early 1990s under the WFP’s programme. Experience tells that the Eucalyptus has not created topsoil at the planting sites, and in fact soil erosion has accelerated due to limited litter and undergrowth. It was revealed at Communal Consultation Meetings carried out twice during the project preparation phase that most farmers will therefore like to replace these old plantations.

Limited work has been done in Vietnam on evaluating the technical and financial suitability of different tree species. However, there appears to be a consensus that for short rotation plantations *Acacia* sp. will be the most appropriate species on degraded land. The trees have established well, there has been limited mortality, and litter and undergrowth have been good, which also allow the generation of some fodder for livestock. This has been confirmed with farmers who have planted *Acacia*, wood traders and processors, and with Forest Science Institute of Vietnam (FSIV). FSDP funded by the World Bank in Central Vietnam is also using *Acacia* as one of tree species which it supports.



The selection of species, either A.hybrid or A.mangium, will be based on soil quality and land productivity class. As shown in the table below, A.hybrid will be used only at sites whose grades are Class I and III, where soils are relatively fertile and the slope is less than 26 degrees. A.mangium will be introduced only under Class II where soils are less fertile (high ferric component) and the slope is over 25 degree.

**Table II - 3 Summary of Land Productivity Class and Selection Tree Species**

*Unit: ha*

	<b>Land Productivity Class and Tree species</b>					<b>Total area</b>
	III-1	I-1	I-2	II-1	II-2	
	A.hybrid	A.hybrid	A.hybrid	A.mangium	A.mangium	
Total	90.69	241.47	824.7	198.18	136.51	1,491.55

Some farmers have found that although A.hybrid tends to grow faster they are susceptible to uprooting during strong winds. It is, therefore, recommended to plant A.mangium on steeper slopes, which also produces harder, valuable timber. Seedlings of A.mangium are also easier to produce and as a result costs are lower (VND 340 per seedling as opposed to VND 530 per seedling for A.hybrid).

### 3.2.3 *Afforestation Plan*

About 1,500 ha in the four communes, Ban Dat, Tan Khanh, Tan Kim, and Tan Hoa will be planted with A.hybrid and A.mangium, of which 1,156 hectare of A.hybrid and 335 ha of A.mangium over seven years (see Table II-4). In the initial years priority will be given to better quality lands located close to roads and commune centers. Successful implementation at the initial planting sites will help create a favorable demonstration of the effects to the rest of the project area. The planning of plantation sites is based on a harvesting plan, aiming at secure and constant supply to the markets.

**Table II - 4 Scale of Annual Planting Sites by Species**

*Unit: ha*

<b>Plantations</b>	<b>1<sup>st</sup></b>	<b>2<sup>nd</sup></b>	<b>3<sup>rd</sup></b>	<b>4<sup>th</sup></b>	<b>5<sup>th</sup></b>	<b>6<sup>th</sup></b>	<b>7<sup>th</sup></b>	<b>Total</b>
A.hybrid	57	110	110	220	220	220	220	1,157
A.mangium	115	110	110					335
Total area	172	220	220	220	220	220	220	1,492

### 3.2.4 *Seedling Supply Plan*

It is envisaged that seedlings will be supplied from two nurseries: (i) Gia Sang Seedling Station, which is owned by the Thai Nguyen Province and is a subordinate nursery of Thai Nguyen Seedling Centre, and (ii) Dong Hy Forest Seedling Station, which is owned by Thai Nguyen Particle Board Company. The production capacity of the nurseries is as follows:

**Table II - 5 Production Capacity of Nurseries**

*Unit: Seedlings per year.*

	A.hybrid	A.mangium
Gia Sang Seedling Station	1,000,000	1,400,000
Dong Hy Forest Seedling Station	1,000,000	-

Source: Interview results at seedling stations

Seedlings are produced using clone materials and modern propagation techniques including in some cases tissue culture. The implementing agency is responsible for securing adequate numbers of seedlings for the project, which also meet its quality standards. It will help smallholders purchase seedlings from these two seedling stations.

### *3.2.5 Tending and Protection Plan*

After planting the plantation should be well tended and technically regulated to ensure high productivity. Activity is implemented right in the first year to the end of the third year, twice a year. Key activities are: Clearing vegetation, digging around the tree and fertilizing.

Protection is applied right after planting until harvesting. Activities applied are: Anti-forest fires, pests and diseases, prevention of invasion and destruction by people and animals.

### *3.2.6 Harvesting Plan*

Harvesting is planned for the eighth year after planting. Harvesting will start after the termination of the project assistance period. As for harvesting methods, clear cutting will be applied. Buffaloes in combination with manual labor will be used in sliding logs to the road side (loading yards). Buyers will be responsible for harvesting. It is estimated that the average skidding distance will be 150 to 250 meters (the estimated furthest plots to their loading yard are about 350 meters).

The estimated standing volume per hectare in the eighth year of the rotation cycle is shown in the table below. The commercial volume of timber at road side is estimated at 70% of the standing volume.

**Table II - 6 Estimated Standing Volume per Ha**

	8 <sup>th</sup>	9 <sup>th</sup>	10 <sup>th</sup>	11 <sup>th</sup>	12 <sup>th</sup>	13 <sup>th</sup>	14 <sup>th</sup>	Total
1. Harvest Area (ha)	192.37	225.87	229.68	227.38	215.42	212.4	188.43	1,491.55
A.hybrid	120.33	214.87	225.16	167.57	185.51	152.26	91.16	1,156.86
A.mangium	72.04	11	4.52	59.81	29.91	60.14	97.27	334.69
2. Volume of Standing Trees(m <sup>3</sup> )	24,668	32,789	33,994	31,226	31,029	29,158	23,046	205,910
A.hybrid	18,215	31,832	33,519	24,946	28,427	23,160	13,127	173,226
A.mangium	6,453	957	475	6,280	2,602	5,998	9,919	32,684
3. Volume of Commercial Wood (m <sup>3</sup> )	17,268	22,948	23,798	21,858	21,718	20,409	16,133	144,132
A.hybrid	12,751	22,279	23,466	17,463	19,897	16,211	9,189	121,256
A.mangium	4,517	669	332	4,395	1,821	4,198	6,944	22,876

### 3.2.7 *Household Labor Force and Labor Requirements*

The amount of household labor required per ha over a rotation cycle, excluding those required in the harvesting year, is shown in the table below (Row (a) of the table). The requirement is high in the first year of the rotation cycle. The field survey undertaken as a part of the project preparation indicates that an average household will have a labor force of 2.8 persons. If a farm household can spare 30 days per year for forestry activities, the total number of man-days supplied per year is estimated at 84 man-days per household (Row (b)). This implies that the demand for labor will exceed the supply capacity of each household in the first year. In this case, it is expected that each household will hire external labor, get help from neighbors and friends, use machinery such as bulldozers for land clearing, and/or smooth out the actual work volume to within the domestic labor capacity over several years.

**Table II - 7 Estimated Average Labor Force Required for Establishing One Hectare**

*Unit: man-day/ha*

Years for implementation	1	2	3	4	5	6	7
Required Labor Force (a)	138	65	53	7	7	7	7
Available Household Labor Force/Household (b)	84	84	84	84	84	84	84
Demand for hired labors (a)-(b)	54	0	0	0	0	0	0

Source: Estimate of the Study Team

### 3.2.8 *Training plan*

The training plan is based on the assessment of the training needs of key stakeholders and the PMB/PIUs staff members who are expected to play a major role in implementing the project.

### (1) Participating smallholders

It is agreed that many farmers have basic knowledge in planting trees but they seem to be short of comprehensive knowledge of site preparation including the size of planting holes and planting density, as well as forest protection and tending.

During the initial four years of the assistance period, short training courses will be provided to participating smallholders. Training will be carried out at respective communes so that participants find it easier to attend. Upon the completion of training, the project will issue a certificate to participants and this will form part of the application documents required for the loan program. The topics dealt at training will be followed-up by the extension workers. Training for group leaders is also planned. The main topic to be covered in the group leader training is group management and administration. The creation of PFA will also be covered in the training course.

### (2) Extension workers

The provision of training to commune forest extension workers at PIUs is also considered to be critical. They are required to perform multiple tasks including explaining loan schemes, carrying out site assessments, helping participating smallholders to organize farmers' groups and PFA, and providing technical services in establishing project forests.

Upon the completion of extension worker recruitment, the PMB provides training to extension workers. Most training will be carried out through on-the-job training by the technical and extension coordinator of the PMB and/or specialists at DARD, other in-house staff, and local experts to be employed.

### (3) PMB staff

PMB staff will receive on-the-job training from local experts who will be assigned basically in the initial stage of the assistance period. The training topics will cover project management, finance and planning, marketing, accounting fields, technical aspects including coordination of extension activities, and coordination for the PFA.

#### 3.2.9 *Infrastructure Development Plan*

Infrastructure is relevant for the deployment of projects as well as the consuming of production forest products at the time of maturity for the mean harvesting age. The project was proposed in 4 communes of Phu Binh district with following characteristics.

The project scale is small and therefore it is not necessary to build working office.

The current road system can connected to the planting sites, so building of new roads or upgrading of transporting roads is not necessary.

Also, there is no need for the setting up of nursery due to the fact that two seedlings companies are located nearby the planting sites and they are capable of supplying seedlings in ensured quality and quantity.

Therefore, it is not necessary to calculate the amount to be invested and the activity plan for infrastructure as the project will not necessitate the implementation of this type of works.

### 3.2.10 *Consulting Service Plan*

In order to successfully carry out the project, consultants who have expertise in various fields will be employed during the preparation and operation periods of the project. Their expertise covers the following areas: (1) financing mechanism development, (2) organizational support to form farmers' groups and PFA, (3) marketing assistance, (4) training of farmers, village leasers, and PMB/PIU staff members, and (5) supporting services to the project management.

## 3.3 *Project implementation schedule*

### 3.3.1 *Overall Schedule for Project Implementation*

The assistance period of the project will be the first eight years out of the 15 year-long project period, including a one year preparation period. During the eight years, external assistance will be extended to the project and the necessary project activities are scheduled in these years for attaining the project objectives.

The assistance period of the project can be divided into the two periods: (1) preparation period in the first year of the assistance period and (2) operation period from the second year to the eighth year of the assistance period. During the preparation period, activities necessary for afforestation activities in the field will be carried out and during the operation period, activities directly related to afforestation will be carried out.

The main activities under each project component and sub-component are summarized in the table below.

**Table II - 8 Overall Schedule of Project Implementation**

<b>Calendar Year</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
<b>Implementing Year</b>	1	2	3	4	5	6	7	8
<b>Component</b>	<b>Period</b>	<b>Operation period</b>						
1. Production Forest Development	Preparation period							
2. Support for Production Forest Development								
2-1. Financing Mechanism Development								
2-2. Production Forest Association								
2-3. Promotion of market linkages								
2-4. Training and Technical Capacity Building								
3. Project Management, Monitoring and Evaluation								

### 3.3.2 *Preparation Period*

During the preparation period, the institutional arrangements will be set up for both sides, the implementing agency and the smallholders. The arrangements on the implementing side will cover the establishment of the financing mechanism and the management and operation structure of the project, internal training of staff members of the implementing agency, and preparation of the annual work plan as well as the budget plan. On the side of the smallholders, arrangements for community mobilization will be made in terms of the identification of participating smallholders, the formation of farmers' groups, and supporting services to the smallholders.

The following table shows an implementation schedule during the preparation period for the establishment of management and operation structure, and community mobilization.

**Table II - 9 Implementation Schedule during Preparation Period**

Step	Activities	Months											
		1	2	3	4	5	6	7	8	9	10	11	12
1	Establishment of a Loan Scheme with a Bank	■	■	■	■	■							
2	Establishment of PMB and PIU			■	■								
3	Office set-up			■	■	■	■	■	■	■	■	■	■
4	Review of F/S, PIP, Tools and Manuals			■	■								
5	Preparation annual work Plan/Budget and Tools and Manuals			■	■	■	■	■	■	■	■	■	
6	Preliminary community mobilization						■	■					
7	Establishment of Strategic Partnership			■	■	■							
8	Staff Training			■	■	■	■						

### 3.3.3 *Operation Period*

Activities during the operation period are directly related to the afforestation activities. These activities will cover all the necessary activities for establishing plantations such as the preparation of annual work/budget plans, the mobilization of smallholders, reforestation plot design, provision of planting materials (seedlings and fertilizer); and the establishment and protection of plantation areas.

The afforestation activities are carried out in a staggered manner in the project area during the operation period. A model rotation cycle of afforestation activities is shown in the following table and this rotation cycle will be repeated in the different locations of the project area during the operation period.

It is thought that the first two to three years will be the most intensive period in carrying out the project. The work load will ease from the fourth year. The nature of the work will change from the sixth year to prepare and organize harvesting and strengthen the market linkages for harvested wood materials.

**Table II - 10 Model rotation cycle of afforestation activities**

Step	Activities	Model rotation cycle						
		1 <sup>st</sup> year	2 <sup>nd</sup> year	3 <sup>rd</sup> year	4 <sup>th</sup> year	5 <sup>th</sup> year	6 <sup>th</sup> year	7 <sup>th</sup> year
1	Community mobilization							
2	Preparation of Detailed Afforestation Plan							
3	Timber Harvesting and Site Cleaning							
4	Afforestation Plot Design							
5	Site Preparation							
6	Delivery of Seedlings and Fertilizer							
7	Refilling							
8	Planting							
9	Beating Up							
10	Tending							
11	Protection							
12	Monitoring and Evaluation							
13	Community Meetings for Organizing a Production Forest Association							



#### 4. PROJECT COST DURING THE ASSISTANCE PERIOD

Project costs during the assistance period have been calculated over a period of eight years in which all the planting works are scheduled to be completed. The total project cost over this period, including physical and price contingencies, is estimated at VND 21.2 billion (US\$ 1.33 million).

##### **(1) Component 1: Production Forest Development (PFD)**

About 1,500 ha of existing plantations of Eucalyptus forests will be rehabilitated. The average cost for rehabilitating one ha is around VND 10.0 million (US\$ 625) and the total baseline cost of this component will be VND 12.9 billion (US\$0.80 million). Some 60% of plantation costs are for unskilled labor, valued at VND 25,000 per day. The cost of purchased input and services is VND 3.9 billion (US\$ 0.25 million) for the project which is VND 2.7 million (US\$ 170/ha) on a per-hectare basis.

##### **(2) Component 2: Support for Production Forest Development (SFFD):**

Cost of this component is estimated at VND 2.3 billion (US\$0.14 million). The largest part of this cost, VND 0.9 billion, will be for providing support for the creation of a Producer Forest Association, and for training and technical capacity building (VND 0.6 billion).

##### **(3) Component 3: Project Management and Monitoring & Evaluation (M&E)**

Cost for this component is estimated at VND 0.7 billion (US\$ 41,000) which is about 3% of the total cost during the assistance period.

##### **(4) Contingencies:**

Physical contingencies have been added at the rate of 5% on the baseline cost. Inflation has been assumed at 5% and price contingencies are based on this projection.

**Table II - 11 Summary Cost of the Project during the Assistance Period**

*Unit: Million VND*

Project Component	Total cost	Ratio	Bank	Government	Farmer
<b>1. Production Forest Development</b>	<b>12,873</b>	<b>60.7%</b>	<b>6,381</b>		<b>6,492</b>
<b>2. Support for Production Forest Development</b>	<b>2,248</b>	<b>10.6%</b>		<b>2,248</b>	
2.1 Financial Mechanism Development	445	2.1%		445	
2.2 Support for Production Forest Association	899	4.2%		899	
2.3 Promotion of Market Linkages	316	1.5%		316	

Project Component	Total cost	Ratio	Bank	Government	Farmer
2.4 Training and Institutional Development	588	2.8%		588	
<b>3. Project Management, M &amp; E</b>	<b>650</b>	<b>3.1%</b>		<b>650</b>	
<b>A) Total baseline cost</b>	<b>15,771</b>	<b>74.4%</b>	<b>6,381</b>	<b>2,898</b>	<b>6,492</b>
B) Physical contingency	789	3.7%	319	145	325
C) Price contingency	4,631	21.9%	2,014	474	2,143
<b>Total cost during assistance period (A + B + C)</b>	<b>21,191</b>	<b>100.0%</b>	<b>8,714</b>	<b>3,517</b>	<b>8,960</b>

**Table II - 12 Summary Cost of Project by Year during the Assistance Period**

*Unit: Million VND*

Calendar Year	2006	2007	2008	2009	2010	2011	2012	2013
Implementing Year	1	2	3	4	5	6	7	8
<b>1. Production Forest Development</b>	-	891	1,537	1,923	2,071	2,111	2,151	2,191
<b>2. Support for Production Forest Development</b>	656	696	504	313	-	-	-	79
2.1 Financial Mechanism Development	287	158	-	-	-	-	-	-
2.2 Support for Production Forest Association	225	225	225	225	-	-	-	-
2.3 Promotion of Market Linkages	-	79	79	79	-	-	-	79
2.4 Training and Institutional Development	144	234	201	9	-	-	-	-
<b>3. Project Management, M &amp; E</b>	<b>90</b>	<b>80</b>	<b>80</b>	<b>80</b>	<b>80</b>	<b>80</b>	<b>80</b>	<b>80</b>
<b>A) Total baseline cost</b>	<b>746</b>	<b>1,667</b>	<b>2,121</b>	<b>2,315</b>	<b>2,151</b>	<b>2,191</b>	<b>2,231</b>	<b>2,350</b>
B) Physical contingency	37	83	106	116	108	110	112	117
C) Price contingency	39	179	351	524	624	782	953	1,178
<b>Total cost during assistance period (A + B + C)</b>	<b>822</b>	<b>1,930</b>	<b>2,578</b>	<b>2,955</b>	<b>2,882</b>	<b>3,082</b>	<b>3,296</b>	<b>3,645</b>

**Table II - 13 Summary Cost of Project by Category during the Assistance Period**

*Unit: Million VND*

Category	Material	Labor	Expert services	Salaries	Operating Cost	Baseline cost	Contingency	Total
<b>1. Production Forest Development</b>	<b>2,599</b>	<b>8,945</b>	<b>1,330</b>			<b>12,873</b>	<b>4,801</b>	<b>17,674</b>
<b>2. Support for Production Forest Development</b>	-	-	<b>2,248</b>	-	-	<b>2,248</b>	<b>416</b>	<b>2,664</b>
2.1 Financial Mechanism Development			445			445	54	499
2.2 Support for Production Forest Association			899			899	169	1,067
2.3 Promotion of Market Linkages			316			316	95	411
2.4 Training and Institutional Development			588			588	97	686

<b>3. Project Management, M &amp; E</b>				<b>480</b>	<b>170</b>	<b>650</b>	<b>203</b>	<b>853</b>
<b>Total baseline cost during assistance period</b>	<b>2,599</b>	<b>8,945</b>	<b>3,578</b>	<b>480</b>	<b>170</b>	<b>15,771</b>	<b>5,420</b>	<b>21,191</b>

## 5. FINANCING PLAN

### 5.1 *Financing Sources for the Project*

There are three sources of project financing as shown in Table II-11. It is expected that the contribution of farmers to the project cost during the assistance period will be 42%. Much of their contributions are in the form of labor. About 40% will be financed by loans (VND 5 million per ha). Loans from the financial institution will be used for purchasing materials, seedlings, and services (relevant to Component 1) while costs relating to support for production forest development (Component 2) and project management (Component 3) will be covered by the government budgets. The government share of the project will be 17% of the project cost during the assistance period.

### 5.2 *Loan Disbursement and Repayment Plan*

A tentative loan disbursement and repayment plan is shown in the following table applying to one smallholder holding 1 ha of degraded forest land. Interest payments are due annually. The principal is repaid in the eighth year.

**Table II - 14 Loan Disbursement and Repayment Plan – One-Hectare Model**

*Unit: VND1,000*

Year	1	2	3	4	5	6	7	8
Loan disbursement	4,000	1,000	-	-	-	-	-	-
Repayment	-	240	300	300	300	300	300	5,300
- Interest	-	240	300	300	300	300	300	300
- Principal	-	-	-	-	-	-	-	5,000
Outstanding balance	4,000	5,000	5,000	5,000	5,000	5,000	5,000	0

Loan conditions follow VBSP practice but are adjusted for the longer repayment period. The rehabilitation of one hectare of degraded forest will require VND 5 million (on Year 2005 basis) to cover the cash cost of such activity. The proposed loan terms and conditions are as follows:

- (1) Loan amount: VND 5 million (Year 2005 basis);
- (2) Interest rate: 0.5% per month (6% p.a.) fixed until the repayment;
- (3) Repayment period of loan: 7 years;
- (4) Grace period: 7 years (for principal only); and
- (5) Loan repayment: full principal at harvesting and interest payments annually.

The project will be financed over eight years. The disbursement and repayment plan for the entire project is shown in the table below.

**Table II - 15 Loan Disbursement and Payment Plan for the Entire Project**

*Unit: VND million*

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Implementation year	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Outstanding balance at beginning	-	686.2	1,781.80	2,983.00	4,244.20	5,568.50	6,959.10	8,419.1	8,027.8	6,932.2	5,731.0	4,469.7	3,145.4	1,754.9	294.8
Loan disbursement	686.2	1,095.60	1,201.20	1,261.30	1,324.30	1,390.50	1,460.10	294.8	-	-	-	-	-	-	-
Repayment	-	41.2	106.9	179	254.7	334.1	417.5	1,191.3	1,577.2	1,617.1	1,605.1	1,592.5	1,579.3	1,565.4	312.5
- Interest	-	41.2	106.9	179.0	254.7	334.1	417.5	505.1	481.7	415.9	343.9	268.2	188.7	105.3	17.7
- Principal	-	-	-	-	-	-	-	686.2	1,095.6	1,201.2	1,261.3	1,324.3	1,390.5	1,460.1	294.8
Outstanding balance at end	686.2	1,781.8	2,983.0	4,244.2	5,568.5	6,959.1	8,419.1	8,027.8	6,932.2	5,731.0	4,469.7	3,145.4	1,754.9	294.8	-

Note: As the preparation work is scheduled to be done in Year 2006, Year 2007 is the second year of the project period.

### 5.3 Fund Flow of the Project

Arrangements to establish loan contracts with eligible smallholders will be carried out by the financial institution in close collaboration with the PMB and PIUs as well as commune PC and representatives of villages and farmers' groups. The financial institutions will disburse loan proceeds directly to participating smallholders. It is envisaged that households will become eligible after becoming a member of a farmers' group and having undergone training. The disbursement flow is shown in Figure II-1, Structural Organization Chart for Project Implementation in Chapter 6 of Part II.

As for the government budget, the provincial government and in a smaller amount, the district government, will release budgets relating to the support for production forest development and project management components to the PMB through the district treasury. The disbursement flow of the government budgets is illustrated in the Figure II-2 Organization Structure and Fund Flow for Supporting Services and Project Management Components in Chapter 6 of Part II.

## **6. ORGANIZATION OF PROJECT MANAGEMENT AND IMPLEMENTATION**

### ***6.1 General Aspect***

The current government staff and facilities will be utilized for the implementation of the project. Consultants, assistants and workers will be recruited on demand.

A Project Management Board (PMB) will be established as an implementing agency of the project. It will be placed under the Phu Binh District People's Committee (PC). The PMB receives technical support from the Agriculture and Rural Development Division (ARDD) of Phu Binh PC and DARD of Thai Nguyen Province. The PMB will not bear financial responsibilities for loan repayment from participating smallholders to the financial institution. It will however be responsible for managing all other aspects of the project and for achieving the project objective. At commune level, Project Implementation Units (PIUs) will be established to carry out daily field operations.

The Sub-Department of Forestry (Sub-DoF) of Thai Nguyen Province sets the policy direction of the project, mainly in the technical field through close collaboration with the Ministry of Agriculture and Rural Development (MARD) and the provincial government.

Loans to each household will be provided by the agreed financial institution. All necessary paper-work to establish loan contracts with participating households will be carried out by the financial institution with project-related information provided by the PMB and PIUs. The financial institution will be responsible for managing the loan contracts and handle cash transactions.

### ***6.2 Project Management Board***

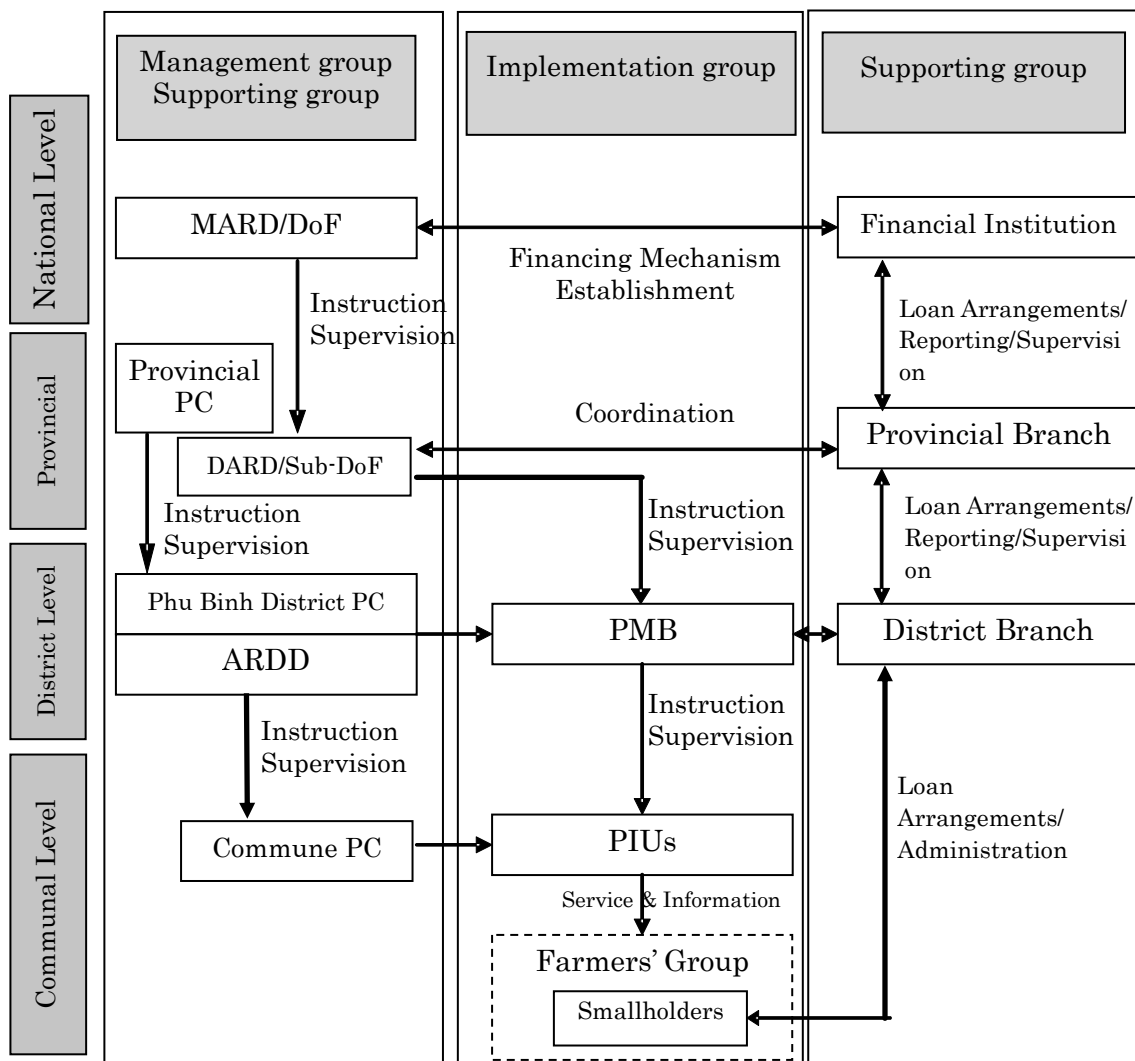
It is proposed that the Vice Chairman of Phu Binh District PC in charge of district forestry activities will be the director of the PMB. The PMB will receive policy directions and control from the District PC mainly in non-technical fields and from the Sub-DoF mainly in technical fields. They will be responsible for implementing the project and achieving the project objective by the end of the assistance period. The Director of ARDD at the District will act as the Deputy Chairman of the District PMB. The PMB will be staffed with an accountant and some other staff from relevant divisions of the district office.

PMB will prepare annual work plans and estimate budgets for submission to the Provincial Government through the District Office. They will be expected to coordinate provision of services to participating smallholders through PIUs and, upon requests from a financial institution, support the financing institution in implementing loan arrangements. The specific structure and tasks of PMB are included in the implementation plan (IP).

### 6.3 Project Implementation Units

It is envisaged that PIUs will be established in each of the four participating communes, Ban Dat, Tan Khanh, Tan Kim and Tan Hoa, in the project area. The Chairperson of Commune PC at each commune is expected to act as the Director of each PIU. The PIUs will carry out daily field activities and provide support to participating smallholders under the supervision of the PMB. The supporting services include training programs to farmers at the commune level and upon the completion of training; a certificate will be issued to trainees in order for them to become eligible for loans. PIUs will be staffed with experienced Forest Extension Workers who have a good understanding and technical knowledge of silviculture. PIUs are also expected to prepare annual work plans and to estimate budgets for submission to the PMB. More specific activities of PIUs are included in the Implementation Plan (IP).

**Figure II - 1 Structural Organization Chart for Project Implementation**



#### **6.4 Roles of Governmental Organizations and Other Stakeholders**

The budget for the support for production forest development (Component 2) and project management, monitoring and evaluation (Component 3) will be provided by the provincial budget and partly from the district budget. Based on the annual work plan and budgets from the PMB through the District Office, the annual budgets will be prepared at the provincial level where the Department of Planning and Investment (DPI) and the Department of Finance (DOF) are involved in the process. After the approval at Provincial PC, the budget will be channeled through the District Treasury to the PMB and PIUs. The expected roles of each organization are as follows.

##### **- MARD**

- (i) Provide broad policy guidance and direction to the PMB through Sub-DoF;
- (ii) Oversee project implementation and address issues and concerns through the Sub-DoF;
- (iii) Support discussions with the financial institution for the extension of loan program for the rehabilitation of smallholder production forests in the project area; and
- (iii) Provide support and information to DARD/Sub-DoF.

##### **- Thai Nguyen Provincial PC**

- (i) Approve the establishment of the PMB at the district level;
- (ii) Provide policy guidance and direction to PMB through the Sub-DoF;
- (iii) Oversee project implementation and address issues and concerns through the Sub-DoF;
- (iv) Review and approve the annual work plan and budget, and release an annual budget for the government portion of the project costs during the assistance period;
- (v) Take the lead in discussion with the financial institution for the establishment of the loan program; and
- (vi) Ensure effective liaison with relevant agencies and stakeholders, and resolve problems that may arise from the project implementation, especially those beyond the control of the PMB and the district office.

##### **- DARD/Sub-DoF**

- (i) Provide policy guidance and directions to PMB mainly in the technical field in collaboration with the Phu Binh District PC;
- (ii) Oversee project implementation and address issues and concerns in collaboration with the Phu Binh District PC;

- (iii) Work with MARD and the local government authorities to establish the loan program and work with the PMB to propagate the project in the project area and other districts;
- (iv) Review and approve the annual work plan of the project;
- (v) Ensure effective liaison with relevant agencies and stakeholders, and resolve problems that may arise in project implementation, especially those beyond the control of the PMB and the district office;
- (vi) Provide support and information to the PMB, including staff, if necessary; and
- (vii) Arrange the evaluation of the project by a third party.

**- Phu Binh District PC**

- (i) Establish a PMB according to the instructions of Thai Nguyen Provincial PC and appoint staff to manage the project;
- (ii) Provide policy guidance and directions to the PMB mainly in the non-technical field in collaboration with the Sub-DoF;
- (iii) Provide support to the PMB in terms of financial and human resources;
- (iv) Oversee project implementation and address issues and concerns in collaboration with the Sub-DoF; and
- (v) Instruct the four Commune PCs to complete the administrative procedures of establishing the PIUs and to assign staff.

**- Phu Binh District Agriculture and Rural Development Division (ARDD)**

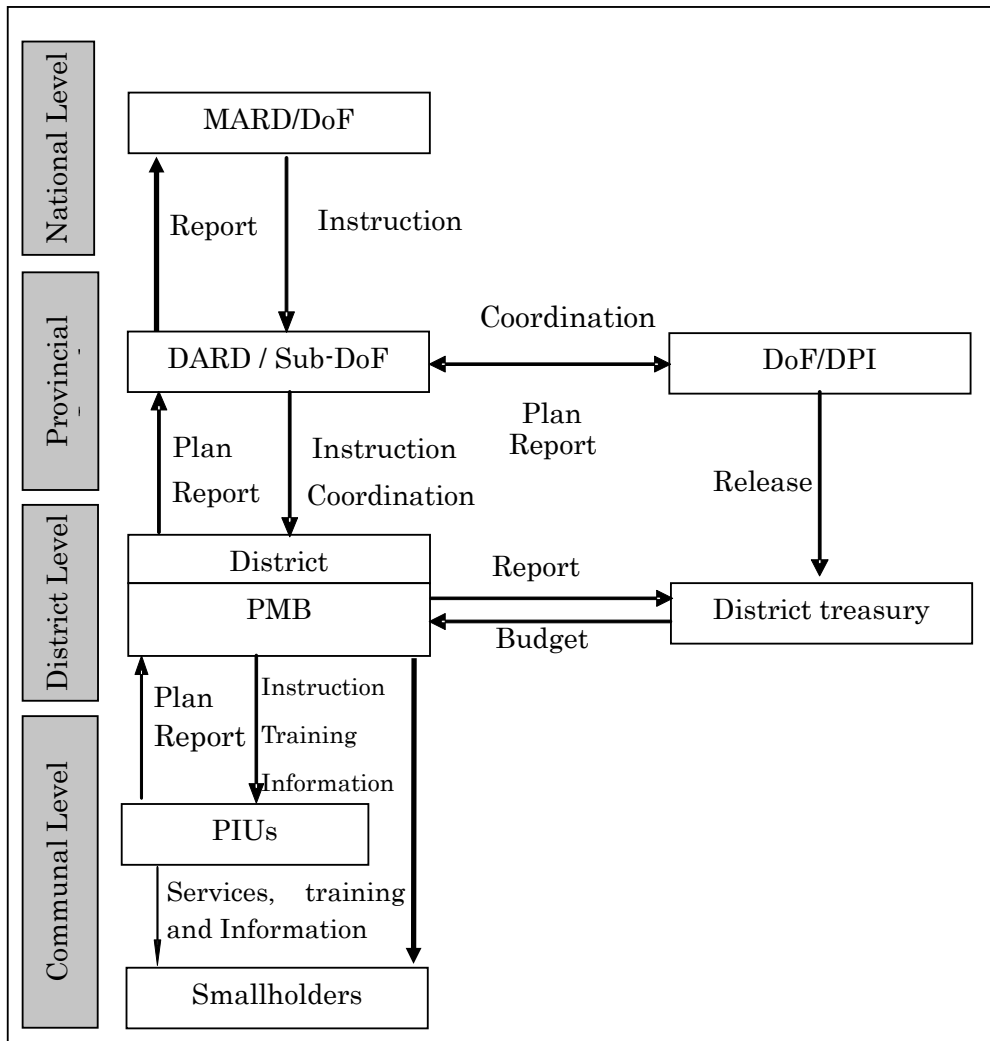
- (i) Provide all support necessary to the PMB in terms of financial and human resources.

**- Commune PCs of Four Communes**

- (i) Establish the PIUs according to the instructions of the District PC; and
- (ii) Provide support to the PIUs in terms of financial and human resources.



**Figure II - 2 Organizational structure and fund flow for supporting services and project management components (Components 2 and 3)**



**- Financial institution**

- (i) Establish a financial mechanism to extend loans to participating smallholders and receive repayment from them;
- (ii) Conduct loan appraisal and administration;
- (iii) Coordinate with the PMB to prepare short-and medium-term operation plans; and
- (iv) Monitor the financial performance of the project.

**- Farmers' Groups and Production Forest Association**

- (i) Farmers' groups function as a venue for participating smallholders to receive training and communicate with the PMB and PIU; and
- (ii) A Production Forest Association (PFA), comprised of farmers' groups, promotes wood marketing and contract bargaining with buyers.

## **7. MONITORING AND EVALUATION**

### ***7.1 Development Impact Indicators***

In order to monitor and evaluate the achievement of the project objective and overall goal, the following “development indicators” are utilized:

(1) Development indicators to evaluate the achievement of the project objective:

- Around 1,500 ha of forest land rehabilitated by 2013

(2) Development indicators to evaluate the achievement of the overall goal:

- Poverty rate reduced.

In relation to this indicator, the contribution to the household income by the project can be also evaluated.

- From 2014 onward, around 20,000 m<sup>3</sup> (commercial wood) harvested each year.

These key development indicators together with detailed monitoring and evaluation methods are shown in the “Indicators” and “Means of verification” of “Project Design Matrix (ANNEX I).”

### ***7.2 Progress Indicators***

The following progress indicators are used to monitor the progress of the project:

(1) A total of about 1,500 ha of production forest established in the degraded forest land by 2013;

In parallel with this indicator, other indicators such as the number of smallholders engaged in the project, records of planting and tending activities, and financial indicators such as the amount disbursed can be used.

(2-1) Participating smallholders start getting institutional loans by 2008;

(2-2) Farmers’ groups and a Production Forest Association established by 2013;

(2-3) Harvesting and marketing plans, and purchasing agreements with traders established by 2013.

(2-4) About 70 training courses offered to participating smallholders, extension workers and village leaders; and

(3) One PMB and four PIUs established by the 1<sup>st</sup> quarter of 2006.

### ***7.3 M&E Implementation***

The PMB and PIUs will be responsible for monitoring the progress of the project and making necessary adjustments and changes to the plan and activities. As for field data, the PIUs will update records of rehabilitated areas and the performance of the afforested areas of participating smallholders through the farmers' groups on a quarterly basis. The primary data collected at the PIUs will be aggregated at the PMB and the aggregated data will be utilized for comparison with the plan. Staff from the implementing agency will make occasional visits to selected planting sites for verification of the information reported. Data relating to the financial aspect will be shared with the financial institutions so far as the information-sharing does not violate the privacy of the participating smallholders.

Adequate formats for recording project activities will be developed in the Implementation Plan. An annual report will be produced at PMB and submitted to the District PC and through the Sub-DoF to the Provincial PC. The budgets required for the monitoring activities will be secured as part of the operating expenses of the implementing agency.

Mid-term and final evaluations will be initiated by the provincial government, DARD in particular, to evaluate the project performance. Field verification will be included in the evaluations.

## **PART III. PROJECT JUSTIFICATION**

# 1. FINANCIAL AND ECONOMIC ANALYSES

## 1.1 *Financial Analysis*

### 1.1.1 Production Forest Model

The project will develop production forests with A.hybrid and A.mangium with a cycle of eight years. Financial analysis is conducted on a one hectare production forest model. The physical contingency is assumed at five percent of the baseline cost while the expected rate of inflation is five percent per annum. The analysis is done on a constant price basis of the Year 2005 by applying a real discount rate of ten percent (10%). The net benefits arising from the without-project cases are expected to be marginal and only with-project cases are considered for the analysis.

### 1.1.2 Expected Expenditures

Average cost for establishment of the forests, including tending and contingencies over the eight year cycle, is estimated at VND 12.4 million per ha for A.hybrid and VND 12.0 million for A.mangium, respectively. Harvesting costs are not included in this amount. The difference is caused by the price difference of seedlings: A.hybrid is VND 530 per seedling, A.mangium VND 340 per seedling. The initial density of a new plantation is 1,660 trees per ha with an estimated need for infilling of 10% in the second year. It is estimated that a total of 1,826 seedlings is required for one hectare of production forests. About 500 kg of fertilizer will be needed over two years and the average cost is VND1.8 million/ton and the cost of fertilization is estimated around VND 900,000 per ha. The unskilled labour cost is VND 25,000 per man-day. Site design and survey cost is assumed to require VND 1.0 million/ha over a three year period.

### 1.1.3 Expected Outputs, Prices and Receipts

It is estimated that one hectare of A.hybrid production forests will yield about 105 m<sup>3</sup> of sales stumpage volume in the eighth year while A.mangium will produce 68 m<sup>3</sup>. Stumpage prices of output depend on the quality of timber and the purpose for which they are sold. For the analysis, the average stumpage value for logs is assumed at VND 350,000 per m<sup>3</sup> for A.hybrid and VND 400,000 for A.mangium as described in the section 2.4 Sales and Marketing of Part I.

### 1.1.4 Financial Results of Production Forest Model (Total Investment Viewpoint)

As summarized in the table below with Annex 4 providing detailed tables for financial analysis, the models show that financial internal rates of return are viable for both types of Acacia. However, returns are slightly higher for A.hybrid as the higher output more than compensates for the lower prices. The field investigation also suggested that the

performance of A.hybrid is better than A.mangium. As explained above, as a result, A.mangium will be planted on poor soils where A.hybrid cannot yield.

The conclusion suggested by the analysis that Acacia plantations are viable is confirmed by farmers' behavior – those who have funds are undertaking plantations on their own. However, it also appears that environmental services, particularly soil erosion, water control and grazing for animals, which were not quantified in the analysis, are important for farmers.

**Table III - 1 Results of financial analysis from a total investment viewpoint (1 ha Model)**

Plantation	A.hybrid	A.mangium
Output (m3/ha)	105	68
<b>Base Case</b>		
Average Stumpage Prices (000 VND/m <sup>3</sup> )	350	400
Sales (million VND)	37	27
<b>Financial Rate of Return</b>	<b>22%</b>	<b>17%</b>
<b>Lower Case</b>		
Average Stumpage Prices (000 VND/m <sup>3</sup> )	237	207
Sales (million VND)	25	14
<b>Financial Rate of Return</b>	<b>15%</b>	<b>5%</b>
<b>Upper Case</b>		
Average Stumpage Prices (000 VND/m <sup>3</sup> )	500	550
Sales (million VND)	52	38
<b>Financial Rate of Return</b>	<b>29%</b>	<b>23%</b>

#### *1.1.5 Sensitivity Analysis on One Hectare Production Forest Model*

Farmers in the project area may not be able to produce wood materials of a quality to meet the requirements of timber merchants and for sawn logs. In this case most of their output will go to wood processors who will buy for production of paper or particle boards. Average stumpage prices in this case will be around VND 200,000/m<sup>3</sup>. As shown in Table III-1 above, in this case A.hybrid will still be viable but the lower yielding A.mangium will be less attractive.

#### *1.1.6 Financial Results of Production Forest Model (Owner's Viewpoint)*

The financial analysis at smallholder level is carried out on the basis of the loan conditions discussed in the section 5.2 Loan Disbursement and Repayment Plan of Part II.

The models presented in Annex 4 indicate that farmers will be able to meet the loan repayment obligation and returns on their own investment will be considerably improved as shown below.

**Table III - 2 Results of Financial Analysis from an Owner's Viewpoint (1 ha basis)***Unit: 1000 VND for NPV*

Items	Hybrid acacia	Acacia mangium
NPV (at 10% discount rate)	8,834	5,183
FIRR on Equity	31%	25%

## 1.2 Economic Analysis

The economic analysis shows the feasibility of the project from the view point of the whole country. In Vietnam most prices reflect scarcity values and no adjustments have been made to obtain economic prices. In line with the analysis conducted for FSDP, it is assumed that the financial prices of Acacia reflect opportunity costs and that the market for Acacia products is competitive. The rural wage of VND 25,000 per man-day is assumed to reflect the opportunity cost of labor in the project area which is located close to Hanoi.

The project costs used for the economic analysis include all support activities, although some of these activities such as the development of the Association and promotion of market linkages will affect households other than those participating. Also no attempt has been made to quantify environmental benefits. The analysis is made over the project period until 2020. The analysis results are presented in the following table.

**Table III - 3 Results of the economic analysis**

Items	Results
NPV (at discount rate of 10%)	VND 4.9billion
EIRR	15.8%

Sensitivity analysis shows that the project is mainly affected by possible changes in prices. A fall of selling prices by about 25% will make investment marginally viable (EIRR=11%). However, such a fall in a market which is currently buoyant, not only in Vietnam but also in the region as a whole, is highly unlikely. The rate of return will also be affected by increases in labour cost – but to a lesser extent than to output prices – even an increase of 20% will allow the project to be viable (EIRR=14%).

## 2. EVALUATION OF ENVIRONMENTAL IMPACTS

The table below shows the expected project impact on the vegetation cover. It is expected that the project will contribute to improving soils and plant diversity under the canopy of new plantations. It is likely that the new plantations will provide an environment where water-runoff will be reduced due to Acacia's higher density on the ground and its ability to produce more litter than the current Eucalyptus plantations. Micro-organisms will also become more active, contributing to soil improvement.

**Table III - 4 Overview of Environmental Benefits under Different Tree Species**

Study Items	Barren land	Land with Eucalyptus coppice	Land with Acacia	Land with Pines
Vegetation cover	15 - 20%	5 - 10%	30 -40 %	20 – 30%
Humid upper ground	Very little	Very little	Medium	Little
Moist level	Dry	Dry	Moist	Light moist
Soil erosion	Heavy	Medium	Very light but heavy during land clearing and planting	Light
Level of water in small streams in the dry season	No water	No water	Some water	Little
Underground water at foothills	6-7 m	6-7 m	4-5 m	4 -5 m
Colour of rivers in rainy season	Heavy, dirty water	Black water	Clean water	Clean water

Soil erosion on steep slopes will be a critical problem for the first year until vegetation covers the soil surface. It is envisaged that this will be avoided by providing participating smallholders with training on site preparation and mitigation measures for soil erosion.



### **3. EVALUATION OF SOCIAL IMPACTS**

#### ***3.1 Impact on Ethnic Minority***

There are five ethnic minority groups in the project area, namely: San Diu, Nung, Tay, Mong, and Hoa, occupying 25% of the total population of the project area. As discussed before, ethnicity does not appear to be the most important determinant of household economy which depends more on the amount of livestock and land, the crops grown, and geographical remoteness. Ethnic minorities in the project area have a long history of planting trees and are expected to fully participate in the project. However, some households of the ethnic minority groups may require a more focused training on the benefits and risks of the project and to promote a sense of mutual assistance due to their relatively weak educational background.

#### ***3.2 Short-and Medium-term Impact on the Household Economy***

The project may bring about negative impacts on the household economy in the short-and medium-term period even though the financial feasibility of the project is confirmed. In the project, it is assumed that an average smallholder will bear the cost of about 12 million VND over the eight years of the rotation cycle. Out of the total cost including contingencies, unskilled labor costs accounts for about 60%. In the analysis, except the time when they are involved in their on-farm work, it is assumed that farmers are engaged in off-farm activities and earn their income at the level of prevailing rural wages. By participating in the project, it is thought that farmers may give up opportunities to earn income that they otherwise could have received by engaging in such activities. The working schedule for the project-related activities should be well considered to reduce foregone opportunity costs.

Farmers are furthermore expected to take a loan in the initial year to meet investment requirements and to repay the interest portion annually thereafter. During the period before the planted trees get ready for sale, farmers continue to meet repayment obligations required under the loan contract. The concessional loan should be utilized to reduce financial burdens on smallholders.

#### ***3.3 Special Consideration for Women's Participation in Training Program***

Women carry out multiple tasks. They not only take care of the households but also participate in productive outdoors activities. The rural socio analysis carried out during the project preparation period revealed that many women are interested in participating in a project that will provide chances of income generation for the household. However, it was noted that men often control the main investment activities in the project area. Women also appear to be busier than men in terms of working hours spent during the day and they may not be able to participate in training programs to be provided by the project. Therefore, special consideration will be given in order for women to receive information about the

project and to participate in the training program. For example, training programs are scheduled so as to fit into their daily schedule.

## **4. SUSTAINABILITY**

### ***4.1 Sustainability on Economic Aspect***

The strong demand for wood is expected to contribute to the sustainability of the proposed project. According to the market analysis, demands for wood in the province and neighboring provinces including Hanoi are likely to remain high. At present, the total annual wood demand in Thai Nguyen only is estimated in excess of 65,000m<sup>3</sup> and there is a local shortage of wood. As a consequence, many processing factories are not able to operate at full capacity. In addition to the local wood demand, the economy of Vietnam and other East and Southeast Asian countries is growing at a fast rate. It is expected that demand and prices for wood will continue to be high. Currently many large international paper companies as well as other wood-based industries are paying close attention to the potential of Vietnam's forestry sector as a major wood supply base in the region.

### ***4.2 Other Aspects of Sustainability***

Participating smallholders will be trained in production forestry. They are expected to gain the necessary skills to continue their activities after the end of the assistance period of the project. In addition, soil improvement through establishing new forest plantations is expected to contribute to the sustainability of land-use. Finally, the project will use the current government structure as much as possible. It is envisaged that experiences gained through the project implementation will enable governments to replicate similar projects elsewhere in the future.

## **5. PROJECT RISKS AND MITIGATION MEASURES**

There are a number of project risks that could possibly pose threats to the realization of the output and project objectives.

### **(1) Delayed Approval and Policy Changes**

One major risk at the initial start-up stage of the project is that the necessary decision to establish the PMB is not promulgated by the provincial government. This causes delays or failure in the project implementation.

The government policy changes in supporting the development of production forests will be another risk particularly at the phase where the achievements of the project are to be disseminated.

Close dialogue with the governments will be essential to avoid or mitigate negative impacts when these risks are realized.

### **(2) Lack of Appropriate Loan Scheme**

One major risk is that the loan scheme is not agreed with VBSP and/or Viet Nam Development Bank (VDB), with terms and conditions in line with similar projects in Vietnam. It is crucial that participating smallholders are able to access loans as individual borrowers. The World Bank has introduced a loan programme for production forest in FSDP which is funded with long-term and low-interest loans. MARD/DARD support is needed to introduce this type of the loan scheme in the project area using funds from the government, VDB, and/or external donor agencies and to channel them to participating smallholders through the financial institutions.

### **(3) Staff Assignment and Budget Allocation**

Another risk will be related to staff assignment and budget allocation. There may be a case where the local governments are not able to assign the appropriate number of experienced staff to the project and to make a timely allocation of budgets for supporting services and the operation and management of the project. Close dialogue with the governments will be essential to avoid or mitigate negative impacts when these risks are realized.

### **(4) Maintenance of Participants' Interests for the Long-term Investment**

Discussions during the rural socio analysis confirm that farmers are aware that agricultural activity alone will not be enough to support their household economy and that a better use of the low-productive forest lands is desirable. However, the long rotation cycle of the tree plantation often poses risks by discouraging farmers to be engaged in the project, as they often look for short-term income earning opportunities. Provision of

training courses and promotion of group activities may serve to keep the farmers interested in the project.

#### (5) Less Experiences of Smallholders in developing Production Forests with Infertile Soils

Many smallholders of land-use rights for the forest land are familiar with tree planting. With infertile soils, however, proper silviculture techniques need to be employed. A planned certification scheme for trainees and quality and performance monitoring by the PIUs are proposed to be linked with the loan disbursement, thereby providing a means for the project to ensure high performance regarding the implementation of the plantation activities and the quality of the wood materials.

#### (6) Pest and Disease Outbreaks and Occurrence of Natural Disasters

A heavy concentration on one or two species always carries the risk of a pest or disease outbreak. However, so far no such outbreak has occurred in Acacia and project authorities will need to exercise constant vigilance against possible outbreaks of pests and diseases. In case of an outbreak, concerned institutions such as MARD and the Forestry University will need to be quickly mobilized to take counter-measures before such pests and diseases take hold.

Occurrence of natural disasters and erratic weather patterns will also add risk to the project. These need to be monitored and mitigation measures to recoup damages will be promptly taken in collaboration with relevant government authorities.

#### (7) Market and Price

The harvest of plantations will start in the eighth year after the plantation of trees. The market and prices of wood materials will remain unpredictable although it is expected that the trend will be upwards. It is also uncertain how the small-scale wood markets will develop. It is important that participating smallholders are well informed about market trends and price changes of wood materials and that market diversification is pursued under the project. Also, payment should be promptly made as agreed between smallholders and buyers. Furthermore, it is important for MARD/DARD to continue to explore potential markets and to expand market linkages.

**PART IV. CONCLUSIONS AND  
RECOMMENDATIONS**

## 1. CONCLUSIONS

The project seeks to efficiently develop some of the degraded forest in Thai Nguyen, which is expected to contribute to the livelihood improvement of participating smallholders and increased production values in the forestry sector. About 1,500 ha of degraded Eucalyptus will be cut down and replaced with Acacia, of which A.hybrid will be planted on 1,157 hectares while A.mangium area will be planted on 335 hectares. At the same time support will be provided to create a sustainable loan system, promote PFA for improved marketing of wood, and provide improved technologies.

The financial analysis indicates that the investments are viable. Farmers are likely to find new plantations attractive. In fact those who can afford to make these investments in Acacia plantations are already doing so. The project will enable smallholders to participate in this process. The quantifiable economic benefits of the project will include increased domestic supply of wood materials (timber and fuelwood) which will reduce imports. In addition, the plantations will improve the environment – in particular, it will reduce soil erosion and surface run-off in the area. The rate of return indicates the project is desirable

Thai Nguyen is a generally well endowed province, located near to markets, and having good implementation capacity. Farmers are generally dynamic and interested in investments that will improve their livelihoods. The overall conditions are therefore favorable and the project is likely to be successfully implemented. The experience of Thai Nguyen should provide lessons to other provinces that would like to develop production forest. The project proposal calls for participation of a financial institution to assist capital-poor smallholders to undertake forest plantations with long gestation periods. Some initiatives of this type are already underway in Central Vietnam with the support of the World Bank. Having a similar model for other provinces in Vietnam will help promote production forest across the country.

## 2. RECOMMENDATIONS

***Approval of Establishment of a PMB:*** The establishment of a Project Management Board will be the very first step of the project. Delay in approval will cause delays or may result in failure in the project implementation. It is recommended that the provincial government issue the approval of the PMB at the appropriate time.

***Needs for an Innovative Loan Scheme:*** The establishment of an innovative loan scheme is fundamental to this project. The role of MARD/DARD as well as the PC of the province is crucial to help financial institutions to prepare an innovative loan scheme preferable for participating smallholders. An example has been provided by the World Bank's project implemented in the central region. It is recommended that MARD/DARD start discussions with the VBSP and VDB to agree a loan programme based on experience with the World Bank project.

***Organizational Strengthening:*** The establishment of the PMB and PIUs in promoting production forests by providing loans to smallholders is quite a new idea in the country. The extent of their responsibilities and roles has been recommended and described in this report but the approach is still unproven in practice. It is crucial that PC of the province issue an approval for the establishment of the PMB, PC and DARD provide a full support to the project and maintain close communication with the PMB. It is recommended that the extension officers at PIUs have training sessions from the Extension Centre of DARD. It is also proposed that the Extension Centre carry out training to the participating smallholders on silviculture. Finally, it is proposed that the members of the PMB and representatives of PIUs visit various on-going forestry projects in Vietnam to acquire the lessons learned in other projects.

***Integration with Other Forestry Initiatives:*** The project is taking place in the context of a national programme. Forest Sector Support Programme (FSSP) has been set up to guide this process. Prior to implementation, close consultation with FSSP is crucial.

***Dissemination of Correct Information:*** In order to avoid possible misunderstandings about the time period required for the trees to be harvested, it is crucial that the implementing agency inform the participating smallholders with full details of the project scheme and the potential risks that they may face. It is important that staff at commune PCs be fully informed about the project and loan scheme implemented in the project.



## **ANNEXES**

## ANNEX I. PROJECT DESIGN MATRIX

**Project Name:** Smallholder Production Forest Development Project in Thai Nguyen Province

**Project Area:** Ban Dat, Tan Khanh, Tan Kim, Tan Hoa Communes-Phu Binh District-Thai Nguyen Province

**Assistance Period:** 2006 – 2013

**Project period:** 2006 – 2020

**Target Beneficiary:** Smallholders who have red books for forest land in the project area.

Version 1 Date: November 2005

Narrative Summary	Indicators	Means of Verification	Critical Assumptions
<b>Overall Goal</b> Livelihood is improved through development of production forest in the project area.	Poverty rate is reduced.	- provincial/district poverty statistics	- The government support for production forest continues.
<b>Project Objective</b> The production value of the forest lands is increased.	. Around 20,000 m3 (commercial wood) is harvested each year from 2013 onward.	- Records of Provincial Department of Forest Protection	- Payment is promptly done as agreed between smallholders and buyers.
<b>Objective of Assistance</b> Production forest area is established in forest land.	- Around 1500 ha of forest land is rehabilitated by 2014.	Project implementation reports	- Demand and sales price of wood remain buoyant.
<b>Outputs</b> 1. The production forest land is planted with species of commercial values. 2-1. A model loan scheme is established for production forest development projects. 2-2. Smallholders' collective negotiation capacity is enhanced. 2-3. Market linkages between smallholders and the markets are promoted. 2-4. Smallholders, extension workers, village leaders are trained with appropriate afforestation technique and management. 3. Institutional capacity to manage the production forest development project is enhanced.	1. Forestry plantation area (around 1,500 ha) are planted with Acacia species by 2013. 2-1 Participating smallholders start getting institutional loans by 2008. 2-2 Production Forest Association is established in four communes by 2013. 2-3 Harvesting and marketing plans, and purchasing agreements with traders are established by 2013. 2-4 About 70 training courses will be offered to participating smallholders, extension workers and village leaders. 3. One PMB and four PIUs are established by 1 <sup>st</sup> quarter of 2006.	Project implementation reports.	- There will not be any natural disaster. - No major pest and disease outbreak will occur.
<b>Activities</b> 1. Facilitate plantation activities by smallholders. 2-1. Design and agree loan scheme with the financial institutions. 2-2. Facilitate /Mobilize smallholders to form farmers' groups and Production Forest Association. 2-3. Prepare harvesting and marketing plans, and purchasing agreements with traders. 2-4. Provide training for trainers, village support group, and smallholders 3. Establish Project Management Board (PMB) in Phu Binh District and four (4) commune Project Implementation Units (PIU).	<b>Inputs</b> Total project cost: VND 21.2 billion (US\$ 1.33 million). (1) Production Forest Development (PFD): VND 12.9 billion (US\$0.80 million). (2) Support for Production Forest Development (SFFD): VND2.2 billion (US\$0.14 million). (3) Project Management and Monitoring & Evaluation (M&E): VND0.7 billion (US\$41,000). -PMB: 4 officers -PIU:8 officers (including 4 extension workers) (4) Contingencies: Physical contingencies: 5%. Price contingencies: 5%.		- Adequate number of experienced staff and budget is allocated by the government throughout the assistance period. - Interest (financial and environmental) of participants in replanting is maintained. - Smallholders gain experience of developing production forests in infertile soils.
			<b>Pre-conditions</b> -The local (provincial and district) government approves the project. -Loan scheme is agreed with VBSP/VDB, with terms and conditions in line with other similar projects in Vietnam.

## ANNEX 2. PHYSICAL FEATURE OF THE PROJECT AREA

### 1. Geographical location

The longitude, latitude and location of project area is as follows:

**Table A2 - 1 The longitude and latitude of project area**

Longitude/latitude	Thai Nguyen Province	Phu Binh District
North latitude	21 <sup>0</sup> 23' to 22 <sup>0</sup> 01'	21 <sup>0</sup> 27' to 21 <sup>0</sup> 35'
East longitude	105 <sup>0</sup> 51' to 106 <sup>0</sup> 16'	105 <sup>0</sup> 55' to 106 <sup>0</sup> 05'

**Table A2 - 2 Location of project area**

Direction from the project area	Province / district which project area belongs to	
	Thai Nguyen Province	Phu Binh District
To the north	Bac Kan Province	Dong Hy District
To the south	Hanoi	Pho Yen District
To the east	Lang Son and Bac Giang provinces	Hiep Hoa District, Bac Giang Province
To the west	Tuyen Quang and Vinh Phuc provinces	Thai Nguyen City
Others	80 km north of Hanoi by National Road No. 3	District headquarter lies 24 km to the south of Thai Nguyen City

As an administrative level, Phu Binh District lies in a favorable geographical area extending in-between Thai Nguyen and Bac Giang provinces, close to Hanoi and many industrial parks (Song Cong Industry Park, Thai Nguyen Province and many industrial parks under Hanoi's administration). These geographical advantages favor trade, industrialization and urbanization of Phu Binh district. The relatively well-developed transport network, including road, railway and waterway, creates favorable conditions for developing trade and services, founding local market-oriented economy and integrating it into the national one.

**Table A2 - 3 The area of administrative section to which project area belongs**

Land use	Whole country	North-east Region	Thai Nguyen Province	Phu Binh District
Total land area	33,037,857	6,596,876	354,110	24,936
Forest lands	19,025,435	4,801,748	205,817	6,279
Forested lands	12,306,859	2,923,265	155,336	5,789
Barren lands designated to forestry	6,718,576	1,878,483	50,481	489
Others	14,012,422	1,795,126	51,118	18,656

(Source: Data on the national forest cover, MARD, December 2004)

## **2. Topography, geology and soil**

### **2.1 Elevation**

Mean elevation of Phu Binh District is 14 m asl. The highest mountain is 250m asl. and this mountain belongs to Deo Bop range (Cao Bang Village). The lowest site is 10m asl. and is found in Duong Thanh Commune.

### **2.2 Topography**

The terrain of Phu Binh District tends to get lower from the northwest to the southeast. The vertical interval is 1.1 m per km in length. In general, the terrain is quite flat. Mountain areas cover mostly slight slope hills with the mean elevation of 100 m asl. The flatlands for cropping contain a mixture of vast and narrow paddy fields extending along the feet of hills.

The five project-targeted communes are located in a hilly and lowland area characterized by low-hill landform with the mean slope varying between 15 and 18 degrees. This form of land is often intermixed with quite large rain-fed rice fields.

These topographical conditions make Phu Binh District as the most advanced for a concentrated industrial plantation area.

### **2.3 Geology**

The mother rocks of Thai Nguyen Province are very diverse. In Tam Dao mountainous area, the main mother rock is identified as hyalite porphyry, while the mountain area of Vo Nhai and North of Dong Hy is covered by grivet karsts.

The main mother rocks found in Phu Binh district develop on shale, schist and sandstones.

## 2.4 Soil and land unit

The method of grouping land unit based on the topographical elements, slope, soil types, mother rocks and soil depth is implemented on the basis of the technical regulations made by the Forest Inventory and Planning Institute (1984). Soil and land unit of the project area is classified as Table A2-4.

Meaning of factors of land unit in Table A2-4 is shown below:

The first factor is related to topographical conditions such as hilly terrain (D), valleys (T) and flat terrain (D2).

The second factor is related to slope level such as slope less than  $8^{\circ}$  (I), slope within  $8-15^{\circ}$  (II), slope within  $16-25^{\circ}$  (III), slope within  $26-35^{\circ}$  (IV) and slope over  $>35^{\circ}$  (V).

The third factor is related to soil types such as Ferralite soil (F), accumulated soil distributed in valleys (dl) and old alluvium (P).

**Table A2 - 4 Soil description from soil profiles**

Productivity class	Land unit	Description of land unit							Other description and planted recommendation and tree
		Soil depth	Humus contents	Component	Soil texture	Mutual stones %	Hardness level	Humid level	
I - 1 <15°	DIF $\bar{S}$ DIF $\bar{O}$ TIIFd $\bar{l}$	40-60 cm	Medium	Mixed sand Limonite clay	Smooth speck	5	Soft	Moist	Flat, wet, soft, fertilizable, easy cultivation, closed to water, good current plantation of A.hybrid.
I - 2 16° -25°	DIIF $\bar{S}$ DIIF $\bar{O}$	30-50 cm	little	Limonite clay	Smooth speck	5 -10	Soft	wet	Light slope, light erosion, moist, soft, less fertility impacted by long term Eucalyptus plantation, close to water source, current Acacia and Eucalyptus
II - 1 26- 35°	DIIF $\bar{O}$	40 cm	Little	Limonite clay	Speck	10	Light tight	wet	Light erosion, thick soil layer, moist along stream, close to water source, adapted to A.mangium, lower yield of A.hybrid
II - 2 26- 35°	DIIFq DIIF $\bar{S}$	30 cm	Very little	Limonite clay	Speck	20	tight	dry	Sloped land, tin layer with light moist, heavy erosion, poor fertility, soft soil. Current Pine, A.mangium and Eucalyptus
III - 1	D2 $\bar{p}$	>100 cm	Much	Mixed sand	Speck		soft	Very wet	Rich fertility, wet, flat. Current agriculture .
III - 2	TIIFd $\bar{l}$	100 cm and down	Medium	Limonite clay	Smooth speck		soft	moist	Accumulate soil, thick layer, rich fertility, moist. Current fruit tree, bamboo and resident.

The fourth factor is related to mother rock such as shale group (s), sandstone (q), ancient alluvium (o) and valleys based-accumulated soil (dl).

The fifth factor is related to a thick layer of soils and symbolized with a dash (-): ex. a soil layer over 80 cm thickness is marked by a dash above mother rocks ( $\bar{o}$ ), while a soil layer within 30 - 80 cm thickness is marked without a dash above mother rocks (q).

#### **2.4.1 Productivity class I-1 and I-2**

Productivity class I-1 is composed of land unit  $DIF\bar{s}$ ,  $DIF\bar{o}$  and  $TIIFd\bar{l}$ . Soil of this class possess very common features, such as thick layer of cultivated soil averaged at 40 - 60 cm, mean muddy ratio (dead plants disintegrated on the ground surface), less heavy physical composition (mixed sand and clay), fine-grained structure (high water-stored capacity) and less rocky (5%), soft and cool soil (distributed nearby ground water and covered with plant strata). Other findings indicate that these types of soil are distributed in evenly flat and fertile areas, close to water sources and great favor for establishing production forests.

Productivity class I-2 is composed of land unit  $DIIF\bar{s}$  and  $DIIF\bar{o}$ , and has slope between  $16^0$  and  $25^0$  (Productivity of class I-2 is lower than class I-1). Characteristics of the soil of this class are thick layer of cultivatable soil averaged at 30 - 40 cm, less muddy ratio, heavy physical soil composition (clay) and fine grain (relatively high water-storage capacity), less rocky (5 - 10%), tight and wet ground. Other observations reveal that these land units are found in gently sloping areas with less fertility as they have been covered with eucalyptus for many years. They often distribute nearby water sources and prove to be very suited for production forest development.

#### **2.4.2 Productivity class II-1 and II-2**

Productivity class II-1 is composed of land unit  $DIIF\bar{o}$ . Cultivated soil layer of this class has an average thickness of 40 cm with less averaged muddy rate, heavy physical composition (clay) and fine -grained (high water-storage capacity), rocky rate 10%, less tight and dry soil. Other findings show that this land unit is distributed in sloping areas and under heavy erosion. This land unit is suitable for tap-rooted trees (pines) or *Acacia mangium* plantation.

Productivity class II-2 is composed of land unit  $DIIF\bar{o}$  and  $DIIFq$  (Productivity of class II-2 is lower than class II-1). Cultivable soil layer of this class has an average thickness of 30 cm, average muddy rate is less, physical composition is averagely heavy (Clay) and fine-grained. Soil structure is tight and dry. Additionally, these land unit are located in sloping terrain, acid soil, heavy erosion, suitable for planting tap-root trees (pines) or possible for planting *Acacia mangium*.

#### **2.4.3 Productivity class III-1 and III-2**

Productivity class III-1 and III-2 are composed of land unit  $D2\bar{p}$  and  $TIFd\bar{l}$ . These land units are seen at predominantly agricultural soil mixed with scarce *Eucalyptus* plantations. Land unit  $D2\bar{p}$  (class III-1) has thick cultivated layer, rich in muddy content, sandy, fine-grained structure. Soil is soft, loose and wet and rather rich in fertility. It is suitable for wet rice cropping. Land unit  $TIFd\bar{l}$  (class III-2) has a thick cultivated layer with average muddy ratio. Its composition contains clay, fine-grained. Soil is soft, loose and cool. It has rather rich fertility. Majority of the area, covered with this soil group, is used for planting fruit bearing trees.

Research findings conclude that soil in Phu Binh district is infertile in general, namely bad soil structure, low water-holding capacity and high acidity with pH of 4 -5.

## 2.5 Area of different land unit in 5 communes

Table A2-5 describes area of each specific land unit found in 5 communes (Ban Dat, Tan Khanh, Tan Kim, Tan Thanh, Tan Hoa) including project area, which is categorized into following three main soil groups according to land units. This table refers to area of specific soil type by considering topography, mother rock and slope level as well as productivity class (I-1, I-2, II-1, II-2, III-1, III-2).

- 1) Hilly soil (D) derived from three types of mother rock like shale (s), sandstone (q) and ancient alluvium (o) covers an area of 4545ha.
- 2) Valley-accumulated soil (Tdl) covers an area of 299ha.
- 3) Flat soil (D2) covers an area of 5,878ha.

Each soil group may contain different land unit categorized by slope and productivity levels. For example, hilly soil type (D) which is derived from shale (s) with a slope of less than 15<sup>0</sup> (I), and under the productivity 1 (I-1) has an area of 457 ha. Similarly, area of all soil type groups found in 5 selected communes including the project area is shown in the Table A2-5.

Data on area of specific land unit will create a base for analyzing and evaluating current productivity of plants in each specific soil type so as to propose appropriate planting species for plantation as well as necessary technical measures to improve plantation productivity.

Area of different land unit is figured out in the following table:

**Table A2 - 5 Area of different land unit in 5 communes**

*Unit: ha*

Topographical Condition and mother rock	Total	Productivity class I			Productivity class II			Productivity class III		
		Subtotal	I-1	I-2	Subtotal	II-1	II-2	Subtotal	III-1	III-2
D	s	3,351.1	2,007.9	456.9	1,551.0	1,343.2		1,343.2		
	o	1,129.4	896.8	188.8	708.0	232.6	232.6			
	q	64.6				64.6		64.6		
Subtotal	4,545.1	2,904.7	645.6	2,259.1	1,640.4	232.6	1,407.8			
T	dl	299.4	274.7	274.7				24.7		24.7
Subtotal	299.4	274.7	274.7					24.7		24.7
D2	P	5,878.1						5,878.1	5,878.1	
Subtotal	5,878.1							5,878.1	5,878.1	
Total	10,722.6	3179.4	920.3	2,259.1	1,640.4	232.6	1,407.8	5,902.8	5,878.1	24.7

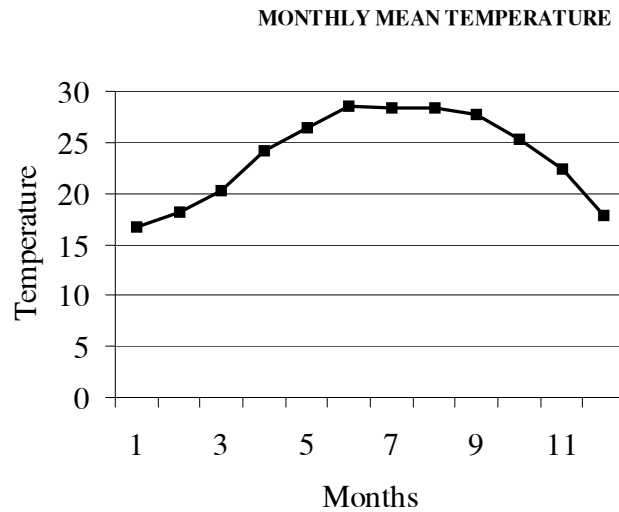
### 3 Climate

#### 3.1 Temperature and rainfall

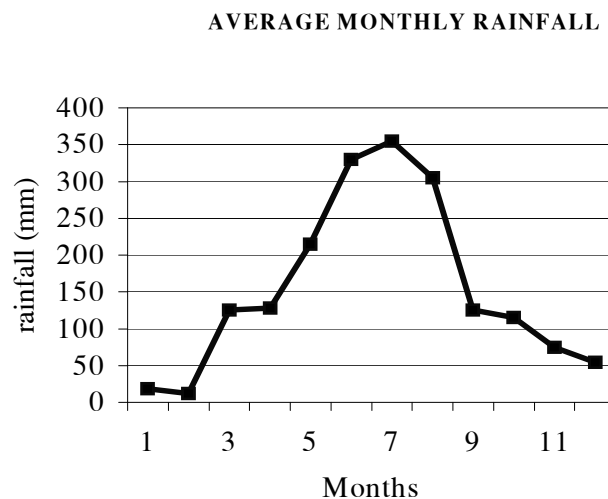
The data recorded by Meteorological Station covering Phu Binh, Dong Hy districts and Thai Nguyen City shows that the project area is located in monsoon tropical climate zone with two distinct seasons. (See Figure A2-1, A2-2, A2-3)

Hot and humid season with high rainfall lasts from April to October and dry season with low rainfall is from November to March.

**Figure A2 - 1 Monthly mean temperature**

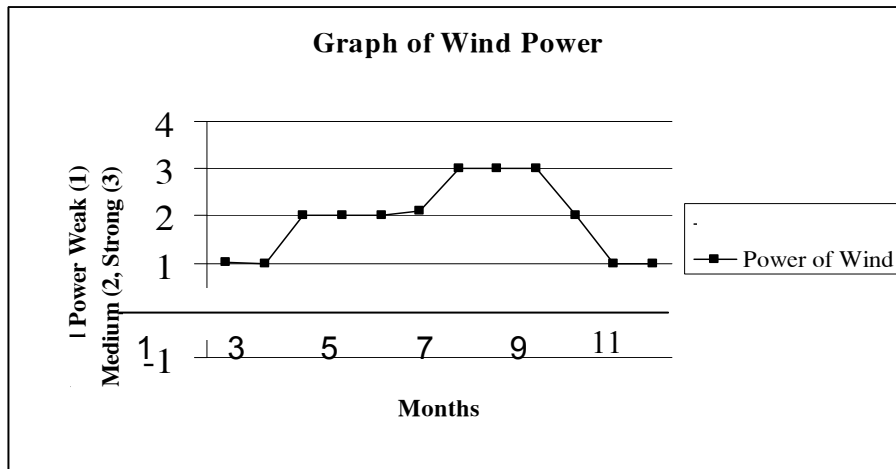


**Figure A2 - 2 Mean Rainfall**





**Figure A2 - 3 Wind Power and Wind session**



### **3.2 Weather conditions in different months of the year**

Annual mean temperature varies between 22.9 and 23.7<sup>0</sup>C. The variation of temperature in different months appears high with the hottest months from June to September. The coolest months are January, February, March and December (data of Phu Binh district within recent 10 years)

Rainfall averages 1,674 - 1,919 mm per year. Annual rainfall unevenly distributes with the highest rainfall in June, July, August and the lowest in January and February (data over the last 10 years).

The sunshine hours total 1,217 - 1,380 per year. Months with the highest number of sunshine hours are May, June, July, August and September, while January, February and March are less sun shined.

Annual mean humidity is between 81 and 82% with maximum humidity in June, July and August and minimum in November and December.

### **3.3 Storms and floods**

There are two dominant wind flows in a year: Southeast wind blows in summer, while North-east monsoon wind occurs in winter. The uncertain and changeable wind regime often causes storms and floods accompanied with hails during July, August and September.

Uneven rainfall distribution largely results in inundation and soil erosion, and considerably hinders agro-forest production.

Findings available from hydrometeorology studies have indicated that climate and weather in Thai Nguyen Province, in general, and in the project area, in particular, is highly diversified. Nevertheless, the climatic and weather conditions therein favor the growth of local natural vegetative cover and a large number of agro-forest planting species.

- (1) Storms, floods, whirlwinds and cyclones often occur in rainy season, particularly during July, August and September. Hence, planting species with brittle and breakable stems, like hybrid Acacia, may be seriously damaged in this season.

## 4 Hydrology

### 4.1 The system of rivers, streams, irrigation schemes and catchments

With the length of 39 km and average width of 120 m, Cau River runs across Phu Binh District. Water discharge is around 580 - 510 m<sup>3</sup>/s and 6.3 - 6.5 m<sup>3</sup>/s during rainy and dry season respectively.

Dao River stretches over 33 km, flowing from Dong Lien Commune down to Bao Ly, Huong Son, Tan Duc communes and joining Thuong River in Bac Giang Province.

Within the territory of the 5 communes, there is the main irrigation canal called "Mang", carrying water from Dong Hy District across Tan Hoa and Ban Dat communes. Together with other small rivers, streams that alternatively located in these communes and Mang Canal, an irrigation network is created to provide water for irrigation and household use. Nevertheless, the hydrological regime is so changeable that it frequently causes inundation in rainy season and water shortage in dry season, while water level of streams and rivers turns down.

Hydrological features: water discharge in streams is changeable due to unequal rainfall distribution through the year. Around 80% of rainfall concentrates in July, August and September. Underground water is abundant at 5 - 7 m deep and is mainly exploited to serve people's daily need. The following table summarizes the system of main rivers, streams in 5 communes.

**Table A2 - 6 Hydrological conditions in 5 communes including project area**

Commune	Rivers, streams	Reservoirs	Water resource and supply capacity
Ban Dat	Mang river	To Te dam	Originated from Dong Hy district, rather stable, but scarce during dry season.
Tan Khanh	Na Ngo, Cau Ngam, Na Tu	Dong Tien, Lan Phan, Lang Ca, Dong Bau	High water level in rainy season, water shortage happens in dry season
Tan Kim	Mon, Chang Dai, Quyet Tien stream	Tan Kim reservoir	High water level in rainy season, water shortage in dry season
Tan Thanh	Lon Tranh, Giua stream	Dong Tien, Cau Van, Ho Cung, Tan Kim dam	High water level in rainy season, water shortage in dry season
Tan Hoa	Ngo, Ho Cung, Ho Du streams	Tan Hoa, Vuc Giang, Vau village dam	High water level in rainy season, water shortage in dry season

Soil erosion and flood: Due to the alternate pattern of hills and paddy fields as a typical topography feature, once heavy rain occurs in short time and exceeds the existing

water penetration and drainage capacity, ground flow can immediately intensify soil erosion and inundation in the area.

#### ***4.2 Irrigation and waterway transport potential***

Large-scale Cau River Irrigation Scheme covers 1,200ha, while Nui Coc Irrigation and Drainage Scheme encompass 980 ha. Other small-scale schemes together can water 200 ha. Reservoirs and pumping stations supply water for around 200 ha. Some 1,020 ha of cultivated area are left un-irrigated, mainly in communes distributed in the North-east of the district.

The existing water sources, thus, can irrigate just 4,400 ha of cultivated area. Around 50% of the area remains non-irrigated.

Waterway transportation along Cau River largely depends on nature due to changeable hydrological regime. In rainy season, when water level turns high, waterway transportation becomes very favorable. Conversely, in dry season, when water level gets down, river transportation may stagnate.

## **ANNEX 3. SOCIO ECONOMIC DATA**

### **1. Introduction and methodology of the rural socio analysis**

Socio-economic data has been collected through the rural socio analysis, mainly by means of the socio-economic survey as well as the household socio-economic survey. It aims to provide an overview of socio-economic conditions of the local people and the project area, and also to identify constraints and potentials with the underlying reasons behind them.

The socio-economic analysis was done based on the secondary data, information collected through interviews with key informants, and visits at selected villages.

The household socio-economic survey was done through the questionnaire survey. If the appropriate sampling method (probability sampling) is used, the household socio-economic survey will provide the analyst with a good picture about socio-economic conditions of the local inhabitants in the project area. However, within the available time and budgets, the questionnaire-based interview survey was conducted through the non-probability sampling method. Although it is difficult to assess how closely the sample represents the population as it is not supported with the statistical techniques, it will provide a preliminary profile of some of the households living in the project areas. The household socio-economic survey was conducted from August 2 and 3, 2005 at the occasion of the Communal Consultation Meetings in the project areas.

### **2. Results of the rural socio analysis**

#### **2. *Overview***

The project area originally covers 5 communes, namely Ban Dat, Tan Khanh, Tan Kim, Tan Thanh, and Tan Hoa of Phu Binh District, Thai Nguyen Province (about 25 km from Thai Nguyen City). However, due to characteristics of the land-use rights in the commune, Tan Khanh is taken out from the original project area at the project planning phase. As the rural socio analysis was conducted at the initial stage of the F/S, the results in this report cover the original project area, including the data from Tan Khanh, unless explicitly so mentioned. Below are the major socio-economic traits.

Emigrants from elsewhere constitute the majority of the local inhabitants. Kinh group accounts for 65.19% of the local population in the project area. Agriculture serves as the major economy (about 70 % of the gross output) in Phu Binh District. Most of the local people are engaged in the primary industry such as rice cultivation, livestock raising, and forestry. In terms of the income structure based on the questionnaire survey, the income from other activities such as off-farm activities also accounts for a large share. The number of households being classified as "poor" in the five communes was 2,634 (35.7% of the total households) in 2004 and Phu Binh district is considered as one of the poorer districts in Thai Nguyen Province. The education and healthcare system covers all communes. In many cases, these services have been made available to villages. Since Ban Dat, Tan Khanh and Tan Kim communes are distant from the district center, access to technical services is difficult.

**Table A3 - 1 Project-targeted communes (original five communes) (in 2004)**

Items	Thai Nguyen Province	Phu Binh District	Originally Targeted communes	Ban Dat	Tan Khanh	Tan Kim	Tan Thanh	Tan Hoa
Ares (km2)	3,541.1	243.9	107.7	18.6	21.9	21.5	26.6	19.1
Population	1,095,991	138,760	29,024	5,664	7,376	6,560	5,060	4,364
Households	N/A	31,160	7,382	1,276	1,630	1,543	1,088	1,845
Households with forestry land	N/A	N/A	2,597	419	914	291	N/A	973
Poor households(*)	N/A	9,777	2,634	540	516	466	446	666
Labor force	584,500	85,310	20,266	3,474	4,504	4,364	3,108	4,816
Villages			80	12	25	14	12	17

Source: Statistical yearbook of Thai Nguyen Province and of Phu Binh District, 2005

Note: Households' income is classified following a set of criteria and indicators defined by Ministry of Labor, Invalids and Social Affairs, issued in July, 2005, as follows:

Poor household in countryside: Average income per capita is 2.4million VND per year.

Poor household in urban area: Average income per capita is 3.12 million VND per year

#### (1) Population

The project area has population of 29,024 persons (7,382 households, 4 persons per household in average), occupying 20.92% of the total district population. Females are recorded at 14,964 persons (51.58%). The proportion between the sexes is fairly balanced. The natural growth of population is 1.0%. People reside in 80 villages. Tan Hoa, which has 17 villages, is the least-populated commune, while Tan Khanh commune, with 25 villages, is the most populated one.

#### (2) Ethnic groups

Ethnic groups living in the project area include Kinh (majority), Nung, Tay, San Diu, Mong, and Hoa. Tan Thanh Commune, in particular, is home to Tay and Nung new settlers, who have come from Cao Bang and Lang Son provinces. Like Kinh group, ethnic minority groups in Phu Binh District have been acquainted with rice cultivation for a long time and their lowland farming techniques are quite similar to those of the Kinh. In addition, these people have accumulated upland farming skills, growing subsidiary food crops like hilly rice, maize, cassava and sweet potato.

**Table A3 - 2 Ethnic groups**

Whole country	North-east	Thai Nguyen Prov.	Phu Binh District*																					
Total ethnic groups: 54, including Kinh, Thai, Muong, Dao, H'Mong, Kho Mu, Day, Lo Lo, Xe Dang, Ka Tu, Gie Trieng, Raglay, Khua, May, Sach, Ruc, Van Kieu, Cham, E De, Ba Na, M'Nong, K'Ho, B'Rau...	Ethnic groups: 40 including: - Kinh, Tay, Nung, Muong, Thai, Hoa (Low - land dwellers). - Cao Lan, San Diu, Pa Then, Trai (Midlands). - H'Mong, Dao, Lo Lo, Kho Mu, Day (Uplands)	Ethnic groups: 10 including Kinh (75,48%), Tay (10,68%), Nùng (5,12%), Sán Diu (2,45%), Dao, Cao Lan, H'Mông	Ethnic groups: 7 including: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Ethnics</th> <th>Persons</th> <th>Households</th> </tr> </thead> <tbody> <tr> <td>Kinh</td> <td>n/a</td> <td>n/a</td> </tr> <tr> <td>Nung</td> <td>5,447</td> <td>1,212</td> </tr> <tr> <td>Tay</td> <td>2,020</td> <td>467</td> </tr> <tr> <td>San Diu</td> <td>2,877</td> <td>550</td> </tr> <tr> <td>Mong</td> <td>15</td> <td>4</td> </tr> <tr> <td>Hoa</td> <td>259</td> <td>51</td> </tr> </tbody> </table>	Ethnics	Persons	Households	Kinh	n/a	n/a	Nung	5,447	1,212	Tay	2,020	467	San Diu	2,877	550	Mong	15	4	Hoa	259	51
Ethnics	Persons	Households																						
Kinh	n/a	n/a																						
Nung	5,447	1,212																						
Tay	2,020	467																						
San Diu	2,877	550																						
Mong	15	4																						
Hoa	259	51																						

Source: Statistical Office, Phu Binh District

### (3) Labor

The project area is endowed with a labor force of 20,266 persons, equivalent to 70% of the total population. Of which, female labors are 10,012 persons, or 49.4% of the total labor force. Each household has 2.7 laborers on average. The labor distribution by sectors in the project areas is shown as in Table A3-3.

**Table A3 - 3 Labor distribution by sectors**

Items	Labors (persons)	Rate (%)
Total	20,266	100.0
Agriculture	13,984	69.0
Forestry	3,445	17.0
Fishery	405	2.0
Industry - Construction	1,824	9.0
Services - Tourism	608	3.0

Source: Statistical Yearbook of Phu Binh District, 2005

Statistical yearbook of Thai Nguyen Province, 2005

Table A3-3 above shows that the most of the laborers are classified into the agriculture sector, accounting for 69.0% of the total labor force in the project area. The agricultural labor force is used mostly in spring crop (50 - 60% of working time a year). Following agriculture, the forestry sector accounts for 17% of the labors. In the project area, a lot of households possess forest lands, but household income derives mostly from agriculture.

#### (4) Gender

The men - women ratio is fairly balanced. Women's share in field work and house-keeping tends even more than that of men.

#### (5) Economic structure of the project area

In 2004, the estimated gross output (current price) of the Phu Binh District amounts to 435,226 million VND, equivalent to 17.9% of the province's gross output. The agriculture accounts for about 70% of the gross output. The economy of the district is based on agriculture. In this area, annual cereal production per capita was 480 kg/person in 2004, 1.42 times higher than that of the province (337 kg).

**Table A3 - 4 Economic structure of the province (GDP) and Phu Binh District (Gross Output)**

Sectors	Province	Phu Binh District
	Gross Domestic Product in 2004	Gross Output in 2004 (Estimated)
1. Agriculture, Forestry and Fishery	26.6%	70.3%
Agriculture	24.9%	68.8%
Forestry	0.8%	0.8%
Fishery	0.9%	0.7%
2. Industry - Construction	37.3%	11.8%
3. Services - tourism	36.1%	17.9%
Total	100.0%	100.0%

Source: Thai Nguyen Statistical Yearbook 2004

Phu Binh District Production Value 2003

#### (6) Organizational structure

The formal administrative system of the district is headed by the District People Committee's Chairman. Under the district, each commune is headed by the Chairman of Commune People's Committee. Although the formal administrative structure ends at the commune level, each village, which is placed under commune, is led by a village head.

Besides the public administrative structure, there are mass organizations including Farmers' Union, Women's Union and Youth Union. These mass organizations play an

important role at commune and village levels. For example, the Youth Union may act as an intermediate organization assisting farmers to receive loan from the VBSP within Program 773 (This Program was launched to support poor farmers to implement agriculture and forestry-related projects).

## 2.2 Households economy

Household-based economic development largely depends on agriculture including irrigated rice cultivation, gardening in home-lots. Beside, local people are also engaged in tree planting and livestock rising.

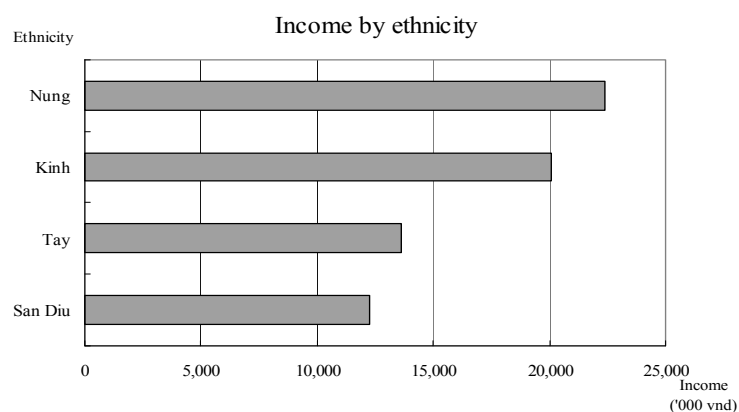
### (1) Household socio-economic survey

Sixty-nine (69) participants attended the Communal Consultation Meetings (CCM) held in August 2005, including 20 from people’s committees, farmers' associations, women’s associations, youth unions, 5 commune forest officers and 44 farmers' representatives. Questionnaires were circulated to participants in advance and collected at the CCM. Information and statistical data gathered at this meeting is given below.

### (2) Ethnicity and its influence on household economy

Among the five communes in the original project area, three communes, including Ban Dat, Tan Khanh and Tan Kim, are home to indigenous ethnic groups of San Diu, Tay, Nung and Kinh immigrants as well. The remaining communes (Tan Thanh and Tan Hoa communes) have no indigenous ethnic minority dwellers. These two communes are covered by Tay, Nung and Kinh immigrants, who have come from Cao Bang and Lang Son provinces. Unlike other upland areas of Vietnam, it is considered that the ethnicity is not attributed to a major factor determining household economy, even though, to a certain extent, there might be some difference in income earned by different groups.

**Figure A3 - 1 Average annual gross income per household by ethnicity**



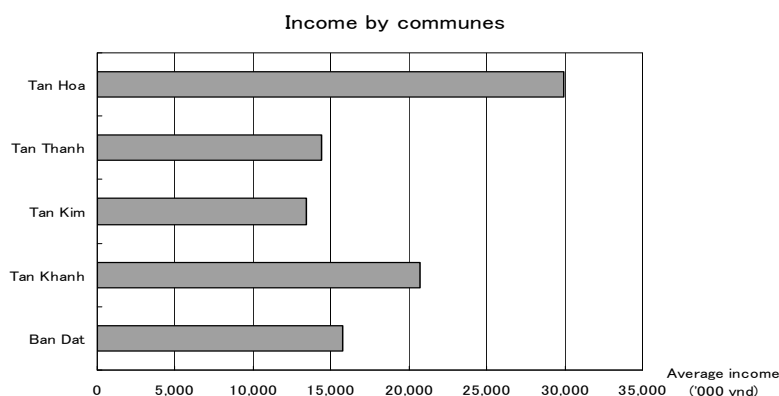
Source: Household socio-economic survey



The survey results verify that the average income of Nung and Kinh is higher than that of San Diu and Tay ethnic minorities.

On the other hand, geographical location constitutes one of the determinants of household economy system. Tan Hoa Commune, which is endowed with fertile soil, better access to market and relatively well developed infrastructure as comparing with other communes in the project area, has higher average household gross income.

**Figure A3 - 2 Average annual gross income per household by commune**



Source: Household socio-economic survey

### (3) Household Income and its structure

According to the surveyed result, the average annual gross income per household (simple average of 66 effective answers) is 19.0 million VND (median is 15.0 million VND and standard deviation is 19.2 million VND), and its components are as follows: income generated from agriculture is 7.3 million VND, providing 38.2 % of the total gross income. Others (off-farm, services, etc) bring about 7.4 million VND, corresponding to 39.1% and taking the first rank in the total gross household income. The third source of earning are salary (company workers, public servants, etc.) that provide 2.5 million VND, or 13.2 % of total gross income. The remainder comes from service (retail, etc.) and forestry, which together provide 1.8 million VND (9.5%).

**Table A3 - 5 Structure of the average annual gross income per household**

Item	Average gross income/HH (mil. VND)	Share (%)	No. out of 66 respondents (Households)
Agriculture	7.3	38.2	66
Forestry (production forest)	1.0	5.2	23
Service (retail, etc.)	0.8	4.3	12
Salary (company workers, public servants, etc.)	2.5	13.2	29
Others (off-farm, services, etc.)	7.4	39.1	45
Total	19.0	100.0	66

Source: Household socio-economic survey

#### (5) Poverty

The analysis of information collected from 69 households by questionnaires shows the following household wealth situation:

- Rich households: 0
- Fairly rich households: 10%
- Medium households: 81%
- Poor households: 8.7%
- Starving households: 0

#### (6) Living conditions

Houses are mainly built with bricks and tiles (97.10%). Wooden and thatched houses remain just at 1.45%.

Transport means: Over 90% of the households have bicycles and motorbikes, only 3-4% has trucks or ox carts.

#### (7) Livestock raising

Household livestock, including buffaloes, cows, pigs and chicken, seems to be well managed.

**Table A3 - 6 Number of households that raise livestock and average number per household**

Animals	Number of Households that raise livestock	Average number of animals per HH (Heads)
Cows	27	2.1
Buffalo	50	1.5
Pigs	66	8.3
Poultry	67	94.0

Source: Household socio-economic survey

#### (8) Spending

Through the questionnaire-based survey with households, the average annual expenditure per household is 13.9 million VND (median is 10.0 million VND and standard deviation is 13.9 million VND). The effective answer was 67 of 69 respondents. This includes agriculture 2.5 million VND (18.0% of the average total expenditure), livestock keeping 4.3 million VND (30.5%, the highest ratio), food 2.3 million VND (16.1%), school 1.8 million VND (13.2%), healthcare 1.1 million VND (7.8%), residential-land tax 0.04 million VND (0.3%), and miscellaneous 2.0 million VND (14.0%).

#### (9) Production

Household production is based on the agriculture, in which harvest of crops and animal husbandry play the key role. Of the most significance is rice, followed by maize, cassava, groundnut, vegetables and bean. Buffaloes, pigs and chicken are domestic animals that have been widely bred in the project area.

#### (10) Financial Sources

Forty-eight (48) households, some 70% of the total households surveyed, obtained loans from either VBARD and/or VBSP, including four households that received loans from both banks, in the last five years. Out of 51 households that received loans from any sources in the last five years, loans used for livestock takes 80.4%, for agriculture 39.2%, for forestry 39.2%, for the handicraft 5.9%, and 3.9% for others.

**Table A3 - 7 Loan use**

Item	Rate out of 51 households(%)
Livestock	80.4
Agricultural development	39.2
Forestry development	39.2
Handicraft	5.9
Other	3.9

Source: Household socio-economic survey

Note: As it is considered that some loans are used for more than one purpose, the percentages do not add up.

Only 3 households (4.3%) out of 69 surveyed have received outside subsidies for livestock raising, agriculture-forestry and handicraft development.

#### (11) Land use right

Land-use rights have been granted to over 90% of households through land and forest allocation. Only two households have bought land.

#### (12) Land- use purpose

**Table A3 - 8 Lands designated to different uses**

No.	Items	Area (ha) per household	Rate (%)
1	Total	2.40	100.0
2	One-crop rice	0.21	8.7
3	Double-crop rice	0.23	9.5
4	Dry-season crop	0.11	4.4
5	Gardening	0.22	9.0
6	Forest home-lots	0.22	9.3
7	Forestry lands	1.38	57.4
8	Others	0.04	1.7

Source: Household socio-economic survey

As indicated in above table, average acreage of lands per household is accounted at 2.4 ha with the largest proportion designated to forestry (1.38 ha or 57.4% of the total area per household), followed by one-crop and double-crop paddy fields (together totals at 0.44 ha or 18% of the total area used by a household), garden land and forest home-lot (each covers 0.22 ha, 9%). The remaining is used for dry-season crop (0.11 ha, 4.4%) and other purposes (0.04 ha, 1.7%).

## 2.3 Other economic-related information

### 2.3.1 Industry

**Table A3 - 9 Selected economic indicators (2004)**

*Unit: Mil. VND*

Items	Nation-wide	%	Thai Nguyen Prov.	%
GDP or RGDP	713,071,000		5,149,537	
GDP per capita	8.693		4.698	
GDP by sector				
Agriculture	118,258,000	17%	1,281,436	25%
Forestry	9,412,000	1%	41,352	1%
Fishery	27,474,000	4%	46,040	1%
Mining & Construction	285,864,000	40%	1,919,358	37%
Service	272,063,000	38%	1,861,351	36%

Source: Statistical Yearbook 2004, General Statistic Office

Thai Nguyen Statistical Yearbook, 2004, Thai Nguyen Statistical Office

As shown in Table above, the average GDP per capita of Vietnam is 8.7 million VND (approximately 543US\$), while GDP per capita of Thai Nguyen Province remains at 4.7 million VND (approximately 293 US\$). Among economic-related activities, the total of agriculture, forestry, and fishery sectors plays an important role generating 22.0% of the national GDP and 27.0% of GDP of Thai Nguyen Province

According to the Socio-Economic Development Plan of Thai Nguyen Province, 2006-2010, the annual growth rate of industrial-production value in the period 2001-2005 is 19.1%. Of this, central industry grows at 20.8%, while local industry is added at 16.8%. The production value of industries using foreign invested capital reduces at 5.9% per year. In this 5 year period (2001-2005), the industrial products with high annual increase and great market-preference are refined coal (8.2% per year), draught beer (9.9%), paper (13.1%), manufactured steel (14.7%), standard printing (20.1%), and cement (28.9%).

### 2.3.2 Poverty

According to survey on the living standard survey of Vietnam (General Statistic Office), general poverty rate and food poverty rate has significantly improved.

**Table A3 - 10 Poverty rate (%)**

Area	2002	2004
WHOLE COUNTRY		
General poverty rate	28.9	19.5
Food poverty rate	9.9	6.9
By region		
<i>Red River Delta</i>		
General poverty rate	22.4	12.1
Food poverty rate	6.5	4.6
<i>North East</i>		
<b>General poverty rate</b>	<b>38.4</b>	<b>29.4</b>
<b>Food poverty rate</b>	<b>14.1</b>	<b>9.4</b>
<i>North West</i>		
General poverty rate	68.0	58.6
Food poverty rate	28.1	21.8
<i>North Central Coast</i>		
General poverty rate	43.9	31.9
Food poverty rate	17.3	12.2
<i>South Central Coast</i>		
General poverty rate	25.2	19.0
Food poverty rate	10.7	7.6
<i>Central Highlands</i>		
General poverty rate	51.8	33.1
Food poverty rate	17.0	12.3
<i>South East</i>		
General poverty rate	10.6	5.4
Food poverty rate	3.2	1.8
<i>Mekong River Delta</i>		
General poverty rate	23.4	19.5
Food poverty rate	7.6	5.2

Source: General Statistics Office (<http://www.gso.gov.vn/>)

Note 1: General poverty rate is poor people rate which is calculated by monthly average expenditure per capita and general poverty line provided by the GSO and the WB with monthly average expenditure per capita for different years as follows: 2002: 160 thousand dong; 2004: 173 thousand dong. Food poverty rate is poor household rate which is measured by monthly average income per capita and food poverty line with monthly average income per capita for different years as follows: 2002: 146 thousand dong for urban, 112 thousand dong for rural; 2004: 163 thousand dong for urban, 124 thousand dong for rural.

Note 2: Thai Nguyen Province is located in the North-East region.

As seen from Table A3-10 above, the poverty rate in the North-East has reduced over the two years from 38.4% in 2002 to 29.4% in 2004 in terms of the general poverty rate, and from 14.1 % to 9.4 % in 2004 in terms of the food poverty rate. However, the poverty rate in the North-East region stays still higher than the rates of the whole country and some other regions (the fourth after North-West, Central Highlands and North Central Coast regions).

There is a wide gap between urban and rural poverty rates of whole Vietnam with 3.3% in urban and 8.13% in rural in 2004 if measured in terms of the food poverty standard.

According to the Socio-Economic Development Plan of Thai Nguyen Province, 2006-2010, the rate of poor households has sharply reduced from 14.9% (2001) down to 5% (2005). According to the Bureau of Labor Organization of Phu Binh district 2004, the poverty rate is 2.66 % in urban and it is 4.33 % in rural. Although it is not stated which criteria have been applied to calculate these rates, it is reasonable to assume that these figures are based on the food poverty standard. The level may show generally better conditions of Thai Nguyen province and Phu Binh District compared with the national and regional averages.

**Table A3 - 11 Poverty rate**

Year	2001	2002	2003	2004	2005
Rate of poor households (%)	14.91	12.83	9.85	6.06	5

Source: Socio-Economic Development Plan of Thai Nguyen Province, 2006-2010

On the other hand, the different poverty rate of Thai Nguyen province in 2005 shows large differences among districts and the higher poverty rate of Phu Binh District within the province. According to Table A3-12 below, Phu Binh District is ranked on the fourth poorest district in the province.

**Table A3 - 12 Poverty rate in Thai Nguyen province**

Ranking	District	Poverty rate in 2005 (%)
1	Thai Nguyen City	9.12
2	Song Cong Town	20.3
3	Dai Tu	20.5
4	Dong Hy	25.68
5	Pho Yen	27
<b>6</b>	<b>Phu Binh</b>	<b>31.38</b>
7	Phu Luong	31.51
8	Dinh Hoa	41.7
9	Vo Nhai	52.77

Source: Statistic Office in Thai Nguyen City, Song Cong Town, Dai Tu District, Dong Hy District, Pho Yen District, Phu Binh District, Phu Luong District, Dinh Hoa District and Vo Nhai District, 2005

Note: The criteria were issued by Ministry of Labor, Invalid Social Affair in 2005. For urban area in Thai Nguyen province, 260,000 VND will be applied for the monthly average income per capita while 200,000 VND for rural area.

### **2.3.3 Markets and enterprises**

Wood based industry and export of wood materials and wood products from Vietnam have shown very fast development in the last five-year period. The export of wood materials and wood products, which exceeded 1.0 billion US\$ (FOB) in the year 2004 and achieved over 1.5 billion US\$ (FOB) in the year 2005, contributes to the development of the national economy.

In 2004, the harvesting volume of wood materials is estimated at 2,500,000m<sup>3</sup> including 500,000m<sup>3</sup> from natural forests and 2,000,000m<sup>3</sup> from plantations. This volume of wood materials can hardly meet the demand from the wood-based industry. Moreover, as wood processing requires appropriate wood materials for in-door and out-door furniture, Viet Nam has to import a great amount of different kinds of wood materials and wood products. Particularly, in 2004, Viet Nam imported 2,550,000m<sup>3</sup>. Statistics on wood materials and wood products in the national economy is shown as following:

**Table A3 - 13 Wood materials and wood products in the national economy**

Products	Unit	Total	Domestic	Export	Import	TN Prov.
Paper	Ton	1,237,714	1,120,614	117,100	484,000	16,000
Pulp	Ton	789,400	661,400	0	128,000	0
Log	M <sup>3</sup>	2,000,000	1,681,010	0	318,990	0
Furniture		3,550,000	500,000	0	2,550,000	22,700
Chip wood		742,243	0	0	742,243	0
Particle board	M <sup>3</sup>	109,165	72,309	0	36,856	9,600
MDF	M <sup>3</sup>	88,177	53,897	0	34,280	0
Ply wood	M <sup>3</sup>	29,147	14,050	0	15,097	150

Source: Statistical year book, 2004

In 2004, the ownership of wood processing enterprises is recorded as in the table below:

**Table A3 - 14 Ownership of wood processing enterprises**

Order	Ownership	Nation-wide	TN Province
1	Total	1,200	28
2	State-owned	374	7
3	Private	786	19
4	Joint-venture	40	Not available
6	Co-operatives and stocks	Not available	2

Source: Vietnamese Timber Association

In 2004, the major wood processors operating in Thai Nguyen are described below.

**Table A3 - 15 Wood processing entities in Thai Nguyen provinces**

Name and location	Wood products	Production capacity	Wood materials	Wood consumption per year
Thai Nguyen Particle Board Factory	Particle board	16,500m <sup>3</sup>	Eucalyptus, Acacia, Mangletia Glauca	30,000-35,000m <sup>3</sup>
Thai Nguyen Wood Product Join-Stock Company	Ply wood Sawn wood Construction wood	2,000m <sup>3</sup> 1,000 m <sup>3</sup>	Styrax tonkinensis, Mangletia glauca A.mangium and natural wood	2,500-3,000m <sup>3</sup> 1,500 m <sup>3</sup>

The wood-material and wood-product industry in the province of Thai Nguyen is not active, compared with other neighboring provinces.

### **2.3.4 Loan**

In Phu Binh district, there are two formal financial institutions, where farmers could access to loan services for production development. They are Vietnam Bank for Agriculture and Rural Development (VBARD) and Vietnam Bank for Social Policies (VBSP).

Under the project scheme, it is expected that the local people with the land-use rights to the forest lands will participate in the project. Study was conducted on fund availability of banks as well as people's accessibility to the loans. The following information was collected during the interview surveys at district and provincial branch offices of VBARD and VBSP.

#### (1) VBARD branch offices in Phu Binh district and Thai Nguyen province

As reported from VBARD in Thai Nguyen province, bank's outstanding loans are shown as in Table A3-16 below.

Total outstanding loans of the provincial VBARD by December 2004 are 985,425 million VND. By December 2005, it is 1,211,409 million VND, increased 22.9% in comparison with that in 2004. Of which, short-term loan went up by 34.5%, medium-term loan increased 13.8% and long-term loan augmented by 10.9% in comparison with those in 2004. Hence, the proportion of the short-term loan was increased in 2005. The number of customers in 2005 reduced 6.9% in comparison with that in 2004. As a result, the average outstanding balance per customer increased from 10.5 million VND to 13.8 million VND.



**Table A3 - 16 Outstanding amount of loans of VBARD in Thai Nguyen Province**

Loan types	Unit	As of 12/2004 (a)	%	As of 12/2005 (b)	%	Comparison (a)/(b)*100 (%)
Total outstanding amount of loan (a)	Mil. VND	985,425	100	1,211,409	100	22.9
Out of which:						
Short term	Mil. VND	450,939	45.8	606,526	50.1	34.5
Medium term	Mil. VND	423,731	43.0	482,017	39.8	13.8
Long term	Mil. VND	110,755	11.2	122,866	10.1	10.9
No. of customers (b)	Mil. VND	94,080		87,560		-6.9
Comparison (a)/(b)	Mil. VND	10.5		13.8		

Source: Provincial branch office of VBARD in Thai Nguyen province

Note: Estimated data in 2005

The total outstanding loan at the VBARD in Phu Binh district was 68,500 million VND as of December 2004. At end of June 2005, it was 75,300 million VND, increased 9.9% in comparison with that in 2004. Of which, short-term loan increased 22.5% while medium and long-term loan went up to 4.1%. It was heard that the medium- and long-term loan was consisted of mainly medium-term loans<sup>8</sup>.

**Table A3 - 17 Outstanding loans amount of VBARD in Phu Binh District**

Loan types	Unit	As of 12/2004 (a)	%	As of 6/2005 (b)	%	Comparison (a-b)*100/a
Total outstanding balance	Mil. VND	68,500	100.0	75,300	100.0	9.9
Short term	Mil. VND	21,800	31.8	26,700	35.5	22.5
Medium and long term	Mil. VND	46,700	68.2	48,600	64.5	4.1

Source: District branch office of VBARD in Phu Binh district

Survey results in these provincial and district branch offices of VBARD indicated that their loans are characterized as mainly short-and medium-terms. Annually, the amount of loans has increased so as to meet loan demands of the local people.

Comparing loan amount in 2004 and 2005, it is shown that: total loan amount increased by 22.9%, mainly commercial sector (54.0% increase). Agriculture loan went up 14.0%; forestry augmented 8.0%; processing industry increased 5.2%; private and cooperative sector reduced 4.8% while other sectors increased 59.5%.

<sup>8</sup> Based on the interview results at Phu Binh Branch Office of VBARD on July 29, 2005

**Table A3 - 18 Sectoral distribution of loans in Thai Nguyen province**

Items	Outstanding loans as of end of year 2004 (a) (Mil. VND)	%	Outstanding loans as of end of year 2005 (estimated) (b) (Mil. VND)	%	Comparison (a)/(b)*100 (%)
Total outstanding loan	985,425	100.0	1.211.409	100.0	22.9
Of which					
Agriculture	381,954	38.8	435,571	36.0	14.0
Forestry	112,891	11.5	121,976	10.1	8.0
Commerce	197,170	20.0	303,659	25.1	54.0
Processing industry	8,869	0.9	9,326	0.8	5.2
Private & cooperatives	175,584	17.8	167,124	13.8	(4.8)
Other sources	108,957	11.1	173,753	14.3	59.5

Source: Provincial branch office of VBARD in Thai Nguyen province

The following show the interest rates with different repayment periods applied by VBARD in July 2005.

**Table A3 - 19 Interest rate with different repayment periods by VBARD (in July 2005)**

Loan term	Interest (%/month)
Short term (< 12 months)	1.05
Medium term (from 12- 60 months)	1.2
Long-term > 60 months (not application)	1.3

Source: Provincial branch office of VBARD in Thai Nguyen province

Interest rate is applicable to every target group.

Interest is paid on quarterly basis.

The grace period of the loan does not exceed one third of the total loan repayment period.

If loan amount is less than 10 million VND, collateral assets are not required but the bank could offer loans to certain customers (depending on capacity on project implementation, loan payment, etc.). If loan amount is in a range from 10 to 20 million VND, applicant household must possess a farmstead and if loan amount is 20 million VND or larger, collateral assets are required. Bank will not offer over 85% of the total plantation cost, the remaining fund (15% of the total cost) will be covered by the borrowers themselves. For households who wish to apply for loans for the forest plantation, they must have land and labor force.

(2) VBSP in Phu Binh district

Outstanding loans of VBSP in Phu Binh district are 38 billion VND in the middle of 2005<sup>9</sup>. This is approximately half of the outstanding amount at Phu Binh branch office of the VBARD in the same period. Currently, the VBSP in Phu Binh district manages two financial sources of the government.

**Table A3 - 20 Two programs managed by VBSP in Phu Binh District**

Financial sources	Beneficiaries	Lending term	Lending procedures	Interest rate
Fund “120” (Youth union)	Member of youth union	Interest & original loan is paid after 5 years	Direct to people	0.5%/month
Contribution	Farmers via social organization	Interest & original loan is paid after 5 years	Direct to people	0.5%/month

Source: District Branch Office of VBSP in Phu Binh District

As a case study, an interview was conducted with households who had been provided with loans from VBSP in Phu Binh district. The following shows the loan profile of the client. The interviewee was a member of a credit group in the project area and two loans were provided to him.

**Table A3 - 21 Case study of a client of VBSP**

Contents	1 <sup>st</sup> time	2 <sup>nd</sup> time
Purpose	Forest plantation	Forest plantation
Amount	8 million VND	5 million VND
Interest	0.5%/month	0.5%/month
Payment duration	5 years	5 years

Source: Interview results with the borrower of VBSP on August 2 and November 24, 2005

To this client, Fund “120” was provided via youth union and fund for the poor was made through social organizations. Prior to loan provision, a cross check was made by commune youth union, district branch office of the bank and district People’s Committee. There are specific features for the loans. They are: technical supports from the district youth union; entitlement of households to the benefits of the loans after joining credit group: easier access to the loan; reciprocal cooperation for production; reciprocal assistance when facing special economic conditions; and creation of close relation in the community.

(3) Observations based on the interview survey that is used for the project formulation

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<sup>9</sup> Based on interview results at VBSP on July 29, 2005.

Based on the interview survey, it was found that the two financial institutions in Phu Binh district extend financial supports to farmers. In particular, the branch office of VBARD increased its loan amount recently in the district. However, the lending terms and conditions currently offered by the financial institutions (mainly short-and medium-term loans) do not match a rotation cycle of A.hybrid and A.mangium (normally from 7 – 8 years). Hence, it is important to have an incentive scheme applicable to local people so that they could find it easier to participate in the project. Points that need to be considered in identifying possible financial sources for the project include: loan amount that is sufficient to cover production cost; preferential interest rate, a longer repayment period of loans; and a longer grace period.

### **2.3.5 Infrastructure**

**Table A3 - 22 Road network in Thai Nguyen Province**

Road type	Length (Km)	Status of road surface			
		Asphalted	Gravel	Gravel & earth	Earth
National road	184,6	160,8	23,8		
Province road	248,8	15,2	113,3	105,0	15,3
District roads	931,0	56,0	263,5	192,2	419,3
Communal roads	3180,6	288,3	31,5	276,7	2584,1

Source: Road Management Office, Thai Nguyen Transport Department, 2004

#### (1) Transport

There is a national road, 22 km long, going through Phu Binh District.

Inter-provincial road network includes Road 13A from Bo Dau to Deo Khe (Dai Tu District), Road KM31 going from to Deo So (Dinh Hoa District), Road number 16 from Dong Bam to Yen The. Other roads connect Dinh Ca District and Lang Son Province through Binh Long District and Thai Nguyen City and Bac Giang Province through Phu Binh District.

The district transport route is supported by the network of roads from Pho Yen - Phu Binh, Thai Nguyen City - Phuc Xuan (Dai Tu District), La Hien - Sang Moc, Ban Ngoai (Dai Tu) - Dinh Hoa, Hoa Thuong - Van Lang, etc.

Railway enables transport in three routes: Thai Nguyen - Da Phuc (Ha Noi), Thai Nguyen - Nui Hong, and Luu Xa - Kep.

The network of inter-commune roads has been improved both in length and quality. Within the last four years (1997-2000), Thai Nguyen Province has upgraded about 800 km of roads and 40 bridges. This has created favorable conditions for socio-economic and cultural development in the province.

#### (2) Power and water supply

### 1) Power supply

Nearly all communes have got access to the national grid. By 31 December 2003, power line was extended to all 179 communes of Thai Nguyen Province. In general, the power demand for both living and production is satisfied by the national power system.

### 2) Water supply

There are two water suppliers operating in Thai Nguyen Province. Thai Nguyen Water Supply Company is entitled to provide water to Thai Nguyen City and some major townships. The Rural Water Supply Center is assigned to investigate and develop water supply projects in rural areas. In addition, The Department of Fixed Cultivation and Sedentarization is also engaged in identification and implementation of water supply projects aimed at newly resettled people and people, who reside in remote areas.

### (3) Irrigation

The irrigation system of Thai Nguyen Province is well developed. It covers not only major paddy fields of the province, but also that of Soc Son District (Ha Noi) and Hiep Hoa District (Bac Giang Province). Reservoirs of Thai Nguyen Province totals at 270 with water-storing capacity of about 200 million m<sup>3</sup>. There are 94 dams and a large number of canal with total length of 1,252 km available in the province. Phu Binh District maintains 100 reservoirs, 32 pump stations and 227 km of irrigation canals.

## ANNEX 4. COST TABLES

**Table A4 - 1 Summary Cost of Project during the Assistance Period**

*Unit: Million VND*

Project Component	Total cost	Ratio	Bank	Government	Farmer
<b>1. Production forest development</b>	<b>12,873</b>	<b>60.7%</b>	<b>6,381</b>		<b>6,492</b>
<b>2. Support for Production Forest Development</b>	<b>2,248</b>	<b>10.6%</b>		<b>2,248</b>	
2.1 Credit Scheme Development	445	2.1%		445	
2.2 Support for Production Forest Association	899	4.2%		899	
2.3 Promotion of market linkages	316	1.5%		316	
2.4 Training and Technical Capacity Building	588	2.8%		588	
<b>3. Project Management, M &amp; E</b>	<b>650</b>	<b>3.1%</b>		<b>650</b>	
A) Total baseline cost	15,771	74.4%	6,381	2,898	6,492
B) Physical contingency	789	3.7%	319	145	325
C) Price contingency	4,631	21.9%	2,014	474	2,143
<b>Total cost (A + B + C)</b>	<b>21,191</b>	<b>100.0%</b>	<b>8,714</b>	<b>3,517</b>	<b>8,960</b>
Percentage			41.1%	16.6%	42.3%
Total project cost in US at 16,000 VND/1 US	1.32				Million USD

**Table A4 - 2 Summary cost of project by year during the assistance period**

*Unit: Million VND*

Project year	1	2	3	4	5	6	7	8
1. Production forest development	-	891	1,537	1,923	2,071	2,111	2,151	2,191
2. Support for production forest development	656	696	504	313	-	-	-	79
2.1 Credit scheme development	287	158	-	-	-	-	-	-
2.2 Support for production forest association	225	225	225	225	-	-	-	-
2.3 Promotion of market linkages	-	79	79	79	-	-	-	79
2.4 Training and technical capacity building	144	234	201	9	-	-	-	-
3. Project management M&E	90	80	80	80	80	80	80	80
A. Total baseline cost	746	1,667	2,121	2,315	2,151	2,191	2,231	2,350
B. Physical contingency	37	83	106	116	108	110	112	117
C. Price contingency	39	179	351	524	624	782	953	1,178
Total cost (A+B+C)	822	1,930	2,578	2,955	2,882	3,082	3,296	3,645

**Table A4 - 3 Summary cost of project by category during the assistance period***Unit: Million VND*

Project year	Material	Labor	Expert services	Salaries	Operating cost	Baseline cost	Contingencies	Total cost
1. Production forest development	2,599	8,945	1,330			12,873	4,801	17,674
2. Support for production forest development			2,248			2,248	416	2,664
2.1 Credit scheme development			445			445	54	499
2.2 Support for production forest association			899			899	169	1,067
2.3 Promotion of market linkages			316			316	95	411
2.4 Training and technical capacity building			588			588	97	686
3. Project management M&E				480	170	650	203	853
Total baseline cost	2,599	8,945	3,578	480	170	15,771	5,420	21,191

**Table A4 - 4 Project cash outflow (1,491.55 ha)***Unit: 1,000,000 VND*

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Implementation Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Inflation index	1.00	1.05	1.10	1.16	1.22	1.28	1.34	1.41	1.48	1.55	1.63	1.71	1.80	1.89	1.98	2.08
1. Production forest development			891	1,537	1,923	2,071	2,111	2,151	2,191	1,037	557	200	160	120	80	40
1.1 Material cost			229	357	372	410	410	410	410	66						
1.2 Labor cost			591	1,035	1,340	1,435	1,475	1,515	1,555	837	490	200	160	120	80	40
1.3 Other cost (design and inspection)			71	144	211	226	226	226	226	134	67					
2. Support for Production Forest Development		656	696	504	313				79							
2.1 Credit Scheme Development		287	158													
2.2 Support for Production Forest Association		225	225	225	225											
2.3 Promotion of market linkages			79	79	79				79							
2.4 Training and Technical Capacity Building		144	234	201	9											
3. Project Management, M & E		90	80	80	80	80	80	80	80							
A) Total baseline cost		746	1,667	2,121	2,315	2,151	2,191	2,231	2,350	1,037	557	200	160	120	80	40
B) Physical		37	83	106	116	108	110	112	117	52	28	10	8	6	4	2

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
contingency																
C) Price contingency	-	39	179	351	524	624	782	953	1,178	600	368	149	134	112	82	45
Total cost (A + B + C)	-	822	1,930	2,578	2,955	2,882	3,082	3,296	3,645	1,689	952	360	302	238	166	87

**Table A4 - 5 Parameter Table**

<b>Exchange rate</b>	<b>16,000 VND/\$</b>
Local expert	1,500 US/month
Local expert	24 Mil VND/month
Assistant	400 US/month
Assistant	6 Mil VND/month
Per Diem	30% of remuneration

**Table A4 - 6 Production Forest Framework Development**

CY	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total	
Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
Estimated number of man-months required for Production Forest Framework Development																		
<b>2.1 Financial mechanism development</b>													Unit: Man-months					
Local expert 1		6	4														10	
Assistant 1		12	4														16	
<b>2.2 Production Forest Association Development</b>																		
Local expert 2		4	4	4	4												16	
Assistant 2 and 3		12	12	12	12												48	
<b>2.3 Promotion of market linkages</b>																		
Local expert 3			2	2	2				2								8	
Assistant 4			2	2	2				2								8	
<b>2.4 Institutional development</b>																		
Local expert 4		4	4	4													12	
Assistant 5		2	12	8													22	
<b>Total of Sub-components (2.1-2.4)</b>																		
Local expert 1-4		14	14	10	6	0	0	0	2	0							46	
Assistant 1-5		26	30	22	14	0	0	0	2	0							94	



**Table A4 - 7 Estimated Cost of Production Forest Framework Development**

*Unit: Million VND*

CY	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
<b>2.1 Financial mechanism development</b>																	
Local expert 1		144	96	0	0												240
Assistant 1		77	26	0	0												102
<b>2.2 Production Forest Association Development</b>																	
Local expert 2		96	96	96	96												384
Assistant 2 and 3		77	77	77	77												307
<b>2.3 Promotion of market linkages</b>																	
Local expert 3		0	48	48	48	0	0	0	48	0	0	0	0	0	0	0	192
Assistant 4		0	13	13	13	0	0	0	13	0	0	0	0	0	0	0	51
<b>2.4 Institutional development</b>																	
Local expert 4		96	96	96	0												288
Assistant 5		13	77	51	0												141
<b>Sub-total of 4 sub-component (2.1-2.4)</b>																	
Local expert		336	336	240	144	0	0	0	48	0	0	0	0	0	0	0	1,104
Assistant		166	192	141	90	0	0	0	13	0	0	0	0	0	0	0	602
Sub-total remuneration		502	528	381	234	0	0	0	61	0	0	0	0	0	0	0	1,706
<b>2. Sub-total of per diem and transportation cost (30 % of remuneration)</b>																	
<b>2.1 Financial</b>		66	36	0	0	0	0	0	0	0	0	0	0	0	0	0	103
<b>2.2 PFA</b>		52	52	52	52	0	0	0	0	0	0	0	0	0	0	0	207
<b>2.3 Market</b>		0	18	18	18	0	0	0	18	0	0	0	0	0	0	0	73
<b>2.4 Institute</b>		33	52	44	0	0	0	0	0	0	0	0	0	0	0	0	129
<b>Sub-total</b>		151	158	114	70	0	0	0	18	0	0	0	0	0	0	0	512
<b>3. Remuneration + Per diem+Other Cost</b>																	
<b>2.1 Financial</b>		287	158	0	0	0	0	0	0	0	0	0	0	0	0	0	445
<b>2.2 PFA</b>		225	225	225	225	0	0	0	0	0	0	0	0	0	0	0	899
<b>2.3 Market</b>		0	79	79	79	0	0	0	79	0	0	0	0	0	0	0	316
<b>2.4 Institute</b>		141	225	191	0	0	0	0	0	0	0	0	0	0	0	0	557
<b>Total Cost</b>		653	686	495	304	0	0	0	79	0	0	0	0	0	0	0	2,217

## Operation cost of PMB and PIUs

**Table A4 - 8 Parameter Table**

<b>Exchange rate</b>	<b>16,000VND/\$</b>
Allowance PMB	250,000VND/month/person
No. of staff(PMB)	4persons
Allowance PIU	1,000,000VND/month/commune
Number of months	12months/year
Number of communes	4communes
Operating cost	30Mil VND/first year
Operating cost	20Mil VND/after first year

**Table A4 - 9 Operation cost of PMB and PIUs**

CY	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Estimated cost of Project Management Board, Monitoring and Evaluation																	
<b>Staff allowances</b>																	
PMB		12	12	12	12	12	12	12	12								96
PIU		48	48	48	48	48	48	48	48								384
Sub-total of staff allowance		60	60	60	60	60	60	60	60								480
<b>Operating costs</b>		30	20	20	20	20	20	20	20								170
<b>Total Project Management</b>		90	80	80	80	80	80	80	80								650

**Table A4 - 10 Training Cost**

CY	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Unit: Persons																	
Number of courses																	
Trainers		1															1
Village Leader		1	2	1													4
Farmer		5	20	20	20												65
Total number		7	22	21	20												70
<b>Target beneficiaries</b>																	
Trainers		10															10
Village Leader		33	66	33													132
Farmer		200	799	799	799												2,597
Total number		243	865	832	799	0	0	0	0	0							2,739

CY	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
<b>Trainers allowance</b>																	
Trainer 1		100	0	0	0	0	0	0	0	0							100
Trainer 2 (Leader)		50	100	50	0	0	0	0	0	0							200
Trainer 2 (Farmer)		250	1,000	1,000	1,000	0	0	0	0	0							3,250
Sub-total (Trainers)		400	1,100	1,050	1,000	0	0	0	0	0							3,550
<b>Allowance to participants</b>																	
Trainers		100	0	0	0	0	0	0	0	0							100
Village Leader		330	660	330	0	0	0	0	0	0							1,320
Farmer		1,998	7,991	7,991	7,991	0	0	0	0	0							25,970
Sub-total (Farmers)		2,428	8,651	8,321	7,991	0	0	0	0	0							27,390
<b>Total allowance</b>		2,828	9,751	9,371	8,991	0	0	0	0	0							30,940
Unit: Million VND																	
Total allowance		2.8	9.8	9.4	9.0	0.0	0.0	0.0	0.0	0.0							30.9

**Table A4 - 11 Cost of Framework development, PMB/PIUs operation costs, and training**

*Unit: Million VND*

CY	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Inflation index	1.00	1.05	1.10	1.16	1.22	1.28	1.34	1.41	1.48	1.55	1.63	1.71	1.80	1.89	1.98	2.08	
2. Framework Development	0	653	686	495	304	0	0	0	79	0	0	0	0	0	0	0	2,217
2.1 Financial	0	287	158	0	0	0	0	0	0	0	0	0	0	0	0	0	445
2.2 PFA	0	225	225	225	225	0	0	0	0	0	0	0	0	0	0	0	899
2.3 Market	0	0	79	79	79	0	0	0	79	0	0	0	0	0	0	0	316
2.4 Institute	0	141	225	191	0	0	0	0	0	0	0	0	0	0	0	0	557
3. Project Mgt, M & E	0	90	80	80	80	80	80	80	80	0	0	0	0	0	0	0	650
4. Training	0	3	10	9	9	0	0	0	0	0	0	0	0	0	0	0	31
Total	0	1,399	1,463	1,079	696	80	80	80	238	0	0	0	0	0	0	0	2,898
Note: all the prices in 2005 constant prices																	
TA Portion (2+4)	0	656	696	504	313	0	0	0	79	0	0	0	0	0	0	0	2,248
Physical contingency	0	33	35	25	16	0	0	0	4	0	0	0	0	0	0	0	112
Price contingency	0	34	75	83	71	0	0	0	40	0	0	0	0	0	0	0	303
Government Portion (3)	0	90	80	80	80	80	80	80	80	0	0	0	0	0	0	0	650
Physical contingency	0	5	4	4	4	4	4	4	4	0	0	0	0	0	0	0	33
Price contingency	0	5	9	13	18	23	29	34	40	0	0	0	0	0	0	0	171

## ANNEX 5. FINANCIAL AND ECONOMIC ANALYSIS

### A.hybrid:

Table A5 - 1 Parameter Table

	Item	Quantity	Unit	Unit price	Unit	Total	Unit
	<b>Year 1</b>					<b>5,426,738</b>	VND
I	<b>Direct costs</b>					<b>5,010,130</b>	VND
A	<b>Materials</b>					<b>1,565,380</b>	VND
	Seedlings (A.hybrid) (including beating – up)	1826	Stem/ha	530	VND/day	967,780	VND
	Fertilizers	332	Kg/ha	1,800	VND/day	597,600	VND
B	<b>Labors (NC)</b>					<b>3,444,750</b>	VND
	<b>Year 1</b>						
	Vegetation treatment	18.48	Man-day/ha	25,000	VND/day	462,000	VND
	Digging hole	29.12	Man-day/ha	25,000	VND/day	728,000	VND
	Filling hole	10.18	Man-day/ha	25,000	VND/day	254,500	VND
	Fertilizing	9.76	Man-day/ha	25,000	VND/day	244,000	VND
	Transport seedling + Planting	8.60	Man-day/ha	25,000	VND/day	215,000	VND
	Beating - up 10%	1.20	Man-day/ha	25,000	VND/day	30,000	VND
	Tending 1						
	Vegetation clearing	13.37	Man-day/ha	25,000	VND/day	334,250	VND
	Weeding, digging around stump	11.22	Man-day/ha	25,000	VND/day	280,500	VND
	Tending 2						VND
	Vegetation clearing + digging around stump	28.58	Man-day/ha	25,000	VND/day	714,500	VND
	Protection	7.28	Man-day/ha	25,000	VND/day	182,000	VND
	Total labor cost in year 1	<b>137.79</b>	Man-day/ha	25,000	VND/day	<b>3,444,750</b>	VND
II	<b>Total cost (40% labor)</b>						VND
III	<b>Baseline cost (I+II)</b>					<b>5,010,130</b>	VND
IV	<b>Others</b>					<b>416,608</b>	VND
	Management = 1.78% of total					-	VND
	Management Fee						

	Item	Quantity	Unit	Unit price	Unit	Total	Unit
	Design for afforestation	7.03	Man-day/ha	46,136	VND/day	324,336	VND
	Check upon delivery	2	Man-day/ha	46,136	VND/day	92,272	VND
V	<b>Total cost in year 1</b>					<b>5,426,738</b>	<b>VND</b>
<b>Year 2</b>						<b>2,221,759</b>	<b>VND</b>
I	<b>Direct cost</b>					<b>1,916,800</b>	<b>VND</b>
A	<b>Materials</b>					<b>298,800</b>	<b>VND</b>
	Fertilizers	166	Kg/ha	1,800	VND/day	298,800	VND
B	<b>Labors</b>	64.72				<b>1,618,000</b>	<b>VND</b>
	Vegetation clearing	13.37	Man-day/ha	25,000	VND/day	334,250	VND
	Weeding, digging around stump	11.22	Man-day/ha	25,000	VND/day	280,500	VND
	Fertilizing - NPK	11.29	Man-day/ha	25,000	VND/day	282,250	VND
	Weeding + digging around stump	21.56	Man-day/ha	25,000	VND/day	539,000	VND
	Protection	7.28	Man-day/ha	25,000	VND/day	182,000	VND
II	<b>Total cost (40% labor)</b>						
III	<b>Baseline cost (I+II)</b>					<b>1,916,800</b>	<b>VND</b>
IV	<b>Others</b>					<b>304,959</b>	<b>VND</b>
	Management fee 1.78% of total					-	VND
	Tending design	4.61	Man-day/ha	46,136	VND/day	212,687	VND
	Tending quality checking	2.00	Man-day/ha	46,136	VND/day	92,272	VND
V	<b>Estimated cost</b>					<b>2,221,759</b>	<b>VND</b>
<b>Year 3</b>						<b>1,621,209</b>	<b>VND</b>
I	<b>Direct costs</b>	52.65	Man-day/ha			<b>1,316,250</b>	<b>VND</b>
	Vegetation clearing time 1 + digging around stump	22.44	Man-day/ha	25,000	VND/day	561,000	VND
	Vegetation clearing time 2 + digging around stump	22.93	Man-day/ha	25,000	VND/day	573,250	VND
	Protection	7.28	Man-day/ha	25,000	VND/day	182,000	VND
II	<b>Total cost (40% labor)</b>						
III	<b>Baseline cost (I+II)</b>					<b>1,316,250</b>	<b>VND</b>
IV	<b>Others</b>					<b>304,959</b>	<b>VND</b>
	Management fee 1,78% of total					-	VND

	Item	Quantity	Unit	Unit price	Unit	Total	Unit
	Tending design	4.61	Man-day/ha	46,136	VND/day	212,687	VND
	Inventory, base mapping	2	Man-day/ha	46,136	VND/day	92,272	VND
V	<b>Estimated cost</b>					<b>1,621,209</b>	VND
	<b>Year 4 to year 7</b>					<b>182,000</b>	VND
	Protection (1 year)	7.28	Man-day/ha	25,000	VND/day	182,000	VND
	Management fee 1,78% of total					-	VND
	<b>Year 8</b>					<b>182,000</b>	VND
I	<b>Direct costs</b>	114.38				<b>182,000</b>	VND
-	Protection	7.28	Man-day/ha	25,000	VND/day	182,000	VND
-	Logging	104.50	m3/ha		VND/m3	-	VND
	Felling	0.30	Man-daym3		VND/m3	-	VND
	Sectioning, debarking	0.60	Man-daym3		VND/m3	-	VND
	Transport	1.70	Man-daym3		VND/m3	-	VND
II	<b>Other costs</b>					-	VND
	Management fee 1,78% of total					-	VND
	Logging design	0.34	Man-daym3		VND/m3	-	VND
	<b>Selling price</b>						
	Thinned volume		VND/m3		m3/ha	-	VND
	Coarse timber		VND/m3		m3/ha	-	VND
	Pulp wood (factory gate price in 2005)	350,000	VND/m3	104.5	m3/ha	36,575,000	VND
	Transportation cost						
	(Average area per household)	1.0	Ha/HH				
	Discount rate (real)	10%					
	Price contingency	5%					
	Physical contingency	5%					
	<b>Loan conditions</b>						
	Quantity	5,000,000	VND				
	Interest	6.0%	p.a.				
	Principal repayment		End of 8 <sup>th</sup> Yr				

Item	Quantity	Unit	Unit price	Unit	Total	Unit
Loan extension		- Year				
Max loan	85%	Total cost for 8 years				
Labors / household (HH)	2.8	Labors				
Labors for forestry work	30	Man/year/HH				

**Table A5 - 2 Parameter Table**

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Implementation Year	0	1	2	3	4	5	6	7	8	9
Inflation rate	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Inflation coefficient	1.00	1.05	1.10	1.16	1.22	1.28	1.34	1.41	1.48	1.55

**Table A5 - 3 List of costs per 1 ha**

*Unit: VND*

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Implementation Year	0	1	2	3	4	5	6	7	8	9
Inflation	1.00	1.05	1.10	1.16	1.22	1.28	1.34	1.41	1.48	1.55
Costs										
<b>1. Material cost (+ contingency)</b>										
Seedlings		0	967,780							
Fertilizers		0	597,600	298,800						
<b>2. Labor cost</b>										
Year 1 (planting)		0	3,444,750							
Year 2 (tending)		0		1,618,000						
Year 3 (tending)		0			1,316,250					

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Year 4 (protection)		0				182,000				
Year 5 (protection)		0					182,000			
Year 6 (protection)		0						182,000		
Year 7 (protection)		0							182,000	
Year 8 (protection + logging) Labor cost etc										182,000
<b>3. Other cost (Design cost etc.)</b>										
1st year Design etc.			416,608							
2nd year Design etc.				304,959						
3rd year Design etc.					304,959					
4th year Design etc.						-				
5th year Design etc.							-			
6th year Design etc.								-		
7th year Design etc.									-	
8th year Design etc.										-
<b>1. Material cost</b>			1,565,380	298,800	-	-	-	-	-	-
<b>2. Labor cost</b>			3,444,750	1,618,000	1,316,250	182,000	182,000	182,000	182,000	182,000
<b>3. Others</b>			416,608	304,959	304,959	-	-	-	-	-
Total labor cost/ha Baseline (1+2+3)			5,426,738	2,221,759	1,621,209	182,000	182,000	182,000	182,000	182,000
<i>Physical contingency (5%)</i>			271,337	111,088	81,060	9,100	9,100	9,100	9,100	9,100
<i>Price contingency</i>			584,053	367,715	366,850	52,797	64,992	77,797	91,242	105,359
Total investment cost/ha (Incl.contingency) (a)		-	6,282,128	2,700,562	2,069,119	243,897	256,092	268,897	282,342	296,459
<b>Total investment cost/ha (Incl. contingency)</b>			<b>12,399,496</b>	<b>VND</b>						
Loan disbursement plan										
Loan (b)			4,000,000	1,000,000	0					



Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Financing Ratio (b)/(a) x 100 (%)			64%	37%	0%					
Management fee			-	-	-	-	-	-	-	-

**Table A5 - 4 Harvest plan (1 ha)**

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Implementation Year	0	1	2	3	4	5	6	7	8	9
Inflation	1.00	1.05	1.10	1.16	1.22	1.28	1.34	1.41	1.48	1.55
Thinning (ha)										
Logging (ha)										1.0
Quantity of thinning										
Salvaged timber (m3)										
Quantity of logging										
Coarse timber (m3)										0
Material timber (m3)										104.50
Sales plan										
Thinning (ha)		0	0	0	0	0	0	0	0	0
Salvaged timber (VND)										
Logging (m3)		0	0	0	0	0	0	0	0	104.5
Coarse timber (VND)										
Material timber (VND)										56,739,829
Total value (VND)			-	-	-	-	-	-	-	56,739,829
<b>Total value (VND)</b>		<b>56,739,829</b>		<b>VND</b>						

**Table A5 - 5 Cash flow from total investment point of view**

*Unit: VND*

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Implementation Year	0	1	2	3	4	5	6	7	8	9
Inflation	<b>1.00</b>	<b>1.05</b>	1.10	1.16	1.22	1.28	1.34	1.41	1.48	1.55
Planting plan (ha)			1.0							
Thinning plan (ha)										
Harvest plan (ha)										1.0
Nominal Cash Inflow										56,739,829
Nominal Cash Outflow		<b>0</b>	6,282,128	2,700,562	2,069,119	243,897	256,092	268,897	282,342	296,459
Nominal Net Cash Flow		<b>0</b>	(6,282,128)	(2,700,562)	(2,069,119)	(243,897)	(256,092)	(268,897)	(282,342)	56,443,371
Cash inflow (real)		<b>0</b>	0	0	0	0	0	0	0	36,575,000
Cash out flow (real)		<b>0</b>	5,698,075	2,332,847	1,702,269	191,100	191,100	191,100	191,100	191,100
Net cash flow (real)		<b>0</b>	(5,698,075)	(2,332,847)	(1,702,269)	(191,100)	(191,100)	(191,100)	(191,100)	36,383,900
Discount factor		<b>0.91</b>	0.83	0.75	0.68	0.62	0.56	0.51	0.47	0.42
PVB (Present Value of Cash Inflow)		-	-	-	-	-	-	-	-	15,511,370
PVC (Present Value of Cash Outflow)		-	4,709,153	1,752,702	1,162,673	118,658	107,871	98,065	89,150	81,045
PVB-PVC		-	(4,709,153)	(1,752,702)	(1,162,673)	(118,658)	(107,871)	(98,065)	(89,150)	15,430,325
Sum of PVB (a)	<b>15,511,370</b>									
Sum of PVC (b)	<b>8,119,316</b>									
NPV (a)-(b)	<b>7,392,054</b>									
NPV (at Real discount rate of 10%)	<b>7,392,054</b>									
FIRR	<b>22%</b>									
BC Ratio (a)/(b)	<b>1.91</b>									

**Table A5 - 6 Loan cash flow**

**Sum of Loan Amount: 5,000,000VND**

*Unit: VND*

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>Implementation Year</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
<b>Outstanding balance (beginning of year)</b>		-	-	4,000,000	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000
<b>Loan disbursement</b>		-	4,000,000	1,000,000						
<b>Repayment</b>										
<b>Interest</b>		-	-	240,000	300,000	300,000	300,000	300,000	300,000	300,000
<b>Principal</b>										5,000,000
<b>Outstanding balance (end of year)</b>		-	4,000,000	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	-
<b>Cash flow of loan (nominal)</b>		-	4,000,000	760,000	(300,000)	(300,000)	(300,000)	(300,000)	(300,000)	(5,300,000)
<b>Cash flow of loan (real)</b>	<b>0</b>	-	3,628,118	656,517	(246,811)	(235,058)	(223,865)	(213,204)	(203,052)	(3,416,427)
<b>Discount factor</b>	<b>1.00</b>	<b>0.91</b>	0.83	0.75	0.68	0.62	0.56	0.51	0.47	0.42
<b>Present value</b>		-	2,998,445	493,251	(168,575)	(145,952)	(126,366)	(109,408)	(94,725)	(1,448,899)
<b>NPV</b>	<b>1,397,771</b>									

**Table A5 - 7 Cash flow analysis from a farmer's viewpoint (in Current Prices)**

*Unit: VND*

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>Implementation Year</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
<b>NCF Total investment (Current)</b>		0	(6,282,128)	(2,700,562)	(2,069,119)	(243,897)	(256,092)	(268,897)	(282,342)	56,443,371
<b>Cumulative NCF Total investment (Current)</b>		0	(6,282,128)	(8,982,690)	(11,051,809)	(11,295,706)	(11,551,798)	(11,820,695)	(12,103,037)	44,340,334
<b>NCF Loan (Current)</b>		0	4,000,000	760,000	(300,000)	(300,000)	(300,000)	(300,000)	(300,000)	(5,300,000)
<b>NCF Farmer (Current)</b>		-	(2,282,128)	(1,940,562)	(2,369,119)	(543,897)	(556,092)	(568,897)	(582,342)	51,143,371
<b>Cumulative NCF Farmer (Current)</b>			(2,282,128)	(4,222,690)	(6,591,809)	(7,135,706)	(7,691,798)	(8,260,695)	(8,843,037)	42,300,334

**Table A5 - 8 Cash flow analysis from a farmer's viewpoint (in Constant Prices)**

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
<b>Implementation Year</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	
<b>NCF Total investment (Constant)</b>		0	-	(5,698,075)	(2,332,847)	(1,702,269)	(191,100)	(191,100)	(191,100)	(191,100)	36,383,900
<b>NCF of loan (Constant)</b>		-	-	3,628,118	656,517	(246,811)	(235,058)	(223,865)	(213,204)	(203,052)	(3,416,427)
<b>NCF from a farmer's viewpoint (Constant)</b>		0	-	(2,069,957)	(1,676,330)	(1,949,080)	(426,158)	(414,965)	(404,304)	(394,152)	32,967,473
<b>NPV - with discount rate of 10%</b>	<b>8,789,825</b>										
<b>IRR</b>	<b>31%</b>										

**A.mangium:**

**Table A5 - 9 Parameter table**

	Items	Sè l-ìng	Unit	Unit price	Unit	Total value	Unit
<b>Year 1</b>						<b>5,079,798</b>	
<b>I</b>	<b>Direct costs</b>					<b>4,663,190</b>	
<b>A</b>	<b>Materials</b>					<b>1,218,440</b>	VND
	Seedlings – A.mangium	1826	Stem/ha	340	VND/day	620,840	VND
	Fertilizers	332	Kg/ha	1,800	VND/day	597,600	VND
<b>B</b>	<b>Labors</b>					<b>3,444,750</b>	
	<b>Year 1</b>						
	Vegetation treatment	18.48	Man-day/ha	25,000	VND/day	462,000	VND
	Digging hole	29.12	Man-day/ha	25,000	VND/day	728,000	VND
	Filling hole	10.18	Man-day/ha	25,000	VND/day	254,500	VND
	Fertilizing	9.76	Man-day/ha	25,000	VND/day	244,000	VND
	Transport seedling + Planting	8.60	Man-day/ha	25,000	VND/day	215,000	VND
	Beating up 10%	1.20	Man-day/ha	25,000	VND/day	30,000	VND
	Tending 1						
	Vegetation clearing	13.37	Man-day/ha	25,000	VND/day	334,250	VND
	Weeding, digging around stump	11.22	Man-day/ha	25,000	VND/day	280,500	VND
	Tending 2						VND
	Vegetation clearing + digging around stump	28.58	Man-day/ha	25,000	VND/day	714,500	VND
	Protection	7.28	Man-day/ha	25,000	VND/day	182,000	VND
	Total labor cost in year 1	<b>137.79</b>	Man-day/ha	25,000	VND/day	<b>3,444,750</b>	VND
<b>II</b>	<b>Total cost (40% labor)</b>						VND
<b>III</b>	<b>Baseline costs (1+2)</b>					<b>4,663,190</b>	VND
<b>IV</b>	<b>Others</b>					<b>416,608</b>	VND
	Management fee = 1.78% of total						- VND
	Management fee	0.00%					
	Afforestation design	7.03	Man-day/ha	46,136	VND/day	324,336	VND
	Check upon delivery	2	Man-day/ha	46,136	VND/day	92,272	VND

	Items	Sè l-îng	Unit	Unit price	Unit	Total value	Unit
V	<b>Total cost in year 1</b>					<b>5,079,798</b>	<b>VND</b>
<b>Year 2</b>						<b>2,221,759</b>	
I	<b>Direct costs</b>					<b>1,916,800</b>	VND
A	<b>Materials</b>					<b>298,800</b>	
	Fertilizers	166	Man-day/ha	1,800	VND/day	298,800	VND
B	<b>Labors</b>					<b>1,618,000</b>	VND
	Vegetation clearing	13.37	Man-day/ha	25,000	VND/day	334,250	VND
	Weeding, digging around	11.22	Man-day/ha	25,000	VND/day	280,500	VND
	Fertilizing - NPK	11.29	Man-day/ha	25,000	VND/day	282,250	VND
	Vegetation clearing + digging around	21.56	Man-day/ha	25,000	VND/day	539,000	VND
	Protection	7.28	Man-day/ha	25,000	VND/day	182,000	VND
II	<b>Total cost (40% labor)</b>		Man-day/ha				VND
III	<b>Baseline costs (1+2)</b>		Man-day/ha			<b>1,916,800</b>	VND
IV	<b>Others</b>		Man-day/ha			<b>304,959</b>	VND
	Management fee 1.78% of total		Man-day/ha			-	VND
	Tending design	4.61	Man-day/ha	46,136	VND/day	212,687	VND
	Check tending quality	2	Man-day/ha	46,136	VND/day	92,272	VND
V	<b>Estimated costs</b>					<b>2,221,759</b>	VND
<b>Year 3</b>						<b>1,621,209</b>	
I	<b>Direct costs</b>					<b>1,316,250</b>	VND
	Vegetation clearing + digging around (time 1)	22.44	Man-day/ha	25,000	VND/day	561,000	VND
	Vegetation clearing + digging around (time 2)	22.93	Man-day/ha	25,000	VND/day	573,250	VND
	Protection	7.28	Man-day/ha	25,000	VND/day	182,000	VND
II	<b>Total cost (40% labor)</b>						VND
III	<b>Baseline costs (1+2)</b>					<b>1,316,250</b>	VND
IV	<b>Others</b>					<b>304,959</b>	VND
	Management fee 1.78% of total					-	VND
	Tending design	4.61	Man-day/ha	46,136	VND/day	212,687	VND
	Inventory, check upon delivery	2	Man-day/ha	46,136	VND/day	92,272	VND

	Items	Sè l-ìng	Unit	Unit price	Unit	Total value	Unit
V	<b>Estimated costs</b>					<b>1,621,209</b>	VND
<b>Year 4 to Year 7</b>						<b>182,000</b>	VND
	Protection (1 year)	7.28	Man-day/ha	25,000	VND/day	182,000	VND
	Management fee 1.78% of total					-	VND
<b>Year 8</b>						<b>182,000</b>	VND
I	<b>Direct costs</b>					<b>182,000</b>	
-	Protection	7.28	Man-day/ha	25,000	VND/day	182,000	VND
-	Harvest	68.40	m3/ha		VND/m3	-	VND
	Felling	0.30	Man-day/m3		VND/m3	-	VND
	Sectioning, debarking	0.60	Man-day/m3		VND/m3	-	VND
	Transport	1.70	Man-day/m3		VND/m3	-	VND
II	<b>Other costs</b>					-	VND
	Management fee 1.78% of total					-	VND
	Harvest design	0.34	Man-day/m3		VND/m3	-	VND
	<b>Selling price</b>						
	Thinning timber		VND/m3		m3/ha	-	VND
	Coarse timber		VND/m3		m3/ha	-	VND
	Pulp wood – A.mangium	400,000	VND/m3	68.40	m3/ha	27,360,000	VND
	Average area per household (HH)	1	ha/HH				
	Discount rate (real)	10%					
	Expected inflation rate	5%					
	Physical contingency (% of the baseline cost)	5%					
	<b>Loan conditions</b>						
	Loan amount	5,000,000	VND				
	Interest rate	6.0%	p.a.				
	Principal repayment	End of 8 <sup>th</sup> Yr					
	Loan extension	-	Year				
	Max loan	85%	Total investment for 8 years				

**Table A5 - 10 Parameter Table**

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>Implementation Year</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
Inflation rate	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Inflation coefficient	1.00	1.05	1.10	1.16	1.22	1.28	1.34	1.41	1.48	1.55

**Table A5 - 11 List of costs per 1 ha**

*Unit: VND*

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>Implementation Year</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
<b>Inflation coeff.</b>	1.00	1.05	1.10	1.16	1.22	1.28	1.34	1.41	1.48	1.55
<b>Costs</b>										
<b>1. Material cost (+ contingency)</b>										
Seedlings		0	620,840							
Fertilizers		0	597,600	298,800						
<b>2. Labor cost</b>										
Year 1 (planting)		0	3,444,750							
Year 2 (tending)		0		1,618,000						
Year 3 (tending)		0			1,316,250					
Year 4 (protection)		0				182,000				
Year 5 (protection)		0					182,000			
Year 6 (protection)		0						182,000		
Year 7 (protection)		0							182,000	
Year 8 (protection + logging)										182,000



Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>3. Other cost (Design etc.)</b>										
Year 1 (planting)			416,608							
Year 2 (tending)				304,959						
Year 3 (tending)					304,959					
Year 4 (protection)						-				
Year 5 (protection)								-		
Year 6 (protection)								-		
Year 7 (protection)									-	
Year 8 (protection + logging)										-
<b>1. Materials cost</b>	-	-	1,218,440	298,800	-	-	--	-	-	-
<b>2. Labor cost</b>	-	-	3,444,750	1,618,000	1,316,250	182,000	182,000	182,000	182,000	182,000
<b>3. Other cost (Design etc.)</b>	-	-	416,608	304,959	304,959	-	--	-	-	-
<b>Total labor costs per ha - Baseline cost (1+2+3)</b>	-	-	5,079,798	2,221,759	1,621,209	182,000	182,000	182,000	182,000	182,000
<b>Physical contingency</b>		-	253,990	111,088	81,060	9,100	9,100	9,100	9,100	9,100
<b>Price contingency</b>		-	546,713	367,715	366,850	52,797	64,992	77,797	91,242	105,359
<b>Total investment cost per ha (incl. contingency) (a)</b>		0	5,880,501	2,700,562	2,069,119	243,897	256,092	268,897	282,342	296,459
<b>Total investment cost per ha</b>	11,997,869	VND								
<b>Loan disbursement plan</b>										
<b>Loan (b)</b>			4,000,000	1,000,000	0					
<b>Financing Ratio (b)/(a) x 100 (%)</b>			68%	37%	0%					

**Table A5 - 12 Harvest plan (per 1 ha)**

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>Implementation Year</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
	1.00	1.05	1.10	1.16	1.22	1.28	1.34	1.41	1.48	1.55
Thinning (ha)										
Logging (ha)										1
Thinning quantity										
Salvaged timber (m3)										
Harvest quantity										
Coarse timber (m3)										
Material timber (m3)										68.4
Sales plan										
Thinning (ha)										
Salvaged timber (VND)										
Coarse timber (VND)										-
Material timber (VND)										42,444,340
Total value (VND)										-
<b>Total value (VND)</b>	<b>42,444,340</b>	<b>VND</b>								

**Table A5 - 13 Cash flow by total investment point of view**

*Unit: VND*

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>Implementation Year</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
Inflation coeff.	1.00	1.05	1.10	1.16	1.22	1.28	1.34	1.41	1.48	1.55
Afforestation plan (ha)			1							
Thinning plan (ha)										
Logging plan (ha)										1
Cash Inflow		0	0	0	0	0	0	0	0	42,444,340
Cash Outflow		0	5,880,501	2,700,562	2,069,119	243,897	256,092	268,897	282,342	296,459
Net Cash inflow)		0	(5,880,501)	(2,700,562)	(2,069,119)	(243,897)	(256,092)	(268,897)	(282,342)	42,147,881
Cash inflow (real)		0	0	0	0	0	0	0	0	27,360,000
Cash flow (real)		0	5,333,788	2,332,847	1,702,269	191,100	191,100	191,100	191,100	191,100
Net cash flow (real)		0	(5,333,788)	(2,332,847)	(1,702,269)	(191,100)	(191,100)	(191,100)	(191,100)	27,168,900
Discount rate		0.91	0.83	0.75	0.68	0.62	0.56	0.51	0.47	0.42
PVB (Present Value of Cash Inflow)		-	-	-	-	-	-	-	-	11,603,311
PVC (Present Value of Cash Outflow)		-	4,408,089	1,752,702	1,162,673	118,658	107,871	98,065	89,150	81,045
Present cash inflow		-	(4,408,089)	(1,752,702)	(1,162,673)	(118,658)	(107,871)	(98,065)	(89,150)	11,522,266
Total present net cash outflow (a)	11,603,311	VND								
Total present net cash outflow (b)	7,818,253	VND								
NPV (a)-(b)	3,785,058	VND								
NPV (Real discount rate of 10%)	3,785,058	VND								
IRR	<b>17%</b>									
BC Ratio (a)/(b)	<b>1.48</b>									

**Table A5 - 14 Loan cash flow**

**Sum of Loan Amount: 5,000,000VND**

*Unit: VND*

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>Implementation Year</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
Outstanding balance (beginning of term)		-	-	4,000,000	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000
Loan disbursement		-	4,000,000	1,000,000						
Repayment										
Interest		-	-	240,000	300,000	300,000	300,000	300,000	300,000	300,000
Principal										5,000,000
Outstanding balance (end of term)			4,000,000	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	-
Cash flow of loan (nominal)		-	4,000,000	760,000	(300,000)	(300,000)	(300,000)	(300,000)	(300,000)	(5,300,000)
Cash flow of loan (constant)		-	3,628,118	656,517	(246,811)	(235,058)	(223,865)	(213,204)	(203,052)	(3,416,427)
Discount rate		0.91	0.83	0.75	0.68	0.62	0.56	0.51	0.47	0.42
Present value	0	-	2,998,445	493,251	(168,575)	(145,952)	(126,366)	(109,408)	(94,725)	(1,448,899)
NPV	1,397,771	VND								

**Table A5 - 15 Cash flow analysis from a farmer's viewpoint (in Current Prices)**

*Unit: VND*

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>Implementation Year</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
NCF Total investment (Current)		0	-5,880,501	-2,700,562	-2,069,119	-243,897	-256,092	-268,897	-282,342	42,147,881
Cumulative NCF Total investment (Current)		0	-5,333,788	-7,666,635	-9,368,904	-9,560,004	-9,751,104	-9,942,204	-10,133,304	17,035,596
NCF Loan (Current)		0	4,000,000	760,000	-300,000	-300,000	-300,000	-300,000	-300,000	-5,300,000
NCF Farmer (Current)		-	(1,880,501)	(1,940,562)	(2,369,119)	(543,897)	(556,092)	(568,897)	(582,342)	36,847,881
Cumulative NCF Farmer (Current)			(1,880,501)	(3,821,063)	(6,190,182)	(6,734,080)	(7,290,172)	(7,859,069)	(8,441,411)	28,406,471

**Table A5 - 16 Cash flow analysis from a farmer's viewpoint (in Constant Prices)**

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>Implementation Year</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
NCF Total investment (Constant)		0	- (5,333,788)	(2,332,847)	(1,702,269)	(191,100)	(191,100)	(191,100)	(191,100)	27,168,900
NCF of loan (Constant)		-	- 3,628,118	656,517	(246,811)	(235,058)	(223,865)	(213,204)	(203,052)	(3,416,427)
NCF from a farmer's viewpoint (Constant)		0	- (1,705,670)	(1,676,330)	(1,949,080)	(426,158)	(414,965)	(404,304)	(394,152)	23,752,473
NPV - with discount rate of 10%		5,182,829								
IRR		25%								

**Table A5 - 17 Project cash outflow for economic analysis (149,155 ha)**

*Unit: 1,000,000 VND*

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Implementation Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Inflation index	1.00	1.05	1.10	1.16	1.22	1.28	1.34	1.41	1.48	1.55	1.63	1.71	1.80	1.89	1.98	2.08
1. Plantation of Production Forest	-	-	891	1,537	1,923	2,071	2,111	2,151	2,191	1,037	557	200	160	120	80	40
1.1 Material cost	-	-	229	357	372	410	410	410	410	66	-	-	-	-	-	-
1.2 Labor cost	-	-	591	1,035	1,340	1,435	1,475	1,515	1,555	837	490	200	160	120	80	40
1.3 Other cost (design and inspection)	-	-	71	144	211	226	226	226	226	134	67	-	-	-	-	-
2. Support for Production Forest Development	-	656	696	504	313	-	-	-	79	-	-	-	-	-	-	-
2.1 Credit Scheme Development	-	287	158	-	-	-	-	-	-	-	-	-	-	-	-	-
2.2 Support for Production Forest Association	-	225	225	225	225	-	-	-	-	-	-	-	-	-	-	-
2.3 Promotion of market linkages	-	-	79	79	79	-	-	-	79	-	-	-	-	-	-	-
2.4 Training and Technical Capacity Building	-	144	234	201	9	-	-	-	-	-	-	-	-	-	-	-
3. Project Management, M & E	-	90	80	80	80	80	80	80	80	-	-	-	-	-	-	-
A) Total baseline cost	-	746	1,667	2,121	2,315	2,151	2,191	2,231	2,350	1,037	557	200	160	120	80	40
B) Physical contingency	-	37	83	106	116	108	110	112	117	52	28	10	8	6	4	2
C) Price contingency	-	39	179	351	524	624	782	953	1,178	600	368	149	134	112	82	45
Total cost (A + B + C)	-	822	1,930	2,578	2,955	2,882	3,082	3,296	3,645	1,689	952	360	302	238	166	87

**Table A5 - 18 Cash flow table for economic analysis**

*Unit: 1,000,000 VND*

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>Implementation Year</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>
Inflation index	1.00	1.05	1.10	1.16	1.22	1.28	1.34	1.41	1.48	1.55	1.63	1.71	1.80	1.89	1.98	2.08
Cash inflow (Nominal per 1ha)																
Acacia hybrid										56.7						
Acacia mangium										42.4						
Cash inflow (Nominal for project area)																
Acacia hybrid										3,226	6,553	6,881	14,450	15,173	15,932	16,728
Acacia mangium										4,868	4,902	5,147				
Cash out flow (Nominal)	-	822	1,930	2,578	2,955	2,882	3,082	3,296	3,645	1,689	952	360	302	238	166	87
Net cash flow (Nominal)	-	(822)	(1,930)	(2,578)	(2,955)	(2,882)	(3,082)	(3,296)	(3,645)	6,405	10,503	11,669	14,148	14,935	15,765	16,641
Cash inflow (Real)	0	0	0	0	0	0	0	0	0	5,218	7,033	7,033	8,047	8,047	8,047	8,047
Cash out flow (Real)	-	783	1,751	2,227	2,431	2,258	2,300	2,342	2,467	1,089	585	210	168	126	84	42
Net cash flow (Real)	-	(783)	(1,751)	(2,227)	(2,431)	(2,258)	(2,300)	(2,342)	(2,467)	4,129	6,448	6,823	7,878	7,920	7,962	8,004
Discount factor	1.00	0.91	0.83	0.75	0.68	0.62	0.56	0.51	0.47	0.42	0.39	0.35	0.32	0.29	0.26	0.24
PVB	-	-	-	-	-	-	-	-	-	2,213	2,711	2,465	2,564	2,331	2,119	1,926
PVC	-	712	1,447	1,673	1,660	1,402	1,298	1,202	1,151	462	225	74	54	37	22	10
NPV	4,900															
IRR	15.8%															
BC Ratio	1.43															

# ANNEX 6. FOREST INVENTORY LOG BOOK OF FOREST LAND

## Bàn Đạt commune

Tiểu Khu (Compartment)	Lô (Section)	Trang thái (Forest status)	Nhóm đất Soil class	Loại đất (Soil type)	Số đỏ (Red book)	Chủ quản lý (Land user)	Diện tích (Area)	Trữ lượng (Volume estimate)			Planting Tree special	Number of planting tree	Planting year	Harvesting year
								Average (M/ha)	Total (M/Sec)	Commercial				
							547.5							
	<b>Total</b>	<b>BĐCI</b>	<b>I-1</b>				<b>1.6</b>							
		<b>BĐCII</b>	<b>I-1</b>				<b>20.1</b>							
		<b>BĐCI</b>	<b>I-2</b>				<b>84.8</b>							
		<b>BĐCII</b>	<b>I-2</b>				<b>393</b>							
		<b>BĐV</b>	<b>I-2</b>				<b>10.8</b>							
		<b>BĐCII</b>	<b>II-2</b>				<b>37.2</b>							
242	133	BĐCI	I-1	ĐIFs	no	Hộ gia đình	1.6	16.5	26.4					
242	46b	BĐCII	I-1	ĐIIFs	no	Hộ gia đình	0.4	24.5	9.8	6.9				
242	115	BĐCI	I-1	ĐIFs	no	Hộ gia đình	2.1	24.5	51.5	36.0				
242	116a	BĐCII	I-1	ĐIIFs	no	Hộ gia đình	3	24.5	73.5	51.5				
		<b>BĐCII</b>	<b>I-1</b>				<b>5.5</b>							
242	58	BĐCI	I-2	ĐIIFs	no	Hộ gia đình	3	16.5	49.5					
242	85	BĐCI	I-2	ĐIIFs	no	Hộ gia đình	1.1	16.5	18.2		A.hybrid			
242	90	BĐCI	I-2	ĐIIFs	no	Hộ gia đình	2	16.5	33.0		A.mangium			
242	105	BĐCI	I-2	ĐIIFs	no	Hộ gia đình	1.1	16.5	18.2					
242	111b	BĐCI	I-2	ĐIIFs	no	Hộ gia đình	1.5	16.5	24.8					
242	111c	BĐCI	I-2	ĐIIFs	no	Hộ gia đình	0.5	16.5	8.3					
242	112b	BĐCI	I-2	ĐIIFs	no	Hộ gia đình	0.5	16.5	8.3					
242	134	BĐCI	I-2	ĐIIFs	no	Hộ gia đình	6.5	16.5	107.3					
242	139	BĐCI	I-2	ĐIIFs	no	Hộ gia đình	9.7	16.5	160.1					
242	142	BĐCI	I-2	ĐIIFs	no	Hộ gia đình	1.9	16.5	31.4					
		<b>BĐCI</b>	<b>I-2</b>				<b>27.8</b>							
242	9a	BĐCII	I-2	ĐIIFs	no	Hộ gia đình	3.6	24.5	88.2	61.7	A.hybrid			
242	11b	BĐCII	I-2	D2P	no	Hộ gia đình	2	24.5	49.0	34.3				
242	13a	BĐCII	I-2	D2P	no	Hộ gia đình	2.5	24.5	61.3	42.9	A.hybrid			
242	48b	BĐCII	I-2	ĐIIFs	no	Hộ gia đình	2.5	24.5	61.3	42.9				
242	49	BĐCII	I-2	ĐIIFs	no	Hộ gia đình	2.2	24.5	53.9	37.7				
242	60	BĐCII	I-2	ĐIIFs	no	Hộ gia đình	2.4	24.5	58.8	41.2				
242	64	BĐCII	I-2	ĐIIFs	no	Hộ gia đình	1.8	24.5	44.1	30.9				
242	67b	BĐCII	I-2	ĐIFs	no	Hộ gia đình	2.6	24.5	63.7	44.6				
242	67c	BĐCII	I-2	ĐIFs	no	Hộ gia đình	4.8	24.5	117.6	82.3				
242	72	BĐCII	I-2	ĐIIFs	no	Hộ gia đình	5.3	24.5	129.9	90.9				
242	88	BĐCII	I-2	ĐIIFs	no	Hộ gia đình	4.3	24.5	105.4	73.7				
242	96	BĐCII	I-2	ĐIIFs	no	Hộ gia đình	13	24.5	318.5	223.0				
242	103	BĐCII	I-2	ĐIIFs	no	Hộ gia đình	7	24.5	171.5	120.1				
242	117	BĐCII	I-2	ĐIIFs	no	Hộ gia đình	2.1	24.5	51.5	36.0				
242	118	BĐCII	I-2	ĐIIFs	no	Hộ gia đình	2.1	24.5	51.5	36.0				
242	120b	BĐCII	I-2	ĐIFs	no	Hộ gia đình	4.6	24.5	112.7	78.9				
242	121	BĐCII	I-2	ĐIIFs	no	Hộ gia đình	1.9	24.5	46.6	32.6				
		<b>BĐCII</b>	<b>I-2</b>				<b>64.7</b>							
242	71	BĐV	I-2	ĐIIFs	no	Hộ gia đình	6.3	99	623.7	436.6				
242	106	BĐV	I-2	ĐIIFs	no	Hộ gia đình	4.5	99	445.5	311.9				
		<b>BĐV</b>	<b>I-2</b>				<b>10.8</b>							
242	126b	BĐCII	II-2	ĐIIFs	no	Hộ gia đình	0.4	24.5	9.8	6.9				
242	137	BĐCII	II-2	ĐIIFs	no	Hộ gia đình	11.1	24.5	272.0	190.4				
		<b>BĐCII</b>	<b>II-2</b>				<b>11.5</b>							
242	6	BĐCII	I-1	ĐIFs	yes	Hộ gia đình	5.9	24.5	144.6	101.2	A.hybrid	10773	2011	2018
242	7	BĐCII	I-1	ĐIFs	yes	Hộ gia đình	1.3	24.5	31.9	22.3	A.hybrid	2374	2011	2018
242	17	BĐCII	I-1	ĐIFs	yes	Hộ gia đình	0.6	24.5	14.7	10.3	A.hybrid	1096	2011	2018
242	35	BĐCII	I-1	ĐIIFs	yes	Hộ gia đình	4.3	24.5	105.4	73.7	A.hybrid	7852	2009	2016
242	46a	BĐCII	I-1	ĐIFs	yes	Hộ gia đình	1.3	24.5	31.9	22.3	A.hybrid	2374	2008	2015



242	116b	BĐCII	I-1	ĐIFs	yes	Hộ gia đình	1.2	24.5	29.4	20.6	A.hybrid	2191	2008	2015
		<b>BĐCII</b>	<b>I-1</b>				<b>14.6</b>							
242	22	BĐCI	I-2	ĐIIFs	yes	Hộ gia đình	0.5	16.5	8.3		A.hybrid	913	2010	2017
242	74	BĐCI	I-2	ĐIIFs	yes	Hộ gia đình	33.7	16.5	556.1		A.hybrid	61536	2013	2020
242	110	BĐCI	I-2	ĐIIFs	yes	Hộ gia đình	2.3	16.5	38.0		A.hybrid	4200	2007	2014
242	111a	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	4.9	16.5	80.9		A.hybrid	8947	2007	2014
242	112a	BĐCI	I-2	ĐIIFs	yes	Hộ gia đình	4.1	16.5	67.7		A.hybrid	7487	2007	2014
242	119	BĐCI	I-2	ĐIIFs	yes	Hộ gia đình	6.5	16.5	107.3		A.hybrid	11869	2007	2014
242	140	BĐCI	I-2	ĐIIFs	yes	Hộ gia đình	2.3	16.5	38.0		A.hybrid	4200	2007	2014
242	141	BĐCI	I-2	ĐIIFs	yes	Hộ gia đình	2.7	16.5	44.6		A.hybrid	4930	2007	2014
		<b>BĐCI</b>	<b>I-2</b>				<b>57</b>							
242	9b	BĐCII	I-2	D2P	yes	Hộ gia đình	0.8	24.5	19.6	13.7	A.hybrid	1461	2011	2018
242	11a	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	11.8	24.5	289.1	202.4	A.hybrid	21547	2011	2018
242	13b	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	5.9	24.5	144.6	101.2	A.hybrid	10773	2011	2018
242	13c	BĐCII	I-2	ĐIFs	yes	Hộ gia đình	1.1	24.5	27.0	18.9	A.hybrid	2009	2011	2018
242	15	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	4	24.5	98.0	68.6	A.hybrid	7304	2011	2018
242	18a	BĐCII	I-2	ĐIFs	yes	Hộ gia đình	1.9	24.5	46.6	32.6	A.hybrid	3469	2010	2017
242	18b	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	46	24.5	1127.0	788.9	A.hybrid	83996	2010	2017
242	20	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	12.2	24.5	298.9	209.2	A.hybrid	22277	2011	2018
242	23	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	5.7	24.5	139.7	97.8	A.hybrid	10408	2010	2017
242	25	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	3.3	24.5	80.9	56.6	A.hybrid	6026	2010	2017
242	27	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	2.3	24.5	56.4	39.4	A.hybrid	4200	2010	2017
242	28	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	4.1	24.5	100.5	70.3	A.hybrid	7487	2009	2016
242	29	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	15.1	24.5	370.0	259.0	A.hybrid	27573	2009	2016
242	30	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	9.2	24.5	225.4	157.8	A.hybrid	16799	2010	2017
242	33	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	11.3	24.5	276.9	193.8	A.hybrid	20634	2009	2016
242	34	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	6	24.5	147.0	102.9	A.hybrid	10956	2009	2016
242	36	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	12.7	24.5	311.2	217.8	A.hybrid	23190	2008	2015
242	40	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	11.1	24.5	272.0	190.4	A.hybrid	20269	2009	2016
242	41	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	3	24.5	73.5	51.5	A.hybrid	5478	2009	2016
242	42	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	17.3	24.5	423.9	296.7	A.hybrid	31590	2009	2016
242	43	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	6.4	24.5	156.8	109.8	A.hybrid	11686	2008	2015
242	44	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	1.3	24.5	31.9	22.3	A.hybrid	2374	2008	2015
242	45	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	10.4	24.5	254.8	178.4	A.hybrid	18990	2008	2015
242	47	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	4.3	24.5	105.4	73.7	A.hybrid	7852	2008	2015
242	48a	BĐCII	I-2	ĐIFs	yes	Hộ gia đình	2.2	24.5	53.9	37.7	A.hybrid	4017	2009	2016
242	51	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	1.6	24.5	39.2	27.4	A.hybrid	2922	2008	2015
242	54	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	6.1	24.5	149.5	104.6	A.hybrid	11139	2008	2015
242	56	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	3.5	24.5	85.8	60.0	A.hybrid	6391	2008	2015
242	62	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	1	24.5	24.5	17.2	A.hybrid	1826	2008	2015
242	65	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	6.8	24.5	166.6	116.6	A.hybrid	12417	2008	2015
242	67a	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	19	24.5	465.5	325.9	A.hybrid	34694	2012	2019
242	70	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	6.3	24.5	154.4	108.0	A.hybrid	11504	2013	2020
242	82	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	5.3	24.5	129.9	90.9	A.hybrid	9678	2008	2015
242	92	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	12.1	24.5	296.5	207.5	A.hybrid	22095	2013	2020
242	100	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	3	24.5	73.5	51.5	A.hybrid	5478	2013	2020
242	101	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	2	24.5	49.0	34.3	A.hybrid	3652	2013	2020
242	102	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	3.7	24.5	90.7	63.5	A.hybrid	6756	2008	2015
242	120a	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	6.8	24.5	166.6	116.6	A.hybrid	12417	2008	2015
242	123	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	1.8	24.5	44.1	30.9	A.hybrid	3287	2007	2014
242	127a	BĐCII	I-2	ĐIFs	yes	Hộ gia đình	12.6	24.5	308.7	216.1	A.hybrid	23008	2012	2019
242	127b	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	22.2	24.5	543.9	380.7	A.hybrid	40537	2012	2019
242	131	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	5.1	24.5	125.0	87.5	A.hybrid	9313	2013	2020
		<b>BĐCII</b>	<b>I-2</b>				<b>328.3</b>							
242	113a	BĐCII	II-2	ĐIIFs	yes	Hộ gia đình	3.7	24.5	90.7	63.5	A.mangium	6756	2007	2014
242	113b	BĐCII	II-2	ĐIIFs	yes	Hộ gia đình	8.4	24.5	205.8	144.1	A.mangium	15338	2007	2014
242	126a	BĐCII	II-2	ĐIIFs	yes	Hộ gia đình	8.8	24.5	215.6	150.9	A.mangium	16069	2007	2014
242	138	BĐCII	II-2	ĐIIFs	yes	Hộ gia đình	4.8	24.5	117.6	82.3	A.mangium	8765	2007	2014
		<b>BĐCII</b>	<b>II-2</b>				<b>25.7</b>							

## Tân Hòa commune

Lô (Section)	Trạng thái (Forest status)	Nhóm đất (Soil class)	Loại đất (Soil type)	Số đo (Red book)	Chủ quản lý (Land user)	Diện tích (Area)	Trữ lượng (Volume estimate)			Planting Tree special	Number of planting tree	Planting year	Harvesting year
							Average (M/ha)	Total (M/Sec)	Commercial				
						536.3							
	BĐCI	I-1				9.9							
	BĐCII	I-1				105.45							
	BĐCI	I-2				42.21							
	BĐCII	I-2				150.12							
	BĐV	I-2				29.12							
	BĐCI	II-1				11.42							
	BĐCII	II-1				183.57							
	BĐV	II-1				3.19							
	IA	I-2				1.32							
117	BĐCI	I-1	ĐIFo	no	Hộ gia đình	1.76	16.5	29					
	BĐCII	I-1				1.76							
118	BĐCII	I-1	ĐIFo	no	Hộ gia đình	2.34	24.5	57	40.1				
126	BĐCII	I-1	ĐIFo	no	Hộ gia đình	2.4	24.5	59	41.2				
140	BĐCII	I-1	ĐIFo	no	Hộ gia đình	9.77	24.5	239	167.6				
	BĐCII	I-1				14.51							
88	BĐCI	I-1	ĐIFo	yes	Hộ gia đình	8.14	16.5	134		A.mangium	14863	2012	2019
	BĐCII	I-1				8.14							
13	BĐCII	I-1	ĐIFo	yes	Hộ gia đình	7.58	24.5	186	130.0	A.hybrid	13841	2007	2014
24	BĐCII	I-1	ĐIFo	yes	Hộ gia đình	1.43	24.5	35	24.5	A.hybrid	2611	2009	2016
25	BĐCII	I-1	ĐIFo	yes	Hộ gia đình	7.6	24.5	186	130.3	A.hybrid	13878	2009	2016
45a	BĐCII	I-1	ĐIFo	yes	Hộ gia đình	1.36	24.5	33	23.3	A.hybrid	2484	2010	2017
48	BĐCII	I-1	ĐIFo	yes	Hộ gia đình	2.24	24.5	55	38.4	A.hybrid	4090	2010	2017
50	BĐCII	I-1	ĐIFo	yes	Hộ gia đình	3.45	24.5	85	59.2	A.hybrid	6300	2007	2014
55a	BĐCII	I-1	D2P	yes	Hộ gia đình	0.29	24.5	7	5.0	A.hybrid	529	2009	2016
55b	BĐCII	I-1	ĐIIFo	yes	Hộ gia đình	1.73	24.5	42	29.7	A.hybrid	3159	2009	2016
55c	BĐCII	I-1	ĐIFo	yes	Hộ gia đình	1.3	24.5	32	22.3	A.hybrid	2374	2009	2016
62	BĐCII	I-1	ĐIFo	yes	Hộ gia đình	2.1	24.5	51	36.0	A.hybrid	3835	2009	2016
63	BĐCII	I-1	ĐIFo	yes	Hộ gia đình	3.54	24.5	87	60.7	A.hybrid	6464	2009	2016
95	BĐCII	I-1	ĐIFo	yes	Hộ gia đình	1.82	24.5	45	31.2	A.hybrid	3323	2009	2016
96	BĐCII	I-1	ĐIFo	yes	Hộ gia đình	4.4	24.5	108	75.5	A.hybrid	8034	2009	2016
105a	BĐCII	I-1	ĐIFo	yes	Hộ gia đình	2.1	24.5	51	36.0	A.hybrid	3835	2011	2018
110	BĐCII	I-1	ĐIFo	yes	Hộ gia đình	3.2	24.5	78	54.9	A.hybrid	5843	2012	2019
111	BĐCII	I-1	ĐIFo	yes	Hộ gia đình	11.56	24.5	283	198.3	A.hybrid	21109	2012	2019
112	BĐCII	I-1	ĐIFo	yes	Hộ gia đình	12.83	24.5	314	220.0	A.hybrid	23428	2012	2019
115	BĐCII	I-1	ĐIFo	yes	Hộ gia đình	2.89	24.5	71	49.6	A.hybrid	5277	2009	2016
133	BĐCII	I-1	ĐIFo	yes	Hộ gia đình	4.85	24.5	119	83.2	A.hybrid	8856	2009	2016
137	BĐCII	I-1	ĐIFo	yes	Hộ gia đình	14.67	24.5	359	251.6	A.hybrid	26787	2011	2018
	BĐCII	I-1				90.94							
15	BĐCI	I-2	ĐIIFo	yes	Hộ gia đình	1.48	16.5	24		A.hybrid	2703	2007	2014
16	BĐCI	I-2	ĐIIFo	yes	Hộ gia đình	1.46	16.5	24		A.hybrid	2666	2008	2015
19	BĐCI	I-2	ĐIIFo	yes	Hộ gia đình	1.56	16.5	26		A.hybrid	2849	2013	2020
34	BĐCI	I-2	ĐIIFo	yes	Hộ gia đình	3.34	16.5	55		A.hybrid	6098	2007	2014
47	BĐCI	I-2	ĐIIFo	yes	Hộ gia đình	6.21	16.5	102		A.hybrid	11340	2010	2017
52	BĐCI	I-2	ĐIIFo	yes	Hộ gia đình	2.14	16.5	35		A.hybrid	3907	2009	2016
54	BĐCI	I-2	ĐIIFo	yes	Hộ gia đình	1.41	16.5	23		A.hybrid	2575	2009	2016
57a	BĐCI	I-2	ĐIIFo	yes	Hộ gia đình	2.4	16.5	40		A.hybrid	4382	2009	2016
57b	BĐCI	I-2	ĐIFo	yes	Hộ gia đình	0.96	16.5	16		A.hybrid	1753	2009	2016
77	BĐCI	I-2	ĐIIFo	yes	Hộ gia đình	1.23	16.5	20		A.hybrid	2246	2009	2016
78	BĐCI	I-2	ĐIIFo	yes	Hộ gia đình	4.53	16.5	75		A.hybrid	8272	2007	2014
85	BĐCI	I-2	ĐIIFo	yes	Hộ gia đình	4.71	16.5	78		A.hybrid	8601	2007	2014
98	BĐCI	I-2	ĐIIFo	yes	Hộ gia đình	2.69	16.5	44		A.hybrid	4912	2009	2016
120	BĐCI	I-2	ĐIIFo	yes	Hộ gia đình	1.57	16.5	26		A.hybrid	2867	2009	2016

122	BĐCI	I-2	ĐIIFo	yes	Hộ gia đình	0.86	16.5	14		A.hybrid	1571	2009	2016
125	BĐCI	I-2	ĐIIFo	yes	Hộ gia đình	1.55	16.5	26		A.hybrid	2830	2009	2016
143	BĐCI	I-2	ĐIIFo	yes	Hộ gia đình	4.11	16.5	68		A.hybrid	7505	2011	2018
	<b>BĐCI</b>	<b>I-2</b>				<b>42.21</b>							
14a	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	21.05	24.5	516	361.0	A.hybrid	38437	2008	2015
14b	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	7.42	24.5	182	127.3	A.hybrid	13549	2007	2014
18	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	17.91	24.5	439	307.2	A.hybrid	32704	2008	2015
26	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	5.7	24.5	140	97.8	A.hybrid	10408	2007	2014
28	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	1.74	24.5	43	29.8	A.hybrid	3177	2007	2014
29	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	6.22	24.5	152	106.7	A.hybrid	11358	2007	2014
32	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	1.47	24.5	36	25.2	A.hybrid	2684	2008	2015
33	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	2.6	24.5	64	44.6	A.hybrid	4748	2008	2015
37	BĐCII	I-2	ĐIFo	yes	Hộ gia đình	4.36	24.5	107	74.8	A.hybrid	7962	2008	2015
46	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	4.28	24.5	105	73.4	A.hybrid	7815	2010	2017
53	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	2.16	24.5	53	37.0	A.hybrid	3945	2009	2016
58	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	2.97	24.5	73	50.9	A.hybrid	5423	2009	2016
67	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	2.25	24.5	55	38.6	A.hybrid	4109	2009	2016
68	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	4.83	24.5	118	82.8	A.hybrid	8820	2009	2016
70	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	4.88	24.5	120	83.7	A.hybrid	8911	2007	2014
74	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	4.82	24.5	118	82.7	A.hybrid	8801	2008	2015
97	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	1.52	24.5	37	26.1	A.hybrid	2775	2009	2016
99	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	1.82	24.5	45	31.2	A.hybrid	3323	2009	2016
100	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	2.31	24.5	57	39.6	A.hybrid	4218	2009	2016
103	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	3.72	24.5	91	63.8	A.hybrid	6793	2009	2016
106a	BĐCII	I-2	ĐIFo	yes	Hộ gia đình	1.99	24.5	49	34.1	A.hybrid	3633	2011	2018
106b	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	3.69	24.5	90	63.3	A.hybrid	6738	2011	2018
107	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	1.25	24.5	31	21.4	A.hybrid	2283	2011	2018
108	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	1.7	24.5	42	29.2	A.hybrid	3104	2012	2019
113	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	3.84	24.5	94	65.9	A.hybrid	7011	2012	2019
114	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	1.2	24.5	29	20.6	A.hybrid	2191	2009	2016
116	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	1.34	24.5	33	23.0	A.hybrid	2446	2009	2016
129	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	6.5	24.5	159	111.5	A.hybrid	11869	2011	2018
134a	BĐCII	I-2	ĐIFo	yes	Hộ gia đình	1.87	24.5	46	32.1	A.hybrid	3414	2009	2016
134b	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	5.01	24.5	123	85.9	A.hybrid	9149	2009	2016
136	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	1.18	24.5	29	20.2	A.hybrid	2155	2011	2018
138	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	7.63	24.5	187	130.9	A.hybrid	13933	2011	2018
142	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	8.89	24.5	218	152.5	A.hybrid	16233	2011	2018
	<b>BĐCII</b>	<b>I-2</b>				<b>150.12</b>							
9	BĐV	I-2	ĐIIFo	yes	Hộ gia đình	6.62	99	655	491.5	A.hybrid	12088	2007	2014
82	BĐV	I-2	ĐIIFo	yes	Hộ gia đình	3.35	99	332	248.7	A.hybrid	6117	2007	2014
127a	BĐV	I-2	ĐIIFo	yes	Hộ gia đình	7.73	99	765	574.0	A.hybrid	14115	2011	2018
127b	BĐV	I-2	D2P	yes	Hộ gia đình	1.2	99	119	89.1	A.hybrid	2191	2011	2018
139	BĐV	I-2	ĐIIFo	yes	Hộ gia đình	10.22	99	1012	758.8	A.hybrid	18662	2011	2018
	<b>BĐV</b>	<b>I-2</b>				<b>29.12</b>							
12	BĐCI	II-1	ĐIII Fo	yes	Hộ gia đình	6.17	16.5	102		A.mangium	11266	2010	2017
43	BĐCI	II-1	ĐIII Fo	yes	Hộ gia đình	2.6	16.5	43		A.mangium	4748	2010	2017
90	BĐCI	II-1	ĐIII Fo	yes	Hộ gia đình	2.65	16.5	44		A.mangium	4839	2007	2014
	<b>BĐCI</b>	<b>II-1</b>				<b>11.42</b>							
10b	BĐCII	II-1	ĐIII Fo	yes	Hộ gia đình	43.48	24.5	1065	745.7	A.mangium	79395	2010	2017
22	BĐCII	II-1	ĐIII Fo	yes	Hộ gia đình	4.37	24.5	107	74.9	A.mangium	7979	2010	2017
23	BĐCII	II-1	ĐIII Fo	yes	Hộ gia đình	2.57	24.5	63	44.1	A.mangium	4693	2009	2016
42a	BĐCII	II-1	ĐIII Fo	yes	Hộ gia đình	10.54	24.5	258	180.8	A.mangium	19246	2013	2020
42b	BĐCII	II-1	ĐIII Fo	yes	Hộ gia đình	43.08	24.5	1055	738.8	A.mangium	78664	2013	2020
45b	BĐCII	II-1	ĐIII Fo	yes	Hộ gia đình	1.95	24.5	48	33.4	A.mangium	3561	2009	2016
75	BĐCII	II-1	ĐIII Fo	yes	Hộ gia đình	7.26	24.5	178	124.5	A.mangium	13257	2012	2019
86	BĐCII	II-1	ĐIII Fo	yes	Hộ gia đình	7.69	24.5	188	131.9	A.mangium	14042	2007	2014
87	BĐCII	II-1	ĐIII Fo	yes	Hộ gia đình	8.19	24.5	201	140.5	A.mangium	14955	2012	2019
89	BĐCII	II-1	ĐIII Fo	yes	Hộ gia đình	4.66	24.5	114	79.9	A.mangium	8510	2013	2020
91a	BĐCII	II-1	ĐIII Fo	yes	Hộ gia đình	14.24	24.5	349	244.2	A.mangium	26002	2012	2019
91b	BĐCII	II-1	D2P	yes	Hộ gia đình	3.61	24.5	88	61.9	A.mangium	6592	2012	2019
93	BĐCII	II-1	ĐIII Fo	yes	Hộ gia đình	22.69	24.5	556	389.1	A.mangium	41432	2013	2020
109	BĐCII	II-1	ĐIII Fo	yes	Hộ gia đình	9.24	24.5	226	158.5	A.mangium	16872	2012	2019
	<b>BĐCII</b>	<b>II-1</b>				<b>183.57</b>							
10a	BĐV	II-1	ĐIII Fo	yes	Hộ gia đình	3.19	99	316	236.9	A.mangium	5825	2010	2017
	<b>BĐV</b>	<b>II-1</b>				<b>3.19</b>							
79	IA	I-2	ĐIIFo	yes	Hộ gia đình	1.32		0		A.hybrid	2410	2007	2014
	<b>IA</b>	<b>I-2</b>				<b>1.32</b>							

## Tân Khánh commune

Tiểu Khu (Compartment)	Lô (Section)	Trạng thái (Forest status)	Nhóm đất Soil class	Loại đất (Soil type)	Số đo (Red book)	Chủ quản lý (Land user)	Diện tích (Area)	Trữ lượng (Volume estimate)			Planting Tree special	Number of planting tree	Planting year	Harvesting year
								Average (M/ha)	Total (M/Sec)	Commercial				
							401.9							
		BĐCI	I-1				24.6							
		BĐCI	I-2				33.8							
		BĐCII	I-1				102.3							
		BĐCII	I-2				136.6							
		IA	I-1				1.1							
		IA	I-2				11.7							
		BĐV	I-2				10.9							
		BĐCII	II-2				73.8							
		IA	II-2				1.5							
		BĐV	II-2				5.6							
246	38a	BĐCI	I-1	ĐIIFs	no	Hộ gia đình	2.0	16.5	33.0					
246	38b	BĐCI	I-1	TIIFdL	no	Hộ gia đình	3.7	16.5	61.1					
246	85	BĐCI	I-1	ĐIFs	no	Hộ gia đình	12.6	16.5	207.9					
246	97	BĐCI	I-1	ĐIFs	no	Hộ gia đình	2.7	16.5	44.6					
		BĐCI	I-1				21.0							
246	69	BĐCII	I-1	ĐIFs	no	Hộ gia đình	7.7	24.5	188.7	132.1				
246	95	BĐCII	I-1	ĐIFs	no	Hộ gia đình	2.9	24.5	71.1	49.7				
246	103b	BĐCII	I-1	ĐIFs	no	Hộ gia đình	5.6	24.5	137.2	96.0				
		BĐCII	I-1				16.2							
246	32a	BĐCI	I-2	TIIFdL	no	Hộ gia đình	0.5	16.5	8.3					
246	32b	BĐCI	I-2	ĐIIFs	no	Hộ gia đình	1.2	16.5	19.8					
246	48b	BĐCI	I-2	ĐIFs	no	Hộ gia đình	0.9	16.5	14.9					
246	62	BĐCI	I-2	ĐIIFs	no	Hộ gia đình	1.1	16.5	18.2					
		BĐCI	I-2				3.7							
246	52	BĐCII	I-2	ĐIIFs	no	Hộ gia đình	14.9	24.5	365.1	255.5				
246	55	BĐCII	I-2	ĐIIFs	no	Hộ gia đình	9.4	24.5	230.3	161.2				
246	61	BĐCII	I-2	ĐIIFs	no	Hộ gia đình	6.8	24.5	166.6	116.6				
246	64	BĐCII	I-2	ĐIIFs	no	Hộ gia đình	8.2	24.5	200.9	140.6				
		BĐCII	I-2				39.3							
246	20a	BĐCII	II-2	ĐIIFs	no	Hộ gia đình	3.9	24.5	95.6	66.9				
		BĐCII	II-2				3.9							
246	63	IA	I-2	ĐIIFs	no	Hộ gia đình	1.8		0.0					
246	67	IA	I-2	ĐIIFs	no	Hộ gia đình	8.0		0.0					
246	159	IA	I-2	ĐIIFs	no	Hộ gia đình	1.4		0.0					
		IA	I-2				11.2							
246	29	BĐCI	I-1	TIIFdL	yes	Hộ gia đình	3.6	16.5	59.4	A.hybrid	6574	2012	2019	
		BĐCI	I-1				3.6							
246	3a	BĐCII	I-1	ĐIIFs	yes	Hộ gia đình	4.7	24.5	115.2	80.6	A.hybrid	8582	2012	2019
246	3b	BĐCII	I-1	TIIFdL	yes	Hộ gia đình	17.7	24.5	433.7	303.6	A.hybrid	32320	2012	2019
246	44b	BĐCII	I-1	ĐIFs	yes	Hộ gia đình	6.7	24.5	164.2	114.9	A.hybrid	12234	2011	2018
246	45a	BĐCII	I-1	ĐIFs	yes	Hộ gia đình	21.4	24.5	524.3	367.0	A.hybrid	39076	2011	2018
246	60	BĐCII	I-1	ĐIFs	yes	Hộ gia đình	5.8	24.5	142.1	99.5	A.hybrid	10591	2011	2018
246	70	BĐCII	I-1	ĐIFs	yes	Hộ gia đình	7.6	24.5	186.2	130.3	A.hybrid	13878	2011	2018
246	87b	BĐCII	I-1	ĐIFs	yes	Hộ gia đình	3.7	24.5	90.7	63.5	A.hybrid	6756	2009	2016
246	88	BĐCII	I-1	ĐIFs	yes	Hộ gia đình	1.3	24.5	31.9	22.3	A.hybrid	2374	2009	2016
246	91a	BĐCII	I-1	ĐIFs	yes	Hộ gia đình	0.8	24.5	19.6	13.7	A.hybrid	1461	2009	2016
246	106c	BĐCII	I-1	ĐIFs	yes	Hộ gia đình	3.6	24.5	88.2	61.7	A.hybrid	6574	2008	2015
246	107b	BĐCII	I-1	ĐIFs	yes	Hộ gia đình	2.3	24.5	56.4	39.4	A.hybrid	4200	2008	2015
246	113	BĐCII	I-1	ĐIFs	yes	Hộ gia đình	2.8	24.5	68.6	48.0	A.hybrid	5113	2008	2015
246	126	BĐCII	I-1	ĐIFs	yes	Hộ gia đình	4.3	24.5	105.4	73.7	A.hybrid	7852	2007	2014
246	147	BĐCII	I-1	ĐIFs	yes	Hộ gia đình	3.4	24.5	83.3	58.3	A.hybrid	6208	2007	2014
		BĐCII	I-1				86.1							
246	36	BĐCI	I-2	ĐIIFs	yes	Hộ gia đình	1.3	16.5	21.5	A.hybrid	2374	2013	2020	

246	41	BDCI	I-2	ĐIIFs	yes	Hộ gia đình	2.2	16.5	36.3		A.hybrid	4017	2013	2020
246	48a	BDCI	I-2	ĐIIFs	yes	Hộ gia đình	1.2	16.5	19.8		A.hybrid	2191	2013	2020
246	54	BDCI	I-2	ĐIIFs	yes	Hộ gia đình	2.7	16.5	44.6		A.hybrid	4930	2010	2017
246	71	BDCI	I-2	ĐIIFs	yes	Hộ gia đình	9.2	16.5	151.8		A.hybrid	16799	2011	2018
246	90	BDCI	I-2	ĐIIFs	yes	Hộ gia đình	9.6	16.5	158.4		A.hybrid	17530	2009	2016
246	101a	BDCI	I-2	ĐIIFs	yes	Hộ gia đình	3.0	16.5	49.5		A.hybrid	5478	2009	2016
246	106a	BDCI	I-2	ĐIIFs	yes	Hộ gia đình	0.9	16.5	14.9		A.hybrid	1643	2009	2016
		<b>BDCI</b>	<b>I-2</b>				<b>30.1</b>							
246	21b	BDCII	I-2	ĐIIFs	yes	Hộ gia đình	16.0	24.5	392.0	274.4	A.hybrid	29216	2010	2017
246	43b	BDCII	I-2	ĐIIFs	yes	Hộ gia đình	2.8	24.5	68.6	48.0	A.hybrid	5113	2013	2020
246	45b	BDCII	I-2	ĐIIFs	yes	Hộ gia đình	6.7	24.5	164.2	114.9	A.hybrid	12234	2013	2020
246	46	BDCII	I-2	ĐIIFs	yes	Hộ gia đình	6.2	24.5	151.9	106.3	A.hybrid	11321	2013	2020
246	56	BDCII	I-2	ĐIIFs	yes	Hộ gia đình	4.2	24.5	102.9	72.0	A.hybrid	7669	2010	2017
246	65	BDCII	I-2	ĐIIFs	yes	Hộ gia đình	9.1	24.5	223.0	156.1	A.hybrid	16617	2010	2017
246	72a	BDCII	I-2	ĐIIFs	yes	Hộ gia đình	0.5	24.5	12.3	8.6	A.hybrid	9013	2011	2018
246	78	BDCII	I-2	ĐIIFs	yes	Hộ gia đình	10.3	24.5	252.4	176.6	A.hybrid	18808	2008	2015
246	91b	BDCII	I-2	ĐIIFs	yes	Hộ gia đình	2.3	24.5	56.4	39.4	A.hybrid	4200	2009	2016
246	99	BDCII	I-2	ĐIIFs	yes	Hộ gia đình	9.5	24.5	232.8	162.9	A.hybrid	17347	2008	2015
246	106b	BDCII	I-2	ĐIIFs	yes	Hộ gia đình	0.9	24.5	22.1	15.4	A.hybrid	1643	2008	2015
246	108a1	BDCII	I-2	ĐIIFs	yes	Hộ gia đình	7.6	24.5	186.2	130.3	A.hybrid	13878	2008	2015
246	109a	BDCII	I-2	ĐIIFs	yes	Hộ gia đình	4.7	24.5	115.2	80.6	A.hybrid	8582	2008	2015
246	110b	BDCII	I-2	ĐIIFs	yes	Hộ gia đình	7.2	24.5	176.4	123.5	A.hybrid	13147	2009	2016
246	133a	BDCII	I-2	ĐIIFs	yes	Hộ gia đình	3.2	24.5	78.4	54.9	A.hybrid	5843	2009	2016
246	156	BDCII	I-2	ĐIIFs	yes	Hộ gia đình	6.1	24.5	149.5	104.6	A.hybrid	11139	2009	2016
		<b>BDCII</b>	<b>I-2</b>				<b>97.3</b>							
246	34	BĐV	I-2	ĐIIFs	yes	Hộ gia đình	7.0	99.0	693.0	519.8	A.hybrid	12782	2013	2020
246	100a	BĐV	I-2	ĐIIFs	yes	Hộ gia đình	3.9	99.0	386.1	289.6	A.hybrid	7121	2008	2015
		<b>BĐV</b>	<b>I-2</b>				<b>10.9</b>							
246	8	BDCII	II-2	ĐIIFs	yes	Hộ gia đình	6.7	24.5	164.2	114.9	A.mangium	12234	2012	2019
246	9	BDCII	II-2	ĐIIFs	yes	Hộ gia đình	3.6	24.5	88.2	61.7	A.mangium	6574	2013	2020
246	10	BDCII	II-2	ĐIIFs	yes	Hộ gia đình	10.2	24.5	249.9	174.9	A.mangium	18625	2013	2020
246	12	BDCII	II-2	ĐIIFs	yes	Hộ gia đình	9.4	24.5	230.3	161.2	A.mangium	17164	2012	2019
246	19	BDCII	II-2	ĐIIFs	yes	Hộ gia đình	2.5	24.5	61.3	42.9	A.mangium	4565	2013	2020
246	117	BDCII	II-2	ĐIIFq	yes	Hộ gia đình	2.5	24.5	61.3	42.9	A.mangium	4565	2008	2015
246	118	BDCII	II-2	ĐIIFq	yes	Hộ gia đình	2.2	24.5	53.9	37.7	A.mangium	4017	2008	2015
246	128	BDCII	II-2	ĐIIFq	yes	Hộ gia đình	2.7	24.5	66.2	46.3	A.mangium	4930	2008	2015
246	129	BDCII	II-2	ĐIIFq	yes	Hộ gia đình	3.6	24.5	88.2	61.7	A.mangium	6574	2008	2015
246	138	BDCII	II-2	ĐIIFq	yes	Hộ gia đình	1.9	24.5	46.6	32.6	A.mangium	3469	2007	2014
246	141	BDCII	II-2	ĐIIFq	yes	Hộ gia đình	2.0	24.5	49.0	34.3	A.mangium	3652	2007	2014
246	143	BDCII	II-2	ĐIIFq	yes	Hộ gia đình	2.2	24.5	53.9	37.7	A.mangium	4017	2007	2014
246	145	BDCII	II-2	ĐIIFq	yes	Hộ gia đình	1.6	24.5	39.2	27.4	A.mangium	2922	2007	2014
246	146	BDCII	II-2	ĐIIFq	yes	Hộ gia đình	3.3	24.5	80.9	56.6	A.mangium	6026	2007	2014
246	150	BDCII	II-2	ĐIIFq	yes	Hộ gia đình	3.7	24.5	90.7	63.5	A.mangium	6756	2007	2014
246	152	BDCII	II-2	ĐIIFq	yes	Hộ gia đình	5.5	24.5	134.8	94.3	A.mangium	10043	2007	2014
246	155	BDCII	II-2	ĐIIFq	yes	Hộ gia đình	10.2	24.5	249.9	174.9	A.mangium	18625	2007	2014
		<b>BDCII</b>	<b>II-2</b>				<b>73.8</b>							
246	154	BĐV	II-2	ĐIIFq	yes	Hộ gia đình	5.6	32.3	180.9	135.7	A.mangium	10226	2007	2014
		<b>BĐV</b>	<b>II-2</b>				<b>5.6</b>							
246	127	IA	I-1	ĐIFs	yes	Hộ gia đình	1.1		0.0		A.hybrid	2009	2007	2014
		<b>IA</b>	<b>I-1</b>				<b>1.1</b>							
246	79	IA	I-2	ĐIIFs	yes	Hộ gia đình	0.5		0.0		A.hybrid	113	2008	2015
		<b>IA</b>	<b>I-2</b>				<b>0.5</b>							
246	2	IA	II-2	ĐIIFs	yes	Hộ gia đình	1.5		0.0		A.mangium	2739	2012	2019
		<b>IA</b>	<b>II-2</b>				<b>1.5</b>							

Tân Kim commune

Tiểu Khu (Compartment)	Lô (Section)	Trang thái (Forest status)	Nhóm đất Soil class	Loại đất (Soil type)	Số đo (Red book)	Chủ quản lý (Land user)	Diện tích (Area)	Trữ lượng (Volume estimate)			Planting Tree special	Number of planting tree	Planting year	Harvesting year
								Average (M/ha)	Total (M/Sec)	Commercial				
							206.68							
		BĐCI	I-1				34.28							
		BĐCII	I-1				28.98							
		BĐCI	I-2				63.39							
		BĐCII	I-2				32.03							
		BĐV	I-1				5.17							
		BĐV	I-2				12.92							
		BĐCI	II-2				29.91							
246	51a	BĐCI	I-1	ĐIFs	no	Hộ gia đình	2.33	16.5	38.4					
246	63a	BĐCI	I-1	ĐIFs	no	Hộ gia đình	0.84	16.5	13.9					
246	69a	BĐCI	I-1	ĐIFs	no	Hộ gia đình	5.14	16.5	84.8					
246	87a	BĐCI	I-1	ĐIFs	no	Hộ gia đình	2.25	16.5	37.1					
246	92a	BĐCI	I-1	ĐIFs	no	Hộ gia đình	1.18	16.5	19.5					
246	96	BĐCI	I-1	ĐIFs	no	Hộ gia đình	1.64	16.5	27.1					
246	115	BĐCI	I-1	ĐIFs	no	Hộ gia đình	1.6	16.5	26.4					
247	68a	BĐCI	I-1	ĐIFs	no	Hộ gia đình	1.87	16.5	30.9					
		BĐCI	I-1				16.85							
246	107a	BĐCII	I-1	ĐIFs	no	Hộ gia đình	0.63	24.5	15.4	10.8				
246	116	BĐCII	I-1	ĐIFs	no	Hộ gia đình	3.47	24.5	85.0	59.5				
246	117	BĐCII	I-1	ĐIFs	no	Hộ gia đình	3.79	24.5	92.9	65.0				
246	127a	BĐCII	I-1	ĐIFs	no	Hộ gia đình	0.5	24.5	12.3	8.6				
246	134	BĐCII	I-1	ĐIFs	no	Hộ gia đình	3.6	24.5	88.2	61.7				
246	135a	BĐCII	I-1	ĐIFs	no	Hộ gia đình	2.6	24.5	63.7	44.6				
		BĐCII	I-1				14.59							
246	37b	BĐCI	I-2	ĐIIFs	no	Hộ gia đình	2.39	16.5	39.4					
246	44b	BĐCI	I-2	ĐIIFs	no	Hộ gia đình	6.59	16.5	108.7					
246	47a	BĐCI	I-2	ĐIIFs	no	Hộ gia đình	2.17	16.5	35.8					
246	54b2	BĐCI	I-2	ĐIIFs	no	Hộ gia đình	0.5	16.5	8.3					
		BĐCI	I-2				11.65							
246	42b	BĐCII	I-2	ĐIIFs	no	Hộ gia đình	5.45	24.5	133.5	93.5				
246	127b	BĐCII	I-2	ĐIIFo	no	Hộ gia đình	0.49	24.5	12.0	8.4				
		BĐCII	I-2				5.94							
246	77	BĐV	I-2	ĐIIFs	no	Hộ gia đình	12.92	99	1279.1	959.3				
		BĐV	I-2				12.92							
246	54b1	BĐCI	I-1	ĐIFs	yes	Hộ gia đình	1.89	16.5	31.2		A.hybrid	3451	2010	2017
246	65b	BĐCI	I-1	ĐIFs	yes	Hộ gia đình	2.45	16.5	40.4		A.hybrid	4474	2007	2014
246	73a	BĐCI	I-1	ĐIFs	yes	Hộ gia đình	8.3	16.5	137.0		A.hybrid	15156	2007	2014
246	99	BĐCI	I-1	ĐIFs	yes	Hộ gia đình	0.7	16.5	11.6		A.hybrid	1278	2008	2015
246	114	BĐCI	I-1	ĐIFs	yes	Hộ gia đình	2.21	16.5	36.5		A.hybrid	4036	2009	2016
247	72c1	BĐCI	I-1	ĐIFs	yes	Hộ gia đình	1.88	16.5	31.0		A.hybrid	3433	2010	2017
		BĐCI	I-1				17.43							
246	60b1	BĐCII	I-1	ĐIFs	yes	Hộ gia đình	5.03	24.5	123.2	86.3	A.hybrid	9185	2010	2017
246	101	BĐCII	I-1	ĐIFs	yes	Hộ gia đình	0.89	24.5	21.8	15.3	A.hybrid	1625	2008	2015
246	106	BĐCII	I-1	ĐIFs	yes	Hộ gia đình	2.65	24.5	64.9	45.4	A.hybrid	4839	2008	2015
246	130	BĐCII	I-1	ĐIFs	yes	Hộ gia đình	1.38	24.5	33.8	23.7	A.hybrid	2520	2008	2015
246	131	BĐCII	I-1	ĐIFs	yes	Hộ gia đình	3.38	24.5	82.8	58.0	A.hybrid	6172	2008	2015
246	133	BĐCII	I-1	ĐIFs	yes	Hộ gia đình	1.06	24.5	26.0	18.2	A.hybrid	1936	2009	2016
		BĐCII	I-1				14.39							
246	102	BĐV	I-1	ĐIFs	yes	Hộ gia đình	0.82	69	56.6	42.4	A.hybrid	1497	2008	2015
246	103	BĐV	I-1	ĐIFs	yes	Hộ gia đình	4.35	69	300.2	225.1	A.hybrid	7943	2008	2015
		BĐV	I-1				5.17							
246	27a	BĐCI	I-2	ĐIIFs	yes	Hộ gia đình	18.87	16.5	311.4		A.hybrid	34456	2012	2019
246	31a	BĐCI	I-2	ĐIIFs	yes	Hộ gia đình	3.71	16.5	61.2		A.hybrid	6775	2012	2019
246	31b	BĐCI	I-2	ĐIIFs	yes	Hộ gia đình	2.48	16.5	40.9		A.hybrid	4529	2012	2019
246	38a	BĐCI	I-2	ĐIIFs	yes	Hộ gia đình	2.75	16.5	45.4		A.hybrid	5022	2012	2019
246	40b	BĐCI	I-2	ĐIIFs	yes	Hộ gia đình	1.09	16.5	18.0		A.hybrid	1190	2012	2019
246	41b	BĐCI	I-2	ĐIIFs	yes	Hộ gia đình	2.29	16.5	37.8		A.hybrid	4181	2012	2019
246	49b	BĐCI	I-2	ĐIIFs	yes	Hộ gia đình	8.3	16.5	137.0		A.hybrid	15156	2010	2017
246	84a	BĐCI	I-2	ĐIIFs	yes	Hộ gia đình	3.56	16.5	58.7		A.hybrid	6501	2008	2015
246	84b	BĐCI	I-2	ĐIIFs	yes	Hộ gia đình	1.2	16.5	19.8		A.hybrid	2191	2008	2015
246	118	BĐCI	I-2	ĐIIFo	yes	Hộ gia đình	0.44	16.5	7.3		A.hybrid	803	2009	2016
247	72c2	BĐCI	I-2	ĐIIFs	yes	Hộ gia đình	7.05	16.5	116.3		A.hybrid	12873	2010	2017
		BĐCI	I-2				51.74							
246	80b	BĐCII	I-2	ĐIIFs	yes	Hộ gia đình	4.5	24.5	110.3	77.2	A.hybrid	8217	2008	2015
246	107b	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	6.3	24.5	154.4	108.0	A.hybrid	11504	2009	2016
246	112	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	6.18	24.5	151.4	106.0	A.hybrid	11285	2009	2016
246	122	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	1.33	24.5	32.6	22.8	A.hybrid	2429	2009	2016
246	123	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	2.49	24.5	61.0	42.7	A.hybrid	4546	2009	2016
246	124	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	2.8	24.5	68.6	48.0	A.hybrid	5113	2009	2016
246	126	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	2.03	24.5	49.7	34.8	A.hybrid	3707	2009	2016
246	128	BĐCII	I-2	ĐIIFo	yes	Hộ gia đình	0.46	24.5	11.3	7.9	A.hybrid	840	2009	2016
		BĐCII	I-2				26.09							
246	43a	BĐCI	II-2	ĐIIIFs	yes	Hộ gia đình	8.3	16.5	137.0		A.mangium	15156	2011	2018
247	72c3	BĐCI	II-2	ĐIIIFs	yes	Hộ gia đình	21.61	16.5	356.6		A.mangium	39460	2011	2018
		BĐCI	II-2				29.91							



## Training Package

Book 1:	Training Plan on Capacity Building for Preparing Feasibility Studies and Implementation Plans for Production Forest/Agroforestry Development Projects in Vietnam
Book 2:	Manual for Preparation of Feasibility Study Reports for Production Forest/Agroforestry Development Projects in Vietnam
Book 3:	Manual for Preparation of Implementation Plans for Production Forest/Agroforestry Development Projects in Vietnam
Book 4:	Model F/S of Thai Nguyen Province
Book 4-1:	Model Feasibility Study Report for Smallholder Production Forest Development Project in Thai Nguyen Province
Book 4-2:	Model Feasibility Study Report for Agroforestry Development Project in Thai Nguyen Province
Book 5:	Model IP of Thai Nguyen Province
Book 5-1:	Model Implementation Plan for Smallholder Production Forest Development Project in Thai Nguyen Province
Book 5-2:	Model Implementation Plan for Agroforestry Development Project in Thai Nguyen Province
Book 6:	Monitoring and Evaluation Report on Technical Training of Participating Provinces
Book 7:	Market Trend Reference Book on Wood-based and Agroforestry Products
Book 8:	Feasibility Study Reports of Participating Provinces
Book 8-1:	Feasibility Study Report on Agroforestry Project in Ta Hoc Commune, Mai Son District, Son La Province
Book 8-2:	Feasibility Study Report on Production Forest Establishment Project in Nui Thanh District, Quang Nam Province
Book 8-3:	Feasibility Study Report on Treatment of Exhausted Natural Forest and Production Forest Establishment Project in Da Teh District, Lam Dong Province
Book 8-4:	Feasibility Study Report on Afforestation Project for Serving Biodiversity Conservation in Long An Province
Book 9:	Implementation Plans of Participating Provinces
Book 9-1:	Implementation Plan on Agroforestry Project in Ta Hoc Commune, Mai Son District, Son La Province
Book 9-2:	Implementation Plan on Production Forest Establishment Project in Nui Thanh District, Quang Nam Province
Book 9-3:	Implementation Plan on Treatment of Exhausted Natural Forest and Production Forest Establishment Project in Da Teh District, Lam Dong Province
Book 9-4:	Implementation Plan on Afforestation Project for Serving Biodiversity Conservation in Long An Province





D o F

DEPARTMENT OF FORESTRY

## **Model Feasibility Study Report for agroforestry development project in Thai Nguyen Province**

### **Book 4-2: Model FS Agroforestry**



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

---FICAB---



## Preface

“Model Feasibility Study for agroforestry development project in Thai Nguyen Province (Book 4-2)” is part of the training package prepared under the development study on capacity building for preparing feasibility studies (F/S) and implementation plans (IP) for afforestation projects in the Socialist Republic of Vietnam (hereinafter referred to as “FICAB”).

The immediate objective of FICAB is to strengthen capacities for the preparation of afforestation projects through practical On-the-Job-Training (OJT), seminars, and workshops. Five provinces have been selected as targeted provinces for FICAB (Thai Nguyen, Son La, Quang Nam, Lam Dong, and Long An Provinces).

FICAB was divided into two phases. Phase I was to prepare Model F/S and IP as well as other training materials in Thai Nguyen, a Core Province (CoP). The second phase was to implement technical training for staff members of four other provinces as Participating Provinces (PPs), i.e. Son La, Quang Nam, Lam Dong, and Long An Provinces. The training was implemented using Model F/S, IP and other training materials.

Through conducting FICAB, four forms of output are to be generated. The first is an enhanced capacity for MARD personnel. Selected staff members of MARD develop administrative and coordination capacity for supervising the quality of F/S and IP. The second is an enhanced capacity for CoP and PPs personnel. Selected staff members of CoP and PPs enhance the capacity for preparing F/Ss and IPs. The third is the development of a monitoring and evaluation method for the technical training for preparation of F/S and IP. The fourth is the development of a training package for conducting the technical training for preparing F/S and IP for afforestation projects.

The training package is prepared as one of the four above forms of output of the FICAB. The entire training package comprises the following nine (9) books:

Book 1: Training plan

Book 2: Manual for preparation of Feasibility Study reports for production forest / agroforestry development projects in Vietnam

Book 3: Manual for preparation of Implementation Plans for production forest / agroforestry development projects in Vietnam

Book 4: Model F/S of Thai Nguyen Province

Book 4-1: Model feasibility study report for smallholder production forest development project in Thai Nguyen Province

Book 4-2: Model feasibility study report for agroforestry development project in Thai Nguyen Province

Book 5: Model IP of Thai Nguyen Province

Book 6: Monitoring and evaluation report on technical training of PPs

Book 7: Market trend reference book of wood-based and agroforestry products

Book 8: F/S reports of Son La, Quang Nam, Lam Dong, and Long An Provinces

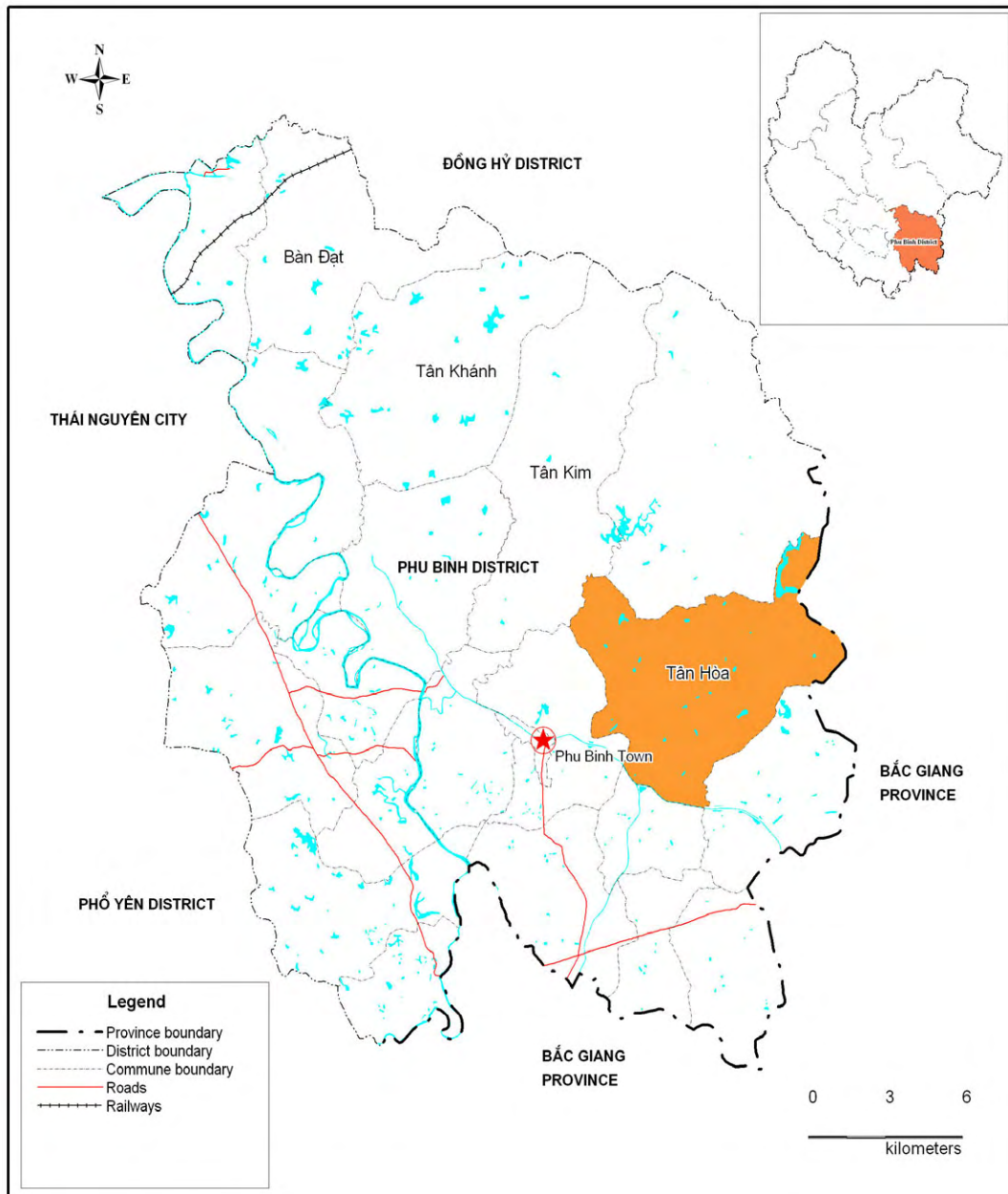
Book 9: IPs of Son La, Quang Nam, Lam Dong, and Long An Provinces

**Map 1 Location of Thai Nguyen Province**





**Map 3 Tan Hoa commune in Phu Binh district**



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## Abbreviation

5MHRP	Five Million Hectare Reforestation Program
ASEAN	Association of Southeast Asian Nations
B/C ratio	Cost-Benefit ratio
CoP	Core Province
CCM	Communal Consultation Meeting
DARD	Provincial Department of Agriculture and Rural Development
DoF	Department of Forestry
DOF	Department of Finance
DPI	Department of Planning and Investment
EIRR	Economic Internal Rate of Return
FAO	Food and Agriculture Organization of the United Nations
FICAB	The Development Study on Capacity Building for Preparing Feasibility Studies and Implementation Plans for Afforestation Projects in the Socialist Republic of Vietnam
F/S	Feasibility Study
FIPI	Forest Inventory and Planning Institute
FIRR	Financial Internal Rate of Return
FSDP	Forest Sector Development Program
GOV	Government of Vietnam
IP	Implementation Plan
IRR	Internal Rate of Return
JICA	Japan International Cooperation Agency
JST	JICA Study Team
LUR	Land Use Right
LUC	Land Use Right Certificate
MARD	Ministry of Agriculture and Rural Development

MPI	Ministry of Planning and Investment
NPV	Net Present Value
PAM	WFP's Program Alimentaire Mondial
PC	People's Committee
PFA	Production Forest Association
PFD	Production Forest Development
PFEP	Production Forest Establishment Project
PIP	Project Implementation Plan
PIU	Project Implementation Unit
PMB	Project Management Board
PMME	Project Management, Monitoring and Evaluation
PPs	Participating Provinces
PST	Provincial Study Team
RRA	Rapid Rural Appraisal
SFE	State Forest Enterprise
SFFD	Support for Production Forest Development
SOE	State of Environment
Sub-DoF	Sub-Department of Forestry at province level
VBARD	Vietnam Bank for Agriculture and Rural Development
VBSP	Vietnam Bank for Social Policies
VDB	Viet Nam Development Bank
WTO	World Trade Organization



# Summary

## Part I Project Background

### Chapter 1 Context of Project Formulation

The forestry sector in Vietnam focused on investment to the development of protection and special-use forest. The aftermath is that Vietnam cannot meet the demand of wood materials for domestic processing and has to import to fill in the gap of deficit of wood materials. In order to reach the self-supporting of wood materials, the forestry sector will focus on the development of production forest. At the same time, there is a growing demand for agro-forestry products for domestic use and for exporting. In order to meet the increasing demand of agro-forestry products, it is expected to increase supply of these products.

The provincial government is establishing forest nurseries in every district and strengthening its agro-forestry extension services, as well as promoting better forest products marketing. Furthermore, the provincial government encourages farmers to establish plantation and agro-forestry to improve their livelihoods while promoting the restructuring of agricultural cooperatives.

### Chapter 2 Natural and Socio-economic Conditions

The project area is entire area of four villages: U, Gian, Ngo and Vau in Tan Hoa commune of Phu Binh district, Thai Nguyen province. Phu Binh district is the mid-land district located in the south of Thai Nguyen province. The project area is 535 ha. There are 292 ha of forest land, accounting for 55% of the project area.

The total population of the four villages is about 2,200 persons living in 512 households. The average household gross income in the project area is VND 21 million annually, and agriculture accounts for VND 7 million or 35% of the total and off-farm activities also accounts for a larger proportion of the gross income. Agriculture is the major activity in the district and the agriculture sector accounts for 70% of the gross output. In Phu Binh District, there are two financial institutions. They are Vietnam Bank for Agriculture and Rural Development (VBARD) and Vietnam Bank for Social Policies (VBSP).

Agro-forestry products of Thai Nguyen Province are Tea, Pine resin, Canarium fruit, Cassava, Rattan, Longan/litchi, and so on. These agro-forestry products contribute for improving local people living. Thai Nguyen Particle Board Factory is one of the major potential clients located closest to the project area.

### Chapter 3 Lesson Learnt

In Thai Nguyen and neighboring provinces, the projects to be noticed are the project of extension development by Thai Nguyen Provincial Extension Centre and Viet Nam–Germany forest project III (KWF3). In implementation of these projects, following points are indicated. Information relating to market for agro-forestry products in domestic and international markets is mentioned duly. These studies are conducted on a bottom up approach with sufficient attention to demand, capacity, and expectation of local residents.

Total investment of project is estimated mentioning on inflation and interest rate etc. that reflects correctly the funding need for the project as well as its economic effectiveness.

## **Chapter 4 Opportunities and challenges**

Forest land in project area has been allocated to farmers. These farmers decide the development of agro-forestry in a close connection with effective use of land, and quality of forest lands are fair and good for maintain a yield of 120 m<sup>3</sup> of wood in 7 years. This yield is sufficient to assure local people in implementing agro-forestry. As the planting sites are quite close to consuming areas, local peoples are familiarized to market oriented agro-forestry development.

It is difficult for local people to approach new technologies for applying into agro-forestry to achieve a high productivity. Local people have no self-mobilizing budget to invest into agro-forestry development except the contribution of labor cost and loans for development of agro-forestry are not accessible easily.

## **Part II Project Contents**

### **Chapter 1 Project Rationale**

The forestry sector of Vietnam is undergoing a basic renovation. The policy of the GOV is to encourage local people to participate in afforestation/agro-forestry program by means of relevant policy and financing support.

However, there are still two key reasons for interference to improve the forestry sector of the Thai Nguyen province. Firstly, not all farmers can deal with agro-forestry development, if no financial support or preferential prices for seedlings/fertilizers etc. are provided. Secondly, the mechanism of supporting farmer is insufficient. Some of important activities need to be improved such as linkage between farmers and credit agency, linkage farmers and markets, and transfer of technology.

### **Chapter 2 Project Objectives and Output**

The overall goal of the project is to improve livelihood through development of agro-forestry plot in the project area. The project objective is to increase the production value of the forest land in the project area by establishing the agro-forestry plots. The objective of the assistance is to establish agro-forestry plots with five models in the project area. The project objective is to be achieved through realization of the outputs such as establishment of 140 ha agro-forestry plot and so on.

### **Chapter 3 Project Activities**

#### **3.1 Project Components**

Various project activities are grouped into three components such as i) Agro-forestry Model Development, ii) Project Management and M&E, iii) Technical Services.

#### **3.2 Project Implementation Plan**

The total area for agro-forestry development is 140 ha and five agro-forestry models are set as follows:

Model 1:A.mangium+Canarium+Rattan+Cassava: 43 ha

Model 2:A.mangium+Dracontomelon duperreanum+Rattan+Cassav: 20 ha



Model 3:A.hybrid+D.duperreanum+Rattan+Cassav: 22 ha

Model 4:A.hybrid+Canarium+Rattan+Cassav: 37 ha

Model 5:A.hybrid+Canarium+D.duperreanum+Rattan+Cassav: 17 ha

It is planned that wood tree will be harvested in the eighth year after planting and harvesting volume is estimated 18,000m<sup>3</sup>. Total harvesting volume of Canarium and D.duperreanum fruits are estimated 1,248 ton respectively and Rattan is estimated 6,300 ton. Volume for cassava products is three tones per ha in average and total harvesting volume is estimated 419 tones. Training is planned for participating farmers and PIU staff members. Consulting service is procured for agro-forestry model plot design and training.

### **3.3 Implementation Schedule**

Assistance period of the project is five years. In the first year, which is regarded as a preparation period, the preparation works for conducting agro-forestry activities will be carried out. During the operation period from the second to the fifth year, activities directly related to the agro-forestry are undertaken in the field.

## **Chapter 4 Project Cost**

Total project cost during the assistance period, including physical and price contingencies are estimated at VND 2,271 million. The total baseline cost of Agro-forestry development component will be VND 1,534 million, that of Project management and M&E component is estimated at VND 206 million and that of Technical service component is estimated at VND 67 million. Physical contingency is estimated at VND 90 million. Price contingency is also estimated at VND 151 million.

## **Chapter 5 Financing Plan**

There will be three financial sources for the implementation of the project, which are loans, government budget and households' fund. The loan is used for buying materials such as seedling and fertilizers, the government budget is used for agro-forestry plots design, training, quality check and management fee, and households' fund is calculated for their labor costs.

## **Chapter 6 Organization of Project Management and Implementation**

Project implementation Unit (PIU) is established as an implementing agency. PIU is managed under Phu Binh DPC. PIU receives supports from Sub-DoF in technical field and from ARDD of Phu Binh district in non-technical field. PIU is responsible for implementing the project and achieving the project objectives. Vietnam bank of social policies will provide loans to project participating farmers. The role and responsibilities of related organizations such as Sub-DoF are explained.

## **Chapter 7 Monitoring and Evaluation**

In order to evaluate the achievement of the project objective and overall goal, the development indicators such as "140 ha of agro-forestry plots are established" and so on, are set out. At the same time, progress indicators such as "PIU is established at 2006" and so on, are set out for monitoring the progress of the project.

## **Part III Project Justification**

### **Chapter 1 Financial and Economic Analysis**

## **1.1 Financial Analysis**

The project will introduce five agro-forestry models. These models are represented by a combination of four components: wood trees (A.hybrid or A.mangium), fruit trees (Canarium or D.Duperreanum), agricultural crop (cassava) and NTFP (rattan). The net benefits arising from the without-project case are expected to be marginal and the only with-project case is considered for the analysis. Financial analysis of each model is conducted on a one-hectare basis.

The results of the analysis show that all the five agro-forestry models are viable as the Net Present Values (NPV) range from VND 13 million to VND 15 million at the financial discount rate of 10%, and the Financial Internal Rates of Return (FIRR) from 24% to 30%.

## **1.2 Economic Analysis**

Economic analysis takes into account entire economic benefits and costs of the project to be implemented in the project area (total planting and cultivating sites of 140 ha). The Net Present Value (NPV) and the Economic Internal Rate of Return (EIRR) of the project are calculated at VND 1.7 billion (at the economic discount rate of 10%) and 25% respectively. The results confirm the feasibility of the project from a viewpoint of the society.

## **Chapter 2 Evaluation of Environmental Impacts**

As for vegetation cover, soil erosion and surface water and so on, positive impacts are expected. Acacia plantation is expected to give positive impacts compared to Eucalyptus, Pine and Bare land.

## **Chapter 3 Evaluation of Social Impacts**

As for ethnic minority, it is necessary to provide them a good picture on income generation plan. The project may bring negative impacts on the household economy due to lose their off-farm income opportunities. It is noted that men often control the main investment activities in the project area. Therefore, special consideration will be given women to receive information on the project and participate in the training program.

## **Chapter 4 Sustainability**

Technical standards for agro-forestry are confirmed through discussion with the government organizations and the University of Thai Nguyen, and through the existing regulations and actual local agro-forestry practices. The strong demand for wood materials is expected to contribute to the sustainability of the project. Agro-forestry products such as fruit products are easy to sell in the markets of Thai Nguyen province, Hanoi and some neighboring provinces. Participating farmers are supposed to gain necessary skills to continue their activities after the end of the assistance period of the project.

## **Chapter 5 Project risks and mitigating measures**

There are numbers of project risks that could possibly pose threats to realization of the outputs and project objectives, which are delayed approval and policy changes, lack of appropriate loan scheme, pest, and disease outbreaks and occurrence of natural disasters, and unstable market and price. As mitigating measures, close dialogues with the government etc are listed up.

## **Part IV Conclusions and Recommendations**

### **Chapter 1 Conclusions**

The project seeks develop some of the degraded forest in Thai Nguyen, which is expected to contribute to the livelihood improvement of farmers and increase production values of the forestry sector. The financial analysis indicates that the investments are viable. The quantifiable economic benefits of the project will include increased domestic supply of wood materials, which will reduce imports. In addition, the plantations will improve the environment. The experience of Thai Nguyen should provide lessons to other provinces that will like to develop agro-forestry.

### **Chapter 2 Recommendations**

It is recommended that the provincial government will issue the approval of the PIU at the appropriate timing. The establishment of an innovative loan scheme is fundamental of this project. It is crucial that provincial PC and DARD provide a full support to the project and maintain a close communication with the PIU and this project is integrated with other forestry initiatives. It is also crucial that the implementing agency will inform the farmers with a full detail of the project scheme and potential risks that they may face.



# LEGAL FRAMEWORK

## **Legal framework for project formulation**

The formulation of agro-forestry project in Phu Binh district, Thai Nguyen province is a step of concretization process of national, provincial advocate of socio-economic development. The project is suitable to the development orientation at different levels of the governments. The project is formulated on the following legal bases:

- a) In socio-economic development plan period 2005-2010, Thai Nguyen province sets up target as follows; forestry growth at 10-11%/year, establishment of 24,000 ha plantation, provision of 100,000 m<sup>3</sup>/year timber.
- b) Based on Decision 199/QĐ-BNN-PTNT dated 22/01/2002 on the approval of Forestry Development Strategy of Vietnam period 2001-2010 with the objective of growing 3.52 million ha, of which 1.8 million ha is production forests.
- c) Based on Decision 661/QĐ-TTg dated 29/07/1998 of the Prime Minister on the objectives, tasks, policy and organization for the implementation of the Five Million Hectare Reforestation Program (5MHRP)

## **Legal documents relating to the application in the project case**

Scales and measures that regulate the project are based on regulations for agro-forestry project, consisting of:

- a) Decision No. 38/2005/QĐ-BNN dated 06/07/2005 of Minister of MARD on the unit price for a man-day labor for afforestation, tending and afforestation design
- b) Circulation No. 28/1999/TT-BTC dated 13/03/1999 of MOF, guideline for distribution of state funds to 5 MHRP by Decision 661/QĐ-TTg, 29/07/1998 of the Prime Minister
- c) Decision No.175/1998/QĐ/BNN/KHCN, dated 04/11/1998 of MARD, promulgating temporarily on contract for forest protection, speeding up natural regeneration in connection to additional planting, afforestation and tending of forest
- d) Technical regulations for intensive afforestation by A.hybrid and A.mangium
- e) Cost norms for different activities relating to afforestation made by Thai Nguyen province

# INTRODUCTION

This report has been prepared as a model F/S report, which aims to be broadly applicable to the whole area of the country, based on the findings of a feasibility study conducted during a period from July 2005 to March 2006 in Phu Binh District of Thai Nguyen Province, Vietnam.

This feasibility study is conducted as a part of the Development Study on Capacity Building for Preparing Feasibility Studies and Implementation Plans for Afforestation Projects in the Socialist Republic of Vietnam which is agreed between the Government of Vietnam and Japan International Cooperation Agency (JICA) in December 2004.

The target project for the feasibility study is an agro-forestry development project in Tan Hoa commune of Phu Binh district. The general outline of the project is as follows:

- The implementing agency is a Project Management Unit (PIU) which is established by the Peoples' committee of Phu Binh district and farmers conduct agro- forestry activities, who have forest land for plantation in four villages of Tan Hoa commune.

- In order to promote economic utilization of degraded forest lands, it is planed to convert poor Eucalyptus plantations to high productive agro-forestry plot and through converting from Eucalyptus plantations to agro-forestry plot, it is also planed to improve livelihood of farmers. And the target products are wood material, NTFP and agro-forestry products.

- As regarding the financial resource for agro-forestry activities, the Vietnam Bank of Social Policy (VBSP) provides loans to farmers, and as for project management, the government of Vietnam provides subsidy to the PIU.

The Forest Inventory and Planning Institute of Vietnam (FIPI) conducted the feasibility study under the guidance and supervision of the JICA Study Team (JST) and in process of the feasibility study, technology transfer from JST to FIPI on feasibility study is executed. And, the provincial study team of Thai Nguyen province also participate in the feasibility study. In order to enhance the capacity for preparing F/S, OJT for the provincial study team is carried out during the feasibility study.

# **PART I PROJECT BACKGROUND**

# 1 CONTEXT OF PROJECT FORMULATION

## 1.1 National context

The forestry sector has basic orientation in forest development. According to the review report of 5MHRP programmed in 2005, in the project area, the sector focused on investment to the development of protection and special use forests using the state budget, therefore it did not encourage people to think of economic benefits taken from agro-forestry and protection of protection and special use forests. The aftermath is that, Vietnam cannot meet the demands for timber for domestic processing, and has to import to fill in the gap of deficit of timber materials annum. At present Vietnam must spend 500 to 600 million USD to import timber in every year.

To reach the self-supporting of timber to domestic production, the GOV often revises policy and program to make them suitable to the socio-economic development. As for the new orientation of 5MHRP from now to 2010, the forestry sector will focus on the development of production forests that is to grow 1.5 million ha of production forest.

At the same time, there is a growing demand for agro-forestry products for domestic use and for exporting.

**Table 1.1 Data on exporting products**

Unit: million VND

Product	2001	2002	2003	2004	2005
Ground nut	38,154	50,852	47,971	27,064	32,931
Café	391,329	322,310	504,814	641,022	735,485
Tea	78,406	82,523	59,848	95,550	96,934
Cashew nut	151,707	108,996	284,475	435,983	501,508
Pepper	6,198	107,173	104,916	152,398	150,482
Cinnamon	9,872	5,861	5,423	8,110	8,026
Fruit	329,972	201,156	151,470	178,840	235,482
Timber products	335,090	435,481	567,197	1,139,090	1,562,533

Source: Vietnam Customs

As it is said in the table above (export data of selected agro-forestry products), export of agro-forestry products has been increased. It is envisaged that the population will be 90 million in 2010 and 100 million in 2020. Therefore, in order to meet the increasing demand of agro-forestry products, it is expected to increase supply of these products. Thai Nguyen has good advantages to have potential markets particularly Hanoi capital as it is a neighboring province to Hanoi.

## 1.2 Local context and the necessity of the project

Thai Nguyen Province is a rich agricultural area with favorable climate, generally good soils and abundant water supplies. Important commodities are produced such as rice, maize, livestock and tea – for which the province is well known. It has a good arterial network of roads and access to markets in Hanoi. The province has a small but important



forestry base. Some 190,000 ha classified as forest land. Most of this is classified as protection forest (90,000 ha) or special use forest (33,000 ha). Five State Forest Enterprises play a key role in the forestry sector. They manage not only forests but also provide broadly social and economic services such as schools, clinics and roads. In line with national policy, the role of SFEs rapidly reduced and most of the forest lands allocated to farmers, usually in blocks of 0.5 to 2.0 ha. There are currently only two SFEs left and they manage only 6,000 ha. At the same time, some 45,000 ha of protection forest have been reclassified as production forest and now available for commercial plantations.

Demand for wood materials in the province is high and is rising rapidly. There are important wood processing companies in the province including the Thai Nguyen Particle Board Factory, Hoang Van Thu Paper Mill, Laminated Board Factory, Forest Joint-Stock Company, Cam Giang Coal Mine, and Chopstick Workshop. It is estimated that the annual consumption of wood materials by these companies is 65,000 m<sup>3</sup>. However, insufficient wood supply imposes a serious challenge to these companies. The Particle Board Factory, for example, operates below capacity due to the lack of wood materials. Similar shortages affect other factories in the province. In addition to the demand from the industrial sector, there is also a large private wood trade for construction, furniture making and fuel wood.

Traders often buy the standing trees from farmers for a fixed sum of money. Traders themselves organize felling and transport. Usually, traders only take the main trunk leaving the branches and litter to the labor as full or partial compensation for their work. Transport of timber to the markets is by truck, buffalos or where possible by river.

As a step to achieve its goals, the provincial government establishes forest nurseries in every district and strengthens its agro-forestry extension services, as well as promotes forest products marketing. Furthermore, the provincial government encourages farmers to establish plantation and agro-forestry to improve their livelihoods while promoting the restructuring of agricultural cooperatives.

Besides that, Thai Nguyen province is well known for its tea production, and in 1997 it was produced 27,000 tons of fresh leaf and 6,000 tons of dry tea, accounting for nearly 20 percent of national output (source: Working paper 5: Viet Nam Crop diversification and export promotion project-1999). In order to harvest tea product for a long time, farmers have to plant wood trees or fruit tree mix with tea on its plots.

Most of the forest in Phu Binh district is in scattered blocks of 1-5 ha. These are predominantly small hillocks or outcrops located near to flat areas. Flat areas are mainly used as paddy fields or for other annual crops such as maize.

The lower areas of hilly and sloping lands are used for homesteads, home gardens, livestock, fruit trees, and the higher area are covered with trees. The traditional primary forests on the sloping lands had been removed several decades ago.

The land was degraded rapidly, because the top soil and the biological litter were washed away by rainfall and/or used for animal browsing and fuel.

Most of plantations are Eucalyptus tree, but this area has been harvested and most of trees are second or third generation of coppiced Eucalyptus. Standing stock of these Eucalyptus areas is about 25 m<sup>3</sup>/ha. This is far below an economically feasible production forest.

## 2 NATURAL AND SOCIO-ECONOMIC CONDITIONS

### 2.1 Natural conditions

#### 2.1.1 Geographical location and area

##### (1) Geographical location

The project area is the entire area of four villages U, Gian, Ngo and Vau in Tan Hoa commune of Phu Binh district, Thai Nguyen province. Phu Binh is the mid-land district located in the south of Thai Nguyen 28 km from Thai Nguyen city, and 30 km from Bac Ninh town.

##### (2) Area

The forest land of Thai Nguyen province is 155,336 ha. Phu Binh district is 5,789 ha and Tan Hoa commune is 676 ha. However, the most of forest land of Tan Hoa commune is plantation; accounting for 99% of total forest land of Tan Hoa commune, bare land is only one ha, accounting for 1%.

The size of the project area is 535 ha including 485 ha of agricultural land, accounting for 91% of the project area, 49 ha of non-agricultural land accounting for 9%, 2 (two) ha of un-use land. In the agricultural land, there are 292 ha of forest land accounting for 55% of the project area.

**Table 1.2 Land classifications by administrative unit**

Unit: ha

Administrative unit Land classification	Thai province	Nguyen Phu District	Binh Tan Hoa commune	Project area	
Total area		354,110	24,936	1,905	535
1. Agricultural land		205,817	6,279	1,802	485
(Out of which: Forest land)		(155,336)	(5,789)	(676)	(292)
2. Non-Agricultural land		50,481	489	100	49
3. Un-use land		51,118	18,656	3	2

Source: Thai Nguyen Sub-Department of Forestry -2005

Note: The numbers do not necessarily sum up due to rounding.

#### 2.1.2 Topography

Average elevation is 14 meters high, the lowest is 10 meters and highest is 250 meters (Deo Bop, Tan Thanh commune). Topographical characters are rather flat with low hills, and gentle sloping is under 80 accounts for most of the project area. It is an advantageous condition for agriculture and agro-forestry development as well as development of production forests.

### 2.1.3 *Soil*

Soil types in Phu Binh district are distributed discretely in general but in the project area are distributed discretely in particular. Soil conditions in the project area, is poor texture, poor capacity of retaining water, low humus content (0.5 to 0.7%), high pH (4 to 5), and poor fertility. In the project area, Ferralite develops on the old alluvia with good soil layer of more than 100 cm, which area is 443 ha accounting for 77.5% of the project area. Ferralite develops on clay soil with good soil layer of more than 100 cm and well-retained moisture, which area is 28 ha accounting for 5.3% of the project area. New alluvia and good soil layer, which area is 92 ha accounting for 17% of the project area.

**Table 1.3 Situation of soil in the project area**

Soil type	Land unit	Area (ha)	Elevation (m)	Sloping class	Layer (cm)	% of rock	Water
1	2	3	4	5	6	7	8
Ferralite developed on the old alluvia of good soil layer (> 100 cm)	ĐIFo-	147	<300	I	> 100	< 10	Running freely
	ĐIIFo-	193	<300	II	> 100	< 10	Running freely
	ĐIIIFo-	75	<300	III	> 100	< 10	Running freely
Ferralite developed on clay, good soil layer	ĐIIIFs-	28	<300	III	> 100	< 10	Running freely
Delta new alluvia, good soil layer	ĐIIIP-	92	<300	III	> 100	< 10	Running freely
Total		535					

Source: District Agriculture Section

### 2.1.4 *Climate*

Annual rainfall in the project area in recent ten years ranges from 1,600 to 2,000 mm. Rainfall regime is affected by the annual monsoon cycle, with a wet monsoon season from April to October. Highest precipitation occurs in the period of May to August that brings more than 80% of annual rainfall. The dry season starts around October and ends in early April. The peak of hot season occurs around June to September, while the cool and dry season runs from December until March and is under the influence of the Northeast monsoon. Mean humidity is around 80% with maximum humidity in June to August and minimum in November and December.

### 2.1.5 *Hydrology*

There are five major rivers in Phu Binh district. Most of them are inter-connected by artificial canals. However, there is not any river in the Tan Hoa commune. The water for irrigation and daily living of local people is taken from lakes, ponds and ground water.

Ground water is believed to be abundant at 5 to 7 m depth and is mainly being pumped up for household use. Now, farmers dig ponds closed to their homes for fish raising and gardening. Agriculture production depends on storm water. Thus, hydrological condition is favorable for agriculture and forestry production in the project area.

## **2.2 Socio-economic conditions**

### **2.2.1 Population, ethnics, labor and poverty**

#### **(1) Population**

The total population of the four villages is about 2,200 persons living in 512 households, or 4.3 persons per household. The population of the four villages accounts for 20% of the total Tan Hoa commune population. The population growth rate is estimated at 1%. The sex ratio is balanced, 1,200 persons or 55% of the total population are female. Population density of the four villages is 386 persons per square kilometer.

**Table 1.4 Population and Labor Force**

Items	Tan Hoa commune	Project area	Vau village	U village	Gian village	Ngo village
Ares (ha)	1,905	535	111	134	170	120
Population	7,366	2,200	700	365	575	560
Female population	3,726	1,200	378	197	311	303
Households	1,598	512	160	90	122	130
Labor force (persons)	4,270	659	210	109	172	168

Source: Cadastral session of Tan Hoa commune, Phu Binh District, June 2005

#### **(2) Labor Force**

The active labor force of the four villages is estimated about 659 persons, accounting for 60% of the total population of the four villages. Female labor makes up about one half of the total. It is estimated that labor availability of each household is on average 1.3 persons.

#### **(3) Ethnic Group**

There are four ethnic groups in the project area. The Kinh group accounts for 60%, Nung is 30%, Tay is 5%, Hoa is 5%. Immigrants from elsewhere constitute the majority of inhabitants of the project area.

The following table shows the distribution of ethnic groups in the four villages.

**Table 1.5 Ethnic Groups and Composition***Unit: Number of persons*

Ethnic group	Project area	Vau village	U village	Gian village	Ngo village
Kinh	1320	500	55	305	460
Nung	660	200	110	50	200
Tay	110	0	0	110	0
Hoa	110	0	0	110	0
Total of population	2200	700	365	575	560
%		32%	17%	26%	25%

Source: Cadastral session of Tan Hoa commune, Phu Binh District Office, June 2005

#### (4) Poverty

According to the Labor Department of Phu Binh district office, the poverty rate of the district in 2004 is about 7% and the number of households classified as the poor is 2,165 in 2004.<sup>1</sup> If compared with the statistics in 2001, the statistics reveals a decreasing trend of the poverty (15.7% and 4,542 households in 2001).

According to the food poverty standard, the percentage of poverty household in 2004 is 6.9% for the whole country and 9.4% for the northeast region. On the other hand, if the government poverty standard is applied, the percentage of poverty household in 2004 is 18.1% for the whole country and 23.2% for the northeast region at the price as of January 2004.<sup>2</sup> If the criterion, which could be same as the government poverty standard, is applied, the poverty rate of Phu Binh district is 31.4 % (2,165 households) in 2004, the fourth poorest district in the province.<sup>3</sup> Although the conditions in Phu Binh district shows improvement over the last four years, the district is, still considered poor if compared with other districts in the province and the national average.

**Table 1.6 Ratio and Number of Poor Household in Phu Binh District**

	2001	2002	2003	2004
Phu Binh district	16%	11%	8%	7%
No. of poor households	4,542	3,348	2,511	2,165
Tan Hoa	15%	14%	11%	8%

Source: Labor Department, Statistics Department of Phu Binh District, June 2005

<sup>1</sup> It is not specified which poverty criterion is used for the calculation. However, it can be assumed that the poverty rate of the district in 2004 will be based on the food poverty standard.

<sup>2</sup> Food poverty standard in 2004 is VND 124,000 per capita per month in rural and VND 163,000 per capita per month in urban. Government poverty standard in period 2006-2010 is VND 200,000 per capital per month in rural and VND 260,000 per capita per month in urban.

<sup>3</sup> The data in the district use per capita average monthly gross income as a base for the calculation. It has not been confirmed that the statistics is based on the government poverty standard.

### 2.2.2 *Household economy*

#### (1) Household income

The main household income in the project area is agriculture. Rice is the most important commodity. A survey carried out during project preparation period revealed that the average household gross income is around 21 million VND (about 1,300 US\$) annually. The income from agriculture in this figure accounts for about 7 million or 35% of the total. Stock raising, such as buffalo, cow, pig, and chicken, plays an important part in the household economy, providing cash to the households.

**Table 1.7 Estimated Household Income**

Item	Gross Income (Note)	
	Million VND	%
Agriculture	7.3	35
Forestry	0.8	4
Salary (company workers, public servants, etc)	0.9	4
Service (retail, etc)	3.0	15
Others (off-farm, services, etc)	8.7	42
Total	20.7	100

Source: The Study Team

Note: Gross income simple average of 49 respondents of the questionnaire survey

#### (2) Off-farm Activities

Some farmers involved in off-farm activities such as retailing businesses while others work on construction sites. A field survey shows that off-farm activities accounts for a larger proportion of the total gross income.

### 2.2.3 *Major economic activities*

#### (1) Agriculture

Agriculture is the major activity in the district and the agriculture sector accounts for 70% of the gross output on the district. Major products include rice, sweet potato, peanut, maize, and soybean. Livestock production also plays an important role in the sector. Livestock mainly comprise chickens, ducks, pigs and cattle, and there are some buffaloes for plough. In terms of cattle, about 36% of cattle of the province is raised in Phu Binh district in 2004. Most animals are stall-fed with crop residue, household waste, and some specialized feds. The use of forest land for grazing is limited, especially as little undergrowth is available in the Eucalyptus planted areas.

**Table 1.8 Gross Output of Phu Binh District (current prices)**

Sector	Share
1. Agriculture/Forestry/Fishery	70%
Agriculture	69%
Crops	38%
Livestock	30%
Agricultural services	1%
Forestry	1%
Fishery	1%
2. Construction	12%
3. Other Services	18%
4. Total	100%

Source: Statistics Yearbook 2003 and Phu Binh Phu Binh District Office, June 2004

## (2) Forestry

The role of forestry for the household economy is small but important. Most available lands are planted with Eucalyptus. The timber from the Eucalyptus plantation yields good commercial value and the price is higher than Acacia. One ha of mature Eucalyptus could be worth twice as much as the same area of Acacia. Most farmers say that the reason why they want to replace Eucalyptus with Acacia, because Eucalyptus is growing slower, particularly after the first coppice-crop. A few better-off households, who do not need immediate income, say that they want to replace Eucalyptus with Acacia because of higher returns.

### 2.2.4 Financial sources

In Phu Binh district, there are two formal financial institutions, where farmers could access to loan services for production purposes. They are Vietnam Bank for Agriculture and Rural Development (VBARD) and Vietnam Bank for Social Policies (VBSP).

According to the household socio-economic survey, 37 households (some 70% of the total households surveyed) obtained loans from VBARD and/or VBSP. Two households received loans from both banks, in the last five years. Out of 40 households that received loans from any sources in the last five years, households that used loans for livestock accounts for 80%, agriculture account or 38%, forestry for 37.5%, handicraft for 5.0%, and others for 5.0%. Most of these loans are considered short and medium term loans that need to be repaid within five years.

**Table 1.9 Loan use**

Item	Rate out of 40 households (%)
Livestock	80.0
Agricultural development	37.5
Forestry development	37.5
Handicraft	5.0
Other	5.0

Source: Household socio-economic survey

Note: As it is considered that some loans are used for more than one purpose, the percentages do not add up.

### *2.2.5 Infrastructure*

#### (1) Communication

A national road runs through Phu Binh district, connecting it to Thai Nguyen City, Hanoi and other provinces as well. It takes less than half an hour to get to Thai Nguyen City and one hour to Hanoi industrial park from Phu Binh town. The transportation network within the Tan Hoa commune has been improved recently, and truck transportation is possible in four villages of Tan Hoa commune, however the road is still narrow lane.

Beside roads, railway routes are (i) Thai Nguyen - Da Phuc (Hanoi), (ii) Thai Nguyen - Nui Hong, and (iii) Luu Xa - Kep keep the way to wider markets.

#### (2) Power and Water supply

Four villages in the project area have access to the national electric grid. Currently, power supply is available for all households and small industrial production units in the area. Water supply for both domestic and irrigation is well developed in the district. Phu Binh district maintains 100 reservoirs, 32 pumping stations, and 227 km of irrigation canals, supplying water to the Tan Hoa commune.

#### (3) Public infrastructure in the Tan Hoa commune

Four villages have village cultural house and a Clinic. Schools are in Tan Hoa CPC Office.



## 2.3 Status of land and forest resource use

### 2.3.1 Current situation of forest land

The total natural land of Phu Binh district is 249.36 km<sup>2</sup> while the whole project area covers 535 ha, including 485 ha of agricultural land and 292 ha of forest land.

The project area is 535 ha, including 292ha of forest land, 49 ha of Non-Agricultural land and 1.4 ha of Un-use land. As for 292 ha on forest land, of which Vau village is 51.6 ha, U village is 71.3 ha, Gian Village is 108.0 ha and Ngo village is 60.7 ha.

**Table 1.10 Land classification by administrative unit**

Unit: ha

Administrative unit	Project area	Vau village	U village	Gian village	Ngo village
Total area	535	111	134	170	120
1. Agricultural land	485	100	119	158	108
(Out of which: Forest land)	(292)	(52)	(71)	(108)	(61)
2. Non-Agricultural land	49	11	15	11	13
3. Un-use land	2	1		1	

Source: Cadastral office of Tan Hoa commune

### 2.3.2 Productivity of forest land

#### (1) A.hybrid

A.hybrid I (1 - 3 years), planted on hill (Đ), slope 15- 25<sup>0</sup> (soil group I), Ferralite (F), Clay (s), old alluvia (o), deposit (dl), mean increment: D = 2.33 cm/year; H = 3.17 m; mean volume 6.83 m<sup>3</sup>/ha/year. In general, trees grow well as there are suitable to soil conditions. However, the old Eucalyptus stumps should be taken up, and NPK should be used for higher productivity.

A.hybrid II (4 - 5 years), planted on hill (Đ), slope 16- 25<sup>0</sup> (soil group I), Ferralite (F), Clay (s), old alluvia (o), deposit (dl), mean increment: D = 2.86 cm/year; H = 4.18 m; mean volume 12.33 m<sup>3</sup>/ha/year. Lands are ploughed and Eucalyptus stumps taken up. Add up NPK for good increment.

A.hybrid I and II (3 - 4 years), planted on hill (Đ), slope > 25<sup>0</sup> (soil group II), Ferralite (F), Clay (s), old alluvia (o), deposit (dl), mean increment: D = year/year; H = 2.38 m; mean volume 16.4 m<sup>3</sup>/ha/year. If invested. Forest will grow well

#### (2) A.mangium

A.mangium I (1 - 3 years), planted on hill (Đ), slope 15 - 25<sup>0</sup> (soil group I), Ferralite (F), Clay (s), old alluvia (o), deposit (dl), mean increment: H = 1.82 m; volume increment is smaller than A.hybrid as less investment in the first 3 years. In general,

A.hybrid is suitable to soil conditions. However old Eucalyptus should be taken away and add NPK for better increment.

A.mangium IV (12 years), planted on hill (Đ), slope 15 - 25<sup>0</sup> (soil group II), Ferralite (F), Clay (s), old alluvia (o), deposit (dl), mean increment: H = 1.36 m; D = 1.33 cm/year; volume increment 16.92 m<sup>3</sup>/ha/year. In general, A.hybrid is suitable to soil conditions.

### (3) Eucalyptus coppice

Planted on hill (Đ), slope 15 - 25<sup>0</sup> (soil group II), Ferralite (F), Clay (s), old alluvia (o), deposit (dl), planted in 1980 - 1993 by PAM program. Mean increment is 4.79 m<sup>3</sup>/ha/year. Need to be replaced by A.mangium and A.hybrid to improve soil and forests

## 2.4 Sales and marketing

### 2.4.1 Demand and supply of forest products and agro- forestry products

In recent 10 years, timber processing industry and exporting wood products developed well in Vietnam. In particular in 2004, the value of export amounted to more than 1 billion US\$ and in 2005, over 1.5 billion US\$ which greatly contributed to the national economy.

In 2004, the exploited timber quantity of Vietnam was 2,443,100 m<sup>3</sup>, roughly (500,000 m<sup>3</sup> from natural forest and 1,943,100 m<sup>3</sup> from plantation forests). Nevertheless, the quantity is not enough for domestic processing capacity. The processing industry sector also requires suitable timber for timber furniture production. Therefore, every year, a big quantity of timber is imported, and in 2004, 2,500,000 m<sup>3</sup> was imported. Wood products in the national economy are in the table below:

**Table 1.11 Wood products in the national economy**

Product	Unit	Country	Domestic	Export	Import	Thai Nguyen	Phu Binh
- Paper	ton	1,237,714	1,120,614	117,100	484,000	0	0
- Pulp	ton	789,400	661,400	0	128,000	0	0
- Planed timber	m3	2,000,000	1,681,010	0	318,990	0	0
- Particle Board	m3	109,165	0	0	36,856	0	0
- Ply (MDF)	m3	88,177	0	0	34,280	0	0
- Glued board	m3	29,147	0	0	15,097	0	0

Source: Year Book - 2004

Wood material consumption depends on the quantity of the timber processing enterprises and their demand. Table 1.12 shows the situation of ownership of timber processing mills in Thai Nguyen province and in whole country.

**Table 1.12 Timber Processing Enterprises**

No.	Ownership types	Country	Thai Nguyen Province
	Total	1,200	28
1	State	374	7
2	Private	786	19
3	Joint venture	40	-
4	Cooperative, share	-	2

Major timber processing factories in Thai Nguyen in 2005 are shown in table 1.13

**Table 1.13 List of timber processing mills in Thai Nguyen**

Location	Product	Quantity	Coarse material	Coarse material
Thai Nguyen Particle board factory	Particle board	16.000 m <sup>3</sup>	Eucalyptus, Acacia, Styrax, Manglietia	30-35.000m <sup>3</sup>
Thai Nguyen Forest product stock Co.	Slide board	2.000m <sup>3</sup>	Styrax, Manglietia	2.500-3.000m <sup>3</sup>

Thai Nguyen Particle Board Factory produces particle board and provides the products to the processing enterprises in the North. The production capacity of the Factory is 16,000m<sup>3</sup>/Year.

Thai Nguyen Forest Product Stock Company produces construction timber and slide board. Construction timber is the key product for provincial use and slide board is sold to Binh Duong province

Agro-forestry products of Thai Nguyen Province are i) Tea, ii) Pine Resin, iii) Canarium, iv) Pineapple, v) Bamboo, vi) Cassava, vii) Rattan, viii) Longan/litchi, ix) D.duperreanum, and x) Medicinal plant. These key agro-forestry products contribute for improving local people living.

The table below shows the scale of agro-forestry products produced in Thai Nguyen Province.

**Table 1.14 Agro-forestry products in the province**

Species	Area (ha)	Quantity (ton)	Product and supply of place
Tea	15,841	83,391	Dai Tu, Phu Luong, Dinh Hoa, Dong Hy, Thai Nguyen city, Pho Yen.
Longan/Litchi	8,947	11,071	Dong Hy, Pho Yen, Phu Binh, Dai Tu, Thai Nguyen city
Oranges, mandarin	432	2,029	Pho Yen, Phu Binh, TP Thai Nguyen city
Pineapple	136	568	Thai Nguyen city, Pho Yen, Dong Hy
Cassava	4,179	40,570	Phu Binh, Pho Yen, Dinh Hoa

Source: Year Book 2004 Thai Nguyen

**Table 1.15 Area, quantity of production of species in Phu Binh - 2004**

Species/group of species	Area (ha)	Quantity (ton)
Tea	46	135
Longan/Litchi	1,202	1,065
Oranges, mandarin	77	385
Pineapple	15	25
Maize	1,681	9,838
Cassava	972	7,322

Source: Year Book 2004 Thai Nguyen

Tea is very popular in Thai Nguyen, the main market is Hanoi, and part of product is used in the province and adjunct provinces

#### 2.4.2 Price and transport of agro-forestry products

##### (1) Product price

Agro-forestry products are commonly perennial products and are strongly impacted by natural conditions and way of practice. Consumers pay more attention to the freshness of the domestic fruit. Cassava or maize products are suffering from challenges of imported articles due to competition prices.

Data on prices collected from the province, the product price of agro-forestry collected in the 9 districts and town of Thai Nguyen province. The average price of agro-forestry products are as follows; fruit of Canarium is 5,500 VND, fruit of D.duperreanum is 4,500 VND, Litchi is 5,000 VND, rattan is 5,000 VND, dry tea is 25,000 VND, cassava products is 500 VND.

**Table 1.16 Price of products, agro-forestry in Thai Nguyen**

Unit: VND/Kg

Product	Average price	District/city								
		Dai Tu	Phu Luong	Dinh Hoa	Vo Nhai	Dong Hy	Thai Nguyen	Pho Yen	Song Cong	Phu Binh
Canarium	5,500	5,000	10,000	10,000	8,000	10,000	12,000	12,000	11,000	6,000
D.duperreanum	4,500	3,500	7,000	8,000	5,000	6,000	10,000	8,000	8,000	5,000
Cassava	500	700	1,000	600	600	600	1,000	700	700	500
Rattan	5,000	----	16,000	10,000	----	12,000	15,000	15,000	14,000	10,000
Litchi	5,000	4,000	4,000	4,000	4,000	4,000	6,000	5,000	5,000	4,000
Dry Tea	25,000	32,000	30,000	30,000	30,000	30,000	40,000	35,000	35,000	30,000

Source: Year Book - Thai Nguyen 2004, and price 2005

##### (2) Transportation

The distance from Phu Binh district to Thai Nguyen city ranges from 20 to 60 Km, and 80 Km from Hanoi. There exists good road system for use. It is possible to use

different means of transport as motorbikes or small vans to take products to the market places or processing enterprises. Transport costs show in the table below.

Means of transport	Cost (VND)	Distance (Km)
Motorbike	2,000	1
Small van (500kg to 700Kg)	50,000 - 70,000	15 - 30
Lorry (5ton)	80,000 - 100,000	50 - 80

There are two trading forms at Phu Binh District. Traders come to the producers and they negotiate the price, or producers bring their products to market about 2 to 4 km far, Farmers decide prices and the GOV does no interference.

#### 2.4.3 Target markets

##### (1) Potential markets for wood products

Recent market is a demand for Acacia from the households. As mentioned before, traders usually visit the planting sites to buy up entire lots based on their assessment about its stumpage volume. Aside from the accessibility to the sites, prices offered depend on the species, size, and conditions of logs.

In terms of processing factories, there are a number of factories located inside and outside the province, among which the Thai Nguyen Particle Board Factory is one of the major potential clients located closest to the project area.

##### (2) Potential markets for agro-forestry products

It is not easy to trace the trading of agro-forestry in the domestic market, as it is not clearly indicated in the statistics and the market. Rice and rubber may not be an agro-forestry product. It is able to cultivate tea, coffee, cashew, peanut and pepper as an agro-forestry product together with trees.

The following data may help the trend of production (and sales) in the country.

**Table 1.17 Production of Selected Agro-forestry Products**

Unit: ton

Year	Tea		Coffee		Cashew	
	Quantity	Location	Quantity	Location	Quantity	Location
2000	314.7	Thai	802.5	Dak Lak, Dak	67.6	Dak Lak, Dak
2001	340.1	Nguyen,	840.6	Nong, Gia Lai,	73.1	Nong, Gia Lai,
2002	423.6	Tuyen	699.5	Kon Tum, Lam	128.8	Kon Tum, Lam
2003	448.6	Quang, Ha	793.7	Dong, Son La,	164.4	Dong, Binh Dinh,
2004	487.6	Giang, Son La	834.6	Dien Bien	206.4	Da Nang, Khanh Hoa

Source: Statistical Year Book 2004

It is clear that the markets for Tea, Coffee and Cashew has been expanding slowly but steady and is expected to have further diversification to various many products throughout the country. NTFP has also been contributing greatly for the export, though it is

not very big and steady as the demand and the supply is largely depends on the export market and the climate condition.

**Table 1.18 Export of Selected NTFP**

Unit: US\$ million

Product	2001	2002	2003	2004	2005*
I. Fiber products	77.84	96.37	108.57	148.13	67.93
1. Bamboo and rattan	4.63	7.62	8.83	9.91	4.07
2. Products from bamboo and rattan	73.22	88.75	99.74	138.22	63.86
II. Bee honey	5.67	16.54	18.69	17.93	8.04
III. Medicine material	6.16	6.47	6.75	6.58	2.37
IV. Extraction products	17.99	18.67	20.28	23.57	8.89
1. Illicium verum, Cinnamomum cassia	10.33	11.02	11.72	11.01	5.11
2. Resin and extraction from plant	4.70	4.17	4.94	5.65	2.11
Chemical products with origin from nature	0.05	0.04	0.29	0.86	0.49
Attar from plant	2.92	3.43	3.60	6.04	1.18
V. Products from trees branches and buds	0.42	0.40	0.31	0.85	0.63
Total	203.93	253.48	283.72	368.75	164.68

Source: MARD (2005\* indicates First 5 months of 2005)

## ***2.5 Lesson from other projects***

### ***2.5.1 Completed projects***

In Vietnam, there are several feasible studies for agro-forestry development. In the Thai Nguyen and Bac Giang province, they conducted by two entities namely: Projects of Extension Development by Thai Nguyen Provincial Extension centre implemented and Viet Nam – Germany forest project III (KWF3) in Bac Giang, Quang Ninh, and Lang Son. (It is not called an Agro-forestry project, but this project was planed the multipurpose products of trees, as Pine, *D. duperreanum* + *Canarium*. Some general comments on the practices of the preparation of those feasible studies can be found following:

Beyond the fact that, in an investment project for agro forestry, information relating to consuming market for Agro forestry products in both domestic and international markets is very well, these had been mentioned duly. Such were analyses on the trends of forest products and forecasting about demand of production materials for each type of products.

Almost all studies were conducted on a bottom up approach with sufficient attention paid to demand, capacity, and expectation of local residents. The implementation of project was attractive and appealed to farmer's participation; project's feasibility remained quite high.

Estimation on total investment of project calculated at the time of project preparation mentioning on risks, inflation and bank interest rates, etc. that does reflect correctly the funding needs for the project as well as its economic effectiveness.

In the studies, the analysis on effectiveness of project implementation was very well that mainly described quality of assessments, especially in the financial & economic analyses, judgments based on science and local actual situation of natural and socio

–economic conditions can be used as a baseline data for monitoring and evaluating of project specific outputs.

Some studies have mentioned about project implementation plan, disbursement plan for entire project implementation course, they were reliable and hold a value.

In the specially, KWF 3 made a fund for farmers by credits, that is encourage to implement good working in a project for agro forestry development.

### 2.5.2 Lessons from completed projects

Average investment enough for one-hectare of Agro-forestry ranged from VND 15 – 20 millions.

During project implementation period, with a view to achieve a high productivity, several silvicultural techniques should be applied such as extensive farming techniques, cellular transplant biotech. The multipurpose species selected when them databases of their market in project area or in the outside.

In implementation of a proper benefit sharing, cooperation among project, involving parties should be based on existing laws and regulations.

In order to obtain good achievements for the project, objectives should be identified very clear from the project design phase that based on actual available resource and consuming of forest products market.

## **2.6 Opportunities and challenges in Phu Binh District**

### 2.6.1 Opportunities

Forest land in project area has been allocated to farmers. Those farmers decide the development of forest in a close connection with effective use of land.

Project areas are close to consuming markets such as Thai Nguyen Particle Board factory and enough to meet with local use. Short distance from forest to consuming site of about 30 km has remarkable helped to cut transport fee.

Soils are suitable for production forest and for A.hybrid and A.mangium. Quality of majority of forest lands is fair and good for maintain a yield of 120 m<sup>3</sup> of wood in 7 years. This yield is sufficient to assure local people in implementing Agro-forestry.

As the planting sites are quite close to consuming areas, local peoples are initially familiarized to market oriented forestry production by planting Eucalyptus, Acacia for producing wood materials. Though Eucalyptus brought back a fair volume, A.hybrid has not retained with products, but this shift has marked a change in people thoughts that change from self-consuming production to market oriented

### 2.6.2 Challenges

It is difficult for local people to approach new technologies for applying into Agro-forestry to achieve a high productivity due to their low level of literacy.

Current income in the area is relatively low, most households are considered poor. In the mean time, according to project design, it takes 7 years from the beginning to the time that local people can harvest and sell products. Moreover, local people have no self-mobilizing budget to invest into production forest except the contribution of labor cost.

Currently, loans for development of production forest are not accessible easily. Red book certificate on forestland using right can be used as collateral for bank loans, however, it requires many other procedures. Social Policy Banks is a good source for funding with low interest rate and long repayment period, however, its capacity is rather limited. Despite of its capacity to provide loans, the Vietnam Bank for Agriculture and Rural Development is still not attractive to farmers in borrowing for investing into production forest due to the bank's short repayment period that is not suitable to long business cycle of forestry species as well as its regulation on annual interest redemption policy.



## **PART II    PROJECT CONTENTS**

## 1 PROJECT RATIONALE

The forestry sector of Vietnam is undergoing a basic renovation. The GOV is implementing the renovation of the State Forest Enterprises (SFE). Forestry is used as a tool for poverty alleviation. Land managed by the SFE in the project area is being allocated to farmers. Moreover, the GOV is successful in the reversion of the trend of forest cover reduction. The following challenge is the fast growing demands for timber.

Now, most of the demand is satisfied by imported sources and timber is ranked fifth in imported items of Vietnam in 2005 with the value of 667 million USD. At present Vietnam has the large forest land for agro-forestry. The policy of the GOV is to encourage local people to participate in afforestation/agro-forestry program by means of supporting of relevant policy and part of finance.

In places of abundant land, the GOV may think of the development of commercial forests in connection to the private sector to do this in the hired land. However, following the policy of renewing the SFE and land allocation to people, there happens the situation that many households manage small and medium size plots (0.5 to 2 ha). These forest owners need support as marketing, technology and pests and diseases control. And as for the areas of more poor people may need support as accessing to the financial sources

The distance to timber markets is rather close. So, the project area in Phu Binh district is a rather advantageous position as far as economic point of view is concerned. This may be a good model for the forestry sector of Vietnam and the timber industry sector as well. Phu Binh district has a big potential on timber supply, but not fully exploited. According to field survey results implemented during the project preparation phase, there still exists 35% of farmers manage small and scattered plots, they do not have capacity of exploiting the potential of forest product market and livelihood and most of them have to depend on agriculture production. Moreover, most of land users are under poverty level.

However, the demand for timber is increasing and local people are willingly to participate in supply different markets with timber, there still have two key reasons for interference to improve the province forestry sector:

1. Firstly, not all farmers can deal with agro-forestry development. In the project area, they involved in the PAM program. The farmers enthusiastically participated in the Eucalyptus growing project. Now they are ready to replace the old Eucalyptus by growing Acacia and the initial agro-forestry is supported by the GOV with 80% of Acacia seedling. Nevertheless, this program was halted. Eucalyptus can be sold to pay the cost for replanting. However, at present it is clear that, for most of the poor, cash from selling Eucalyptus is used for repaying debts, maintenance houses. Therefore, if no financial support or preferential price for seedlings/fertilizers etc., they may willingly to keep the old coppice Eucalyptus. The only support to farmers is the signing contracts of buying products with Dong Phu Forest Enterprise. They get cash for their agro-forestry and they will pay the enterprise in kind (timber) for what they got from the enterprise. This way may not be positive as the enterprise buys timber with much lower price comparing to the market price while the farmers have to depend on what said in the contracts and do not

have opportunity to take market advantages. Therefore, only few farmer households can possibly take this system.

2. Secondly, the mechanism of supporting farmer households is insufficient. Some of important activities need to be improved: the linkage between farmer households and credit agency and markets, and transfer of technology.

In Vietnam, some of financial agencies lend the farmer households are VBARD and VSPB. These banks provide credits with the term of 2-3 years and the rate of interest is 1.2% / month. However, the scale of getting necessary loan for agro-forestry of farmer households is small (less than 500 USD/household) and loan term is from 8-10 years. Private traders control the relationship between small forest land owners and market as well as the mills applies the price at landings or mill gates. Traders come to the farm at the harvest time and negotiate with farmers the price of the standing trees. Logging and transporting are duty of traders. Benefit may be increased if farmers link together to arrange price and quantity of supply. The negotiation may be in favor to the producers.

Planting technique need to be improved. Most of the farmers are very much interested in the replacement of the old Eucalyptus by Acacia due to mainly short term rotation of Acacia. However, it is necessary to evaluate the species, silvicultural experience, and pest control in a more systematic manner.

Base on conditions of Phu Binh, it is suitable to carry out agro-forestry, which is better than simple tree planting.

Geographical location of the project area: Phu Binh is the mid-land district located in Nguyen city, and 30 km from Bac Ninh town. It is very easy to transport forest products, easy to buy many products and contact with marketing.

Soils are suitable for production forest such as A.hybrid, A.mangium, Canarium and Duperreanum species. Quality of majority of forest land is fair and good for maintaining a yield of 120 m<sup>3</sup> of wood in 7 years. This yield is sufficient to assure local people in implementing agro-forestry.

Beside roads, railway routes are (i) Thai Nguyen - Da Phuc (Hanoi), (ii) Thai Nguyen - Nui Hong, and (iii) Luu Xa - Kep keep for wider markets.

In the project area, about 200 households own plantations with official land-use rights. Most of these families are eager to replace the old Eucalyptus plantations with fast growing tree species of higher value. The project of agro -forestry development in Phu Binh district, Thai Nguyen province is a step of concretization of national, provincial advocate of socio-economic development the project is suitable to the development orientation at different levels.

## **2 PROJECT OBJECTIVES AND OUTPUTS**

### ***2.1 Overall goal***

The overall goal of the project is to improve livelihood through development of agro-forestry plot in the project area.

### ***2.2 Project objective***

The project objective is to increase the production value of the forest land in the project area by establishing the agro-forestry plots.

The objective of the assistance is to establish agro-forestry plots with five models in the project area. It is planned that the objective of the assistance is achieved by end of the assistance period (2006 - 2010).

The target beneficiaries of the project are farmers who have the land-use right certificates or the red books for the forest land in the project area. The project area is located in the four villages of Tan Hoa commune, Phu Binh district, Thai Nguyen province.

### ***2.3 Project outputs***

The project objective is achieved through realization of the following outputs:

1. The degraded Eucalyptus forests are converted to high productive agro-forestry plots.
2. Agro-forestry development project is managed properly together with monitoring and evaluation.
  - 3.1 Agro-forestry plot designing is conducted properly.
  - 3.2 Institutional capacity for managing the agro-forestry development project and capacity for conducting agro-forestry activities in enhanced.

### **3 PROJECT ACTIVITIES**

#### ***3.1 Project components***

Various project activities are planned to produce the intended outputs of the project. These activities are grouped into three inter-related components as follows:

##### **(1) Component 1: Agro-forestry Model Development**

Agro-forestry is broadly conducted in the project area. Before closing canopy of plantation, it is possible to cultivate short-term agricultural crops such as Cassava in order to increase income. Shadow tolerant species as Canarium, Rattan are planted together with Acacia in the first years. When they need more lights, it is also time for Acacia exploitation. Following five agro-forestry models are applied in the project area under this component.

Model 1: A.mangium + Canarium + Rattan + Cassava

Model 2: A.mangium + Dracontomelon duperreanum + Rattan + Cassava

Model 3: A.hybrid + Canarium + Rattan + Cassava

Model 4: A.hybrid + Dracontomelon duperreanum + Rattan + Cassava

Model 5: A.mangium + Canarium + Dracontomelon duperreanum + Rattan + Cassava

##### **(2) Component 2: Project management, Monitoring and Evaluation**

The project will fund the administration costs of the PIU, as well as the cost of monitoring and evaluation. The PIU will be responsible to ensure efficient implementation of the project and carry out effective coordination with other important stakeholders. Drawing staff from and working closely with Thai Nguyen DARD and Sub-DoF, the PIU is responsible in carrying out the above components as well as facilitating timely supply of materials to participating farmers. PIU is scheduled to operate during the assistance period up to 2010.

##### **(3) Component 3: Technical services**

This component supports development of an enabling environment for agro-forestry development through providing technical services on agro-forestry plot design and conducting training.

###### **(i) Component 3-1: Agro-forestry plot design**

Agro-forestry experts, who are employed by PIU, make plot design for agro-forestry development such as measuring extent of agro-forestry plot, allocation of seedling for establishing proper agro-forestry plot.

###### **(ii) Component 3-2: Training**

This sub-component aims to provide proper technical knowledge and skill on agro-forestry to participated farmers and to strengthen capacity of the staff at the PIU on management of the project.

## 3.2 Project implementation plan

### 3.2.1 Planting site selection

The selection of planting sites is aiming at the identification of area for planting according to project objective (in line with Government's policy, and natural and socio-economic conditions etc.).

Based on findings of site surveys on natural and socio-economic conditions in project area, basic concept on selection of planting site is defined as follows:

(1) Land use policy

Selected sites are planned for agro-forestry plantation. There are no conflicts on land-use rights. Red book is granted.

(2) Land use status and viewpoints of land users

Selected sites are non-forested land, or degraded Eucalyptus plantation and need to be improved.

(3) Natural conditions

Planting sites have similar conditions in terms of soil, rainfall, elevation and, sloping etc., compared to existing agro-forestry plots that have good results

(4) Road and transport facilities are good enough.

(5) Lands for forestry development in Tan Hoa commune.

Land use status	Classification					
	I-1	I-2	II-1	II-2	III-1	Total
Total	99	223	198	0	10	530
Existing forest land	99	221	198	0	10	529
Bare land	0	1	0	0	0	1

Source: Cadastral section of Tan Hoa commune

From the above criteria the study team has worked together with villagers to select land possibly use for agro-forestry development: 140 ha.

**Table 2.1 Lands for agro-forestry development**

Unit: ha

Land	Total	Village Vau	Village U	Village Gian	Village Ngo
Forestry land	173	21	41	78	33
Red Book (BĐ)	140	21	25	71	22
Households	206	42	49	68	47

Source: Cadastral section of Tan Hoa commune

Total of population involved the project in Tan Hoa commune is 206 farmers, including Vau village: 42 farmers, U village: 49 farmers, Gian village: 68 farmers, Ngo village: 47 farmers. Total area for agro-forestry development is 140 ha, including Vau village: 21ha, U village: 25 ha, Gian village: 71 ha, Ngo village: 22 ha.

### 3.2.2 Species selection

Before selecting species for agro-forestry development, the Study team has interviewed some experienced persons on agro-forestry, such as Dr. Nguyen Huu Hong, lecturer of Thai Nguyen Forestry College, staff of Thai Nguyen Sub-DoF and staff of Thai Nguyen Extension Center etc.

The study team has visited to the agro-forestry models in Dong Hy and Phu Luong district of Thai Nguyen province. The study team also (i) reviewed the unit price of some timber categories given by MARD; and (ii) study market trend, living condition of local people, as well as socio-economic and natural conditions in Thai Nguyen province.

The results of discussion with staff of Thai Nguyen Sub-DoF, staff of Tan Hoa commune and the farmers who are on behalf of farmers of Vau, U, Ngo, Gian villages in the Tan Hoa commune is meeting, the species selected as follow:

Wood tree: A.mangium, A.hybrid

Fruit tree: Canarium, D.duperreanum

Agricultural crop: Cassava

NTFP: Rattan

### 3.2.3 Seedling supply plan

#### (1) Seedling supply situation

According to field survey results in the project area, different suppliers provide seedlings; provenance is unknown, uneven quality. At present there are not any agencies dealing with seedling production for agro-forestry. To provide enough seedlings for agro-forestry as plan in Table 2-2, seedlings will be bought from seedling production agencies closed to the project area. Criteria for selection of suppliers: (i) Capacity of seedling production (ii) Distance from nursery to the project area site is not more than 50 km.

There are two companies, that are able to provide seedlings as follows:

a) Gia Sang Seedling Production Station under Thai Nguyen Seedling Center. Production capacity is as follows: (i) A.hybrid: 1,000,000 seedlings/year; (ii) A.mangium: 1,400,000 seedlings/year; Canarium; Rattan and D. duperreanum.

b) Dong Hy Seedling Station belongs to the Thai Nguyen Particle Board Factory. Production capacity is as follows; 1,000,000 seedling of A.hybrid Canarium, Rattan and D.duperreanum per year.

#### (2) Annual seedling supply plan

Based on the annual planting plan, and planting density (1,500 seedlings/ha plus 20% for additional planting, total required seedlings are 1.800 seedlings for one ha), annual seedling supply plan is prepared as following table:

**Table 2.2 Seedling Supply Plan**

Year	2007			2008		2009		2010		Total Number of seedling
	Density	Area	Number of seedling	Area	Number of seedling	Area	Number of seedling	Area	Number of seedling	
Species										469661
A.mangium	1500	11	16500	17.5	26250	43	64500	0	0	107250
A.hybrid	1500	9	13500	12.5	18750	37	55500	9.78	14670	102420
Canarium	300	9	2700	17.5	5250	53	15900	9.49	2847	26697
D.duperreanum	300	11	3300	12.5	3750	27	8100	0.29	87	15237
Rattan	1560	20	31200	30	46800	80	124800	9.78	15257	218057

*Source: Based on the project of agro-forestry plan*

### 3.2.4 Agro-forestry plan

Agro-forestry model has four kinds of products, wood tree (A.hybrid and A.mangium) fruit tree (Canarium and D.duperreanum), agricultural crop (Cassava) and non-timber forest product (Rattan).

Table below shows the combination of four products of each model and the size of the model.

Model	Area (ha)	Wood tree	Fruit tree	Crop	Non timber forest product
Model 1	43	A.mangium	Canarium	Cassava	Rattan
Model 2	20	A.mangium	D.duperreanum	Cassava	Rattan
Model 3	22	A.hybrid	Canarium	Cassava	Rattan
Model 4	37	A.hybrid	D.duperreanum	Cassava	Rattan
Model 5	17	A.hybrid	Canarium and D.duperreanum	Cassava	Rattan

The total of area for agro-forestry development is 140 ha, of which 21 ha for Vau village, 25 ha for U village, 22 ha for Ngo village, 71 ha for Gian village.

**Table 2.3 Annual implementation schedule by agro-forestry models**

Model	Area (ha)				
	total	2007	2008	2009	2010
Total area	140	20.0	30.0	80.0	10
Model 1	43	5.0	10.0	28.0	0
Model 2	20	5.0	5.0	10.0	0
Model 3	22	5.0	5.0	12.0	0
Model 4	37	3.0	5.0	20.0	10
Model 5	17	2.0	5.0	10.0	0



Based on implementation schedule of agro-forestry project, detailed activities are mentioned in the table below.

**Table 2.4 Total of implementation plan for 4 years**

Village	Year	Total area ( ha )	Planting plan ( ha )				Protection					
			Soil preparation	Digging hole	Planting	Supplementary planting	Tending 1	Fertilizer	Disease protection	Thinning	Fire protection	Pestilent Insect
Total	Year	140	140	140	140	140	320	320	320	320	320	320
Giàn village	Year 1	71	5	5	5	5	5	5	5	5	5	
Ngo village	Year 1	22	5	5	5	5	5	5	5	5	5	
U village	Year 1	25	5	5	5	5	5	5	5	5	5	
Vau village	Year 1	21	5	5	5	5	5	5	5	5	5	
Total	Year 1		20	20	20	20	20	20	20	20	20	
Gian village	Year 2	72	15	15	15	15	20	20	20	20	20	20
Ngo village	Year 2	22	5	5	5	5	10	10	10	10	10	10
U village	Year 2	25	5	5	5	5	10	10	10	10	10	10
Vau village	Year 2	21	5	5	5	5	10	10	10	10	10	10
Total	Year 2		30	30	30	30	50	50	50	50	50	50
Gian village	Year 3	72	49	49	49	49	69	69	69	69	69	69
Ngo village	Year 3	22	10	10	10	10	20	20	20	20	20	20
U village	Year 3	25	12	12	12	12	22	22	22	22	22	22
Võu village	Year 3	21	8	8	8	8	18	18	18	18	18	18
Total	Year 3		80	80	80	80	130	130	130	130	130	130
Giàn village	Year 4	72	2	2	2	2	66	66	66	66	71	71
Ngò village	Year 4	22	2	2	2	2	16	16	16	16	22	22
U village	Year 4	25	3	3	3	3	20	20	20	20	25	25
Vau village	Year 4	21	3	3	3	3	16	16	16	16	21	21
Total	Year 4		9	9	9	9	119	119	119	119	139	139

### 3.2.5 *Tending and protection*

#### (1) Tending

(1)-1 wooden tree and fruit tree

It is conducted twice a year at April and September (at beginning and end of the rainy season) and repeated in three years after planting. Soil is turn over around seedling

and shrubs and climber are removed.

(1)-2 crop

It is conducted twice in the first year at April and September (at beginning and end of the rainy season). Soil is turn over around crops and shrubs and climber are removed.

(2) Protection

Prevent from cows, buffaloes, and thieves all the time until harvesting.

**Table 2.5 Tending and protection Plan**

Unit: ha

Activities	Year					
	2007	2008	2009	2010	2011	2012
Tending	20	50	130	119	89	9
Protection	20	50	130	140	140	140

3.2.6 Harvesting plan

(1) Harvesting plan for wood

It is planned to harvest in the eighth year after planting. Harvest will start after the termination of the project assistance period. As for wood harvesting method, clear cutting will be applied (A.hybrid, A.mangium). Buffaloes in combination with manual labor will be used in skidding logs to roadside (loading yards). Buyers will be responsible for harvesting. It is estimated that the average skidding distance will be 150 to 250 meters (it is estimated about 350 meters from the furthest plots to the loading yards).

The estimated standing volume per hectare in the eighth year of the rotation cycle is shown at the table below. The commercial volume of timber at roadside is estimated at 70% of the standing volume.

(2) Harvesting plan for fruit

Canarium, D.duperreanum calculated by their fruits. The commercial volume of Canarium and D.duperreanum fruits are estimated as the table below.

**Table 2.6 Area and Volume of Harvesting by products**

Year		8 <sup>th</sup>	9 <sup>th</sup>	10 <sup>th</sup>	11 <sup>th</sup>	12 <sup>th</sup>	13 <sup>th</sup>	14 <sup>th</sup>	Total
Products and Area		(2014)	(2015)	(2016)	(2017)	(2018)	(2019)	(2020)	
Area of harvesting (ha)		20	50	130	140	140	140	140	
Canarium fruits (tone)		25	60.5	180	224.7	246.6	246.6	246.6	1248
D. duperreanum fruits (tone)		25	60.5	180	224.7	246.6	246.6	246.6	1248
Rattan (kg)		300	600	600	1,200	1,200	1,200	1,200	6,300
Acacia sp.	area (ha)	20	30	80	10	-	-	-	140
	volume (m3)	2,600	3,900	10,400	1,271	-	-	-	18,171

### (3) Harvesting plan for crop

The volume for cassava products is three tones per ha in average. In each year of the forthcoming years, the volumes are calculated as follows:

Year 1 (2007): 3 tones x 20 ha	= 60 tones
Year 2 (2008): 3 tones x 30 ha	= 90 tones
Year 3 (2009): 3 tones x 80 ha	= 240 tones
<u>Year 4 (2010): 3 tones x 9,78 ha</u>	<u>= 29 tones</u>
<b>Total</b>	<b>= 419 tones</b>

### 3.2.7 *Labor requirements*

The total labor required during assistance period (seven years) is 48,380 man-day. The estimation of labor required by year and by activities are shown table below.

**Table 2.7 Estimation of required Labor**

Unit: man-day

Activity	Year 1 (2006)	Year 2 (2007)	Year 3 (2008)	Year 4 (2009)	Year 5 (2010)	Year 6 (2011)	Year 7 (2012)	Year 8 (2013)	Total
Total	280	4,500	7,800	15,337	9,771	7,186	2,066	1,440	48,380
Site design	280	420	1,120	137					1,957
Planting		2,000	3,000	8,000	978				13,978
Tending		640	2,240	5,760	5,373	5,746	626		22,365
protection		1,440	1,440	1,440	1,440	1,440	1,440	1,440	10,080

### 3.2.8 *Training plan*

#### (1) Training Plan at the field level

Two training course is carried out for improving the capacity of farmers implementation of agro-forestry.

First course is training of trainers who are expected to conduct on site training for farmers. Target trainees are communal extension workers, staffs of Phu Binh forest protection office and Phu Binh agricultural and rural development division. Second course is training for farmers who have lands for the development of agro-forestry in project area and participate to the project.

#### (2) Training plan at the level of the implementing agency

The extension workers will be assigned to the PIU. They are required to perform multiple tasks in the fields, including explaining the loan scheme, facilitating farmers to organize farmers' groups and providing technical services in establishing production forests. Therefore, the provision of training to extension workers is considered critical. One-day training course will be offered in the filed of the technology transfer for

establishing agro-forestry. Aside from the one-day training course, most of the training will be carried out through on-the-job training by the specialists of Sub-DoF, DARD, and local experts to be employed under the project.

Aside from extension workers, a project director, finance and planning manager, technical and extension coordinators, and accountant will be assigned to the PIU. They are required to strengthen their capacity in the field of the project management, finance and planning skills, technical and coordination skills as well as the accounting skills. Training in the respective areas will be carried out through the on-the-job training by the experts to be employed under the project, and specialists of DARD in the respective fields. The study trips to other projects will be also organized as part of the training for them.

### 3.2.9 Infrastructure improvement plan

As project scale is small, it is not necessary to build working office. Current road system can connect to the planting sites, so construction of new roads or upgrading transporting roads is not necessary. In addition, there is no need for setting up of nursery, because two seedlings companies are located nearby planting sites and they are capable to supply seedlings in ensured quality and quantity.

Therefore, it is no need to calculate the investing amount and activity plan for infrastructure.

### 3.2.10 Consulting service plan

In order for successful implementation of the project, consultants who have expertise in various fields are employed during the preparation and operation period of the project. Their expertise covers the agro forestry models plots design and training of farmers and PIU staff members.

## **3.3 Schedule for project implementation**

### 3.3.1 Overall schedule for project implementation

Assistance period of the project will be in five years. It is including preparation period and operation period. The overall schedule of the respective components and sub-components during the assistance period are summarized in the table below. It covers a period from 2006 to 2010. The overall schedule may be subject to revision over the course of the project implementation.

In the first year, which is regarded as a preparation period, the preparation works for conducting agro-forestry activities will be carried out. During the operation period from the second to the fifth year, activities directly related to the agro-forestry are undertaken in the field.

**Table 2.8 Overall Schedule of Project Implementation during the Assistance Period**

Calendar Year	2006	2007	2008	2009	2010
Implementing Year	1	2	3	4	5
Component	Period	Operation period			
	Preparation period				
1 Agro-forestry models development.					
2 Project management and M&E					
3 Technical services					
3-1 Agro-forestry plot design					
3-2 Training and institutional development					

*3.3.2 Preparation period*

There are three critical points in the preparation period.

Selecting agro-forestry models, which are suitable for each local region and for each type of soil. Establishing project operational and managing mechanism, including (i) establishment of PIU, (ii) development of financing mechanism for providing credit to farmers who participate to the project, (iii) monitoring and evaluation, and (iv) establishing linkage with material suppliers. Developing a supporting program, including (i) design of agro-forestry plots and (ii) training for project staff and farmers those participate in the project activities.

The implementation schedule during the preparation period is shown in Table 2.9 below.

**Table 2.9 Implementation schedule of preparation period**

Step	Activities	Month											
		1	2	3	4	5	6	7	8	9	10	11	12
1	2-1.Establishment of PIU												
2	1-1.Households selection												
3	1-2 Agro-forestry Plots selection												
4	2-4 Species and fertilizers supply contracts												
5	3-1 Agro forestry model of plots design												
6	2-2.Establishment of a Loan Scheme with a Bank												
7	3-2.Training												
8	2-3.Monitoring and evaluation												

Note: Strategic Partners include seedling centers, fertilizer suppliers, training services provider, design contractors of the agro-forestry plots, and timber buyers.

**Table 2.10: Implementation schedule of Seedling (reference for step 4)**

Activities	Month															
	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Seedling contracts																
A.mangium, A.hybrid																
Duperreanum																
Canarium																
Rattan																
Transportation																

**3.3.3 Operation period**

(1) Schedule for agro-forestry model implementation

There are five agro-forestry models in the four villages as follows:

Model 1: A.mangium + Canarium + Rattan + Cassava

Model 2: A.mangium + Duperreanum + Rattan + Cassava

Model 3: A.hybrid + Canarium + Rattan + Cassava

Model 4: A.hybrid + Duperreanum + Rattan + Cassava

Model 5: A.mangium + Canarium + Duperreanum + Rattan + Cassava

As in the plan, the models (4) and (5) are implemented through four years. Nevertheless, models (1), (2) and (3) are only implemented in three years.

**Table 2.11: Implementation schedule for agro-forestry model**

No.	Model	Year				
		Year 0	Year 1	Year 2	Year 3	Year 4
1	(1)					
2	(2)					
3	(3)					
4	(4)					
5	(5)					

(2) One ha model cycle of agro-forestry activities

Activities during the operation period are directly related to the agro-forestry activities. These activities will cover all the necessary activities for agro-forestry development including work/budget plan; supporting the farmers involved in agro-forestry; agro-forestry plot designing; providing planting materials (seedlings and fertilizer); and managing and protecting the agro-forestry plots.

The model rotation cycle of agro-forestry activities is showed in the following table and this rotation cycle will be repeated in the different locations of the project area during the operation period. It is considered that the first two to three years will be the most intensive period in carrying out the project. The workload will be easing in the fourth year.

**Table 2.12 Model cycle of wood tree activities schedule**

Step	Activities	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year
1	Villager's meetings							
2	Preparation of Detail Agro-forestry Plan							
3	Timber Harvesting Site Preparation							
4	Agro-forestry Plot Design							
5	Delivery of Seedlings and Fertilizer							
6	Refilling							
7	Planting							
8	Beating Up							
9	Tending							
10	Protection							
11	Harvesting							
12	Monitoring and Evaluation							

**Table 2.13 Implementation schedule for fruit trees**

Step	Activities	Implementation schedule for fruit trees			
		Year 1	Year 2	Year 3	Year 4
1	Villager's meetings				
2	Preparation of Detail Agro-forestry Plan				
3	Timber Harvesting and Site Cleaning				
4	Agro-forestry Plot Design				
5	Site Preparation				
6	Delivery of Seedlings and Fertilizer				
7	Refilling				
8	Planting				
9	Beating Up				
10	Tending				
11	Protection				
12	Monitoring and Evaluation				

## 4 PROJECT COSTS DURING THE ASSISTANCE PERIOD

Project costs during the assistance period have been calculated over a period of five years in which all the planting works are scheduled to complete. Total project cost over this period, including physical and a price contingency is estimated at 2,271 million VND.

### 1) Component 1: Agro-forestry Model Development

About 140 ha of agro-forestry plot will be established. The average cost for agro-forestry of one ha is around 11 million VND and the total baseline cost of this component will be 1,534 million VND. Some 48% of cost for this component is for labor, and labor wage is 25,000 VND/man-day. Cost materials is 804 million VND and 52% of this component.

### 2) Component 2: Project management and M&E

Cost of this component is estimated at 206 million VND. The largest part of this cost, 176 million VND, will be for providing support for management fee, equipments, and stationary, and for quality check, 30 million VND will be provided.

### 3) Component 3: Technical service

Cost for this component is estimated at 67 million VND, which is about 3% of the project cost during the assistance period.

### 4) Contingency

Physical contingency have been added at the rate of 5% on the baseline cost (90 million VND). Inflation has been assumed at 5 % and price contingency is based on this projection. Price contingency is 151 million VND.

**Table 2.14 Summary Cost of the Project by financial source during Assistance period**

Unit: 1,000 VND

Project component	%	Total	Loan	State	Household
1. Agro-forestry Model Development	68	1,533,707	804,042	0	729,665
2. Project management and M&E	9	205,745	0	205,745	0
3. Technical service	3	67,377	0	67,377	0
3-1 Agro-forestry plot design	-	22,041	0	22,041	0
3-2 Training and Institute Development	-	45,336	0	45,336	0
(A) Total baseline cost	80	1,806,829	804,042	273,122	729,664
(B) Physical contingency (5%)	4	90,341	40,202	13,656	36,483
(C) Price contingency (5%)	16	373,399	166,163	56,443	150,792
Total (A+B+C)	100	2,270,569	1,010,407	343,221	916,940



**Table 2.15 Summary cost of the Project by year during the Assistance Period**

Unit: 1,000 VND

Project component	2006	2007	2008	2009	2010	Total
Area of 5 models (139,78 ha)	0	20	30	80	9.78	
1. Agro-forestry Model Development	0	168,800	299,870	803,040	261,997	1,533,707
2. Project management and M&E	0	95,969	20,646	50,399	38732	205,746
3. Technical service	10,061	9,482	17,717	26,945	3172	67,377
3-1 Agro-forestry plot design	10,061	2,995	7,987	998	0	22,041
3-2 Training and Institute Development	0	6,487	9,730	25,947	3172	45,336
(A) Total baseline cost	10,061	274,251	338,233	880,384	303901	1,806,829
(B) Physical contingency (5%)	503	13,713	16,912	44,019	15195	90,341
(C) Price contingency (5%)	528	29,516	55,980	199,215	88160	373,399
<b>Total (A+B+C)</b>	<b>11,092</b>	<b>317,479</b>	<b>411,123</b>	<b>1,123,618</b>	<b>407,256</b>	<b>2,270,569</b>

**Table 2.16 Summary Cost of Project by Category during the Assistance Period**

Unit: 1,000 VND

Project component	Material	Labor	Expert services	Salaries	Operating Cost	Baseline cost	Contingency	Total
1. Agro-forestry Model Development	804,042	729,665				1,533,707		
2. Project Management and M&E	86,806		29,507	89,433		205,746		
3. Technical Service			67,377			67,377		
3-1 Agro-forestry plot design			22,041					
3-2 Training and Institutional Development			45,336					
<b>Total</b>	<b>890,848</b>	<b>729,665</b>	<b>164,261</b>	<b>89,433</b>		<b>1,806,829</b>	<b>463,740</b>	<b>2,270,569</b>

## 5 FINANCING PLAN

### 5.1 Financing sources for the project

As the project cost is shown in the Table 2.14, there are three financial sources for the implementation of the project, which are loans, government budget and farmers' fund.

Total loan amount is 804 million VND, accounting for 45% of total baseline cost of 1,807 million VND. Rate of interest is 0.5% per month for 7 years. The loan is used for buying materials such as seedling and fertilizer.

The government budget is used for agro-forestry plots design, training, quality check and management fee. Farmers' fund is calculated for their labor costs.

### 5.2 Loan disbursement and repayment plan

Loan is used for procuring materials and disbursed in the first year. Repayment of principal (one time) is done in the seventh year and interest is paid by annual manner. Loan conditions for one farmer with an area of 0.67 ha are as follow:

Total loan amount: 6 million VND

Rate of interest: 0.5% per month (6% per year), pay interest annum.

Loan term: 7 years (at timber harvest time)

Grace period: 7 years

The table below shows the disbursement and repayment of loan for a farmer with an area of 0.67 ha for agro-forestry model 1.

**Table 2.17 Disbursement for an area of 0.67 ha**

Unit: VND

Year	2007	2008	2009	2010	2011	2012	2013
Implementation year	2	3	4	5	6	7	8
Outstanding loan (beginning of year)		6,006,565	6,006,565	6,006,565	6,006,565	6,006,565	6,006,565
Disbursement	6,006,565						
Repayment		362,767	362,767	362,767	362,767	362,767	6,369,332
- Interest		362,767	362,767	362,767	362,767	362,767	362,767
- Principal							6,006,565
Outstanding loan (end of year)	6,006,565	6,006,565	6,006,565	6,006,565	6,006,565	6,006,565	0
Cash flow	6,006,565	-362,767	-362,767	-362,767	-362,767	-362,767	-6,369,332

The schedule of disbursement and repayment of loans will be in accordance with a seven years harvesting cycle of wood tree from planting to harvesting. Loan disbursement will be conducted from 2007 to 2010 as shown in the table below.

**Table 2.18 Disbursement for an area of 140 ha****Total loan: VND 1,156 million**

Unit: 1,000 VND

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Implementation year	2	3	4	5	6	7	8	9	10	11
Inflation	1.10	1.16	1.22	1.28	1.34	1.41	1.48	1.55	1.63	1.71
Outstanding loan (beginning of year)		136,758	369,654	1,051,592	1,156,126	1,156,126	1,156,126	1,019,368	786,471	104,534
Disbursement	136,758	232,897	681,938	104,534						
Repayment		8,259	22,325	63,511	69,824	69,824	206,582	294,461	729,436	110,847
- Interest		8,259	22,325	63,511	69,824	69,824	69,824	61,565	47,499	6,313
- Principal							136,758	232,897	681,938	104,534
Outstanding loan (end of year)	136,758	369,654	1,051,592	1,156,126	1,156,126	1,156,126	1,019,368	786,471	104,534	
Cash flow	136,758	224,637	659,612	41,023	-69,824	-69,824	-206,582	-294,461	-729,436	-110,847

### ***5.3 Fund flow of the project***

Arrangements to establish loan contracts with eligible farmers will be carried out by the financial institution in close collaboration with the PIU as well as commune PC and representatives of villages and farmers' groups. The financial institution will disburse loan directly to farmers. It is envisaged that farmers will become eligible after becoming a member of farmers' group and having undergone training. The fund flow is shown in the Figure 3 Structural Organization Chart for Project Implementation in Chapter 6 of Part II.

As for the government budget, the provincial government and the district government will release budgets relating to the project management and M&E component and technical service component to the PIU through the district treasury.

## **6 ORGANIZATION OF PROJECT MANAGEMENT AND IMPLEMENTATION**

### ***6.1 General Aspect***

The current government staffs and facilities will be utilized for the implementation of the project. Consultants, assistants and workers will be recruited on demand.

Project Implementation Unit (PIU) will be managed under the Phu Binh DPC and will be provided technical supports from the Agriculture and Rural Development Division (ARDD) of Phu Binh district and DARD of Thai Nguyen Province. PIU do not have financial responsibilities on loan repayment.

Sub-DoF of Thai Nguyen province sets a policy direction of the project, mainly in the technical field through close collaboration with MARD and the provincial government.

The financial institution will provide loans to participating farmers. The financial institution will conduct all necessary paper work for establishing loan contracts following the project-related information provided by PIU. The financial institution will be responsible for managing the loan contracts and handle cash transactions.

### ***6.2 Project Implementation Unit***

PIU will be established as an implementing agency when the Model Feasibility Study for Agro-forestry Development Project in Thai Nguyen province is approved by the donor and the GOV. It is important that PIU needs to select persons who have good capacity and experience in implementation of necessary duty. When the project budget is approved, PIU staffs will be selected from different organizations such as Tan Hoa CPC, DARD, and Forest Protection units of Phu Binh district. These staff will work as part time basis and receive some allowance from the project.

PIU have clear roles and responsibilities as follows.

- i) Set up annual financial and work plan for activities as planting, tending, protection of forest and crops
- ii) Mobilize labor force
- iii) Technical support, coordination of procurement
- iv) Support in sales and marketing in getting loans from financial agencies for farmers
- v) Supervise the project activities implemented by farmers and the use of loans
- vi) Report on periodic results of project activities then submit to Phu Binh DPC

### ***6.3 Other stakeholders***

The budget for the supports for the project management, monitoring and evaluation will be provided by the provincial budget and partly from the district budget. PIU will prepare annual work plan and budgets then submit them to Thai Nguyen PPC through sub-DoF/DARD/DPI and DOF for approval. After the approval by Thai Nguyen PPC, the budget will be channeled through the district treasury to PIU. The expected roles of each organization are as follows figure 3.

### 6.3.1 The Stakeholders directly concern with project implementation

#### a) Seedling supply agency:

There are two seedling supply companies such as Gia Sang Seedling Co. under Thai Nguyen Seedling Center and Đông Hy Seedling Co. under Thai Nguyen Particle Board Co. Contracts between PIU and seedling supply companies will make for seedling supply.

#### b) District Agricultural Material Station will supply fertilizer and others

Role and responsibility: supply fertilizer and others as the contracts between PIU and seedling supply agency

#### c) Vietnam Bank of Social Policies

The bank creates chance for farmers get loans for project implementation. Based on a loan scheme established, the bank provides funds to farmers. The bank conducts loan appraisal and administration and coordinate with PIU to prepare short and medium-term operation plans, and monitor the financial performance of the project.

### 6.3.2 The other stakeholders

#### a) Thai Nguyen PPC

Thai Nguyen PPC approves the establishment of PIU and provides the policy guidance and direction to PIU through DARD/Sub-DoF. Thai Nguyen PPC also supervises overall project implementation, and reviews and approves the annual work and budget plan, and release annual budget for the government portion of the project costs during the assistance period.

Thai Nguyen PPC takes lead in discussion with the financial institution for the establishment of the loan program and ensures effective liaison with relevant agencies and stakeholders, and resolves problems that may arise from the project implementation, especially those beyond control of PIU and the Phu Binh DPC.

#### b) DARD/Sub-DoF

The role and responsibility of DARD/Sub-DoF are as follows:

i) Provide the policy guidance and directions to PIU mainly in the technical field in collaboration with the Phu Binh DPC. ii) Supervise the project implementation and address issues and concerns in collaboration with the Phu Binh DPC, iii) Work with MARD and the local government authorities to establish the loan program and work with the PIU to propagate the project in the project area and other districts, iv) Review and approve the annual work plan of the project, v) Ensure effective liaison with relevant agencies and stakeholders, particularly resolve problems that may arise in project implementation, especially those beyond control of the PIU and the district office, vi) Provide supports and information to the PIU including staff if necessary, and vii) Arrange the evaluation of the project by a third party.

#### c) Phu Binh District PC

Role and responsibility of Phu Binh DPC are as follows:

i) Establish PIU according to the instruction of Thai Nguyen PPC and appoint staff to manage the project, ii) Provide the policy guidance and directions to PIU mainly in the non-technical field, iii) Provide supports to PIU in terms of the financial and human resources, and iv) Oversee the project implementation and address issues and concerns in collaboration with the Sub-DoF.

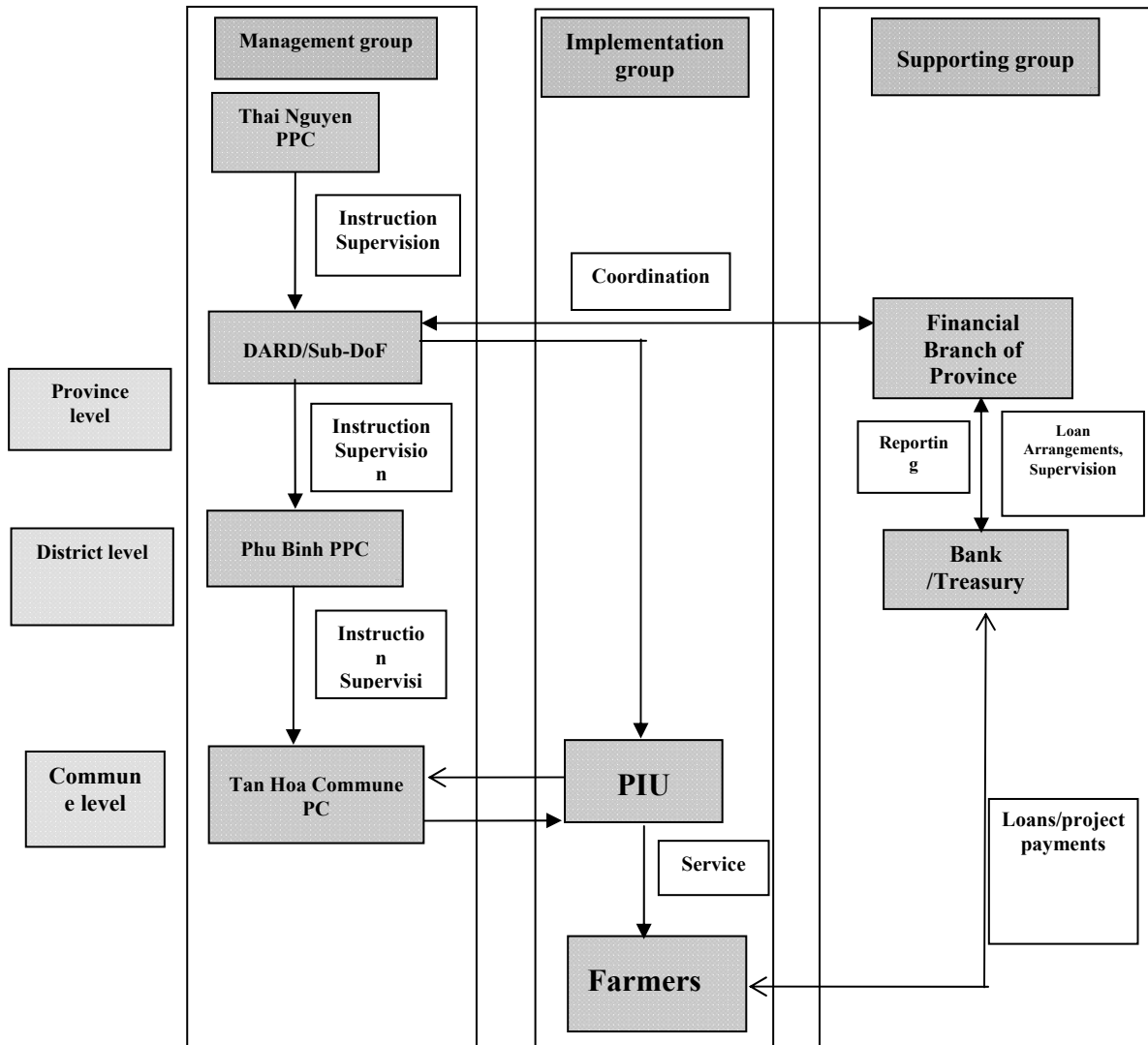
d) Phu Binh District Agriculture and Rural Development Division (ARDD)

ARDD provides all necessary supports to PIU in terms of the financial and human resources.

e) Tan Hoa Commune PC

Tab Hoa CPC provides supports to PIU human resources as project staffs and office space and provides supports to PIU for making financial and implementation plans.

**Figure 1 Organizational structure and fund flow for supporting services and Project management**



## **7 MONITORING & EVALUATION**

### ***7.1 Development impact indicators***

In order to monitor and evaluate the achievement of the project objective and overall goal, the following “development indicators” are utilized:

In order to evaluate overall goal, "Around 130 m<sup>3</sup>/ha/year of commercial wood, 3 tons/ha/year of agricultural product and 1.8 tons/ha/year of fruit are harvested" is set and for project objective, "Around 140 ha of degraded Eucalyptus forest is converted to agro-forestry plot by 2010" is set.

### ***7.2 Progress indicators***

The following progress indicators are used to monitor the progress of the project:

1. Five models of agro-forestry (around 140 ha) are established by 2010.
2. A PIU is established in 2006.
- 3-1. Agro-forestry plot design is conducted properly in around 140 ha forest land by 2010.
- 3-2. Nine training courses for farmers and two training courses for project management staff is conducted.

These key development indicators together with detailed monitoring and evaluation method are shown in the Project Design Matrix.

### ***7.3 Monitoring and Evaluation implementation***

#### ***7.3.1 Monitoring and evaluation team***

Sub-DoF and Phu Binh DPC directly guide monitoring and evaluation activities through the project progress reports. PIU supervises and access results of the project activities by reviewing the monthly, semi-annual and annual reports.

An independent team conducts evaluation mission, which include representatives of VBARD of Phu Binh District, State Treasury, Sub-DARD/Sub-DoF, Economic Unit of Phu Binh District. Phu Binh DPC will issue a decision on the establishment of an evaluation team.

#### ***7.3.2 Operation mechanism***

The M&E team will works in a certain period, and will dissolve itself after completion of the mission. PIU is requested to involve in the monitoring and evaluation process if it is necessary.

#### ***7.3.3 Operation costs***

Cost for the monitoring and evaluation activities will be charged to the project management budget. Each team member will be supported an allowance up to VND 50,000 per man- day.



## **PART III    PROJECT JUSTIFICATION**

# 1 FINANCIAL AND ECONOMIC ANALYSES

## 1.1 Financial analysis

### 1.1.1 *Agro-forestry development model*

The financial analysis is conducted on a one-hectare agro-forestry model. The physical contingency is assumed at five percent (5%) of the baseline cost while the expected rate of inflation is five percent (5%) per annum. The analysis is done on a constant price basis of the Year 2005 by applying a real discount rate of ten percent (10%). The net benefits arising from the without-project case are expected to be marginal and the only with-project case is considered for the analysis.

### 1.1.2 *Expected costs and benefits*

#### (1) Costs

The table below is prepared from some of key information on cost per one hectare in the first year.

At the first year: (i) Labor cost: 25,000 VND/man-day (actual price in the project area), (ii) Fertilizer and seedling cost, (iii) Others (including design, checking and management): 46,136 VND/man-day.

**Table 3.1 Total cost accounts per one hectare**

Item	Price in 2005 (in Tan Hoa)	Quantity per 1 ha
Year 1		
Labor for clearance and planting	3,377,500 VND/ha	
Other costs		
Design	324,336 VND/ha	
Quality check	92,272 VND/ha	
Management fee	365,858 VND/ha	
Seedling		
A.hybrid	530 VND/stem	1250 stem
A.mangium	340 VND/stem	1250 stem
Canarium	13,000 VND/stem	250 stem (125 stem for model 5)
D. duperreanum	1,000 VND/stem	250 stem (125 stem for model 5)
Rattan	500 VND/stem	1300 stem
Fertilizer		
NPK	1,800 VND/kg	450 kg
Microorganism	1,400 VND/kg	300 kg

#### (2) Benefit

The table below shows selling price at household in 2005 and quantity harvested from one ha. As for A.hybrid and A.mangium, the selling price is applied for volume of standing trees.

**Table 3.2 Selling price at household in 2005 and product per ha**

Item	Price in household in 2005		product per ha										Unit		
			0	1	2	3	4	5	6	7	8	9		10	
A.hybrid	367,000	VND/m3									74				m3
A.mangium	337,000	VND/m3									59				m3
Canarium	5,000	VND/Kg							1,063	1,275	1,487	1,700	2,125	Kg	
D. duperreanum	4,000	VND/Kg							1,063	1,275	1,487	1,700	2,125	Kg	
Canarium+D.duperreanum	4,500	VND/Kg							1,063	1,275	1,487	1,700	2,125	Kg	
Cassava	500	VND/Kg		3000										Kg	
Rattan	6000	VND/Kg							260	325	390	455	455	Kg	
Firewood	12,000	VND/stere								10				stere	

Source: Farmers and local cadres of Tan Hoa commune in 11 - 2005

Stumpage price of A.hybrid and A.mangium is 237,000 VND/m3 and 207,000 VND/m3 respectively. The factory gate price of A.hybrid and A.mangium at Thai Nguyen Particle Board factory is 367,000 VND/m3 and 337,000 VND/m3. These prices include transportation cost of 30,000 VND/m3 from landing to factory gate, and logging and skidding cost of 100,000 VND/m3. Thus, the difference of price at factory gate and farm (forest) gate is 130,000 VND/m3; both varieties are harvested in year 7.

D.duperreanum and Canarium have same harvesting year and fruit yield but productivity in different years is uneven. Productivity gets higher in the following years. Harvest happen from the 6<sup>th</sup> year (5 kg in year 1, 6 kg in year 2, 7 kg in year 3, 8 kg in year 4 and 10 kg in year 5 and 85% of trees can be harvest (250 x 85% = 213 trees)).

Rattan productivity annum increases by 0.5 kg per clump, but the increasing productivity annum obtained due to the increased harvested clumps. Rattan is harvested from 6<sup>th</sup> year (productivity in year 1 = 40% of planted clump at the beginning. Year 2= 50%, Year 3 = 60%, Year 4= 70%, and Year 5= 70%).

The analysis period is for an 11 years including preparation period (Year 0). That means the wood trees (Acacia sp.) are already for harvest. Agriculture product (Cassava) and NTFPs (Canarium, D. duperreanum and Rattan) have been harvesting for 5 years, which brings about benefits to the project. No analysis is done for the following years, as data are difficult to identify.

Acacia wood materials are product is mainly consumed by Thai Nguyen Particle Board Factory. Agriculture products and NTFP are domestically used in the province (in Thai Nguyen market places).

### 1.1.3 Results of financial analysis from a total investment view point

Analysis of total investment only deals with benefits and direct costs. The table below will show results of analysis by total investment point of view (constant price in 2005).

**Table 3.3 Result of analysis by Total Investment Point of View**

Unit: 1,000 VND

Model		NPV (Discount rate is 10%)	IRR	B/C ratio
Model 1	1 ha	13,426	24%	1.92
	43 ha	495,644	23%	1.90
Model 2	1 ha	13,532	28%	2.19
	20 ha	239,735	28%	2.18
Model 3	1 ha	15,757	30%	2.36
	22 ha	305,184	29%	2.34
Model 4	1 ha	15,673	25%	2.05
	37.49 ha	453,271	24%	1.97
Model 5	1 ha	15,714	27%	2.19
	17.29 ha	233,778	27%	2.17
Total	139.78 ha	1,727,612	25%	2.05

Although results of the five models are different, according to the investment criteria applied, the feasibility of the five models has been confirmed as follows: NPV is positive; B/C ratio is more or less 2; the value of IRR is from 23% to 30%. However, it should be noted the net cash flow from total investment viewpoint of model 1, for instance, reveals negative values in 2005 constant price up to Year 7 and after harvest, net cash flow becomes positive.

#### *1.1.4 Sensitivity analysis*

As an example, the results of sensitivity analysis by total investment viewpoint of one ha model (Model 1) show that:

##### (1) Input price

When labor price is going up by 50,000 VND/man-day then the NPV is still 6.3 million Dong, IRR= 16%, B/C= 1.29.

When seedling of Canarium is up by 150%, means 19,500 VND/seedling, then the NPV is 11.7 million VND, IRR= 21%, B/C= 1.71.

When combining unit price per man-day and price of seedlings of Canarium, if the man-day is increasing up to 50,000 VND/man-day and price of Canarium is 19,500 VND/seedling, then the NPV is 4.6 million VND.

Through the above analysis, if considering the index of NPV, IRR and B/C ratio, it is said that this agro-forestry model is of high feasibility.

##### (2) Output price

When the price of Acacia is going down to 30% (62,100 VND/m<sup>3</sup>) of the base case, then NPV is still 9.4 million VND, IRR= 20%, B/C= 1.64.

When the price of Canarium is going down to 30% (1,500 VND/kg), NPV is 2.3 million VND, IRR= 13%, B/C= 1.16.

When combining the decrease in selling prices of both Acacia and Canarium at the same time (the price of timber is going down to 30% and Canarium to 30% of the base cases), then the NPV becomes negative. The feasibility of the model is questioned in this case.

#### 1.1.5 Results of financial analysis from an owner's viewpoint (0.67 ha model)

The net cash flow from a farmer's viewpoint is obtained by combining the net cash flow from loan disbursement, principal and interest repayment with the net cash flow from a total investment viewpoint.

Loan is used for materials (seedlings and fertilizer). Loan sum for a household (an area of 0.7 ha) is as follows; Model 1: 6 million VND, Model 2: 3.2 million VND, Model 3: 3 million VND, Model 4: 6.2 million VND, and Model 5: 4.8 million VND.

The proposed financial agencies, which can provide loans in the project area, are VBSP and VBARD. Due to the loan duration of the project, loan conditions are referred to the VBSP during the analysis. Conditions for getting loans are as follow:

Loan sum: 3 to 6 million per household, borrow one time in year 1, and repay at the end of the loan term

Interest: 0.5%/month (6%/Years), payment of interest annually

Term: 7 years (At the harvest time of Acacia)

Grace period: 7 years

Analysis results underneath will rely on an angle of a household with an area of 0.7 ha. Analysis results are shown in table below:

Unit: 1,000 VND

Model		NPV (at discount rate of 10%)	IRR
Model 1	0.67 ha	10,586	37%
Model 2	0.67 ha	9,918	38%
Model 3	0.67 ha	11,467	41%
Model 4	0.67 ha	12,150	40%
Model 5	0.67 ha	11,808	40%

Based on the results of analysis mentioned above, most of five models have the NPV value of more than 10 million VND, at the discount rate of 10%, in which model 4 is the biggest (12 million VND). IRR index of five models is between 37% and 41%; this implies that the project is highly feasible.

Looking at the net cash flow diagram, from year 1 to year 10, the net cash flow is negative particularly in year 1 and 2 (planting and tending year). However, from year 7 onward harvest is starting so the net cash flow becomes positive, particularly the year 7 the highest one (Harvesting year of Acacia).

## 1.2 Economic analysis

Prerequisites for analysis as the parameters of input/output prices, plan of agro-forestry, product sales plan, do not change comparing to financial analysis. It is considered that prices used for the financial analysis are competitive and less distorted. Therefore, economic analysis is conducted in a similar way to financial analysis (analysis of total investment viewpoint for 140 ha) in the conditions given.

**Table 3.4 Analysis on the point of view of the GOV for the whole project (140ha)**

Five agro-forestry models		NPV (discount coefficient 10%) Unit: 1,000 VND	IRR	B/C ratio
Total	139,78 ha	1,727,612	25%	2.05

With the results of economic analysis by GOV point of view the NPV value of the project will be 1,728 million VND; IRR = 25% and B/C ratio = 2.05. Therefore, it is possible to say that all agro-forestry models are of high feasibility.

## 2 EVALUATION OF ENVIRONMENT IMPACTS

Study items	Open land	Eucalyptus	Acacia	Pine
Vegetation cover	15 - 20%	5 - 10%	30 - 40 %	20 - 30%
Surface humus	Very little	Very little	Medium	Little
Soil moisture	Dry	Dry	Humid	Cool
Soil erosion	Heavy	Medium	Very little	Little
Surface water	No	No	Water available	Little water
Ground water	6-7 m	6-7 m	4-5 m	4 -5 m
Pollution in rainy season	Strong, muddy water	Black water	Clear water	Clear water

As for vegetation cover, soil erosion, surface humus, surface water, soil moisture, ground water, possible impacts are examined. Air environment in the forested area is often cool and healthy Soil in Eucalyptus plantation is often dry, compressed, poor operation of microorganism comparing to site of other tree species.

For a long time no guidelines for evaluation of impacts especially for agro-forestry and solutions for overcoming, however the following impacts can be seen:

Positive	Negative	Solutions
<ul style="list-style-type: none"> <li>- Increase the cover.</li> <li>- Production forest development</li> <li>- Land use reasonably</li> <li>- Limitation of flood, regulating surface and ground water</li> <li>- Good environment</li> <li>- More tree</li> <li>- Absorb carbonic ...</li> </ul>	<ul style="list-style-type: none"> <li>- Reduce numbers of useful insects that support agriculture and forestry production</li> <li>- Over use water</li> <li>- Reduce bio-diversity</li> <li>- Over use of fertilizers/ pesticides</li> </ul>	<ul style="list-style-type: none"> <li>- Diversify trees and crops</li> <li>- Planning for use of surface/ground water reasonably</li> <li>- Mixed planting of different species, multi-purpose trees/crops</li> <li>- Improve and enrich the soil</li> <li>- PIU for agro-forestry project</li> </ul>

### **3 EVALUATION OF SOCIAL IMPACTS**

#### ***3.1 Impact on ethnic minority groups***

There are three ethnic minority groups in the project area namely, Nung, Tay, Hoa, accounts for 40% total population of the project area. In the process of project implementation, all ethnic minority groups can participate in agro-forestry.

A few ethnic minority households of Tan Hoa commune are under lower knowledge. They used to keep present way of practice and they are not ready to involve in this project. In order to promote participation of ethnic minorities, it is need to explain and to get understanding that it is necessary long time to generate incomes from agro-forestry project. As for this reason, it is necessary to provide them a good picture on income generation plan to special minority households.

#### ***3.2 Evaluation of social impact to households***

It is estimated that each household establishes 0.7 ha of agro-forestry plot and invests about 12.8 to 15.8 million VND. Among this investment, 9.1 million VND is used for labor cost and it is expected to contribute by household. When farmers have spare time on off-farm time, they may work as labor and get additional incomes. If farmers spend their off-farm time to involve other work instead of agro-forestry activities as contribution for establishing agro-forestry plot, they can get 25.000 VND/man-day of wage. The sum of 9.1 million VND for labor cost is considered as opportunity cost. It is assumed that lose of this opportunity cost give negative impact to household economy.

#### ***3.3 Special consideration for women's participation in training program***

Women carry out multiple tasks. They not only take care of the households but also participate in productive outdoors activities. Many women are interested in participating in a project that will provide chances of income generation for the households. However, it was noted that men often control the main investment activities in the project area. Women also appear to be busier than men during the daytime and they may not be able to participate in training programs to be provided by the project. Therefore, special consideration will be given in order for women to receive information on the project and participate in the training program. For example, training programs are scheduled to fit into their daily schedule.



## **4 SUSTAINABILITY**

### ***4.1 Sustainability of technical aspects***

Technical standards for agro-forestry is referred to JICA project in Hoa Binh province and KWF3 project in Bac Giang province, and is also referred to “Planting techniques for some forest species” published by Agriculture Publish House in 1994.

In order to set up agro-forestry plot design, field survey and interview are conducted on advantages and disadvantages of agro-forestry and on cultivation system of farmer in the project area. Furthermore, as for agro-forestry models proposed, Discussion is conducted on experiences of agro-forestry development among agriculture and rural development division and forest protection division of Phu Binh district as well as Sub-DoF and Thai Nguyen Agriculture and Forestry University.

### ***4.2 Sustainability of economic aspects***

The strong demand for wood is expected to contribute to the sustainability of the project. According to the market analysis, demands for woods in the province and neighboring provinces including Hanoi are likely to remain high. At present, the total annual wood demand in Thai Nguyen province is estimated at about 65,000m<sup>3</sup> and there is shortage of wood. Consequently, many processing factories are not able to operate at full capacity. In addition, the economy of Vietnam and other East and Southeast Asian countries is growing at a fast rate. It is expected that demand and prices for wood continue to high. Currently many large international paper companies as well as other wood-based industries are paying close attentions to the potential of Vietnam’s forestry sector as a major wood supply base of the region. Fruit products, crops and non-timber forest products are easy to sell in the markets at Thai Nguyen province, Hanoi and neighboring provinces.

### ***4.3 Other aspects of sustainability***

Participating farmers will be trained in production forestry. They are expected to gain the necessary skills to continue their agro-forestry activities after the end of the assistance period of the project. In addition, soil improvement through establishing new agro-forestry plots is expected to contribute to the sustainability of land-use. Finally, the project will use the current government structure as much as possible. It is envisaged that experiences gained through the project implementation will enable governments to replicate similar projects elsewhere in the future.

## **5 PROJECT RISKS AND MITIGATING MEASURES**

There are numbers of project risks that could possibly pose threats to realization of the outputs and project objectives.

### ***5.1 Delayed approval and policy changes***

One major risk at the initial start-up stage of the project is that the necessary decision to establish PIU is not promulgated by the provincial government. This causes delays or failures of the project implementation. The government policy changes to support development of production forest will be another risk particularly at the phase where the achievements of the project are to be disseminated. Close dialogue with the governments will be essential to avoid or mitigate negative impacts when these risks are realized.

### ***5.2 Lack of appropriate loan scheme***

One major risk is that the loan scheme is not agreed with VBSP, with terms and conditions in line with similar projects in Vietnam. It is crucial that farmers are able to access loans as individual borrowers. The World Bank has introduced a loan program for production plantation in FSDP, which is funded with long-term and low-interest loans. MARD/DARD support is needed to introduce this type of the loan scheme in the project area using funds from the government, VDB, and/or external donor agencies and to channel them to farmers through financial institutions.

### ***5.3 Pest and disease outbreaks and occurrence of natural disasters***

Heavy concentration on one or two species always carries the risk of a pest or disease outbreak. However, so far, no such outbreak has occurred in *Acacia* sp. and project authorities will need to exercise constant vigilance against possible outbreaks of pests and diseases. In case of the outbreaks, concerned institutions such as MARD and Forestry University will need to be quickly mobilized to take counter-measures before such pests and diseases take hold. Occurrence of natural disasters and erratic weather patterns will be also the risks to the project. These need to be monitored and mitigation measures to recoup damages will be promptly taken in collaboration with relevant government authorities.

### ***5.4 Market and price***

The harvest will be started in the eighth year after the planting. Markets and prices of wood materials will remain unpredictable although it is expected that the trend will be upwards. It is also uncertain how the small-scale wood markets will develop. It is important that farmers are well informed about market trends and price changes of wood materials and that market diversification is pursued under the project. Moreover, payment should be promptly done as agreed between farmers and buyers. Furthermore, it is important for MARD/DARD to continue to explore potential markets and to expand market linkages.

## **PART IV CONCLUSIONS AND RECOMMENDATIONS**

# 1 CONCLUSIONS

The project established based on the documents from Phu Binh district and Tan Hoa commune, also based on the field survey. This is a base document for analyzing social activities in project area.

The project develops the degraded forests in Thai Nguyen province, which is expected to contribute to the livelihood improvement of farmers and increase production values of the forestry sector. About 140 ha of degraded Eucalyptus cut down and replace to agro-forest plots with Acacia, Canarium, D.duperreanum, Cassava and Rattan. At the same time, support provided to create a sustainable loan system.

The financial analysis indicates that the investments are viable. Farmers are likely to find new plantations attractive. In fact, those who can afford to make these investments in Acacia plantations are already doing so. The project will enable the farmers to participate in this process. The quantifiable economic benefits of the project will include increased domestic supply of wood materials, and it will reduce imports. In addition, the plantations will improve the environment. In particular, it will reduce soil erosion and surface run-off of the area. The rate of return indicates the project is desirable.

Thai Nguyen province is a generally well-endowed province, located near to markets, and having good implementation capacity. Farmers are generally dynamic and interested in investments that will improve their livelihoods. Therefore, the overall conditions are favorable for developing production forest and the project is likely to be successfully implemented. The experiences in Thai Nguyen province should provide lessons learnt to other provinces that will like to develop production forest. The project proposal calls for participation of financial institutions to assist capital-poor farmers who undertake to develop production forest with long gestation periods. Some initiatives of this type are already underway in central Vietnam with support of the World Bank. Having a similar model for other provinces in Vietnam will help promote production forest across the country.

## **2 RECOMMENDATIONS AND FOLLOW UP**

### ***Approval of Establishment of a PIU***

The establishment of a Project Implementation Unit will be the very first step of the project. Delay of the approval will cause delays of or may result in failures of the project implementation. It is recommended that the provincial government will issue the approval of the PIU at the appropriate timing.

### ***Needs for an Innovative Loan Scheme***

The establishment of an innovative loan scheme is fundamental of this project. The role of MARD/DARD as well as the Thai Nguyen PPC is crucial to facilitate financial institutions to prepare an innovative loan scheme preferable for farmers. An example has been provided by the World Bank's project implemented in the central region. It is recommended that MARD/DARD start discussion with the VBSP and VDB to agree a loan program based on its experience with the World Bank project.

### ***Organizational Strengthening***

The establishment of the PIU in promoting agro-forestry by providing loans to farmers is a quite new idea in the country. The extent of their responsibilities and roles has been recommended and described in this report but the approach is still unproven in practice. It is crucial that PC of the province issue an approval for establishment of the PIU, PC and DARD provide a full support to the project and maintain a close communication with the PIU. It is recommended that the extension officers at PIU will have training sessions from the Extension Centre of DARD. It is also proposed that the Extension Centre will carry out training to the farmers on silvicultural. Finally, it is proposed that the members of the PIU will visit various on-going forestry projects in Vietnam to acquire lessons learned accumulated in other projects.

### ***Integration with Other Forestry Initiatives:***

The project is taking place in the context of the national program for forestry sector Vietnam. Forest Sector Support Program (FSSP) has been set up in order to guide stakeholders to this process. Prior to implementation, close consultation with FSSP is crucial.

### ***Dissemination of Correct Information***

In order to avoid possible misunderstandings about the time required for the trees to be harvested, it is crucial that the implementing agency will inform the farmers with a full detail of the project scheme and potential risks that they may face. It is important that staff at commune PCs will be fully informed about the project and loan scheme implemented in the project.

## **ANNEXES**

## **Annex 1a: Physical features and socio-economic of the project area**

### **1.1 Socio-economic conditions**

Geographical location:

Hoa commune has border

North, bordered to: Tan Thanh commune, Phu Binh, Thai Nguyen

South, bordered to: Luong Phu commune, Phu Binh, Thai Nguyen

East, bordered to: Tan Kim commune, Phu Binh, Thai Nguyen

West, bordered to: Huong Son town, Phu Binh, Thai Nguyen

Coordinates: 21<sup>0</sup>23'73" – 21<sup>0</sup>23'79" NL

106<sup>0</sup>02' - 106<sup>0</sup>08' EL

### **Climate**

(1) Mean annual temperature and rainfall

Information collected from hydrometeorology stations (Phu Binh, VND Hy, Thai Nguyen city) the project area is located in the tropical monsoon area of two distinctive seasons:

Hot and humid season, lots of rain fro April to October

Dry season, less rain, fro November to March

Number of sunny hours in the year: 1,217 to 1,380 Hours.

Mean temperatures annum vary from 22,9<sup>0</sup>C to 23,7<sup>0</sup>C.

Mean rainfall: 1,674 mm to 1,919 mm in May, June, July and August

Mean humidity: 81% - 82%, max in June July and August; and min in November and December

(2) Weather

The temperature is not stable and high in months June, July, and September and low in months 1, 2, 3 and 12 (data of recent 10 years of Phu Binh). Rainfall is not evenly distributed. Most of rain happens in months 6, 7, 8, and low in months one and 2 (data of recent 10 years of Phu Binh)

(3) Typhoon:

The prevailing wind is the Southeast Wind in summer and Northeast Wind in winter. The windy regime is abnormal, which causes typhoons in months 7, 8 and 9 with local hails

Uneven rainfall distribution results in water logging, erosion that make big problem for agriculture and forestry production

The study of hydrometeorology shows that the climatic and weather conditions in Thai Nguyen in general and in the project area in particular is rather diverse, but in general advantageous for the growth of natural vegetations, trees and agriculture crops

Typhoon, whirl happens in rainy season that poorly impacts on A.hybrid as it is fragile species

Hydro

(1) Stream/river, lake/reservoir and irrigation system:

(2) Gentle sloping topography (8-15<sup>0</sup>), so no stream/river, exist in the project area

The project area has five reservoirs (two ha) that supply water for 2-crop field (20 ha), and 1-crop field (173.6 ha).

In villages, 20% of households has ponds, but small ones (about 100 m<sup>2</sup>) for daily use and gardening

### (3) Irrigation potential and water transport

As mentioned above, the water transport potential in the project area is nothing.

Now, households dig ponds closed to their homes for fish rising and gardening. Agriculture production depends on storm water.

#### **Farming system**

It is not specified which poverty criterion is used for the calculation. However, it can be assumed that the poverty rate of the district in 2004 will be based on the food poverty standard. Food poverty standard in 2004 is VND 124,000 per capita per month in rural and VND 163,000 per capita per month in urban. Government poverty standard in period 2006-2010 is VND 200,000 per capital per month in rural and VND 260,000 per capita per month in urban. The data in the district use per capita average monthly gross income as a base for the calculation. It has not been confirmed that the statistics is based on the government poverty standard.

Based on the Government poverty standard, the Study Team selected 3 groups of household: 3 rich, 3 medium and 3 poor households in each village to interview on cultivation, and 36 farmers were interviewed from 4 villages: Regulation of rich, medium and poor household by the Viet Nam government' regulation for the countryside's in the mountainous area.

#### (1) Rich and better of household:

They have Labors, fund available, agriculture land consists of paddy land and corn cropland and forestland and less diseases, experienced in production, Good protection of their crops. They have had training on planting new species, Chances to learn experience from others.

Tools for production: Each householder has 1-2 pumping machines, one pluck rice machine; few have plough machines, bulldozers. Average gross income per household is about VND 36 – 50 million from agriculture and others and pension

#### (2) Medium household:

They have Labors, funds, land available, fewer diseases, small experience in production, and have had Opportunity: Training on planting new species. Each householder has pumping machine and pluck rice machine. Average gross income per householder: 22-23 million VND/year, mainly from agriculture production

#### (3) Poor householder

They have had Labors available. They also have opportunity of training for growing new species.



## 1.2 Agriculture production

Agriculture production accounts for larger part in the district economy, food production is for subsistence.

**Table A1.1: Criteria for economic development period 2001- 2005 in Phu Binh**

Criteria	Unit	5 years implementation results 2001-2005				
		2001	2002	2003	2004	2005
Economic growth	%	5,75	8,66	5,40	6,33	8,00
Per capita	Mil. VND	1,97	2,15	2,29	2,77	3,21
Food	Ton	58.075	65.611	64.540	66.698	67.000
Per capita	Kg	420	471	459	471	477
Fruit tree area	Ha	1.882	2.232	2.582	3.007	3.000
Land use coefficient	Time	2,25	2,35	2,31	2,32	2,4
Meat	Ton	8.425	8.827	9.872	10.602	11.000
Reduction of poverty rate	%	15,66	11,33	8,25	6,99	36,09

Note: Only estimation for 2005, (Source: Phu Binh Agriculture Section)

(1) Cultivation: Sub-cultivation system is the child system and is the center of the cultivation system, the structure decides the operation of other child system as livestock, processing...

(2) Formulas of rotational cultivation and poly-culture (intercropping, overlapping cropping...)

The cropping system in this area is very simple with few species: Eucalyptus sp. account for 90% of plantations area, and then Acacia.

Eucalyptus plantations planted by PAM funds since the 90s, they are remained with coppice crops

(3) Total product quantity

In the recent years, the irrigation system was well exploited, so cultivation area was expanded and effectiveness of land use improved greatly

In 2004, drought happens seriously, the winter crop was poor, and total quantity of crop is low

**Table A1.2: Total agriculture product - 2004**

Unit: ton

Item	Village U	Village Gian	Village Ngo	Village Vau	Tan Hoa	Phu Binh	Thai Nguyen
Rice	160.00	144.00	200.00	49.60	2.952	56.640	314.387
Maize	96.00	27.00	9.00	32.00	510.1	9.838	54.558
Sweet potato	90.00	10.00	10.00	0	556	7.254	55.653
Taro	0	0	0	0	21	419	0
Soya bean	0	0	9.00	0	35	790	4.317
Ground nut	108.00	7.00	9.00	0	34	1.478	5.047
Sesame	0	0	0	0	0.27	5.3	0
Red bean	0	0	0	0	28	398	0
Vegetation	0	0	0	0	211	7.276	0
Cassava	125.00	30.00	13.00	32.00	551	7.254	40.570
Potato	0	0	0	0		1.213	0
Tea	0	0.20	0	2.00		0	83.391
Pineapple						25	568
Others						1.065	11.079

Source: Interview in four villages, organizations in Phu Binh

### 1.3 Forestry production

Eucalyptus (PAM project) is dominant in this area, and now these plantations are allocated to households for long-term management (50 years). Farmers grow litchi as well. In recent time, the value of litchi is low and people want to replace litchi with others

**Table A1.3: Timber products and NTFP**

Item	Unit	Village U	Village Gian	Village Ngo	Village Vau	Tan Hoa	Phu Binh	Thai Nguyen
Timber	m3	9.00	12.20	13.00	10.00	150.2	774.07	22,700
Firewood	Ster	108	144	192	166	6.342		290,140
Fruit	Ton	45.00	7.00	1.00	14.00	340.0	1.475	12,813
Food							135.0	83,391

*(Source: four Villages; organizations in Phu Binh)*

### 1.3 Livestock

#### a) Cattle:

As for cattle, controlled grazing from Feb. to October and from Nov. to January free grazing is applied on harvested rice fields.

Grasses are planted under the tree canopy for fodder. If lemon grass is planted under 360 m<sup>2</sup> of litchi canopy with good, caring the fodder is enough for two cows per year.

#### b) Pig:

Pig (sow and porker), swine's are sold and some is kept o continue raising

Pig manure is used for cultivation or gas production for fuel  
The VAC ecosystem is available in the project area.

c) Poultry: Chicken, duck ... but the problem is now flu happens in area, and numbers of individuals reduce greatly.

**Table A1.4: Livestock - 2005**

Item	Unit	Village U	Village Gian	Village Ngo	Village Vau	Tan Hoa Co.	Phu Binh D.	Thai Nguyen
Cattle								
Buffalo	Head	100	120	70	100	637	11,990	112,346
Cow (beef)	Head	50	20	30	50	211	7,052	40,485
Mother cow	Head	100		11	50	401	9,035	0
Porker pig	Head	400	600	520	800	4032	69,799	502,447
Sow	Head	200	130	180	200	1581	25,046	0
Poultry	Head	500	3,600	6,500	9,000	40,000	0	4,375
Fish	Ton	70	1	5	16	200	600	3,749

(Source: four Villages; Phu Binh statistic section, planning section-DARD)

#### **1.4 Rural industry**

Brick production is one of the rural industries in the project area. Brick is used for domestic construction and sold to other areas.

Bulldozing and filling in is a new profession but brings about high income.

Transport of materials and products is by cart, horse cart or lorry.

### **2. Assessment of natural, socio-economic conditions, people's life**

#### **2.1 Assessment of natural, socio-economic conditions**

As the natural conditions mentioned above, it is possible to conclude that the conditions for the identification of agro-forestry area in the project area.

There are four key ethnic groups in the project area. They have friendly relation. The knowledge is fairly even and advantageous for project activities.

Main income of local people is taken from agriculture: rice, maize, corn crops and fruit trees, and livestock. In addition, income of ranked households can be seen below:

Rich households: As land use, coefficient is 2.5 -3 times, food source is corn which is used for daily living and raising animals. Products can be sold are animals (buffalo, cow, pig, chicken, duck and mushy duck).

Medium households: As land use, coefficient is 2.5 times, so income is something similar to that of the rich households with a bit smaller quantity. Products can be sold are animals.

Poor households: Income is limited and is used for life. Nothing to sell for cash and land use coefficient is only 1.0 –1.5 times.

Poverty rate is 36.09% (2005) in Tan Hoa commune according to Phu Binh statistics.

#### **2.2 assessments of social conditions**

There are cooperatives and agriculture service cooperatives in the villages, on the other hand many ethnic groups are living in the same location and having no conflicts. This is a good condition for the organization of agro-forestry and agro-forestry activities.

## Annex 1b: Agro-forestry model

### (1) Model 1:A.mangium + Canarium +Rattan +Cassava planted in year 1

#### Arrangement:

Plot size	= 50 m x 50 m
Distance for A.hybrid	= 2,5 x 2,5 m
Distance for Canarium	= 5 m x 5m
Distance for D. duperreanum	= 5 m x 5 m
Distance for rattan	= 0,3 x 0,3m
Distance for cassava	= 0,3 m x 0,3 m
Agro-forestry (Model 1) S =2,500m <sup>2</sup>	

	Activity	Unit price	Man-day	Revenue
I	Direct man-day	26568	25	664200
1	Vegetation treatment	26568	6	159408
2	Digging	26568	6	159408
3	Digging hole	26568	2	53136
4	NPK	26568	2	53136
5	Seedling transport & planting	26568	2	53136
6	Vegetation clearing	26568	3	79704
7	Protection	26568	3	79704
8	Cassava harvest	26568	1	26568
II	Materials		1647	2068650
1	Seedling		1215	1316250
	A.hybrid (including supplementary planting)	340	375	127500
	D.duperreanum	13000	75	975000
	Canarium	500	390	195000
	Rattan	50	375	18750
2	Cassava		432	752400
a	Materials		376	651600
	NPK for agriculture crops	1800	313	563400
	NPK	1400	63	88200
b	Microorganism		56	100800
	NPK for agriculture crops	1800	56	100800
III	NPK		5	230680
1	Others	46136	2	92272
2	Agro-forestry design (level 2)	46136	1	46136
3	Quality check	46136	2	92272
A	Management fee		1677	2963530
	Total estimation		0	
I	Tending in year 2 - 10		42	1174560
1	Direct costs		39	1036152
	Labor	26568	11	292248
	Vegetation clearing (time 1 and time 2)	26568	10	265680
	Weeding, digging around	26568	18	478224
2	Protection		3	138408
	Others	46136	2	92272
	Quality check	46136	1	46136
II	Management fee		31	823608
1	Cost for collection of product	26568	14	371952

2	Canarium collection	26568	10	265680
3	Rattan collection	26568	7	185976
B	Logging in year 7		73	1998168
C = A+B	Total estimation		1750	4961698

Product harvested

Model 1: S = 2,500 m<sup>2</sup>

No.	Item	Unit price (VND)	Quantity (Kg)	Revenue (VND)
I	Product			7258500
1	Firewood (Unit = ster)	120000	3	360000
2	Acacia . (Unit = M <sup>3</sup> )	459900	15	6898500
II	Cassava	500	750	375000
III	Canarium		0	9565000
1	Year 6 (1)	5000	266	1330000
2	Year 7 (2)	5000	319	1595000
3	Year 8 (3)	5000	372	1860000
4	Year 9 (4)	5000	425	2125000
5	Year 10 (5)	5000	531	2655000
IV	Rattan		0	2832000
1	Year (1)	6000	65	390000
2	Year 7 (2)	6000	81	486000
3	Year 8 (3)	6000	98	588000
4	Year 9 (4)	6000	114	684000
5	Year 10 (5)	6000	114	684000
	Total		3153	20030500

**(2) Model 2: A.mangium + D. duperreanum + Rattan + Cassava planted in year 1**

**Arrangement:**

Plot size	= 50 m x 50 m
Distance for A.hybrid	= 2,5 x 2,5 m
Distance for Canarium	= 5 m x 5m
Distance for D.duperreanum	= 5 m x 5 m
Distance for rattan	= 0,3 x 0,3m
Distance for cassava	= 0,3 m x 0,3 m

Unit price for agro-forestry (Model 2) S =2,500m<sup>2</sup>

	Activity	Unit price	Man-day	Revenue
I	Direct man-day	26568	25	664200
1	Vegetation treatment	26568	6	159408
2	Digging	26568	6	159408
3	Digging hole	26568	2	53136
4	NPK	26568	2	53136
5	Seedling transport & planting	26568	2	53136
6	Vegetation clearing	26568	3	79704
7	Protection	26568	3	79704
8	Cassava harvest	26568	1	26568
II	Materials		1647	1168650
1	Seedling		1215	416250
	A.hybrid (including supplementary planting)	340	375	127500
	D.duperreanum	1000	75	75000
	Canarium	500	390	195000
	Rattan	50	375	18750
2	Cassava		432	752400
a	Materials		376	651600
	NPK for agriculture crops	1800	313	563400
	NPK	1400	63	88200
b	Microorganism		56	100800
	NPK for agriculture crops	1800	56	100800
III	NPK		5	230680
1	Others	46136	2	92272
2	Agro-forestry design (level 2)	46136	1	46136
3	Quality check	46136	2	92272
A	Management fee		1677	2063530
	Total estimation		0	
I	Tending in year 2 - 10		42	1174560
1	Direct costs		39	1036152
	Labor	26568	11	292248
	Vegetation clearing (time 1 and time 2)	26568	10	265680
	Weeding, digging around	26568	18	478224
2	Protection		3	138408
	Others	46136	2	92272
	Quality check	46136	1	46136
II	Management fee		31	823608
1	Cost for collection of product	26568	14	371952
2	Canarium collection	26568	10	265680
3	Rattan collection	26568	7	185976
B	Logging in year 7		73	1998168

Product harvested

Model 2: S = 2,500 m<sup>2</sup>

No.	Item	Unit price (VND)	Quantity (Kg)	Revenue (VND)
I	Product		18	7258500
1	Firewood (Unit = ster)	120000	3	360000
2	Acacia (Unit = M <sup>3</sup> )	459900	15	6898500
II	Cassava	500	750	375000
III	Canarium		1913	9299000
1	Year 6 (1)	4000	266	1064000
2	Year 7 (2)	4000	319	1595000
3	Year 8 (3)	4000	372	1860000
4	Year 9 (4)	4000	425	2125000
5	Year 10 (5)	4000	531	2655000
IV	Rattan		472	2832000
1	Year (1)	6000	65	390000
2	Year 7 (2)	6000	81	486000
3	Year 8 (3)	6000	98	588000
4	Year 9 (4)	6000	114	684000
5	Year 10 (5)	6000	114	684000
	Total		3153	19764500



**(3) Model 3: A.hybrid + D.duperreanum + Rattan + Cassava planted in year 1**

**Arrangement:**

Plot size = 50 m x 50 m  
 Distance for A.hybrid = 2,5 x 2,5 m  
 Distance for Canarium = 5 m x 5m  
 Distance for D.duperreanum = 5 m x 5 m  
 Distance for rattan = 0,3 x 0,3m  
 Distance for cassava = 0,3 m x 0,3 m  
 Agro-forestry (Model 3) S = 2,500m<sup>2</sup>

No.	Activity	Unit price	Man-day	Revenue
I	Direct man-day	26568	25	664200
1	Vegetation treatment	26568	6	159408
2	Digging	26568	6	159408
3	Digging hole	26568	2	53136
4	NPK	26568	2	53136
5	Seedling transport & planting	26568	2	53136
6	Vegetation clearing	26568	3	79704
7	Protection	26568	3	79704
8	Cassava harvest	26568	1	26568
II	Materials		1647	1239900
1	Seedling		1215	487500
	A.hybrid (including supplementary planting)	530	375	198750
	D. duperreanum	1000	75	75000
	Canarium	500	390	195000
	Rattan	50	375	18750
2	Cassava		432	752400
a	Materials		376	651600
	NPK for agriculture crops	1800	313	563400
	NPK	1400	63	88200
b	Microorganism		56	100800
	NPK for agriculture crops	1800	56	100800
III	NPK		5	230680
1	Others	46136	2	92272
2	Agro-forestry design (level 2)	46136	1	46136
3	Quality check	46136	2	92272
A	Management fee		1677	2134780
	Total estimation		0	
I	Tending in year 2 - 10		42	1174560
1	Direct costs		39	1036152
	Labor	26568	11	292248
	Vegetation clearing (time 1 and time 2)	26568	10	265680
	Weeding, digging around	26568	18	478224
2	Protection		3	138408
	Others	46136	2	92272
	Quality check	46136	1	46136
II	Management fee		31	823608
1	Cost for collection of product	26568	14	371952
2	Canarium collection	26568	10	265680
3	Rattan collection	26568	7	185976
B	Logging in year 7		73	1998168
C = A+B	Total estimation		1750	4132948

Product estimation harvested

Model 3: S = 2,500 m<sup>2</sup>

No.	Item	Unit price (VND)	Quantity (Kg)	Revenue (VND)
I	Product		18	6502500
1	Firewood (Unit = ster)	120000	3	360000
2	Acacia (Unit = M <sup>3</sup> )	409500	15	6142500
II	Cassava	500	750	375000
III	Canarium		1913	9299000
1	Year 6 (1)	4000	266	1064000
2	Year 7 (2)	4000	319	1595000
3	Year 8 (3)	4000	372	1860000
4	Year 9 (4)	4000	425	2125000
5	Year 10 (5)	4000	531	2655000
IV	Rattan		472	2832000
1	Year (1)	6000	65	390000
2	Year 7 (2)	6000	81	486000
3	Year 8 (3)	6000	98	588000
4	Year 9 (4)	6000	114	684000
5	Year 10 (5)	6000	114	684000
	Total		3153	19008500

**(4) Model 4: A.hybrid + Canarium + Rattan + D.duperreanum**

**Arrangement:**

Plot size	= 50 m x 50 m
Distance for A.hybrid	= 2,5 x 2,5 m
Distance for Canarium	= 5 m x 5m
Distance for D.duperreanum	= 5 m x 5 m
Distance for rattan	= 0,3 x 0,3m
Distance for cassava	= 0,3 m x 0,3 m

Unit price for agro-forestry Model 4: S = 2,500m

	Activity	Unit price	Man-day	Revenue
I	Direct man-day	26568	25	664200
1	Vegetation treatment	26568	6	159408
2	Digging	26568	6	159408
3	Digging hole	26568	2	53136
4	NPK	26568	2	53136
5	Seedling transport & planting	26568	2	53136
6	Vegetation clearing	26568	3	79704
7	Protection	26568	3	79704
8	Cassava harvest	26568	1	26568
II	Materials		1647	2139900
1	Seedling		1215	1387500
	A. hybrid (including supplementary planting)	530	375	198750
	D.duperreanum	13000	75	975000
	Canarium	500	390	195000
	Rattan	50	375	18750
2	Cassava		432	752400
A	Materials		376	651600
	NPK for agriculture crops	1800	313	563400
	NPK	1400	63	88200
b	Microorganism		56	100800
	NPK for agriculture crops	1800	56	100800
III	NPK		5	230680
1	Others	46136	2	92272
2	Agro-forestry design (level 2)	46136	1	46136
3	Quality check	46136	2	92272
A	Management fee		1677	3034780
	Total estimation		0	
I	Tending in year 2 - 10		42	1174560
1	Direct costs		39	1036152
	Labor	26568	11	292248
	Vegetation clearing (time 1 and time 2)	26568	10	265680
	Weeding, digging around	26568	18	478224
2	Protection		3	138408
	Others	46136	2	92272
	Quality check	46136	1	46136
II	Management fee		31	823608
1	Cost for collection of product	26568	14	371952
2	Canarium collection	26568	10	265680
3	Rattan collection	26568	7	185976
B	Logging in year 7		73	1998168
C = A+B	Total estimation		1750	5032948

Product estimation harvested

Model 4: S = 2,500 m<sup>2</sup>

No.	Item	Unit price (VND)	Quantity (Kg)	Revenue (VND)
I	Product		18	6502500
1	Firewood (Unit = ster )	120000	3	360000
2	Acacia (Unit = M3 )	409500	15	6142500
II	Cassava	500	750	375000
III	Canarium		1913	9565000
1	Year 6 (1)	5000	266	1330000
2	Year 7 (2)	5000	319	1595000
3	Year 8 (3)	5000	372	1860000
4	Year 9 (4)	5000	425	2125000
5	Year 10 (5)	5000	531	2655000
IV	Rattan		472	2832000
1	Year (1)	6000	65	390000
2	Year 7 (2)	6000	81	486000
3	Year 8 (3)	6000	98	588000
4	Year 9 (4)	6000	114	684000
5	Year 10 (5)	6000	114	684000
	Total		3153	19274500

**(5) Model 5: A. hybrid +Canarium + D.duperreanum + Rattan + Cassava**

**Arrangement:**

Plot size	= 50 m x 50 m
Distance for A. hybrid	= 2,5 x 2,5 m
Distance for Canarium	= 5 m x 5m
Distance for D. duperreanum	= 5 m x 5 m
Distance for rattan	= 0,3 x 0,3m
Distance for cassava	= 0,3 m x 0,3 m

Unit price for agro-forestry (Model 5) S = 2,500m<sup>2</sup>

	Activity	Unit price	Man-day	Revenue
I	Direct man-day	26568	25	664200
1	Vegetation treatment	26568	6	159408
2	Digging	26568	6	159408
3	Digging hole	26568	2	53136
4	NPK	26568	2	53136
5	Seedling transport & planting	26568	2	53136
6	Vegetation clearing	26568	3	79704
7	Protection	26568	3	79704
8	Cassava harvest	26568	1	26568
II	Materials		1647	1652400
1	Seedling		1215	900000
	A. hybrid (including supplementary planting)	530	375	198750
	D. duperreanum	1000	37,5	37500
	Canarium	13000	37,5	487500
	Rattan	500	390	195000
	Cassava	50	375	18750
2	Materials		432	752400
a	NPK for agriculture crops		376	651600
	NPK	1800	313	563400
	Microorganism	1400	63	88200
b	NPK for agriculture crops		56	100800
	NPK	1800	56	100800
III	Others		3	230680
1	Agro-forestry design (level 2)	46136	2	92272
2	Quality check	46136	1	46136
3	Management fee	46136	2	92272
A	Total estimation		1675	2547280
	Tending in year 2 - 10		0	
I	Direct costs		42	1174560
1	Labor		39	1036152
	Vegetation clearing (time 1 and time 2)	26568	11	292248
	Weeding, digging around	26568	10	265680
	Protection	26568	18	478224
2	Others		3	138408
	Quality check	46136	2	92272
	Management fee	46136	1	46136
II	Cost for collection of product		31	823608
1	Canarium collection	26568	14	371952
2	Rattan collection	26568	10	265680
3	Logging in year 7	26568	7	185976
B	Total estimation		73	1998168
C = A+B	Total		1748	4545448

Aggregation of estimation of product harvested

Model 5: S = 2,500 m<sup>2</sup>

No.	Item	Unit price (VND)	Quantity (Kg)	Revenue (VND)
I	Product			6502500
1	Firewood (Unit = ster)	120000	3	360000
2	Acacia (Unit = M3 )	409500	15	6142500
II	Cassava	500	750	375000
III	Canarium + D. duperreanum		0	8608500
1	Year 6 (1)	4500	266	1197000
2	Year 7 (2)	4500	319	1435500
3	Year 8 (3)	4500	372	1674000
4	Year 9 (4)	4500	425	1912500
5	Year 10 (5)	4500	531	2389500
IV	Rattan		0	2832000
1	Year 6 (1)	6000	65	390000
2	Year 7 (2)	6000	81	486000
3	Year 8 (3)	6000	98	588000
4	Year 9 (4)	6000	114	684000
5	Year 10 (5)	6000	114	684000
	Total		3153	18318000

## Annex 2: Tentative plan for agro-forestry project for each model

Tan Hoa commune, Forest district No.: 258 Red Book available

Unit: ha

Plot	Vegetation	Productivity class	Soil type	Area	model				
					1	2	3	4	5
12	BĐCI	II-1	ĐIIIFo	6.17	6.17				
43	BĐCI	II-1	ĐIIIFo	2.6			2.6		
47	BĐCI	I-2	ĐIIFo	6.21			1.7		4.51
54	BĐCI	I-2	ĐIIFo	1.41			1.41		
10b	BĐCII	II-1	ĐIIIFo	36.96	11.96			25.0	
22	BĐCII	II-1	ĐIIIFo	4.37	1.87	2.5			
45a	BĐCII	I-1	ĐIFo	1.36			1.36		
46	BĐCII	I-2	ĐIIFo	4.28		1.59	2.69		
48	BĐCII	I-1	ĐIFo	2.24			2.24		
56	BĐCII	III-1	D2P	2.72		2.72			
10a	BĐV	II-1	ĐIIIFo	3.19		3.19			
	Giàn			71.51	20.0	10.0	12.0	25.0	4.51
122	BĐCI	I-2	ĐIIFo	0.86					0.86
77	BĐCI	I-2	ĐIIFo	1.23	1.23				
103	BĐCII	I-2	ĐIIFo	3.72					3.72
23	BĐCII	II-1	ĐIIIFo	2.5			2.1	0.4	
24	BĐCII	I-1	ĐIFo	1.43	0.48	0.95			
45b	BĐCII	II-1	ĐIIIFo	1.95		1.05	0.9		
53	BĐCII	I-2	ĐIIFo	2.16	2.16				
58	BĐCII	I-2	ĐIIFo	2.97				2.97	
68	BĐCII	I-2	ĐIIFo	3.83				1.63	2.2
59	KTTI	I-1	ĐIFo	1.13	1.13				
	Ngo			21.78	5.0	2.0	3.0	5.0	6.78
52	BĐCI	I-2	ĐIIFo	2.14			2.14		
57a	BĐCI	I-2	ĐIIFo	2.4		1.0	1.4		
57b	BĐCI	I-2	ĐIFo	0.96			0.96		
114	BĐCII	I-2	ĐIIFo	1.2		1.2			
115	BĐCII	I-1	ĐIFo	2.88	0.25	1.5	0.5	0.63	
116	BĐCII	I-2	ĐIIFo	1.34				1.34	
55b	BĐCII	I-1	ĐIIFo	1.73	1.73				
55c	BĐCII	I-1	ĐIFo	1.3		1.3			
60	BĐCII	III-1	D2P	1.7	1.7				
62	BĐCII	I-1	ĐIFo	2.1	2.1				
95	BĐCII	I-1	ĐIFo	1.82	1.82				
96	BĐCII	I-1	ĐIFo	4.4	0.4				4.0
97	BĐCII	I-2	ĐIIFo	1.52				1.52	

Plot	Vegetation	Productivity class	Soil type	Area	model				
	U			25.49	8.0	5.0	5.0	3.49	4.0
117	BĐCI	I-1	ĐIFo	1.76		1.41	0.35		
120	BĐCI	I-2	ĐIIFo	1.57	1.57				
125	BĐCI	I-2	ĐIIFo	1.55			1.55		
118	BĐCII	I-1	ĐIFo	2.34	1.00	1.24	0.10		
126	BĐCII	I-1	ĐIFo	2.4	2.05	0.35			
133	BĐCII	I-1	ĐIFo	4.22				2.22	2.0
134a	BĐCII	I-2	ĐIFo	1.87	1.87				
134b	BĐCII	I-2	ĐIIFo	5.01	3.51			1.50	
132	KTTI	I-1	ĐIFo	0.28				0.28	
	Vau			21	10.0	3.0	2.0	4.0	2.0

Note: BĐ CI: Eu. class I; BDCII: Eu. class II; (Source: Group C1)

**Table A2.1: Implementation plan for the first year**

	Total area ( ha )	Planting plan ( ha )				Other			
		Soil preparation	Digging hole	Planting	Supplementary planting	Tending 1	Fertilizer	Disease protection	Fire protection
Total	139,78	20	20	20	20	20	20	20	20
Giàn village	71,51	5	5	5	5	5	5	5	5
Ngò village	21,78	5	5	5	5	5	5	5	5
U village	25,49	5	5	5	5	5	5	5	5
Võu village	21	5	5	5	5	5	5	5	5

**Table A2.2: Implementation plan for the second year**

	Total area ( ha )	Planting plan ( ha )				Protection					
		Soil preparation	Digging hole	Planting	Supplementary planting	Tending 1	Fertilizer	Disease protection	Thinning	Fire protection	Pestilent Insect
Total	139,78	30	30	30	30	50	50	50	50	50	50
Giàn village	71,51	15	15	15	15	15	15	15	15	15	15
Ngò village	21,78	5	5	5	5	10	10	10	10	10	10
U village	25,49	5	5	5	5	10	10	10	10	10	10
Võu village	21	5	5	5	5	10	10	10	10	10	10



**Table A2.3: Implementation plan for the third year**

	Total area (ha)	Planting plan ( ha )				Protection					
		Soil preparation	Digging hole	Planting	Supplementary planting	Tending 1	Fertilizer	Disease protection	Thinning	Fire protection	Pestilent Insect
Total	139,78	9,78	9,78	9,78	9,78	119,78	119,78	119,78	119,78	139,78	139,78
Giàn village	71,51	2	2	2	2	66,51	66,51	66,51	66,51	71,51	71,51
Ngò village	21,78	1,78	1,78	1,78	1,78	16,78	16,78	16,78	16,78	21,78	21,78
Uvillage	25,49	3	3	3	3	20,49	20,49	20,49	20,49	25,49	25,49
Võuvillage	21	3	3	3	3	16	16	16	16	21	21

**Table A2.4: Implementation plan for the fourth year**

	Total area ( ha )	Planting plan ( ha )				Protection					
		Soil preparation	Digging hole	Planting	Supplementary planting	Tending 1	Fertilizer	Disease protection	Thinning	Fire protection	Pestilent Insect
Total	139,78	9,78	9,78	9,78	9,78	119,78	119,78	119,78	119,78	139,78	39,78
Giàn village	71,51	2	2	2	2	66,51	66,51	66,51	66,51	71,51	71,51
Ngò village	21,78	1,78	1,78	1,78	1,78	16,78	16,78	16,78	16,78	21,78	21,78
U village	25,49	3	3	3	3	20,49	20,49	20,49	20,49	25,49	5,49
Võu village	21	3	3	3	3	16	16	16	16	21	21

## Annex 3: Financial and economic analyses

### 1. Term and conditions for loans

Farmers' loan is used for procurement of materials (seedling, fertilizer), and part of cost for hiring labors for agro-forestry project the banks also support through credit. As mentioned above, condition to get loan from VBSP is used for analysis.

As calculated each household involving the project will have 0.67 ha in average for agro-forestry model, so, below term and conditions for loans is formulated for households with an area of 0.67 ha for agro-forestry model. To ensure the feasibility of the project term and conditions for getting loans area formulated as follow:

Loan sum: In average each household can borrow from 3 - 6 million VND for 0.67 ha, borrow one time in year 1 (planting year), principal and interest are paid at the end of the term

Rate of interest 0.5%/month (6%/Year), yearly paid manner

Term: 7 years (when harvest Acacia)

Grace period: 6 year

Condition for loan for agro-forestry practice is constructed based on the policy of the VSPB:

### 2. Terms and conditions for loans from other financial sources

There are two banks (Agriculture Bank and Social Policy Bank) in Phu Binh district. Through survey, it is got to know that they have their own advantages and disadvantages Below are details on the possibility of lending, conditions, interest and terms of both Banks in Phu Binh district.

Item	Agriculture Bank Phu Binh	Social Policy Bank Phu Binh
Lending capacity	80 – 85% project cost	±10 million VND, as the Bank depends on the Central level
Conditions	<ul style="list-style-type: none"> <li>- Households get loans from the bank directly</li> <li>- Loan sum &lt; 10 million VND, no collateral (it depends on households)</li> <li>- Loan sum 10 - 20 million VND, Households have model</li> <li>- Loan sum &gt; 20 million VND (collateral)</li> <li>- If borrow for agro-forestry Households must have Red Book and labors available</li> </ul>	<ul style="list-style-type: none"> <li>- Through mass organizations as Youth Union, Women Union, (guarantee)</li> </ul>
- Term	1 – 5 Years (medium term)	5 Years
- Interest	1,05%/month (12,6%/Year)	0,5%/month (6%/Year)
- Term of extension	1/3 of initial time	Not more than 6 months
- Payment form	<ul style="list-style-type: none"> <li>- Principal is paid in year 2 of the term, payment may be done in 1 or 2- 3 times (periodically)</li> <li>- Interest, pay by quarter manner (3 months one time of payment)</li> </ul>	<ul style="list-style-type: none"> <li>* Source from Programmed 120:</li> <li>- After 5 Years (pay principal + interest)</li> <li>* Source from contribution:</li> <li>+ Principal paid by term</li> <li>- After year 1 pay 1/3 of the principal</li> <li>- Year 3, pay 1/3 of the principal</li> <li>- Year 5, pay 1/3 of the principal</li> </ul>

Item	Agriculture Bank Phu Binh	Social Policy Bank Phu Binh
		+ Interest, pay by quarter manner (3 months one time of payment)

### 3. Bases for the selection of implementation

(1) The selection for project implementation as mentioned above is supported by people in the project area and accepted by GOV agencies as MARD, Thai Nguyen DARD and JICA.

(2) The selection of personnel for project implementation agency: i) As for the PIU, its head should be the chairman of the commune, vice head is the commune forestry cadre, as they fully understand the general development of the commune or district and possible to push up and support the concerned parties relating to the implementation of the project; ii) This is an advantageous condition to get to know the wish of people to involve in agro-forestry. Commune chairman acting as a head of the PIU can easily support people to get loans, the vice head can easily help farmers set up agro-forestry plans, and techniques relating to planting, tending ... and harvest.

(3) The selection of location for agro-forestry project in Tan Hoa commune is based on the analysis of field survey and the project area and the adjunct areas (Yen Bai, Bac Giang).

### 4. Cost calculation

#### 4.1 Prerequisite for cost calculation

To implement the project the prerequisites for cost calculation are:

- Base year (price of the year used for project cost calculation) is 2005.
- Inflation is 5%.

**Table A3.1: Pre-conditions for cost calculation**

Indicators	2001	2002	2003	2004	Medium (%)
Consumption price indicator (CPI)	100.8	104	103	109.5	4.3
Product price Indicator (PPI)	96.2	107.4	103.9	108.7	4.1
Forestry sector	102.1	102.5	106.8	113.6	6.3

(Source: Year Book 2004)

Based on the indicator of CPI and PPI of the recent years (2001 – 2004) to calculate the mean value of inflation indicator (> 5%). In the report this inflation indicator is used for analysis

- Quantity reservation is 5% of total cost
- Time of the project is from 2006 to 2019. In report the calculation for a management/business cycle is 10 years as this is the time of harvest. As for the following years, it is difficult to identify data on harvest of products, so it is not used for project cost calculation.

- Working day price is calculated in 2 cases:

Case 1: 25,000 VND/day (the realistic price in the project area)

Case 2: 38,500 VND/day (regulations said in Decree No. 38/2005/QĐ-BNN, dated 06/7/2005 of MARD on agro-forestry technical norms).

Skilled labors as for design: 46,136 VND/man-day (regulation of the forestry sector)

- Seedlings, fertilizers prices at producers' gate (Tan Hoa, Phu Binh, Thai Nguyen) are used for analysis – Cost for training is implemented in two steps as follow:

#### **4.2 Cost calculation**

a) Case 1: 25.000 VND/ man-day

- Total project cost from 2005 – 2019 is 3.47 billion VND, if no reservations applied, the project cost is 2.51 billion VND. Total project cost from 2005 – 2010 is 2.27 billion VND and baseline cost is 1.81 billion VND.

- Total baseline cost of the project consists of five key items: labor (for planting, tending....), materials, training, equipment, and others (design, quality check....). Labor cost accounts for most (55.72%); materials – 31.90%, others – 8.06%, and cost for equipment and training accounts for a small percentage (4.21%).

b) Case 2: 38,500 VND/man-day

- Total project cost from 2005 – 2019 is 4.63 billion VND; if no reservations applied the project cost is 3.3 billion VND. Total project cost from 2005 – 2010 is 2.8 billion VND and baseline cost is 2.23 billion VND.

- Total baseline cost consists of five key items: labor, materials, training, equipment, and others (design, quality check....). Labor cost accounts for most (65.42%); materials - 24,32%, others - 6,14%, and cost for equipment and training accounts for a small percentage (4,12%).

**Table A3.2: Estimated total cost and components**  
(case 1: unit price 25,000 VND/man-day)

Unit: 1000 VND

Component	Project cost from 2006 – 2019							Total cost (2006 – 2010)
	Model 1 (43 ha)	Model 2 (20 ha)	Model 3 (22 ha)	Model 4 (37,49)	Model 5 (17,29)	Total (2006 – 2019)	% compared to baseline cost	
a. Labor cost	431,978	200,920	221,012	376,625	173,695	1,404,230	55.72%	729,664
b. Materials	296,700	66,000	78,870	269,366	93,107	804,042	31.90%	804,042
c. Other costs	62,452	29,047	31,952	54,449	25,111	203,011	8.06%	164,275
- Design	13,946	6,487	7,135	12,159	5,608	45,336	1.80%	45,336
-Quality check	11,903	5,536	6,090	10,378	4,786	38,693	1.54%	29,507
- Management fee	36,602	17,024	18,727	31,912	14,717	118,982	4.72%	89,433
d. Training	7,779	2,685	3,018	5,967	2,592	22,041	0.87%	22,041
e. Equipment + stationary (3.6%)	28,481	10,655	11,946	25,216	10,509	86,806	3.44%	86,806
Total baseline cost	827,389	309,307	346,798	731,622	305,014	2,520,130	100.00%	1,806,829
- Quantity reservation (5%)	41,369	15,465	17,340	36,581	15,251	126,007		90,341
- Price reservation (5%)	263,111	102,060	114,959	251,910	99,693	831,733		373,399
Total cost	1,131,869	426,833	479,097	1,020,113	419,958	3,477,869		2,270,569

**Table A3.3: Estimated total cost and components***(case 1: unit price 38,500 VND/man-day)*

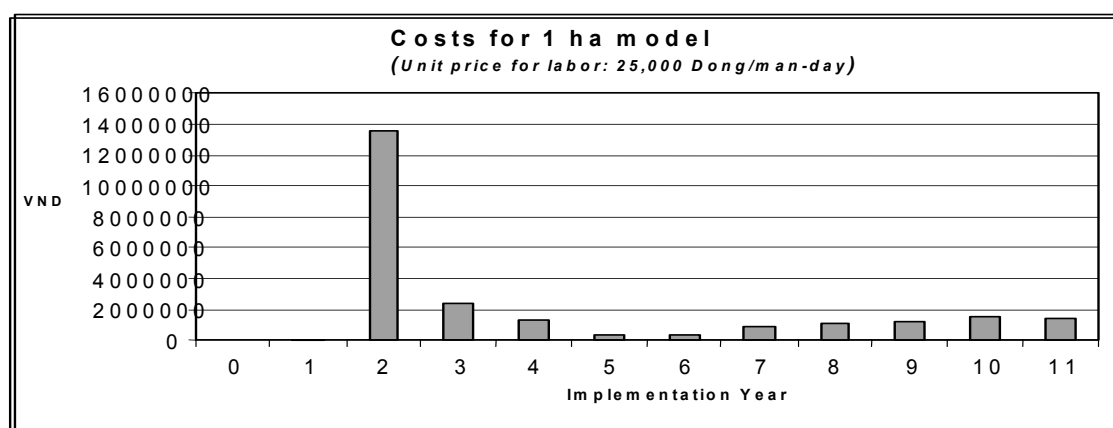
Component	Project cost from 2006 – 2019							Total cost (2006 – 2010)
	Model 1 (43 ha)	Model 2 (20 ha)	Model 3 (22 ha)	Model 4 (37,49)	Model 5 (17,29)	Total (2006 – 2019)	compared to baseline cost %	
a. Labor cost	665.246	309.417	340.358	580.002	267.491	2.162.514	65,42%	1.123.683
b. Materials	296.700	66.000	78.870	269.366	93.107	804.042	24,32%	804.042
c. Other costs	62.452	29.047	31.952	54.449	25.111	203.011	6,14%	164.275
- Design	13.946	6.487	7.135	12.159	5.608	45.336	1,37%	45.336
-Quality check	11.903	5.536	6.090	10.378	4.786	38.693	1,17%	29.507
- Management fee	36.602	17.024	18.727	31.912	14.717	118.982	3,60%	89.433
d. Training	7.779	2.685	3.018	5.967	2.592	22.041	0,67%	22.041
e. Equipment + stationary (3.6%)	36.878	14.561	16.242	32.537	13.886	114.104	3,45%	114.104
Total baseline cost	1.069.055	421.710	470.441	942.321	402.187	3.305.713	100,00%	2.228.146
- Quantity reservation (5%)	53.453	21.085	23.522	47.116	20.109	165.286		111.407
- Price reservation (5%)	363.670	146.659	164.594	345.958	139.872	1.160.753		463.408
Total cost	1.486.178	589.454	658.557	1.335.395	562.168	4.631.751		2.802.961

**Table A3.4: Cost for each year for 1 ha model (model 1)**  
(25,000 VND/man-day)

Unit: 1000 VND

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Total
Implementation year	0	1	2	3	4	5	6	7	8	9	10	11	
Inflation	1.00	1.05	1.10	1.16	1.22	1.28	1.34	1.41	1.48	1.55	1.63	1.71	
Baseline cost		83	11,747	2,024	1,061	260	260	610	703	796	891	809	19,242
Total cost		91	13,598	2,460	1,354	348	365	901	1,090	1,297	1,523	1,453	24,480

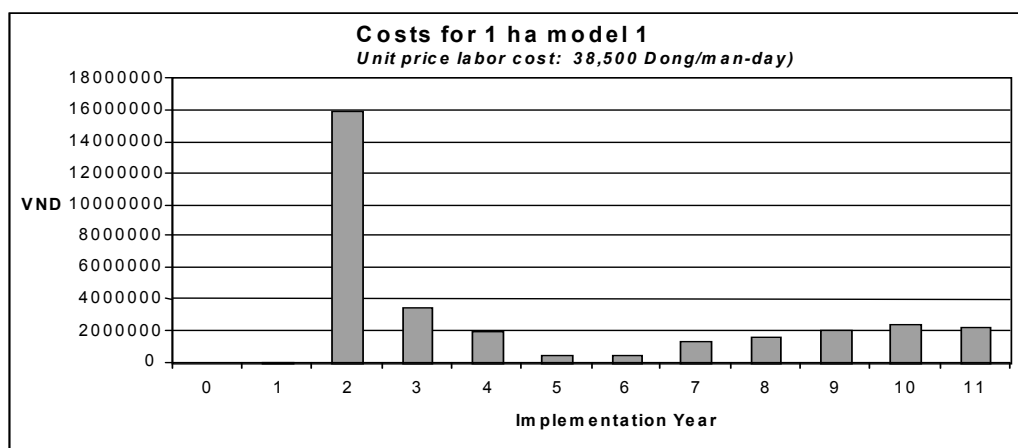
**Costs for one ha model**



**Table A3.5: Estimated total cost and components**  
(case 2: unit price 38,500 VND/man-day)

Unit: 1000 VND

Component	Project cost from 2006 – 2019						% compared to baseline cost	Total cost (2006 – 2010)
	Model 1 (43 ha)	Model 2 (20 ha)	Model 3 (22 ha)	Model 4 (37,49)	Model 5 (17,29)	Total (2006 – 2019)		
a. Labor cost	665,246	309,417	340,358	580,002	267,491	2,162,514	65.42%	1,123,683
b. Materials	296,700	66,000	78,870	269,366	93,107	804,042	24.32%	804,042
c. Other costs	62,452	29,047	31,952	54,449	25,111	203,011	6.14%	164,275
- Design	13,946	6,487	7,135	12,159	5,608	45,336	1.37%	45,336
- Quality check	11,903	5,536	6,090	10,378	4,786	38,693	1.17%	29,507
- Management fee	36,602	17,024	18,727	31,912	14,717	118,982	3.60%	89,433
d. Training	7,779	2,685	3,018	5,967	2,592	22,041	0.67%	22,041
e. Equipment + stationary (3.6%)	36,878	14,561	16,242	32,537	13,886	114,104	3.45%	114,104
Total baseline cost	1,069,055	421,710	470,441	942,321	402,187	3,305,713	100.00%	2,228,146
- Quantity reservation (5%)	53,453	21,085	23,522	47,116	20,109	165,286		111,407
- Price reservation (5%)	363,670	146,659	164,594	345,958	139,872	1,160,753		463,408
Total cost	1,486,178	589,454	658,557	1,335,395	562,168	4,631,751		2,802,961



**Table A3.6: Cost of 1 ha model per year – model 1**  
*(38,500 VND/man-day)*

Unit: 1000 VND

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Total
Implementation year	0	1	2	3	4	5	6	7	8	9	10	11	
Inflation	1.00	1.05	1.10	1.16	1.22	1.28	1.34	1.41	1.48	1.55	1.63	1.71	
Baseline cost		83	13,766	2,895	1,538	358	358	938	1,082	1,226	1,371	1,246	24,862
Total cost		91	15,936	3,519	1,963	479	503	1,387	1,678	1,997	2,346	2,237	32,138

Diagram of costs for model 1 ha (Model 1 (Fixed price in 2005))

The Table above shows annual cost of 1 ha agro-forestry, biggest cost is for year 3 (2007), costs for the following years is not much, cost for tending, protection is only more or less 2 million VND.

**Table A3.7: Estimation costs**  
*(Case 1: 25,000 VND/man-day)*

Unit: 1000 VND

Component	Project costs from 2006 – 2019							Total (2006 – 2010)
	M. 1 (43 ha)	M. 2 (20 ha)	M. 3 (22 ha)	M. 4 (37,49)	M. 5 (17,29)	Total cost (2006 – 2019)	% compared to baseline cost	
a. Labor	431,978	200,920	221,012	376,625	173,695	1,404,230	55.72%	729,664
b. Materials	296,700	66,000	78,870	269,366	93,107	804,042	31.90%	804,042
c. Others	62,452	29,047	31,952	54,449	25,111	203,011	8.06%	164,275
- Design	13,946	6,487	7,135	12,159	5,608	45,336	1.80%	45,336
- Quality check	11,903	5,536	6,090	10,378	4,786	38,693	1.54%	29,507
- Management fee	36,602	17,024	18,727	31,912	14,717	118,982	4.72%	89,433
d. Training	7,779	2,685	3,018	5,967	2,592	22,041	0.87%	22,041
e. Equipment + stationary (3.6%)	28,481	10,655	11,946	25,216	10,509	86,806	3.44%	86,806
Total baseline cost	827,389	309,307	346,798	731,622	305,014	2,520,130	100.00%	1,806,829



Component	Project costs from 2006 – 2019							Total (2006 – 2010)
	M. 1 (43 ha)	M. 2 (20 ha)	M. 3 (22 ha)	M. 4 (37,49)	M. 5 (17,29)	Total cost (2006 – 2019)	% compared to baseline cost	
- Quantity reservation (5%)	41,369	15,465	17,340	36,581	15,251	126,007		90,341
- Price reservation (5%)	263,111	102,060	114,959	251,910	99,693	831,733		373,399
Total cost	1,131,869	426,833	479,097	1,020,113	419,958	3,477,869		2,270,569

### 5. Analysis regulation: Analysis regulation is done by following steps

a) Construction of Parameter Table on cost per one ha of agro-forestry, in which detailed articles to be implemented, quantity of man-day and unit price, quantity and price of materials, quantity and price of products harvested from agro-forestry models. For detail, see also Annex.

b) From five agro-forestry models planned, table of agro-forestry as well as harvest plan are constructed.

Time of the project is 14 years from 2006 - 2019 (For agro-forestry, project lifetime is extending to the harvest of long term rotation trees)

c) Set up plan table for sales (input cash flow) and plan table for costs (output cash flow) of 1 ha and 139,78 ha by each agro-forestry model

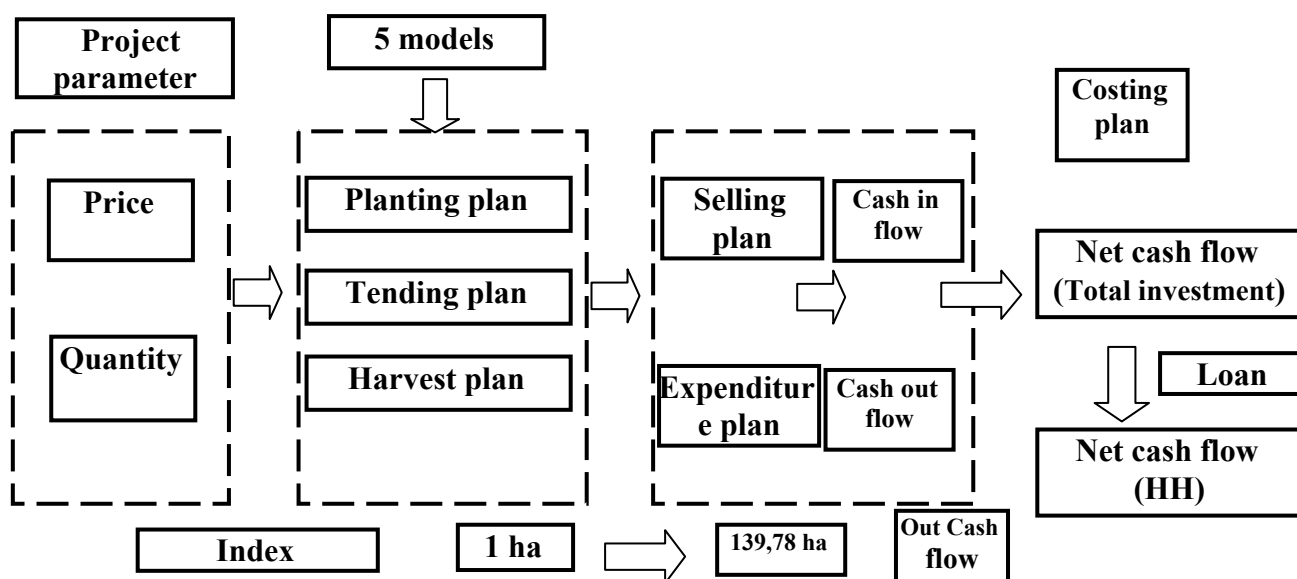
d) Analyze the value of NPV, IRR and ratio B/C by total investment point of view of one ha and total area of the model.

e) Set up plan table to get loan, analysis of NFC value of lending.

g) Analyze NPV and IRR index by project holder point of view (Farmers) of 0.7 ha which is average area of a household (139.78 ha/ 206 household = 0.7 ha).

h) Analysis of the sensitiveness of NPV and IRR index by point of view of project holder (households) with an area of 0.67 ha on the changeable conditions as: Total loan, interest and unit price per man-day. Analysis of the sensitiveness NPV, IRR value and ratio B/C by total investment point of view on changeable conditions of output price as unit price per man-day, seedling price or input price a species of Acacia, fruits

Analysis is implemented as in a diagram below:



### Evaluation of social impact

Unit: 1000 VND

Item	Model 1	Model 2	Model 3	Model 4	Model 5	
Year 1	Material cost	-5.328	-2.548	-2.768	-5.548	-4,158
	Labor cost	-193	-193	-193	-193	-193
	Loan	6.007	3.214	3.435	6.228	4,832
	Others	-1.168	-1.168	-1.168	-1.168	-1,168
	Turnover	1.108	1.108	1.108	1.108	1,108
	Total for year 1	425	413	414	426	420
Year 2	Interest payment	-363	-194	-207	-376	-292
Year 3	Interest payment	-363	-194	-207	-376	-292
Year 4	Interest payment	-363	-194	-207	-376	-292
Year 5	Interest payment	-363	-194	-207	-376	-292
Year 6	Interest payment	-363	-194	-207	-376	-292
	Turnover	6.481	5.479	5.479	6.481	5,980
	6 years in total	6.119	5.285	5.272	6.105	5,689
Year 7	Interest payment	-363	-194	-207	-376	-292
	Turnover	21.518	20.256	25.527	26.790	26,158
	Principal payment	-6.007	-3.214	-3.435	-6.228	-4,832
	7 years in total	15.148	16.848	21.885	20.186	21,034
Year 8	Turnover	10.160	8.614	8.614	10.160	9,387
Year 9	Turnover	12.256	10.401	10.401	12.256	11,328
Year 10	Turnover	15.304	12.869	12.869	15.304	14,086
Total income in 10 years		57,960	53.654	58.627	62.933	60.776
Average income per year		5,796	5.365	5.863	6.293	6.078

Assumptions:

Each household has 2.8 labors

Household does not have to pay the labor cost, and

Household spends 30 man H day/years.

If working day is more 30 they have to pay the extra for hiring at the price of 25.000 VND/person/day

Household has to pay for seedlings, fertilizer

Each household can get 6 million VND, 3.2 million VND, 3.4 million VND, 6.2 million VND and 4.8 million VND in year 1 for model 1, 2, 3, 4 and 5 from DSF rate of interest annum is 6,0%, pay principal and interest in year 7.

At harvest time, each household sells the standing trees so do not have to pay for harvest.

Technical necessary fee (design, quality check...) is taken from loans. Fee for year 1 is used to pay technical fee for year 1; Fee for year 2 is used to pay technical fee for year 2 to year 8. The Bank will transfer this sum of money to Consultancy Company to implement design and quality check for the project.

Labor arrangement.

	Labor mobilization demand
Year 1	Mobilization demand all labors in the household (2.8 person/household) in 30 days (84 person/day) for agro-forestry, tending ....In addition, each household has to pay 193,000 VND to hire labor for agriculture and forestry production.
Year 2	Mobilization demand all labors in the household (2.8 person/household) in 18 days (50.3 person/day)
Year 3	Mobilization demands all labors in the household (2.8 person/household) for 8.5 days (say 23.7 person/day).
Year 4	Mobilization demand 4.9 person/day/year
Year 5	Mobilization demand 4.9 person/day/year
Year 6	Mobilization demand 16.3 person/day/year
Year 7	Mobilization demand 18.8 person/day/year
Year 8	Mobilization demand 21.3 person/day/year
Year 9	Mobilization demand 23.9 person/day/year
Year 10	Mobilization demand 21.7 person/day/year

*Impact in a short time on household economy*

As said in the table of input cash flow of each household, in average each household gets 0.4 million VND of cash per year 1, or 2% of average income annum of the household. The project generate an initial income for households from cassava and a loan from banks, therefore people do not meet with difficulty in the initial period. On the other, benefit taken from cassava is not enough for investment to the project at the initial period. That is why the project recommends household of opportunity to borrow money with preferential rate of

interest. Moreover, the project generates job opportunity for households involving in the project.

*Long-term impact on household economy*

To year 5, in average each household has to spend about 0.2 – 0.4 million VND to pay the interest annum while no benefit got from the project, in addition household must mobilize labors to do the project.

From year 6 onward, each household can get money from selling products of 5.5 – 6.5 million VND in year 6; 20.1 – 26.4 million VND in year 7; 15.1-21.9 million VND in year 8 and 10.4 – 12.3 million VND in year nine; 12.9 – 15.3 million VND tin year 10. Minus all costs, each household in average can get about 53.4 – 62.9 million VND in 10 years. As the analysis above in average each household can get about 5.3 – 6.3 million VND annum, and the income of the household increases by 11~ 22% per year.

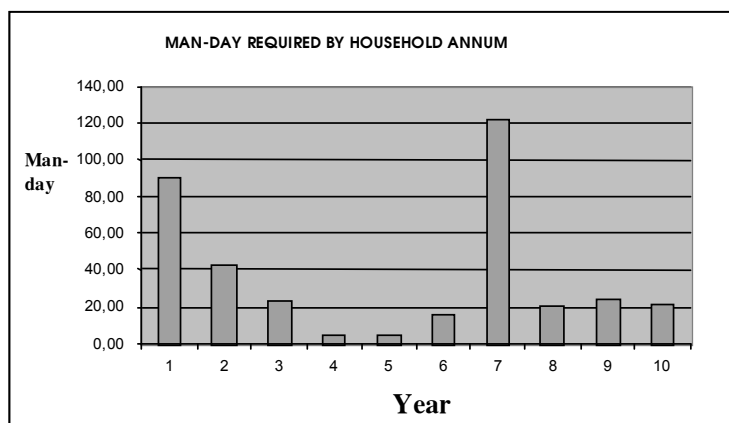
**Financial analysis**

The calculation is as follow: In average, each household has 2.8 labors, for forestry production is 30 days per month say 84 man-day for forestry production annum. Supposing that 84 man-day for forestry production is not enough they have to hire labors at the price of 25,000 VND/man-day. Most of households can spend 84 man-day for forestry production. But for year 1 (planting) each household needs to hire 6 man-day for 0.7 ha model

**Table A3.8: The capacity of labor supply annum and additional hired working day**

CY	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Year	1	2	3	4	5	6	7	8	9	10
1 ha model										
Labor	135.10	64.54	35.33	7.28	7.28	24.38	181.5	31.85	35.62	32.36
Skilled labor	16.96	7.48	3.68	1.68	1.68					
Total	152.06	72.02	39.01	8.96	8.96	24.38	181.50	31.85	35.62	32.36
0.67 ha model										
Labor	90.52	43.24	23.67	4.88	4.88	16.33	121.61	21.34	23.87	21.68
Skilled labor	11.36	5.01	2.47	1.13	1.13	0.00	0.00	0.00	0.00	0.00
Total	101.88	48.25	26.14	6.00	6.00	16.33	121.61	21.34	23.87	21.68
Labor supply capacity of a household per	84	84	84	84	84	84	84	84	84	84
Hire labor	6.52	-40.76	-60.33	-79.12	-79.12	-67.67	37.61	-62.66	-60.13	-62.32

**Figure: Man-day required by household annum**



(2) Sensitiveness analysis by total investment point of view per an area of 1 ha  
Analysis of output price

**Table A3.9: Sensitiveness analysis of A.mangium price of model 1**

%	VND/m3	NPV (10% discount) (1000 VND)	IRR	B/C
100%	207,000	13,426	24%	1.92
70%	144,900	11,717	22%	1.80
50%	103,500	10,577	21%	1.72
30%	62,100	9,438	20%	1.64

**Table A3.10: Sensitiveness analysis selling price Canarium fruit of model 1**

%	VND/m3	NPV ( 10% discount) ( 1000 VND)	IRR	B/C
100%	5,000	13,426	24%	1.92
70%	3,500	8,669	20%	1.59
50%	2,500	5,498	17%	1.38
30%	1,500	2,327	13%	1,16

**Table A3.11: Sensitiveness analysis NPV on Acacia timber price and Canarium fruit**

Unit: 1000 VND

		Acacia timber price				
Canarium fruit price	NPV (10%)	100%	70%	50%	30%	
	100%	13,426	11,717	10,577	9,438	
	70%	8,669	6,960	5,821	4,681	
	50%	5,498	3,789	2,649	1,510	
	30%	2,327	618	(522)	(1,661)	

Analysis of the input

**Table A3.12: Sensitiveness analysis for labor unit price**

VND/man-day	NPV (10%) (1000 VND)	IRR	B/C
50.000	6,363	16%	1.29
40.000	9,188	19%	1.49
30.000	12,013	22%	1.75
25.000	13,426	24%	1.92
15.000	16,251	28%	2.38

**Table A3.13: Sensitiveness analysis of price for Canarium seedling**

%	VND/stem	NPV (10%) (1000 VND)	IRR	B/C
150%	19,500	11,673	21%	1.71
130%	16,900	12,374	22%	1.79
110%	14,300	13,075	23%	1.87
100%	13,000	13,426	24%	1.92
70%	9,100	14,478	26%	2.07

**Table A3.14: Sensitiveness analysis (unit price per man-day and Canarium seedling)**

	Labor price per man-day					
	NPV (1000 VND)	50.000	40.000	30.000	25.000	15000
Price of seedling (Canarium) (VND)	150%	4,610	7,435	10,260	11,673	14,498
	130%	5,311	8,136	10,962	12,374	15,199
	110%	6,013	8,838	11,663	13,075	15,901
	100%	6,363	9,188	12,013	13,426	16,251
	70%	7,415	10,240	13,065	14,478	17,303

**Table A3.15: Supervision system**

Briefing	Criteria	Method of evaluation	Data collection			Report aggregation			Decision issuing		Sending Decision for implementation	
			Collector	Time & sequence	Method	Send to	Time & sequence	Method	Who	Time & sequence	Time	Method
Overall objective	To 2010 It has 139.78 ha agro forestry in red book planted; To 2010 It has 139.78 ha agro forestry in red book planted by multipurpose species mix crop.	Project implementation report; Accounting book, Business report of forest product	Evaluation group	Dec. annum since year 2 (2007)	Reference of docs. and reports	Tân Hòa commune PIU	Dec. annum since year 2 (2007)	Aggregation and analysis of data from collected sources	Head of PMB	Dec. annum since year 2 (2007)	January of following year	Direct
Project objective	Every household incomes VND 63.4-62.9 million in 10 year; To 2010 It has 139.78 ha agro forestry in red book planted by multipurpose species mix crop.	Business report of forest product 2019. Statistic book	Evaluation group	12 - 2019	Reference report, documents, field survey	District PMB and DPC	12 - 2019	Aggregation and analysis of data from collected sources	Head of PMB	12 - 2019		
Project results												
1-1 Agro forestry models established	Agro forestry models established in 4 villages Tan Hoa commune	Meeting minutes	Evaluation group	Dec. every year since 2007 to 2010	Reference documents available in the commune filed sampling	Tan Hoa PIU and Tan Hoa CPC	Dec. every year since 2007 to 2010	Aggregation of data from information sources collected and reporting	Head of Tân Hòa PIU	Dec. annum since 2007 to 2010	Q. IV of the same year	Direct
1-2 The householders income from Agro forestry models.	Every year each household incomes from the project: VND5.3-6.3 million	Documents of PRA, Project reports, Tan Hoa commune, District reports of Socio-economic development	Evaluation group	Dec. every year since 2007 to 2019	Reference documents available in the commune filed sampling	Tan Hoa PIU and Tan Hoa CPC	Dec. every year since 2007 to 2019	Aggregation of data from information sources collected and reporting	Head of Tân Hòa PIU	Dec. annum since 2007 to 2019	Q. IV of the same year	Direct
2) Project management and M&E established	01 PIU and M&E arrangement established;	Quarter and annual reports.	Evaluation group	Dec. every year since 2007 to 2019	Reference documents available in the commune filed sampling	Tan Hoa PIU and Tan Hoa CPC	Dec. every year since 2007 to 2019	Aggregation of data from information sources collected and reporting	Head of Tân Hòa PIU	Dec. annum since 2007 to 2019	Q. IV of the same year	Direct
3) Technical service activities implemented	9 training courses for 230 people to be trained. Farmers loan VND 6.0 million from the Bank. 139.78 of 5 agro forestry plots designed.	Training course reports; Financial reports; Documents of agro forestry plots design.	Evaluation group	Dec. every year since 2007 to 2010	Reference documents available in the commune filed sampling	Tan Hoa PIU and Tan Hoa CPC	Dec. every year since 2007 to 2010	Aggregation of data from information sources collected and reporting	Head of Tân Hòa PIU	Dec. annum since 2007 to 2010	Q. IV of the same year	Direct
2-1 Setting up Tan Hoa PIU	Tân Hòa PIU comes into life	Decision for PMB establishment	Evaluation group	Q. II 2006	Reference documents available in the commune	Phú Bình DPC	Q. II 2006	Copying the Decision and reports	Chairman of Phu Binh DPC	Q. II 2006	Q. II 2006	Administrative
2-2 Village meetings	Households are informed about the project	Meeting minutes	Evaluation group	Q. III 2006	Reference documents available in the commune	DPC, CPC	Q. III 2006	Copying the meeting minute and reports	Head of Tân Hòa PIU	Q. III 2006		
1-1 Agro- forestry models selection	Actual afforested area	Agro forestry plots design doc., land use map, report on Agro- forestry results	Evaluation group	Dec. every year since 2007 to 2010	Reference documents available in the commune filed sampling	Tan Hoa PIU and Tan Hoa CPC	Dec. every year since 2007 to 2010	Aggregation of data from information sources collected and reporting	Head of Tân Hòa PIU	Dec. annum since 2007 to 2010	Q. IV of the same year	Direct
1-7a Tending	Agro- forestry area protected	Agro forestry design doc., land use map, report on tending plantation forest results	Evaluation group	Dec. every year since 2008 to 2015	Reference documents available in the commune, field sampling	Tan Hoa PIU and Tan Hoa CPC	Dec. every year since 2008 to 2015	Aggregation of data from information sources collected and reporting	Head of Tân Hòa PIU	Dec. annum since 2008 to 2015	Q. I of the following year	Direct
1-2 Buying and seedling	469661 seedling of	Project reports	Evaluation group	Dec. every	Reference documents	Tan Hoa PIU and	Dec. every	Aggregation of data from	Head of Tân Hòa	Dec. annum	Q. IV of the same	Direct



Briefing	Criteria	Method of evaluation	Data collection			Report aggregation			Decision issuing		Sending Decision for implementation	
			Collector	Time & sequence	Method	Send to	Time & sequence	Method	Who	Time & sequence	Time	Method
fertilizers	Acacia, Canarium, rattan, D.duperranum			year since 2007 to 2010	available in the commune filed sampling	Tan Hoa and Tan Hoa CPC	Dec. every year since 2007 to 2010	information sources collected and reporting	PIU	since 2007 to 2010	year	
1-5 Planting	To 2010 It has 139.78 ha agro forestry in red book planted by multipurpose species mix crop.	Project reports Document of Agro forestry plots design.	Evaluation group	Dec. every year since 2007 to 2010	Reference of documents available in the commune filed sampling	Tan Hoa and Tan Hoa CPC	Dec. every year since 2007 to 2010	Aggregation of data from information sources collected and reporting	Head of Tan Hoa PIU	Dec. annum since 2007 to 2010	Q. IV of the same year	Direct
1-7b Protection	Agro- forestry area protected and not damaged	Agro- forestry design doc., land use map, report on protection of plantation forest results	Evaluation group	Dec. every year since 2007 to 2020.	Reference of documents available in the commune and sample field checking	Tan Hoa and Tan Hoa CPC	Dec. every year since 2007 to 2020	Aggregation of data from information sources collected and reporting	Head of Tan Hoa PIU	Dec. annum since 2007 to 2020.	Q. I of the following year	Direct
1-8Harvest	Agro- forestry area harvested	Harvest design doc., land use map, report on results of harvest/ business of plantation forest	Evaluation group	Dec. every year since 2014 to 2020	Reference of documents available in the commune, map, statistical book, direct field check	Tan Hoa and Tan Hoa CPC	Dec. every year since 2014 to 2020	Aggregation of data from information sources collected and reporting	Head of Tan Hoa PIU and Tan Hoa commune chairman	Dec. annum since 2014 to 2020.	Q. I of the following year	Direct
4.Environmental impact caused by the project	Environmental impact caused by the project evaluated	Report on project implementation, statistics on environment impact	Evaluation group	Dec. every year since 2007 to 2020	Reference of statistics, collect report on negative environment impact	Tan Hoa and Tan Hoa CPC	Dec. every year since 2007 to 2020	Aggregation of data from information sources collected and reporting	Head of Tan Hoa PIU and Tan Hoa commune chairman	Dec. annum since 2007 to 2020.	Q. I of the following year	Post / Direct
5.Socio-economic impact caused by the project	Socio-economic impact caused by the project evaluated	Report on project implementation, statistics on Socio-economic impact	Evaluation group	Dec. every year since 2007 to 2020	Reference of statistics, collect report on negative Socio-economic impact	Tan Hoa and Tan Hoa CPC	Dec. every year since 2007 to 2020	Aggregation of data from information sources collected and reporting	Head of Tan Hoa PIU and Tan Hoa commune chairman	Dec. annum since 2007 to 2020.	Q. I of the following year	Post / Direct

## Annex 4: Cost tables

**Table A4.1: Cost for each year for 1 ha model (25.000 VND/man-day)**

Unit: VND

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Total
Implementation year	1	2	3	4	5	6	7	8	9	10	11	
Inflation	1.05	1.10	1.16	1.22	1.28	1.34	1.41	1.48	1.55	1.63	1.71	
Baseline cost	82,577	11,746,890	2,024,150	1,061,225	259,508	259,508	609,500	702,500	796,250	890,500	809,000	19,241,609
Total	91,042	13,598,493	2,460,367	1,354,421	347,766	365,154	900,509	1,089,808	1,297,007	1,523,057	1,452,848	24,480,473

**Table A4.2: Estimation cost**

(Case 2: 38,500 VND/man-day)

Unit: 1000 VND

Component	Project costs from 2006 – 2019							Total (2006 – 2010)
	M. 1 (43 ha)	M. 2 (20 ha)	M. 3 (22 ha)	M. 4 (37.49)	M. 5 (17.29)	Total cost (2006 – 2019)	% compared to baseline cost	
a. Labor	665,246	309,417	340,358	580,002	267,491	2,162,514	65.42%	1,123,683
b. Materials	296,700	66,000	78,870	269,366	93,107	804,042	24.32%	804,042
c. Others	62,452	29,047	31,952	54,449	25,111	203,011	6.14%	164,275
- Design	13,946	6,487	7,135	12,159	5,608	45,336	1.37%	45,336
- Quality check	11,903	5,536	6,090	10,378	4,786	38,693	1.17%	29,507
- Management fee	36,602	17,024	18,727	31,912	14,717	118,982	3.60%	89,433
d. Training	7,779	2,685	3,018	5,967	2,592	22,041	0.67%	22,041
e. Equipment + stationary (3.6%)	36,878	14,561	16,242	32,537	13,886	114,104	3.45%	114,104
Total baseline cost	1,069,055	421,710	470,441	942,321	402,187	3,305,713	100.00%	2,228,146
- Quantity reservation (5%)	53,453	21,085	23,522	47,116	20,109	165,286		111,407
- Price reservation (5%)	363,670	146,659	164,594	345,958	139,872	1,160,753		463,408
Total cost	1,486,178	589,454	658,557	1,335,395	562,168	4,631,751		2,802,961

**Table A4.3: Cost for each year for 1 ha model (38,500 VND/man-day)****Unit: VND**

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Total
Implementation year	1	2	3	4	5	6	7	8	9	10	11	
Inflation	1.05	1.10	1.16	1.22	1.28	1.34	1.41	1.48	1.55	1.63	1.71	
Baseline cost	82,577	13,766,034	2,895,440	1,538,180	357,788	357,788	938,630	1,081,850	1,226,225	1,371,370	1,245,860	
Total	91,042	15,935,905	3,519,425	1,963,150	479,471	503,444	1,386,784	1,678,304	1,997,391	2,345,508	2,237,386	32,137,811

## Annex 5: Tentative training courses planned under the project

**Table A5.1: Tentative training courses planned under the project**

Title	Objective	Training content	No of courses	Target participations	No of participation	Duration	Timing	Cost	Instructor	Place
Training course for extension workers	Increase extension capabilities of extension workers	Transfer technology in planting, tending, protection Guide and co-ordinate the household in project area and management including tending and protection Skill improvement for the project management	1	Trainers (extension officers)	10	Total of 1 day	Nov -Dec	Teacher for trainer: 100,000VND/day Other cost (material, etc.): 10,000VND/person/day Total: 200,000 VND	Extension center in the Province / Thai Nguyen Agriculture and Forestry University	At Extension Station in Phu Binh Dist.
Leaders' training course	Increase leaders' capabilities in undertaking the project	Basic project knowledge (Including administration issues) agro-forestry technique	1	Village Support Group Leader	10	Total of 1 day	Nov -Dec	Trainer: 50,000VND/day Other cost (material, etc.) 10,000 VND/person/day Total: 200,000VND	Extension officers in the District and commune level	At commune
Farmers' training course	Increase farmers' capabilities in implementing the project	Basic project knowledge agro-forestry technique	9	Farmers	230	Total of 1 day	Nov -Dec	Trainer: 50,000VND/day Other cost (material, etc.) 10,000 VND/person/day Total: 1,800,000VND	Extension officers in the District and commune level	At commune
Total			11		250			Total 2,200,000VND		

## Annex 6: Project design matrix

Project Name: Agro-forestry Development Project in Thai Nguyen Province  
 Project Areas: fourth villages Tan Hoa Communes-Phu Binh District-Thai Nguyen Province  
 Assistance Period: 2006 – 2010  
 Project period: 2006 – 2019  
 Target Beneficiary: Households who have red books for forest land in the project area

Version 1 Date: November 2007

Narrative Summary	Indicators	Means of Verification	Critical Assumption
<u>Overall objective</u> Livelihood is improved through development of agro-forestry plots in the forest land.	Poverty rate is reduced.	Poverty statistics of province/district	The government support for agro-forestry development continuously.
<u>Project objective</u> The production value of the forest land is increased.	Around 130 m3/ha/year of commercial wood, 3 tons/ha/year of agricultural product and 1.8 tons/ha/year of fruit are harvested.	Record of the forest protection office and the DARD	Payment is promptly done as agreed between household and buyers.
<u>Objective of assistance</u> agro-forestry plot is established in forestry land.	Around 140 ha of degraded Eucalyptus forest is converted to agro-forestry plot by 2010.	Project implementation report	Demand and sales price remain buoyant.
<u>Project Outputs</u> 1. The degraded Eucalyptus forest is converted to a high productive agro-forestry plot. 2. Agro-forestry development project is managed properly together with monitoring and evaluation. 3-1. Agro-forestry plot designing is conducted properly. 3-2. Institutional capacity for managing the agro-forestry development project and capacity for conducting agro-forest activities is enhanced.	1. Five model of agro-forestry (around 140 ha) are established by 2010. 2. A PIU is established in 2006. 3-1. Agro-forestry plot design is conducted properly in around 140 ha forest land by 2010. 3-2. About 9 training courses for household and 2 training courses for project management staff is conducted.	Project implementation report	There is not any natural disaster. No major pest and disease outbreak is occurred.
<u>Activities</u> 1. Facilitate agro-forestry activities by farmers. 2. Establish a Project Implementation Unit (PIU) in Tan Hoa commune. 3-1. Conduct an agro-forestry plot design. 3-2. Provide training courses for project management and agro-forestry activities to project management staff and participating farmers.	<u>Inputs</u> Total project cost: VND 3,477 million (1) Agro Forestry Model Development VND 2,208 million (2) Project Management and, Monitoring and Evaluation VND 244 million eight officers for PIU (3) Technical Service VND 67 million		Adequate number of experienced staff and budget is allocated by the government throughout the assistance period. Interest of participants on agro-forestry is maintained. Technical service is conducted adequately.
			<u>Pre-condition</u> The local government approves the project. Loan scheme is agreed with VBSP on interest rate, grace period and repayment period

## Training Package

Book 1:	Training Plan on Capacity Building for Preparing Feasibility Studies and Implementation Plans for Production Forest/Agroforestry Development Projects in Vietnam
Book 2:	Manual for Preparation of Feasibility Study Reports for Production Forest/Agroforestry Development Projects in Vietnam
Book 3:	Manual for Preparation of Implementation Plans for Production Forest/Agroforestry Development Projects in Vietnam
Book 4:	Model F/S of Thai Nguyen Province
	Book 4-1: Model Feasibility Study Report for Smallholder Production Forest Development Project in Thai Nguyen Province
	Book 4-2: Model Feasibility Study Report for Agroforestry Development Project in Thai Nguyen Province
Book 5:	Model IP of Thai Nguyen Province
	Book 5-1: Model Implementation Plan for Smallholder Production Forest Development Project in Thai Nguyen Province
	Book 5-2: Model Implementation Plan for Agroforestry Development Project in Thai Nguyen Province
Book 6:	Monitoring and Evaluation Report on Technical Training of Participating Provinces
Book 7:	Market Trend Reference Book on Wood-based and Agroforestry Products
Book 8:	Feasibility Study Reports of Participating Provinces
	Book 8-1: Feasibility Study Report on Agroforestry Project in Ta Hoc Commune, Mai Son District, Son La Province
	Book 8-2: Feasibility Study Report on Production Forest Establishment Project in Nui Thanh District, Quang Nam Province
	Book 8-3: Feasibility Study Report on Treatment of Exhausted Natural Forest and Production Forest Establishment Project in Da Teh District, Lam Dong Province
	Book 8-4: Feasibility Study Report on Afforestation Project for Serving Biodiversity Conservation in Long An Province
Book 9:	Implementation Plans of Participating Provinces
	Book 9-1: Implementation Plan on Agroforestry Project in Ta Hoc Commune, Mai Son District, Son La Province
	Book 9-2: Implementation Plan on Production Forest Establishment Project in Nui Thanh District, Quang Nam Province
	Book 9-3: Implementation Plan on Treatment of Exhausted Natural Forest and Production Forest Establishment Project in Da Teh District, Lam Dong Province
	Book 9-4: Implementation Plan on Afforestation Project for Serving Biodiversity Conservation in Long An Province