

**DEPARTMENT OF FORESTRY (DOF),
VIETNAM FORESTRY UNIVERSITY (VFU) AND
FOREST SCIENCE INSTITUTE OF VIETNAM (FSIV),
MINISTRY OF AGRICULTURE AND RURAL DEVELOPMENT (MARD)
SOCIALIST REPUBLIC OF VIETNAM**

**THE STUDY
ON
CAPACITY DEVELOPMENT FOR AR-CDM PROMOTION
IN
THE SOCIALIST REPUBLIC OF VIETNAM**

**INTERIM REPORT (2)
- Results of the Study -**

MARCH 2008

JAPAN INTERNATIONAL COOPERATION AGENCY

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SOJITZ RESEARCH INSTITUTE, LTD.**

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Currency (Transfer Rate of Vietcom Bank)
US\$ 1.0 = ¥ 107.93 = 15,973 VND (As of January 29, 2008)
US\$ = United State Dollar
¥ = Japanese Yen
VND = Vietnamese Dong



Location Map of Hoa Binh Province

SUMMARY OF THE STUDY

- Study Title** : The Study on Capacity Development for AR-CDM Promotion in the Socialist Republic of Vietnam
- Executing Agency** : Department of Forest, Ministry of Agriculture and Rural Development
- Counterpart Agencies** : Vietnam Forestry University (VFU) and Research Center for Forest Ecology and Environment (RCFEE)
- Duration of the Study** : 30 months (From October 2007 to March 2009)
The study period was extended from 18 months to 30 months.
- Budget** : Approx. 1.1 million US\$ (Grant from the Japanese Government)
- Objectives of the Study** :
- ◆ To support government agencies (DOF/MARD, VFU and RCFEE) to develop their capacity for promotion of AR-CDM.
 - ◆ To recommend a vision and action plans to promote AR-CDM in Vietnam
- Study Area** : The Study will cover the entire area of Vietnam.
- Five sites in Cao Phong district, Hoa Binh province were selected for preparation of a small-scale AR-CDM project plan and draft Project Design Document (PDD) required for approval as a CDM project.
- Study Components** :
- ◆ Support for increasing awareness of AR-CDM (conduct of seminars and workshops)
 - ◆ Support for Establishment of AR-CDM Promotion System (establishment of a website, AR-CDM Helpdesk, and preparation of guidebooks and other materials.)
 - ◆ Support for Development of Capacity on AR-CDM Project Formulation (preparation of draft PDD of a small-scale AR-CDM project and, if necessary, development of new methodology)
- Output of the Study** :
- ◆ A Vision for AR-CDM promotion and Action Plans in Vietnam.
 - ◆ A Guidebook for AR-CDM developers and/or investors.
 - ◆ A website containing information and services necessary for the development of AR-CDM projects in Vietnam.
 - ◆ A draft PDD for a small scale AR-CDM project and, if necessary, a new methodology for small-scale AR-CDM.

Project Design Matrix

Narrative Summary	Verifiable Indicators	Means of Verification	Assumption
<p>Overall Goal:</p> <ul style="list-style-type: none"> ◆ Contribution to Kyoto Protocol by Vietnam ◆ Reforestation of degraded land in Vietnam ◆ Sustainable development of rural communities 	<ul style="list-style-type: none"> ◆ Increased generation of carbon credits ◆ Increased area of AR-CDM plantations on degraded land. ◆ Increased income of rural communities. 	<ul style="list-style-type: none"> ◆ Forestry statistics ◆ Satellite images ◆ Statistics of UNFCCC ◆ Socio-economic census ◆ Annual report of AR-CDM working group 	<ul style="list-style-type: none"> ◆ There is no negative movement on AR-CDM in the international arena. ◆ There is no drastic change in policies of forest sector. ◆ The government will maintain a strong intention to combat global warming.
<p>Project Purposes:</p> <ul style="list-style-type: none"> ◆ AR-CDM working group under MARD will become capable to promote AR-CDM projects. 	<ul style="list-style-type: none"> ◆ Increased number of AR-CDM project formulation ◆ Increased number of AR-CDM seminars organized or supported by WG 	<ul style="list-style-type: none"> ◆ Data or annual report of AR-CDM WG 	<ul style="list-style-type: none"> ◆ An AR-CDM working group will be officially established by MARD.
<p>Outputs:</p> <ul style="list-style-type: none"> ◆ Vision and action plans for AR-CDM promotion will be recommended. ◆ Guidebook for developers and investors will be developed. ◆ A website on AR-CDM will be established. ◆ A draft PDD for a small-scale AR-CDM project will be prepared. ◆ New methodology for small-scale AR-CDM (if necessary) 	<ul style="list-style-type: none"> ◆ Vision and action plan for AR-CDM promotion in Vietnam ◆ Guidebook(s) for AR-CDM developers/ investors ◆ A website about AR-CDM ◆ Draft PDD ◆ New methodology for small-scale AR-CDM 	<ul style="list-style-type: none"> ◆ Interim report ◆ Final report ◆ Guidebook ◆ Website ◆ Handouts of seminars / workshops ◆ Draft PDD 	<ul style="list-style-type: none"> ◆ The counterpart will be actively involved in the Study. ◆ There is no change in assigned counterpart. ◆ There is no negative movement on AR-CDM in the international arena. ◆ The local stakeholders in the site are cooperative to the Study.
<p>Activities:</p> <ul style="list-style-type: none"> ◆ Awareness raising for AR-CDM promotion (seminars and workshops) ◆ Establishment of AR-CDM promotion system (website, helpdesk, guidebooks) ◆ Formulation of a small-scale AR-CDM project 	<p>Inputs:</p> <p><u>Japanese side</u></p> <ol style="list-style-type: none"> 1. Consultants <ul style="list-style-type: none"> ◆ Team leader/ CDM institutional dev. (1) ◆ CDM institutional development (2) ◆ CDM forestry (1) ◆ CDM forestry (2) ◆ CDM project planning (1) ◆ CDM project planning (2) 2. Subcontracting works 3. Equipment and rental vehicles <p>Cost related to the Study: US\$ 1.0 million</p>	<p>Pre-condition</p> <ol style="list-style-type: none"> 1. The counterpart agencies will assign enough staff to organize a counterpart team for the Study. 2. The executing agency will assign staff to manage the study activities and coordinate with relevant agencies. 3. The executing agency can propose a site suitable for small-scale AR-CDM project formulation. 4. The local stakeholders of the site will accept interventions to be made by the Study. 	

SUMMARY OF INTERIM REPORT (2)

Objectives and outputs of JICA study

1. The Study on capacity development for AR-CDM promotion in the Socialist Republic of Vietnam commenced in October 2006 with the objectives of (a) developing the capacity of the government agencies for AR-CDM promotion and (b) recommending a vision and action plans to promote AR-CDM in Vietnam. The major outputs of the Study are:
 - (1) A Vision for AR-CDM promotion and Action Plans in Vietnam.
 - (2) A Guidebook for AR-CDM developers and/or investors.
 - (3) A website containing information and services necessary for the development of AR-CDM projects in Vietnam.
 - (4) A draft PDD for a small scale AR-CDM project including a new methodology, if necessary.

CDM in Vietnam

2. In Vietnam, the International Cooperation Department (ICD) of MONRE was designated as a DNA in March 2003 and is responsible for executing matters related to Kyoto Protocol. The National Steering Committee for UNFCCC, Kyoto Protocol (NSC) has the task of reviewing PIN and PDD and reporting this to the minister of MONRE for issuing a formal letter of endorsement for PIN or letter of approval for PDD based on the exclusive and priority criteria of CDM. The approval procedures were established by MONRE Circular No: 10/2006/TT-BTNMT, dated 12th December 2006.
3. The Government of Vietnam has issued several policies with regard to CDM. Among those, the Prime Ministerial Decision No.47/2007/QĐ-TTg dated 6/04/2007 describes the action plans for the implementation of the Kyoto Protocol in the period of 2007-2010. Meanwhile, the Prime Ministerial Decision No.130/2007/QĐ-TTg dated 2/08/2007 provides the financial mechanisms and policies for CDM projects. The PM decision No.130 defines the ownership of CERs and CER selling fee which CDM investors shall pay the Vietnam Environmental Protection Fund (VEPF) when selling CERs.

AR-CDM workshops and seminars

4. The Study team organized a training workshop for the counterparts on the basic principles and rules of AR-CDM in December 2006. Two more training workshops were held to share experiences on the formulation of small-scale AR-CDM pilot project in Cao Phong district, Hoa Binh province with the counterparts. After the completion of the draft PDD of the pilot project, the Study team and the counterparts organized the AR-CDM seminars for potential developers and investors in November 2007 at Hanoi, Ho Chi Minh, and Hue cities.

AR-CDM promotion system

5. Under the activities involved in the establishment of an AR-CDM promotion system, the Study team and the counterpart established a AR-CDM website (URL: <http://ar-cdm.vfu.edu.vn/>) on the web server of the information center of VFU. An AR-CDM Guidebook and a booklet for small-scale AR-CDM were prepared and distributed for the counterparts and the participants of the seminars, respectively. The Study team also proposed the establishment of an AR-CDM helpdesk at the International Cooperation Division of VFU. The helpdesk shall serve to navigate AR-CDM development in Vietnam under the guidance of DOF/MARD and also be responsible for management and update of the AR-CDM website.

Formulation of a small-scale AR-CDM pilot project and preparation of draft PDD

6. The Study team selected Cao Phong district in Hoa Binh province among three sites proposed by the counterpart for preparation of a draft PDD for a small-scale AR-CDM project. After a reconnaissance survey of several sites in the district, five sites were chosen for PDD preparation in consideration of the present land use, accessibility, land eligibility, additionality, the willingness of local community to cooperate to the study activities, among other. Soon after the site selection, the Study team and the counterpart carried out the boundary survey of the five sites, vegetation classification survey, baseline biomass survey and soil survey in the sites.
7. The lands of the five sites selected in Cao Phong district are categorized as “production forest land” and the land usage rights are already allocated to local people. The Study team and the counterpart identified the owners of the land usage rights with the assistance of the Forest Protection Division of the district. Then stakeholder meetings were organized inviting the land owners as well as the leaders of communes and villages in order to explain to them the purposes of the Study - preparation of the plan and documents of a small-scale AR-CDM project in cooperation with the stakeholders. All stakeholders agreed that the Study team and the counterpart would proceed to plan activities.
8. According to the results of the interview survey to the local people, the forest in the proposed project sites was cleared before 1980 for crop production in accordance with government policy. After intensive cultivation of the land, they were left fallow due to a decline in productivity. Since then, the land has been used only occasionally for crop production and cattle grazing. Though the lands were allocated to local people, they cannot afford to develop forest in the land due to lack of funding. The government’s reforestation programs have also failed to provide sufficient economic incentives to them for forest development. The local people are willing to develop forest in the proposed project sites provided that they would be supported by the project.
9. The features of the project are summarized below:

Area for planting:	308.5 ha net (365.26 ha in gross)
Tree species:	Acacia mangium: 280.37 ha net; Acacia auriculformis: 28.12 ha net
Rotation:	15 years
Thinnings:	A. mangium: at 8 th year. A. auriculformis: at 8 th and 12 th years
Year of tree planting:	140.18 ha in 2009; 168.32 ha in 2010
Plans other than reforestation:	Support for greed fodder production, extension and demonstration

Project management unit:	A Social Fund to be established by Cao Phong district and VFU
Project cost (current price): (in 17 years)	<p>Total: 14,630 mil. VND</p> <p>The Social Fund will shoulder 5,696 mil. VND. Project participants will contribute 3,209 mil. VND.</p> <p>Breakdown of the project cost</p> <p>Reforestation: 9,539 mil. VND Green fodder production: 861 mil. VND Extension & demonstration: 80 mil. VND CDM related cost: 1,328 mil. VND Project management: 2,075 mil. VND Contingency: 746 mil. VND</p>
Project benefits (current price): (in 17 years)	<p>From forest products: 22,535 mil. VND Sales of t-CER: 1,968 mil. VND (the benefits of t-CER are estimated very conservatively)</p>
Source of funding	Honda Vietnam Co., Ltd. will provide 3,500 mil. VND to support the project implementation.
Validation / verification schedule	Validation: at 3 rd quarter 2008 1 st verification: 2013; 2 nd verification: 2018; 3 rd verification: 2023

10. The cash flow analysis of the Social Fund, the project management unit of the project, was conducted to see if the fund could implement and manage the project financially. With the donation from a Japanese company (Honda Vietnam Co., Ltd.) at an early stage of the project as well as expected support for validation by JICA, the fund could operate the project without financial burden. The shared benefits of t-CER (in year 6 and 11) and thinned timber (in year 9, 10 and 14) would also contribute to financially stable operation of the fund. Though the fund shows a deficit of 369 million VND at the end of Year 15, the fund could overcome the problem by, for example, borrowing funds from banks. The debt could be repaid next year using the shared benefits of harvested timber.

Year		O&M Cost	Revenue	Cash Flow	Cash at end of year
Year 0	2008	374	740	366	366
Year 1	2009	767	1,018	251	617
Year 2	2010	1,102	1,031	-71	546
Year 3	2011	480	1,027	548	1,094
Year 4	2012	300	55	-246	848
Year 5	2013	490	42	-448	400
Year 6	2014	138	106	-32	368
Year 7	2015	138	18	-119	249
Year 8	2016	138	12	-125	123
Year 9	2017	138	304	166	289
Year 10	2018	407	323	-83	206
Year 11	2019	138	308	170	376
Year 12	2020	138	19	-119	257
Year 13	2021	138	13	-125	132
Year 14	2022	138	41	-97	35
Year 15	2023	407	2	-405	-369
Year 16	2024	122	2,860	2,738	2,369
Year 17	2025	145	2,833	2,688	5,057

11. The anticipated benefits to be received by the project participants were estimated under the following assumptions:

1) Average area of plantation established by a participating household is 1.0 ha.	<u>Basis of assumption</u> A total of 320 households would participate in the project and establish 308.5 ha (net area) of plantation and 30 ha of green fodder.
2) Average area of greed fodder planted by a participating household is 0.1 ha.	

A participating household could receive material supply equivalent to 3.14 million VND and also 61.9 million VND of incentive and shared benefits in cash by the time of harvesting all the plantations in Year 17. Each household could receive 3.11 million VND of cash incentives for planting and tending activities on average.

Anticipated benefits of the project per household

	Material support (mil. VND)		Cash incentives and benefits (mil. VND)		
	Reforestation	Green fodder production	Planting and tending	Shared benefit of forest products	Shared benefit of t-CER
Years 1-5	1.71	1.40	3.11	-	-
Years 6-10	-	-	-	5.90	0.28
Years 11-17	-	-	-	48.89	2.91
Total	1.71	1.40	3.11	54.79	3.19
	3.14		61.09		

Note: The figures indicate the anticipated benefits for 1.0 ha of reforestation and 0.1 ha of green fodder production

Vision and action plans for AR-CDM promotion

12. Vietnam has actively implemented reforestation programs since the 1990s. The Five Million Hectare Reforestation Program (1998-2010) has achieved reforestation of a substantial area nation-wide and, as a result, forest coverage was improved from 27.2% in 1990 to 39% in 2006. The National Forestry Strategy (2006-2020) issued in 2007 also states the intention of the government to establish, manage, protect and use 14.3 million hectare of forest land sustainably by 2020 while ensuring wider participation from various socio-economic sectors in forest development to increase their contribution to socio-economic development, environmental protection, bio-diversity conservation and provision of environmental services in order to reduce poverty and to improve the livelihood of rural people in mountainous area.
13. The growing awareness of global climate change has heightened the interests of public and private institutions as well as the general public about reforestation and forest protection. This results in increasing private investment to reforestation and sustainable forest management partly as a CSR (Corporate Social Responsibility) activity. The tendency is beneficial to forestry sector in Vietnam including to the promotion of AR-CDM. Like reforestation projects, AR-CDM projects would provide direct benefits to local communities and contribute to environmental protection. In addition, implementing AR-CDM projects could influence the quality of reforestation projects in terms of mapping, stakeholder participation, benefit sharing and monitoring, among others. It also provides additional economic benefits in the form of CERs.

14. GHG emission reduction is not the sole responsibility of industrialized countries anymore since emissions from developing countries have grown as the economy grows. In this regard, Vietnam would also be one of the major emitters of GHG in the near future due to fast industrial development. The forestry sector will play an important role in Vietnam in suppressing GHG emission of the country. Forest development also provides short- and long-term benefits directly to the poor rural communities and contributes to sustainable development, unlike industrial development. No other country in Indochina is active in promoting AR-CDM. Considering these, the vision of AR-CDM development in Vietnam was prepared as follow:

Vietnam plays a leading role in Indochina in demonstrating GHG abatement by the implementation of AR-CDM, sustainable development and environmental protection in mountain areas.

15. There are about 3.2 million ha of bare land (IA+IB) in three categories of forest lands in Vietnam. Of which, AR-CDM projects could be developed on land which is accessible, satisfies land eligibility and additionality, and has clear land ownership. Despite of the potential, AR-CDM development faces several constraints:

Constraints for forest development in general

- a) Long gestation period despite large initial investment
- b) Risks of forestry investment (vulnerable to natural and man-made disasters)
- c) Poor access to reforestation sites

Constraints specific to AR-CDM

- a) Uncertain additional benefits of AR-CDM
- b) High transaction cost
- c) Ambiguity of AR-CDM methodology
- d) Lack of consultants with experience in PDD preparation and validation
- e) Lack of experience in implementing AR-CDM projects and marketing of t-CERs and l-CERs
- f) Unclear land ownership
- g) Lack of data and information on location of the lands suitable for AR-CDM

16. The countermeasures against the constraints to forestry projects in general are mainly financial. MARD has already implemented the measures by promoting and assisting the implementation of forestry projects and programs including those assisted by ODA. They are expected to strengthen the efforts and expand it for promotion of private funds for forestry development in Vietnam. On the other hand, there are several countermeasures specific to the constraints of AR-CDM. Among them, the most important and urgent to implement is the materialization of the small-scale AR-CDM pilot project formulated by the Study. The implementation of the pilot project is expected to resolve other constraints or lessen the degree of constraints such as ambiguity of the methodology and lack of experiences.

Constraints of AR-CDM development and the countermeasures

Classification	Constraints for development	Countermeasures
Constraints common to forestry projects	Large investment required at initial stage of the projects; long gestation period (leading to difficulty to attract private investment)	<ul style="list-style-type: none"> ◆ Investment and financial support by the government including promotion of ODA forestry projects ◆ Promotion of CSR activities on forestry by private sector
	Risk of natural and man-made disasters	<ul style="list-style-type: none"> ◆ Ensuring the implementation of preventive and mitigation measures against disasters ◆ Financial support of the government on recovery
	Poor access to the project sites	Investment and financial support by the government including promotion of ODA forestry projects
Constraints specific to AR-CDM		
Cost and economic feasibility	Unclear additional benefits from the sales of t-CER/ l-CER	<ul style="list-style-type: none"> ◆ Study on the market price of CER ◆ Study application for VER
	High transaction cost of CDM procedures (reliance to foreign DOEs)	<ul style="list-style-type: none"> ◆ Promotion of bundling ◆ Financial support by ODA projects ◆ Promotion of CSR support for transaction cost of AR-CDM
Lack of experience	Unclear if justification of additionality is acceptable or not	<ul style="list-style-type: none"> ◆ Implementation of the AR-CDM pilot project ◆ Study the experiences of other AR-CDM projects
	Unclear if justification of land eligibility is acceptable or not	
	Ambiguity of AR-CDM methodology	
	Lack of consultants with experience in PDD preparation and validation	<ul style="list-style-type: none"> ◆ Capacity building of local consultants through their participation in succeeding AR-CDM projects ◆ Donors' support for development of PDD of AR-CDM projects
	Lack of experiences in implementing AR-CDM projects and marketing of t-CER/ l-CER	<ul style="list-style-type: none"> ◆ Accumulation and dissemination of AR-CDM experiences through the implementation of projects ◆ Study the experiences of other AR-CDM projects in other countries
Others	Unclear land ownership	<ul style="list-style-type: none"> ◆ Conduct cadastral survey and land allocation when developing AR-CDM ◆ Involvement of local governments in the planning of AR-CDM to resolve problems associated with land ownership
	Lack of data and information on location of the lands suitable for AR-CDM	<ul style="list-style-type: none"> ◆ Identification of the lands suitable for small-scale AR-CDM ◆ Dissemination of the survey results to developers and investors

17. The action plans for AR-CDM development and promotion were prepared for the important countermeasures against the constraints specific to AR-CDM discussed in the previous sections. It is noted that some actions have been already taken by the initiative of the counterpart and JICA Study team.

Action plans for AR-CDM development and promotion

Plan	Actions required	Responsible agency	Timing
1. Implementation of the small-scale AR-CDM pilot project formulated by the Study	Securing the funding required for the project implementation	JICA Study team and the counterpart (CP)	Done. (Honda Vietnam Co., Ltd. made a commitment to support.)
	Establishment of NPO (Social Fund)	Cao Phong district PC assisted by VFU	By March 2008
	Application of the approval of PDD to DNA	NPO assisted by CP	2 nd quarter 2008
	Validation of the pilot project in Cao Phong district	NPO assisted by JICA Study team and CP	3 rd Quarter of 2008
	Organizing project participants	NPO assisted by CP and Cao Phong district PC	2 nd to 3 rd Quarter of 2008
	Concluding contracts between NPO and project participants	NPO and project participants assisted by Cao Phong district PC	3 rd to 4 th Quarter of 2008
	Preparation of detail work plan for the project implementation	NPO assisted by CP and Cao Phong district PC	3 rd to 4 th Quarter of 2008
2. Accumulation of AR-CDM experiences through project implementation (including the pilot project)	Documenting the experiences of AR-CDM planning and implementation and disseminating it through AR-CDM website or seminars	DOF/MARD (through AR-CDM helpdesk)	After validation and registration of the pilot project
3. Survey the lands suitable for small-scale AR-CDM	Request JICA for technical assistance	DOF & ICD/MARD	Done in August 2007
	Negotiation with JICA on the scope of works	DOF & ICD/MARD	Depend on JICA

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in the Socialist Republic of Vietnam**

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Location Map of Hoa Binh Province

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Abbreviations:

ANR	Assisted Natural Regeneration
ANPP	Above-ground Net Primary Production
AR-CDM	Afforestation/Reforestation Clean Development Mechanism
BAU	Business as Usual
CDM	Clean Development Mechanism
CDM-EB	Clean Development Mechanism Executive Board
CER	Certified Emission Reductions
CNA	CDM National Authority
CNECB	CDM National Executive and Consultative Board
COP	Conference of the Parties
CP	Counterpart
CPC	Cleaner Production Center
CPC	Commune People's Committee
CSR	Corporate Social Responsibility
d.m.	Dry Matter
DARD	Department of Agriculture and Rural Development
DMI	Daily Dry Matter Intake
DNA	Designated National Authority
DOE	Designated Operational Entities
DOF	Department of Forestry
DONRE	Department of Natural Resources and Environment
DPC	District People's Committee
EB	Executive Board
EIA	Environmental Impact Assessment
EU	European Union
EU-ETS	European Union Greenhouse Gas Emission Trading Scheme
FEZ	Forestry Ecological Zone
FIRR	Financial Internal Rate of Return
FSIV	Forest Science Institute of Vietnam
GC	Grazing Capacity
GDP	Gross Domestic Product
GEC	Global Environmental Center
GHG	Greenhouse Gas
GIS	Geographic Information System
GPS	Global positioning system
HHs	Households
ICAP	International Carbon Action Partnership
ICD	International Cooperation Department
IFIs	International Financial Institutions
IPCC	Intergovernmental Panel on Climate Change
JBA	Japanese Business Association
JICA	Japan International Cooperation Agency
JSC	Joint Stock Company
KP	Kyoto Protocol
ICER	Long-term Certified Emission Reductions
LULUCF	Land-use, Land-use Change and Forestry
MAI	Mean Annual Increment
MARD	Ministry of Agriculture and Rural Development
MOC	Ministry of Construction
MOCI	Ministry of Culture and Information
MOET	Ministry of Education and Training
MOF	Ministry of Finance
MOFA	Ministry of Foreign Affairs
MOI	Ministry of Industry
MOJ	Ministry of Justice
MONRE	Ministry of Natural Resources and Environment
MOP	Meeting of the Parties

MOST	Ministry of Science and Technology
MOT	Ministry of Trade
MPI	Ministry of Planning and Investment
NFS	National Forestry Strategy
NGO	Non-Governmental Organizations
NPO	Nonprofit Organization
NSS	National Strategy Study
NTFP	Non Timber Forest Products
O&M	Operation & Maintenance
ODA	Official Development Assistance
PC	People's Committee
PDD	Project Design Document
PIN	Project Idea Note
PPC	Provincial People's Committee
PRA	Participatory Rural Appraisal
QA	Quality Assurance
QC	Quality Control
RCEE	Research Center for Energy and Environment
RCFEE	Research Center for Forest Ecology and Environment
SD	Standard Deviation
SOP	Standard Operating Procedures
tCER	Temporary Certified Emission Reductions
UNDP	United Nations Development Program
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization
UPS	Uninterruptible Power Supply
VEPF	Vietnam Environmental Protection Fund
VFU	Vietnam Forestry University
VINAFOR	Vietnam Forest Cooperation
VNCPC	Vietnam Cleaner Production Center
VND	Vietnam Don (Currency)
VUSTA	Vietnam Union of Science and Technology Association
5MHRP	Five Million Hectare Reforestation Program

CHAPTER 1 INTRODUCTION

1.1 Backgrounds

The United Nations Framework Convention on Climate Change (UNFCCC) was signed by many countries in June 1992 in Rio de Janeiro, Brazil. This committed the countries to set up a framework for reduction of greenhouse gases (GHG) to stabilize GHG in the atmosphere and prevent dangerous impacts on the climate system. The Kyoto Protocol is a UNFCCC protocol that was approved in Kyoto, Japan in December 1997. The Clean Development Mechanism (CDM) is one of the three (3) mechanisms mentioned in Kyoto Protocol that is of practical significance to the developing countries including Vietnam. There are two (2) CDM schemes: one is CDM for GHG reduction, another is CDM for GHG absorption by sink (Afforestation/Reforestation CDM or AR-CDM).

Vietnamese government ratified the Kyoto Protocol in September 2002 and then set up the CDM National Authority (CNA) under the MONRE (Ministry of Natural Resources and Environment) as a DNA (Designated National Authority). In April 2003, The CDM National Executive and Consultative Board (CNECB) were established with twelve (12) representatives from line ministries and this was chaired by the Director General of the International Cooperation Department (ICD) of MONRE. The Vietnamese Government has worked actively to prevent global warming by establishing the required institutional system for CDM.

In the forestry sector, Vietnamese Government adopted a Five (5) Million Hectare Reforestation Program (5MHRP) in 1997 in order to facilitate a recovery in national forested area up to 43% by 2010. The Government intends to promote AR-CDM not only to absorb GHG but also to facilitate reforestation in more than six (6) million hectares of bare land in the whole country¹. To materialize the intention, Ministry of Agriculture and Rural Development (MARD), as the AR-CDM focal point, has determined definition of forestry and worked for promotion and implementation of AR-CDM projects. However, AR-CDM is quite a new area of development scheme internationally. Therefore, MARD as well as other relevant agencies have limited knowledge, experience, and ability in promoting AR-CDM at present.

In connection with this, the Government of Vietnam requested to the Government of Japan in July 2004 for implementation of a development study on AR-CDM promotion. In response to the request, the Japan International Cooperation Agency (JICA) dispatched two preparatory study missions and a preliminary study mission from May 2005 to March 2006. Finally, JICA and MARD agreed in July 2006 and signed a Scope of Work (S/W) for a Study on Capacity Development for AR-CDM Promotion in the Socialist Republic of Vietnam. (refer to **Appendix 1**).

1.2 The Study

1.2.1 Objectives of the Study

The objectives of the Study are summarized as follows:

¹ According to the MARD Decision No.1970/QD/BNN-QL dated 6th July 2006, the area of bare land and denuded hill was 6.4 million ha as of the end of 2005.

- 1) To support government agencies (MARD/DOF, Vietnam Forestry University [VFU], and the Forest Science Institute of Vietnam [FSIV]) to develop their abilities to promote AR-CDM.

- 2) To recommend a vision and action plans for promotion of AR-CDM in Vietnam

1.2.2 Components of the Study

The Study consists of the following three (3) major modules of capacity development for AR-CDM promotion. Through the implementation of the modules, the Study Team has studied and recommended a vision for AR-CDM promotion in Vietnam and action plans including institutional, policy, and regulatory measures and capacity development.

(1) Support for Increasing Awareness for AR-CDM Promotion :	<ul style="list-style-type: none"> ➤ To implement seminars and/or workshops for increasing awareness on AR-CDM for the counterparts, government agencies, and potential project developers/ investors. ➤ To aim for capacity development of the counterpart to organize AR-CDM seminars and/or workshops by themselves for relevant agencies and potential project developers/ investors. ➤ To support increasing awareness of AR-CDM promotion by establishing a website.
(2) Support for Establishment of AR-CDM Promotion System :	<ul style="list-style-type: none"> ➤ To establish an interactive AR-CDM promotion system such as a helpdesk, website etc. via the cooperation of MARD/DOF as the AR-CDM focal point in Vietnam and relevant agencies in order to provide necessary information and/or services to AR-CDM developers/ investors inside/outside Vietnam. ➤ To clarify and define tasks and responsibilities of each agency for provision of information and services necessary for AR-CDM
(3) Support for Development of Capacity on AR-CDM Project Formulation :	<ul style="list-style-type: none"> ➤ To prepare a draft PDD for a small-scale AR-CDM project via the collaboration of the Study Team and the counterpart. The activities could include development of a new baseline and monitoring methodology <u>if necessary</u>. Through the activities, the counterpart can understand information and support that is requested by project developers/ investors. It also aims at capacity development of counterpart to enable development of AR-CDM projects without external assistance

1.2.3 Outputs of the Study

Major outputs of the Study are presented below:

- (1) A Visions for AR-CDM promotion and Action Plans in Vietnam.
- (2) A Guidebook for AR-CDM developers and/or investors.
- (3) A website containing information and services necessary for the development of AR-CDM projects in Vietnam.
- (4) A draft PDD for a small scale AR-CDM project including a new methodology, if necessary.

1.3 Organizational Structure of the Study

1.3.1 The JICA Study Team

The JICA Study Team is composed of the following team members. The assignment schedule is shown in **Figure 1.1**.

Table 1.1 Members of the JICA Study Team

Specialty	Name
Team Leader / CDM Institutional Development (1)	Akihiko Sasaki
CDM Institutional Development (2)	Hiroataka Negishi
CDM Forestry (1)	Makino Yamanoshita (Yamada)
CDM Forestry (2)	Tomoki Nakamura
CDM Project Planning (1)	Masaru Ishikawa
CDM Project Planning (2)	Tsuyoshi Toriu
CDM Seminar / PDD Validation	Takuya Ogushi
Satellite Image Analysis	Itaru Morita
Coordinator	Tomoki Nakamura

JICA has organized a Technical Support Committee composed of Japanese AR-CDM experts and researchers to support the Study.

Figure 1.1 Assignment Schedule

	Specialty	Name	FY 2006			FY 2007												FY 2008																	
			10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3			
Field Work	Team Leader / CDM Institutional Development (1)	Akihoko Sasaki		■	■	■			■	■	■		■	■	■			■					■	■								■			
	CDM Institutional Development (2)	Hiroataka Negishi		■	■					■				■																					
	CDM Forestry (1)	Makino Yamanoshita			■	■				■			■	■	■								■	■								■			
	CDM Forestry (2)	Tomoki Nakamura		■	■					■			■	■	■										■	■									
	CDM Project Planning (1)	Masaru Ishikawa		■	■	■				■	■	■																							
	CDM Project Planning (2)	Tsuyoshi Toriu			■						■	■	■	■	■																				
	CDM Seminar / PDD Validation	Takuya Ogushi			■											■																			
	Satellite Image Analysis	Itaru Morita													■																				
	Coordinator	Tomoki Nakamura			■	■					■	■				■																			
Home Work	Team Leader / CDM Institutional Development (1)	Akihoko Sasaki	□				□											□					□			□									
	CDM Institutional Development (2)	*****																																	
	CDM Forestry (1)	*****	□				□																□			□		□							
	CDM Forestry (2)	*****																						□			□								
	CDM Project Planning (1)	*****																																	
	CDM Project Planning (2)	*****																																	
	CDM Seminar / PDD Validation	*****																																	
	Satellite Image Analysis	*****																																	
Report			△				△																												
Stage of the Study			■	■	■					■	■	■	■	■										■	■							■			
			□				□																	□		□		□					□		

Field Work : ■ Home Work : □ Field Work (Cost of Nippon Koei) : ▨ △ Submission of Report

1.3.2 Counterpart Agencies and Organizational Structure of the Study

The counterpart agencies for the Study are the Department of Forestry (DOF), Vietnam Forest University (VFU) and the Forest Science Institute of Vietnam (FSIV). All of them fall under the umbrella of MARD.

The following three organizations have been established for smooth implementation of the Study.

Organizations	Responsibilities and Formation		
Steering Committee	<ul style="list-style-type: none"> ➤ To coordinate implementation and supervise the Study at central government level. ➤ Vice Director of DOF, MARD as a chairman (or equivalent person). ➤ Relevant Vietnam government agencies, VFU, FSIV, JICA Vietnam Office as member of the Committee. ➤ The Committee shall be organized to review and approval of Inception Report, confirmation of outputs of the Study. 		
Standing Unit	<ul style="list-style-type: none"> ➤ To be established at DOF, MARD and to support the role of the Steering Committee. ➤ To have regular meetings with the Study Team and counterpart Team every 2 weeks and to provide advice/direction for implementation of the Study. ➤ To coordinate with relevant agencies and collect opinions and suggestions from them. 		
	<u>Name</u>	<u>Position</u>	
	Mr. Pham Duc Tuan	Vice Director of DOF	
	Mr. Bui Chinh Nghia	Head of Forest Basic Inventory Division, DOF	
Counterpart Team	<ul style="list-style-type: none"> ➤ To implement the Study with the JICA Study Team. Team member are listed as follows. 		
	<u>Name</u>	<u>Position in counterpart team</u>	<u>Organization</u>
	1. Mr. Pham Xuan Hoan	Project Director	VFU
	2. Ms. Do Thi Ngoc Bich	Project Coordinator	VFU
	3. Mr. Nguyen Quang Ha		VFU
	4. Mr. Pham Van Dien		VFU
	5. Mr. Pham Minh Toai		VFU
	6. Mr. Nguyen The Dung		VFU
	7. Ms. Nguyen Thi Bich Hao		VFU
	8. Ms. Phi Thi Hai Ninh		VFU
	9. Ms. Le Hong Lien		VFU
	10. Mr. Vu Tan Phuong		RCFEE/FSIV
	11. Mr. Tran Lam Dong		FSIV
	12. Mr. Nguyen Tien Hung		RCFEE/FSIV
	13. Mr. Nguyen Thanh Tung		RCFEE/FSIV
	14. Ms. Tran Thi Thu Ha		RCFEE/FSIV
	15. Mr. Nguyen Viet Xuan		RCFEE/FSIV
	16. Mr. Nguyen Hung Cuong		VFU
	17. Mr. Tran Trung Thanh		RCFEE/FSIV
	18. Mr. Pham Ngoc Thanh		RCFEE/FSIV
	19. Mr. Tran Ngoc The		VFU
	20. Mr. Nguyen Dinh Hai		VFU
	21. Ms. Mai Thi Thanh Nhan		VFU
22. Ms. Tran Mai Sen		VFU	

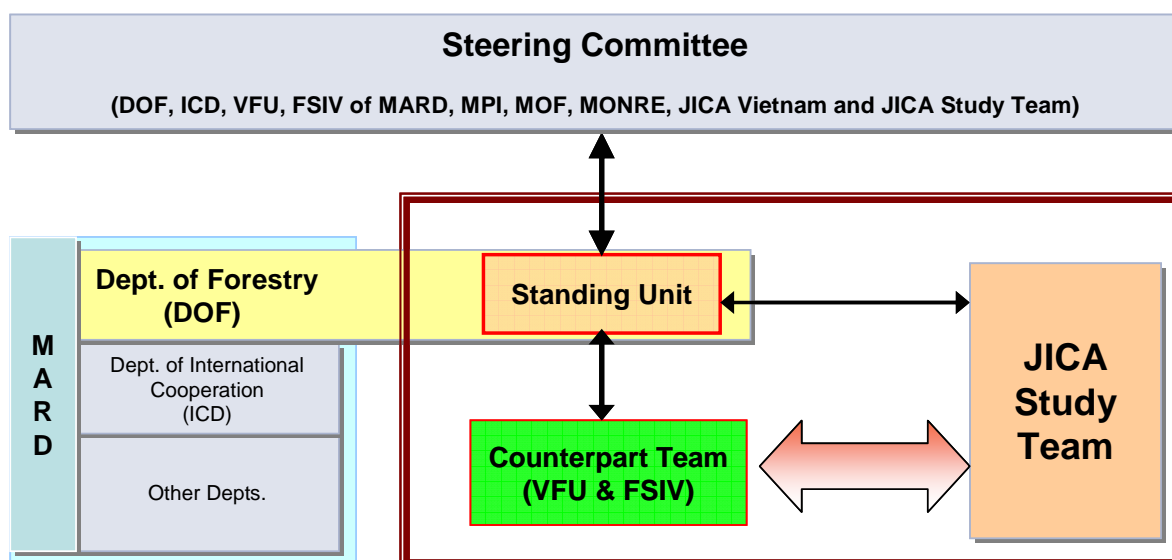


Figure 1.2 Organizational Structure for the Study

1.4 Schedule of the Study

Originally, the Study consisted of Preparatory Work in Japan, three Field Works in Vietnam and three Home Works in Japan. The Study was commenced at the end of October 2006 and the following study activities were to be undertaken:

1st year

- Preparatory Work in Japan : At the end of October 2006
- 1st Field Work in Vietnam : From the end of Oct. 2006 to the beginning of February 2007
- 1st Home Work in Japan : In the middle of February 2007

2nd year

- 2nd Field Work in Vietnam : The middle of May 2007- The end of November 2007
- 2nd Home Work in Japan : In December 2007
- 3rd Field Work in Vietnam : During the middle - end of February 2008
- 3rd Home Work in Japan : In February 2008

3rd year

- 4th Home Work in Japan : During the middle - end of May 2008
- 4th Field Work in Vietnam : The beginning of June 2008- The end of July 2008
- 5th Home Work in Japan : The middle of August 2008 - The end of October 2008
- 5th Field Work in Vietnam : The middle of January 2009
- 6th Home Work in Japan : The middle of February 2009

In October 2007, the Vietnamese government, through the Ministry of Planning and Investment (MPI), made a request to the Japanese government to extend the Study for a year in order to support the validation of the small-scale AR-CDM pilot project formulated by the Study. The Japanese government accepted the request and JICA and MARD signed the minutes of the discussion regarding the extension.

A work flow of the Study reflecting the extension of the Study is shown in **Figure 1.3**. The Study will support the validation of the pilot project by a DOE (Designated Operational Entity) to materialize the first AR-CDM project in Vietnam.

Figure 1.3 Work Flow of the Study (1)

FY	Month/Year	Preparatory Work in Japan and Vietnam	Capacity Development				Recommend a Vision for AR-CDM promotion in Vietnam and relevant measures for realization	Seminar and Workshop etc.	Report	Explanation and Discussion
			Awareness increasing for AR-CDM promotion	Establishment of AR-CDM promotion system in Vietnam including provision of necessary information and services	Capacity development on a small-scale AR-CDM project formulation					
FY 2006 (1st Year)	Oct. 2006	[0-1] Collection, arrangement and review of existing secondary data [0-2] Study on current situation of AR-CDM and review of methodologies and						[0-3] Preparation of draft Ic/R		
	Nov. 2006	[1-2] Additional collection and review of secondary data and information [1-3] Clarification on responsibilities of relevant agencies for the Study [1-4] Preparation of Joint Work Plan of the Study with C/P	[1-6] Discussion on contents and method of awareness activities for AR-CDM promotion to C/P	[1-7] Discussion and preparation of awareness increasing for AR-CDM promotion to relevant agencies	[1-10] Planning of AR-CDM promotion system to be established	Selection of a recommended site for PDD and consideration of basic framework of PDD [1-13] Review of PDD preparation procedure [1-14] Clarification of tasks and responsibilities among counterpart on PDD preparation [1-15] Confirmation of candidate sites for draft PDD preparation [1-16] Collection of information regarding candidate sites for draft PDD preparation [1-17] Field reconnaissance of candidate sites	[1-20] Review of National CDM Strategy and existing plans relevant to AR-CDM [1-21] Study on constraints of AR-CDM promotion in Vietnam	[1-4] Preparation of a Joint Work Program with C/P [1-5] Preparation of Ic/R	[1-1] Explanation of Draft Ic/R [1-5] Support the organization of a Steering Committee Meeting for approval of Ic/R	
	Dec. 2006		[1-8] Implementation of awareness increasing for AR-CDM to C/P	[1-9] Implementation of awareness for AR-CDM to agencies concerned	[1-11] Planning for preparation of a guidebook for AR-CDM developers and investors [1-12] Planning of website establishment for provision of information and data	[1-18] Selection of a site for PDD preparation [1-19] Study on methodologies, additionality and project participants	[1-22] Preparation of a draft Vision for AR-CDM promotion in Vietnam	AR-CDM Knowledge Acquisition Seminar AR-CDM Awareness Increasing Seminar (1)		
	Jan. 2007				[1-23] Confirmation of the Work Plan in 2nd Year					
	Feb. 2007								[2-1] Preparation of Interim Report	
	Mar. 2007									
FY 2007 (2nd Year)	Apr. 2007									
	May 2007					Preparation of draft PDD [3-9] Explanation to local stakeholders about the virtual AR-CDM project [3-10] Study for demonstration of additionalities of the virtual AR-CDM project [3-11] Development and demonstration of baseline and monitoring methodologies related to the virtual AR-CDM project [3-12] Study on leakage and leakage estimation related to the virtual AR-CDM project [3-13] Demonstration of land eligibility (Satellite image analysis) [3-14] Consideration of implementation body for the virtual AR-CDM project [3-15] Consideration of potential developers, investors and buyers of CER [3-16] Study on socio-economic impacts [3-17] Environmental impact assessment of the virtual AR-CDM project [3-18] Collection of stakeholders' comments [3-19] Preparation of draft PDD of the virtual AR-CDM project and consolidation of data	[3-20] Preparation of policy and regulatory measures for AR-CDM promotion [3-21] Analysis of AR-CDM potential in Vietnam		[3-1] Explanation of Interim Report	
	June 2007			[3-4] Data collection and coordination with relevant agencies for establishment of AR-CDM promotion system	[3-8] Establishment and operation of a web site to provide information related to AR-CDM				[3-7] Preparation and reproduction of a guidebook on AR-CDM for developers and investors	
	July 2007									
	Aug. 2007		[3-2] Planning of awareness increasing for AR-CDM promotion to potential developers/ investors	[3-5] Agreement with relevant agencies on proposed AR-CDM promotion system						
	Sep. 2007				(Operation of website)					
	Oct. 2007		[3-3] Implementation of awareness increasing for AR-CDM promotion to potential developers/ investors	[3-6] Trial operation and verification of AR-CDM promotion system (Helpdesk)				[5-3] Conduct of a seminar to present study outputs AR-CDM Validation W/S Seminar for AR-CDM Developer	[3-18] Preparation of draft PDD of the virtual AR-CDM project	
	Nov. 2007									
	Dec. 2007								[4-1] Preparation of Draft It/R2	
	Jan. 2008									
Feb. 2008							AR-CDM Awareness Increasing Seminar (2)		[5-1] Explanation of and discussion on Draft It/R2	
Mar. 2008								[6-1] Submission of It/R2		
Work in Japan										
Work in Vietnam										

Figure 1.3 Work Flow of the Study (2)

FY	Month/Year	Preparatory Work in Japan and Vietnam	Capacity Development			Recommend a Vision for AR-CDM promotion in Vietnam and relevant measures for realization	Seminar and Workshop etc.	Report	Explanation and Discussion
			Awareness increasing for AR-CDM promotion	Establishment of AR-CDM promotion system in Vietnam including provision of necessary information and services	Capacity development on a small-scale AR-CDM project formulation				
FY 2008 (3rd Year)	Apr. 2008								
	May 2008			Support for verification [7-1] Selection and contract of suitable DOE [7-2] Provision of information to DOE					
	June 2007			[8-1] Support for verification [8-2] Timely revision of PDD					
	July 2007								
	Aug. 2008								
	Sep. 2008					[9-1] Timely revision of PDD			
	Oct. 2008								
	Nov. 2008								
	Dec. 2008								
	Jan. 2009							[9-2] Preparation and submission of Df/R	[10-1] Explanation of and discussion on Df/R
	Feb. 2009								
	Mar. 2009							[11-1] Submission of F/R	
	Project Output			MARD and relevant agencies have enough knowledge and skills on AR-CDM		CPs have capability to consolidate, manage and provide technical information on AR-CDM	CPs have acquired skills for project planning and implementation comprehensively and have capability for promotion of AR-CDM		
Work in Japan									
Work in Vietnam									

1.5 Steering Committee Meetings of the Study

The steering committee (SC) meetings of the Study have been held twice since the commencement of the Study: the first on 17th November 2006 and the second 18th May 2007. In the first SC meeting, the Study team explained the participants the contents of the Inception Report including the objectives, scope, outputs, and the plan of operation of the Study. It was agreed by all the participants that the Inception Report should be finalized taking into account of the comments such as inserting the summary of the report and a short explanation of AR-CDM.

In the second SC meeting, the Study team presented the contents of the Interim Report, mainly about the progress of the Study in October 2006 to February 2007. The chairman expressed his appreciation of the good progress of the Study and excellent coordination between the Study team and the counterpart. There were discussions on the development of a new methodology for small-scale AR-CDM. The counterpart explained that developing a new methodology is quite difficult and costly and therefore the Study team should utilize the existing methodology approved by UNFCCC. The chairman concluded on the issue that the Study team should submit the justification of not developing to DOF through the Standing Unit for their consideration and guidance to the Study team. The Study team submitted the justification to the Standing Unit on 15th June 2007.

The minutes of the SC meetings and the justification of not developing a new methodology for AR-CDM are presented in **Appendix-1**.

CHAPTER 2 CDM PROCEDURES AND EXPERIENCES IN VIETNAM

2.1 Existing CDM Organizations and Functions in Vietnam

2.1.1 DNA (Designated National Authority)

The Marrakech Accord requires CDM host countries to furnish a DNA. The International Cooperation Department (ICD) of MONRE was designated as a DNA in March 2003¹ and is responsible for executing matters related to the Kyoto Protocol in Vietnam. The DNA is also called CNA (CDM National Authority) in Vietnam and the Director General of the ICD leads the organization. The functions of the DNA are:

- Building national assessment criteria, regulations and guidelines for CDM
- Assessing CDM projects at the national level
- Submitting potential CDM projects to the National Steering Committee for UNFCCC, Kyoto Protocol (NSC) for evaluation.
- Receiving, assessing and submitting CDM Project Idea Note (PIN) or Project Design Document (PDD) to the Minister of MONRE in order to issue a formal letter of endorsement or letter of approval respectively
- Providing CDM information to interested investors, related organizations, consultants and the public
- Managing and coordinating CDM activities and investment in Vietnam.

2.1.2 NSC (National Steering Committee for UNFCCC, Kyoto Protocol)

The DNA reports applications of CDM to the NSC and the NSC reports to the minister of MONRE for issuance of a formal letter of endorsement for PIN or letter of approval for PDD. The NSC is chaired by the Vice Minister of MONRE and composed of 16 members from MONRE (3 members including a chairperson), MPI (Ministry of Planning and Investment), MOST (Ministry of Science and Technology), MOFA (Ministry of Foreign Affairs), MARD, MOF (Ministry of Finance), MOET (Ministry of Education and Training), MOT (Ministry of Trade), MOC (Ministry of Construction), MOJ (Ministry of Justice), MOIT (Ministry of Information and Technology), MOCI (Ministry of Culture and Information), MLWISW (Ministry of Labor, War Invalid and Social Welfare) and VUSTA (Vietnam Union of Science and Technology Associations)².

The NSC is responsible for CDM project development, implementation and management in Vietnam. Evaluation and a recommendations for PIN are also the task of the NSC. The NSC calls

¹ By Official Document No.502/BTNMT-HTQT dated 24th March 2003.

² By MONRE Decision No. 1016/QD-BTNMT dated 4th July 2007. NSC supersedes the CNECB (CDM National Executive and Consultative Board)

for three regular meetings in January, April and August. Irregular meetings are also held when project evaluation and approvals are necessary.

2.2 CDM Criteria and Procedures

(1) CDM criteria

In Vietnam, CDM projects are evaluated by the DNA using two kinds of criteria that are based on internationally accepted requirements for CDM projects, and to ensure the project would promote sustainable development of the country.

The Exclusive Criteria will be applied to judge if a proposed project is eligible for further analysis. A project will be excluded if it does not meet the Exclusive Criteria. There are three types of Exclusive Criteria: sustainability, additionality, and feasibility.

Table 2.1 Exclusive Criteria of CDM

Category	Content of criteria	
A: Sustainability	A1: Be consistent with the national sustainable objectives.	
	A2: Meet the sectoral and provincial strategy objectives.	
B: Additionality	B1: Baseline	B11: For determining current project baseline, all economical and technical indicators should be in accordance with sub-sectoral BAU (Business As Usual). If relevant CDM indicators are lower than BAU's, it must be shown that the own resources have been maximally mobilized for achieving present stage.
		B12: For determining projected project baseline, all economical and technical indicators should be in accordance with sub-sectoral BAU. If relevant CDM indicators are lower than BAU's, it must be shown that all indicators are in medium regional level or a country's environmental regulatory requirements at the considered momentum.
	B2: Emission Reduction	B2: GHG emissions from CDM projects must be less than that of the project baseline. Emission reductions should be measurable and verifiable (CER).
	B3: Financial	B3: CDM's financial source shall be additional to current obligations such as ODA, GEF
C: Feasibility	C1: The support of the government shall be secured.	
	C2: Monitoring methodology and performance shall be clearly described.	

Source: Vietnam CDM Project Pipeline, MONRE (March 2005)

In addition to exclusive criteria, there are Priority Criteria in terms of economic environmental, social and institutional sustainability, commercial viability and feasibility to identify priority Vietnamese projects for CDM eligibility. These criteria are qualitative and no measurable standards exist.

Table 2.2 Priority Criteria

Category	Contents of criteria		
A: Sustainability	Economic Sustainability	National Income Generation	<ul style="list-style-type: none"> ◆ Growth of national income ◆ CER revenue
		Economic externalities	<ul style="list-style-type: none"> ◆ Technology transfer ◆ Import substitution
	Environmental Sustainability	Green house effect	◆ GHG emission reduction
		Non GHG air pollution	<ul style="list-style-type: none"> ◆ Non GHG air pollution emission ◆ Non GHG water pollution
		Waste	◆ Waste generation rate
		Ecosystem	<ul style="list-style-type: none"> ◆ % change in forest cover ◆ Soil erosion ◆ Likely effect on biodiversity
	Social and Institutional Sustainability	Poverty eradication	<ul style="list-style-type: none"> ◆ Creation of rural employment ◆ Reduction in number of poor households
		Quality of life	<ul style="list-style-type: none"> ◆ Income of people ◆ Improvement of living conditions
		Readiness of implementing agencies	<ul style="list-style-type: none"> ◆ Public sector ◆ Private sector
	B: Commercial Viability	International demand	
Attractiveness to investors			
C: Feasibility	Get strong support from the central and local authorities and be more attractive to investors		
	Having adequate infrastructure and manpower		

(2) Approval procedure

MONRE Circular No: 10/2006/TT-BTNMT dated 12th December 2006 provides detailed guidance for preparation, formulation, certification and approval of CDM projects in Vietnam. According to the circular, project participants have to prepare PIN in both English and Vietnamese following a prescribed format provided by the circular if the investor requests for a certification from MONRE. PIN should be submitted to DNA together with the following documents:

- (i) Official letter of the project's implementer to request for consideration of the project.
- (ii) Official letter from the concerned ministry, sector, people's committee under central government which manages the project, to request for examination of the project and acceptance.

- (iii) Comments made by the concerned parties of the project (such as district government where project will be implemented, organization/community which will use the project's results or be affected directly by the project activities).

After receiving the PIN, DNA will consider the legal status of project and examine the enclosed documents. Then it will be forwarded to all members of NSC for their consideration and comments in written form.³ Based on the comments of NSC, the Minister of MONRE will re-consider and issue a letter of endorsement. The whole process must be accomplished within 25 days after DNA receives the PIN and all the enclosed documents

Project participants must prepare PDD in both Vietnamese and English in line with the prescribed format given in the circular. PDD should be submitted to DNA with the other necessary documents (the same documents required together with PIN) as well as an Environment Impact Report or Certification form of Environment Protection Commitment. Upon receipt of PDD and enclosed documents, DNA examines the legal status of all documents and sends PDD to energy or non-energy technical expert group for technical review. After that, PDD and other documents will be sent to the members of NSC for their consideration and comments in the light of national criteria. After the consideration, NSC will organize meetings to evaluate PDD. At the first meeting session of NSC, the representatives of the project developer will be invited to present a project summary as well as to answer all questions raised by NSC members. In the second meeting session, all members of the Committee will conclude and vote for the project. The project will be approved if it has the support of the majority of NSC members. Based on the conclusion made by NSC, the Minister of MONRE will re-consider and issue a Letter of Approval.

³ *According to verbal information from DNA, concerned member of technical experts group will conduct a technical review of the PIN before forwarding it to the members of CNECB though it does not described in the circular.*

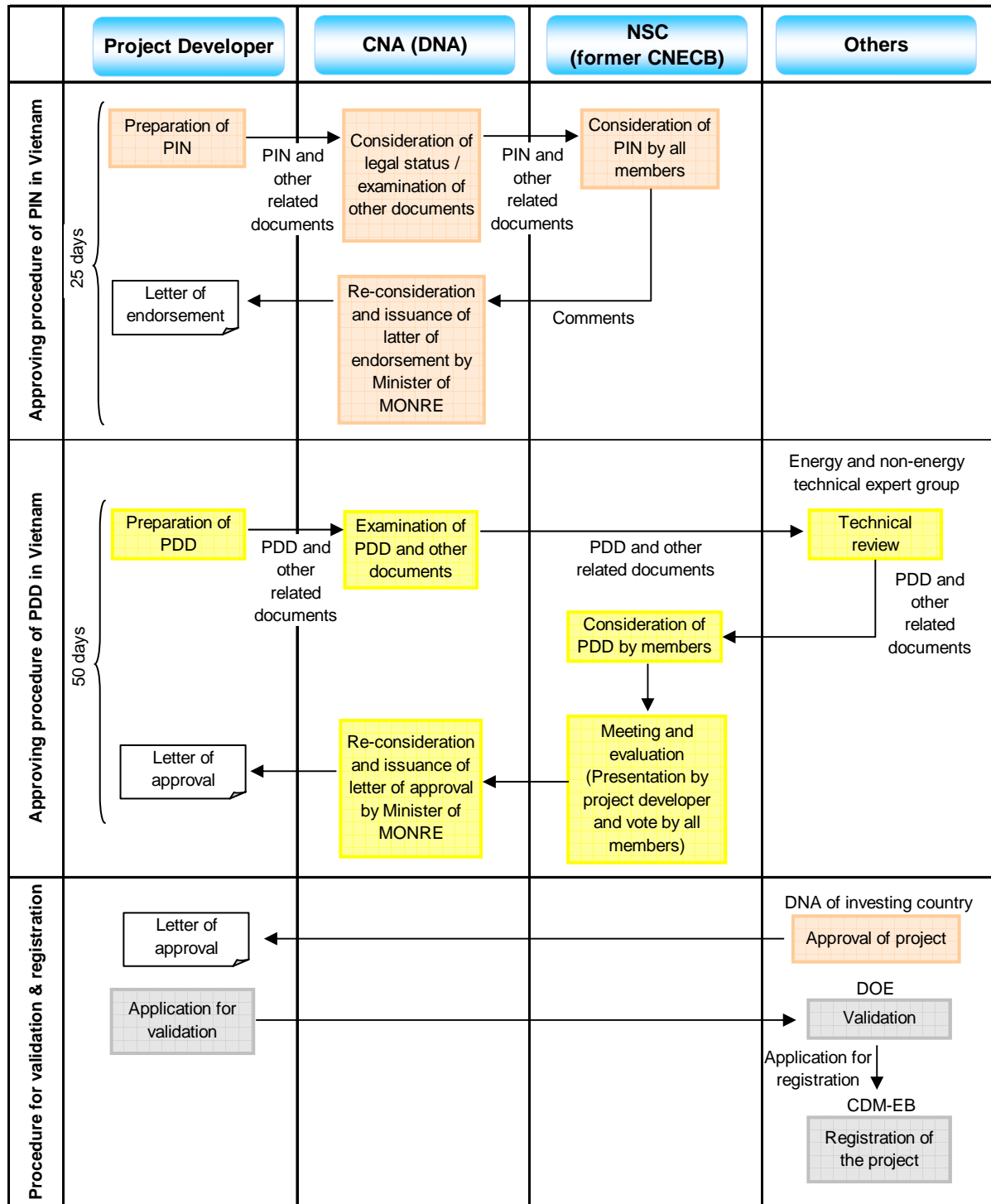


Figure 2.1 Approval Procedures of PIN and PDD in Vietnam

2.3 National Strategy Study on CDM

National Strategy Studies Program carried out from 1997 to 2004 by the World Bank to evaluate and assist the development of the countries' environmental policy for implementing Kyoto Protocol's flexible mechanisms, namely CDM, JI and emission trading. The study in Vietnam was assisted by Australia and completed in 2003. But the report is not publicly available.

Vietnamese National Strategy Study (NSS) outlines the functions of CDM, its contribution to the Vietnamese social and economic development and global warming mitigation, identification and implementation of CDM projects in Vietnam and development of methodologies to accelerate project development.

NSS report has five (5) chapters, as follows:

Chapter 1 The Clean Development mechanism theory practice and current status

Chapter 2 Greenhouse gas emission abatement potential and costing Vietnam

Chapter 3 GHG emission abatement market opportunities

Chapter 4 Domestic prerequisites

Chapter 5 CDM projects in Vietnam

With regard to AR-CDM, NSS says that:

- (a) AR-CDM would provide the highest contributions to Vietnam's sustainable development (though the contributions to commercial viability are low).
- (b) Because of low commercial viability, it is not likely that foreign commercial investors will provide funds for implementation of AR-CDM.
- (c) Direct investment from the government or international donors may be required for AR-CDM implementation and these projects may become unilateral CDM projects.

NSS also presents some recommendations with regard to attracting private investors, it is worth to note:

- (a) Encourage early implementation of pioneer CDM projects, learn by doing, and improve the process over time
- (b) Provide guidance to project developers through "one-stop" CDM office on how the CDM approval process works
- (c) Contribute to estimation of sectoral baselines
- (d) Approve all projects that reduce GHG emissions and promote local sustainability according to CDM and Vietnam rules
- (e) Encourage all project finance models⁴

⁴ It includes not only private investment but also investment from the government and donors and the combination of these.

2.4 Government's Policies and Plans related to CDM

2.4.1 Development of plans for Kyoto Protocol implementation

A Prime Minister's Directive No.35/2005/CT-TTg was issued on 17th October 2005 to instruct concerned ministries to develop plans and policies for effective implementation of the Kyoto Protocol (KP). The instructions contained in the directive include:

- (a) MONRE in cooperation with MPI, MOFA and other relevant ministries and agencies shall develop the plan for KP implementation for the period of 2006-2010 with specified priority fields in accordance with national socio-economic development plans for 2006-2010.
- (b) MONRE in cooperation with MOF, MPI, and other relevant ministries and agencies shall carry out studies and forecast the trade markets for CER (Certified Emission Reduction) and give guidance to agencies, organization and enterprises on developing CDM projects in Vietnam.
- (c) MONRE in cooperation with relevant ministries shall integrate CDM into activities of other international environmental conventions and commitments to which Vietnam is a signatory or party.
- (d) MOCI in cooperation with MONRE and mass media agencies shall carry out advertising and public awareness increasing about disasters caused by climate change and on the responsibilities and opportunities of the implementation of KP and CDM projects.
- (e) MOJ in cooperation with MONRE, MOFA, other relevant agencies and local authorities shall review related legal documents and make submissions to the competent authorities for modifications to promote and facilitate the implementation of KP.
- (f) MOF in cooperation with MPI, MONRE and other relevant ministries and agencies shall develop a project on financial mechanisms for CDM projects, which would stipulate incentives on tax, interest, and government credit subsidy for domestic and foreign organizations and private organization who invest into CDM projects in Vietnam.
- (g) MPI in cooperation with MONRE, MOI (Ministry of Industry), MOC, MOT, MARD, and other relevant ministries and agencies shall develop a plan for attracting domestic and foreign investment capital into CDM projects in the fields of energy, industry, waste management, transportation, agriculture and forestry.
- (h) Ministries, ministerial level and governmental agencies, centrally-affiliated provincial and municipal people's committees shall, within their mandate, proactively integrate CDM activities into local and sectoral development plans.

The PM directive sets the deadline for submission of the above plans and policies to the end of 2005 or 2006.

2.4.2 Plan to implement Kyoto Protocol to UNFCCC for the period of 2007-2010

The Prime Ministerial Decision No.47/2007/QĐ-TTg dated 6/04/2007 is the one that MONRE was instructed to implement by the Prime Ministerial Decision No.35/2005/CT-TTg. It describes Action Plans for the implementation of the Kyoto Protocol in the period of 2007-2010, with the following tasks;

- (1) Develop and finalize legal framework and system of documentation on law and under law regarded/ related to the climate convention, Kyoto protocol and CDM.
- (2) Propagate, raise awareness, build capacity/ train human resources, improve organization capacity and strengthen infrastructure to implement the climate convention, Kyoto protocol and CDM.
- (3) Promote intensive basic inventory activities and scientific research activities to implement the climate convention, Kyoto protocol and CDM.
- (4) Strengthen effective international cooperation in accordance with the climate convention, Kyoto protocol and CDM.
- (5) Develop and organize activities to implement the climate convention, Kyoto protocol and CDM in various sectors to protect the environment and develop the socio-economy.

The Action Plan is listed below. MONRE is designated as the presiding agency of the plans in coordination with other ministries, PPCs, and other organizations.

No.	Name of mission/activity	Presiding agency	Coordinating agencies	Schedule
I. Develop and finalize legal framework on the UN Framework convention on climate change (Climate convention), Kyoto Protocol and Clean Development Mechanism (CDM)				
1	Develop, add and revise policies, legitimate papers/documents to be consistent with the Climate Convention, Kyoto Protocol and CDM	MONRE	MOJ, MOFA, relevant Ministries, sectors, PPCs	2007 - 2010
2	Develop mechanisms, socialization policies to encourage and support production and business projects of enterprises with the aim of reducing greenhouse gas emission; social organization projects at the central and local level to implement the Climate convention and Kyoto Protocol to protect the environment and contribute to sustainable socio-economic development	MONRE	Relevant Ministries, sectors	2007 - 2010
3	Develop plan to attract domestic and foreign fund for CDM projects, projects to implement of Climate convention and Kyoto Protocol in the following fields:	MPI	MONRE, MOST and relevant Ministries and sectors	2007 - 2010

No.	Name of mission/activity	Presiding agency	Coordinating agencies	Schedule
	sewage/waste management, energy, industry, civil engineering, agriculture, forestry and transportation			
4	Develop mechanism integrating activities to carry out CDM projects, projects to implement the Climate convention and Kyoto Protocol as well as activities to implement other international conventions on environment into socio-economic development strategies, sectoral and local plans and programs	MPI	MONRE, MOFA, and relevant Ministries and sectors	2007-2010
5	Develop financial mechanism for CDM project and projects implementing Climate convention and Kyoto Protocol	MoF	MPI, MOST, MONRE, and relevant ministries and sectors	2007 - 2010
II. Raise awareness, build capacity/ train human resources, improve organization capacity and strengthen infrastructure to implement the Climate convention, Kyoto protocol and CDM				
6	Raise public awareness of Direction No. 35/2005/CT-TTg dated 17 October 2005 from the Prime Minister on implementation of the Climate convention, Kyoto Protocol and CDM	MONRE	MOCI, Vietnam Television, Radio Voice of Vietnam	2007 - 2010
7	Develop and arrange the carrying out the policy, planning, education plans and capacity building to serve the implementation of the Climate convention, Kyoto Protocol and CDM	MOET	MONRE, MOLISA, relevant ministries, sectors and localities	2007 - 2010
8	Provide training and guidance to equip relevant agencies, enterprises, social organizations at the central and local level with required knowledge and skills on procedures, sequences for the development, approval and implementation of CDM projects, and projects to implement the Climate convention and Kyoto Protocol	MONRE	Relevant ministries, sectors, PPCs, organizations and agencies	2007-2010
9	Improve technical facilities and climate observation systems; arrange the assessment and acquisition of advanced technology implementing Climate convention, Kyoto Protocol and CDM	MONRE	MOST and relevant ministries, sectors and localities	2007 - 2010
10	Set up a Steering Unit in charge of the Climate convention, Kyoto Protocol based on the existing CDM Executive-Consultative Board to assist the focal point (National Authority) in providing guidance, management and coordinating activities to implement the Climate convention, Kyoto Protocol and CDM in Vietnam	MONRE	Relevant ministries and sectors	2007

No.	Name of mission/activity	Presiding agency	Coordinating agencies	Schedule
III. Promote intensive basic inventory activities and scientific research activities to implement the climate convention, Kyoto protocol and CDM				
11	Conduct a preliminary survey on climate change status; conduct greenhouse gas inventory	MONRE	MOST, relevant ministries and sectors	2007 - 2010
12	Do research on climate change impact assessment; develop, seek out solutions to cope with and adapt to climate change; conduct research on greenhouse gas emission coefficients in operation fields of CDM project	MONRE	MOST, relevant ministries and sectors	2007 - 2010
13	Research on current and potential status of international market; give recommendations on effective participation in international market of CERs	MONRE	MOST, MOF, MPI, MOT, and relevant ministries and sectors	2007 - 2010
IV. Strengthen effective international cooperation for the climate convention, Kyoto protocol and CDM				
14	Improve the National Authority (Focal Point) in Climate convention, Kyoto Protocol and CDM	MONRE	MOFA, and relevant ministries and sectors	2007
15	Develop National Announcement of Vietnam on Climate change	MONRE	Relevant ministries and sectors	2007 - 2009
16	Enhance and strengthen international cooperation with international finance organizations and developed industrialized countries with demands on CER trading	MONRE	MOFA, MPI, MOT, etc. and relevant PPCs	2007 - 2010
17	Enhance and strengthen international cooperation with international science and technology organizations with the aim at implementing the Climate convention, Kyoto Protocol and CDM	MONRE	MOFA, MPI, and relevant ministries, sectors and PPCs	2007 - 2010
V. Develop and organize activities implementing the Climate convention, Kyoto protocol and CDM in various sectors serving for the mission of environmental protection and socio- economic development.				
18	Develop and arrange the carrying out of CDM projects, projects to implement the Climate convention and Kyoto Protocol in the industrial and energy fields	Ministry of Industry	MONRE, MOST, and relevant ministries, sectors and localities	2007 - 2010
19	Develop and arrange the carrying out of CDM projects, projects implementing Climate convention and Kyoto Protocol in the civil engineering field	MOC	MONRE, MOST, and relevant ministries, sectors and localities	2007 - 2010
20	Develop and arrange the carrying out of CDM projects, projects to implement the Climate convention and Kyoto Protocol in	MARD	MONRE, MOST, and relevant	2007 - 2010

No.	Name of mission/activity	Presiding agency	Coordinating agencies	Schedule
	the agricultural and forestry fields		ministries, sectors and localities	
21	Develop and arrange the carrying out of CDM projects, projects to implement the Climate convention and Kyoto Protocol in the transportation field	Ministry of Transportation	MONRE, MOST, and relevant ministries, sectors and localities	2007 - 2010
22	Develop and arrange the carrying out of CDM projects, projects to implement the Climate convention and Kyoto Protocol field of sewage/waste management	MONRE, social organizations, relevant PPCs	MOST, and relevant ministries, sectors and localities	2007 - 2010

2.4.3 Financial Mechanisms and Policies Applicable to CDM Projects

The Prime Ministerial Decision No.130/2007/QĐ-TTg dated 2/08/2007 provides the financial mechanisms and policies for CDM projects developed by MOF under the Prime Ministerial Decision No.35/2005/CT-TTg. It defines (a) rights and duties of CDM investors, (b) management and utilization of CERs, (c) fee to sell CERs, (d) accounting rules of CDM projects, among others.

(1) Ownership of CERs and monitoring of them

According to the decision, investors developing and implementing CDM projects have ownership of CERs obtained and are given preferential treatment regarding business income tax, land use fee, depreciation of fixed assets, and etc. The Vietnam Environmental Protection Fund (VEPF) is designated as being responsible for monitoring and managing CERs that are granted to CDM projects operating in Vietnam. CERs owners shall register with VEPF when receiving, dividing and selling CERs and report to DNA.

(2) CERs selling fees

CDM investors shall pay a CER selling fee to VEPF when selling CERs. The CER selling fee is calculated by a percentage of the total amount of money from the CER sale. The percentage of fee will be stipulated by the MoF later. VEPF is responsible for collecting CER selling fees. Collected fees shall be used to cover expenses for fee collection, support propagation and awareness raising activities for CDM, support approval of CDM project documents, support management and monitoring of CDM project implementation, and other purposes relevant to CDM.

(3) Other policies

- Business income tax, tax exemption, and business income tax reduction applied to CDM projects are similar to projects under special preferential treatment for investment under Investment Law and Business Income Tax Law.

- In accounting, income from selling CERs shall be allocated to the respective years within remaining valid time of CERs.
- Rapid depreciation method is applied to fixed assets of a CDM project.
- CDM projects shall be exempted from import duties if goods are imported (a) as fixed assets of the project, (b) in the form of raw materials, materials, semi-finished products that are not yet able to be produced in Vietnam, and (c) to serve production activities of the project.

2.5 Experiences in Energy Sector CDM

Out of 16 CDM projects approved by the Vietnamese DNA based on PDD, only two projects are registered to UNFCCC as of December 2007. The reason behind this lag in progress is the insufficiency of resources for development for development of CDM projects.

2.5.1 Insufficient Financial Resources

The Kyoto Mechanism CDM is designed to call for investment from Annex I countries coupled with technology transfer. The project developers are expected to nurture projects up to a level that is sellable to potential investors in Annex-I countries. According to the analysis of the Global Environmental Center (GEC), developing a normal scale CDM project costs a minimum of \$3,000 to over \$100,000 to draft PIN⁵. Further costs of the project include development of PDD, receiving validation and registration whereby needed.

There was a bi-lateral MOU concluded between Vietnam and Austria in 2005 on CDM project development. Two PINs were developed for the projects that have been pending at the identification stage because of a shortage in finance. The track-record of Vietnamese DNA approvals for 16 other projects is recalled as well as the Japanese parties' efforts to conduct feasibility studies for more than 15 projects. An environmental consultant commented that these projects face severe financial restraint.

Under these circumstances, Prime Ministerial Decision No.130/2007/QD-TTg dated 2/08/2007 regarding "*Decision on Several Financial mechanisms and policies applied to investment projects for Clean Development Mechanisms*" states that the plan is to charge so-called "*CER selling fees*" at the time of the sale of the CER to the foreign parties⁶. The purpose of the fee-collection is to reinforce the government's administrative capacity for CDM and promote project development. Though the Decision presents tax exemptions or reduction of CDM projects, it is anticipated that proposed fee system would discourage both Vietnamese and foreign and decelerate CDM project development in Vietnam.

⁵ pp.25 CDM/JI Project Development Manual, Global Environmental Center, August 2006

⁶ Prime Minister Decree #130/2007/QD-TTg "*Decision on Several Financial mechanism and policies applied to investment projects on Clean Development Mechanism.*" The Ministry of Finance is supposed to release the detail of CER selling fee until the end of 2007 but has not released yet at the date of writing this report.

2.5.2 Insufficient skills and understanding with regard to CDM

Awareness about global warming is growing in Vietnam. However not many sections of industry understand CDM correctly. Insufficient skills and knowledge about CDM is closely linked with insufficient finance: Such financial shortages lessen the opportunity to contact with CDM project developers or disseminate information about CDM.

International organizations such as the Asian Development Bank, UNEP, and EU have conducted capacity building exercises for the DNA or sectors eligible for CDM projects, for instance renewable energy or energy intensive industries. Japan also conducted a feasibility study program as previously noted and those efforts did not pay off.

2.5.3 Insufficient human resources

Insufficient skills and understanding about CDM paralyze the development of human resources to progress for projects in Vietnam. Insufficient human resources can be observed in two facets. One is in government's administrative function, and the other is in private corporate sectors. There are signs of improvement in this aspect with the recent establishment of environmental consultants in major cities. But, these fee-base services are faced with the financial constraints of the project proponents. Without active development of CDM projects, it is difficult to envisage reinforcement of the government's administrative functions with regard to CDM.

CHAPTER 3 INCREASING AWARENESS OF AR-CDM PROMOTION

3.1 Training Workshops for the Counterpart

This Study aims at capacity development for the counterpart on AR-CDM formulation and promotion. In the 1st and 2nd Year of the Study, the JICA Study Team organized three training workshops for the counterpart to provide basic and practical knowledge on AR-CDM project formulation and share the experiences of AR-CDM project formulation in the field.

1 st Training Workshop	Date:	7-8 December 2006
	Venue	A meeting room at VFU
	Participants:	25 participants
	Topics:	<ul style="list-style-type: none"> (1) Introduction of CDM (2) Basic Rules of AR-CDM (3) Implementation Procedure of AR-CDM (1): Plan formulation ~ PDD preparation (4) Baselines and Monitoring Methodologies (5) Implementation Procedures of AR-CDM (2): Validation ~ Emission Trading including forest certification (6) Issues of AR-CDM and Measures for Promotion <p>The Study team requested the participants to answer a questionnaire to evaluate their level of knowledge of AR-CDM prior to the workshop and to comment on the workshop. The results of the questionnaire survey are presented in Section 3.2.</p>
2 nd Training Workshop	Date:	31 st January 2007
	Venue	A meeting room at VFU
	Participants:	25 participants
	Topics:	<ul style="list-style-type: none"> (1) Site selection (2) Stratification and baseline biomass measurement (3) Preliminary idea on vision and action plans for AR-CDM promotion
3 rd Training Workshop	Date:	9 th November 2007
	Venue	A meeting room at VFU
	Participants:	25 participants

	<p>Topics:</p> <ol style="list-style-type: none">(1) Formulation of small-scale AR-CDM pilot project(2) Survey on land eligibility(3) Developing project design document (PDD)(4) Guidance on PDD preparation and clarifications on AR-CDM implementation(5) AR-CDM and its beyond(6) Promotion of AR-CDM in Vietnam <p>The Study team requested the participants to answer a questionnaire to evaluate the improvement of their knowledge of AR-CDM after the Study. The results are presented in Section 3.2.</p>
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The presentation materials of the training workshops are used for the AR-CDM Guidebook.

3.2 Improvement in the Knowledge Level of the Counterparts on AR-CDM

The Study team requested the participants of the 1st and 3rd training workshops to answer a questionnaire to evaluate their knowledge level on AR-CDM key words and activities in four grades:

- 0: Don't know the word at all
- 1: Know it but can not explain properly
- 2: Can explain it properly
- 3: Have experience working on it

The objective of the survey is to assess the improvement in the counterparts' knowledge of AR-CDM by comparing their knowledge level before and after the Study. The questionnaires used in the 1st and 3rd training workshops are presented in **Appendix 3**. The comparison of their knowledge level before and after the Study is shown in **Figures 3.1 to 3.8**.

The results of the survey indicate that many of the counterparts could understand keywords of AR-CDM to some extent before the JICA Study since they had attended CDM seminars and workshops organized by other donors. But it is clearly shown in the survey that their knowledge of or understanding level of the keywords was significantly improved after the Study - those who responded that they can explain AR-CDM keywords or have working experiences with some activities related to AR-CDM increased in in the 3rd training workshop. There were still participants who responded that they cannot explain the keywords or don't know them at all in the 3rd training workshop. But they were participants of the workshop from counterpart agencies, not counterparts of the Study who worked closely with the Study team.

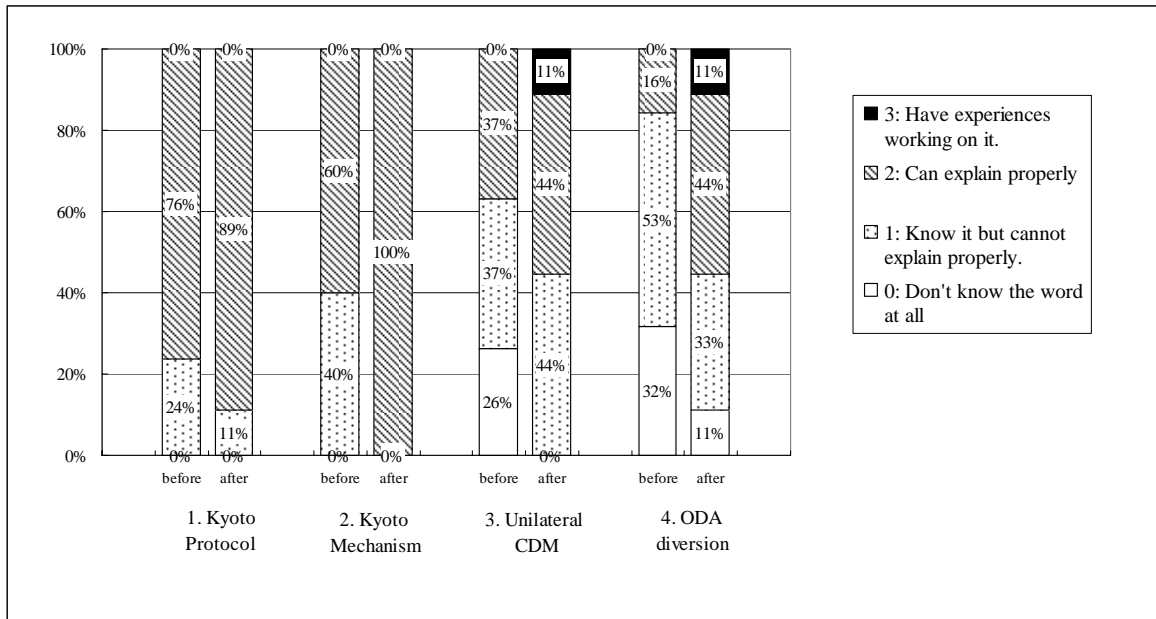


Figure 3.1 Results of a questionnaire survey on the knowledge level of the counterparts (Introduction of CDM)

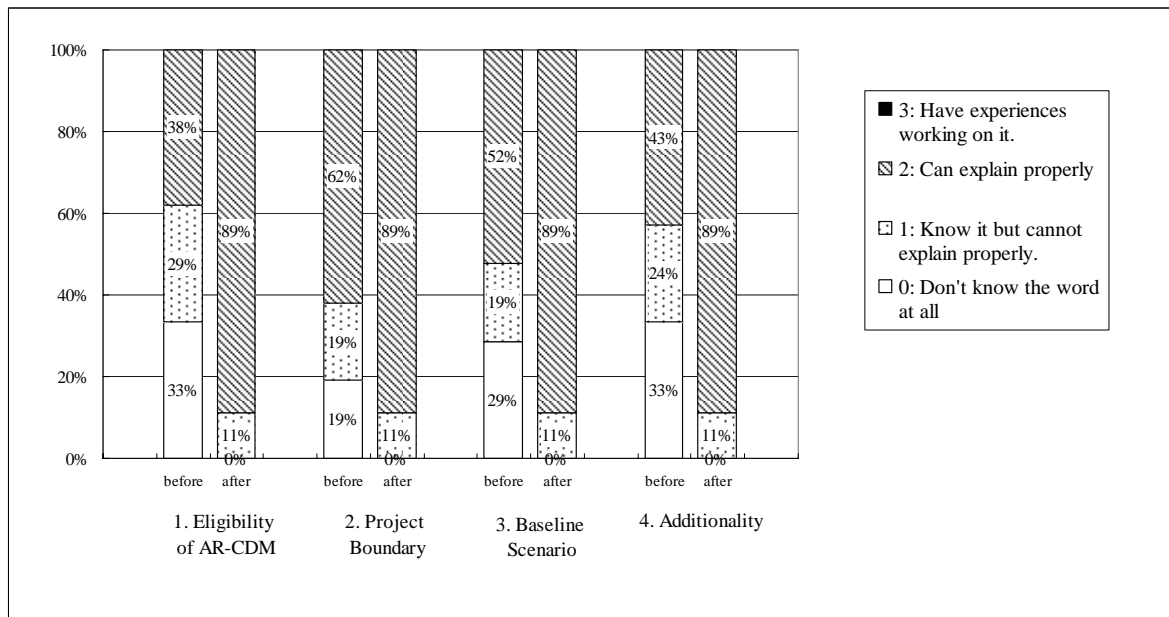


Figure 3.2 Results of a questionnaire survey on the knowledge level of the counterparts (Basic Rule of AR-CDM [1])

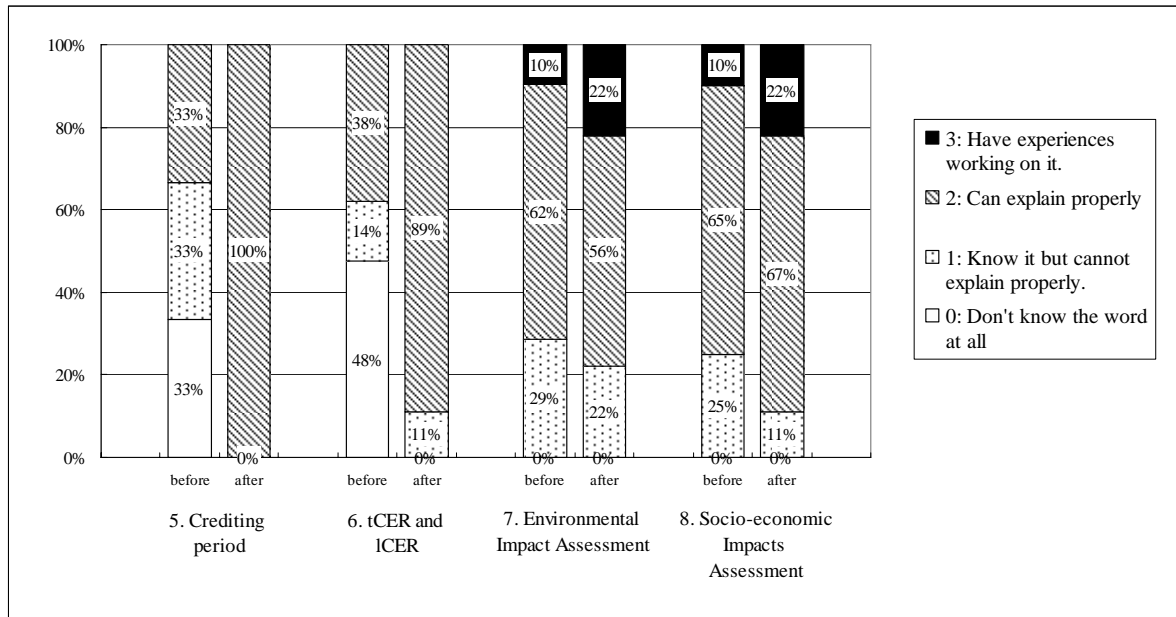


Figure 3.3 Results of a questionnaire survey on the knowledge level of the counterparts (Basic Rule of AR-CDM [2])

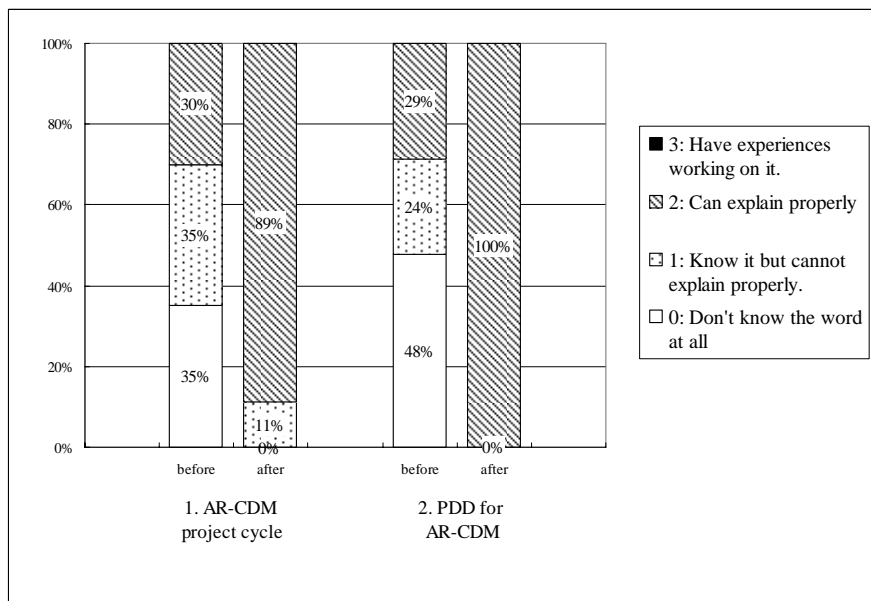


Figure 3.4 Results of a questionnaire survey on the knowledge level of the counterparts (Procedures of AR-CDM Implementation [1])

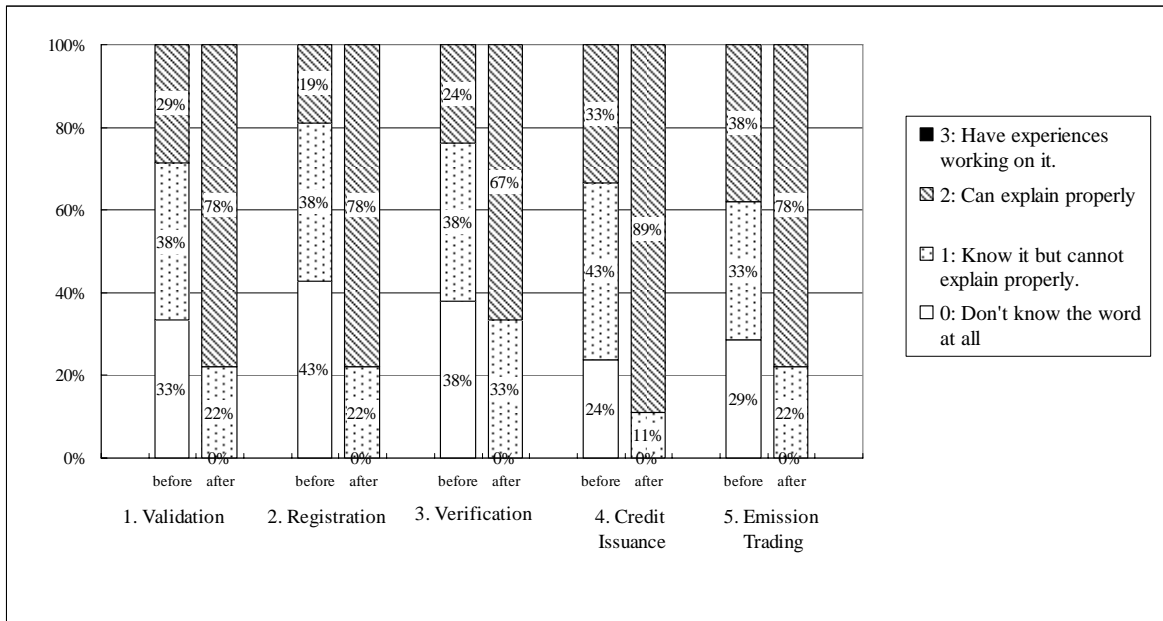


Figure 3.5 Results of a questionnaire survey on the knowledge level of the counterparts (Procedures of AR-CDM Implementation [2])

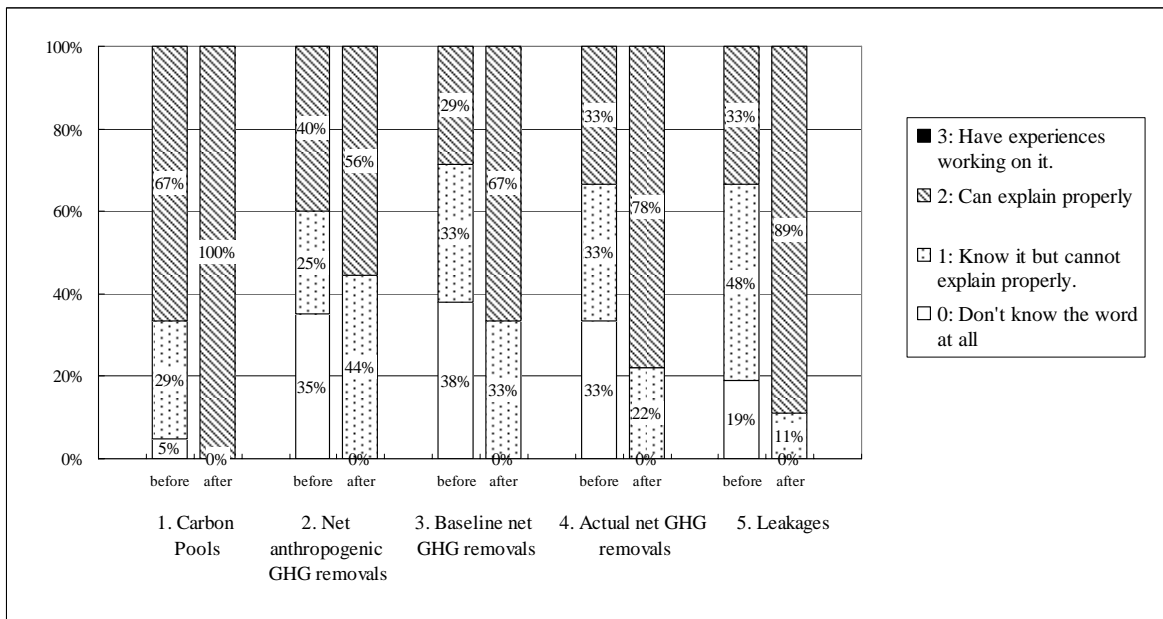


Figure 3.6 Results of a questionnaire survey on the knowledge level of the counterparts (Baseline and Monitoring Methodologies [1])

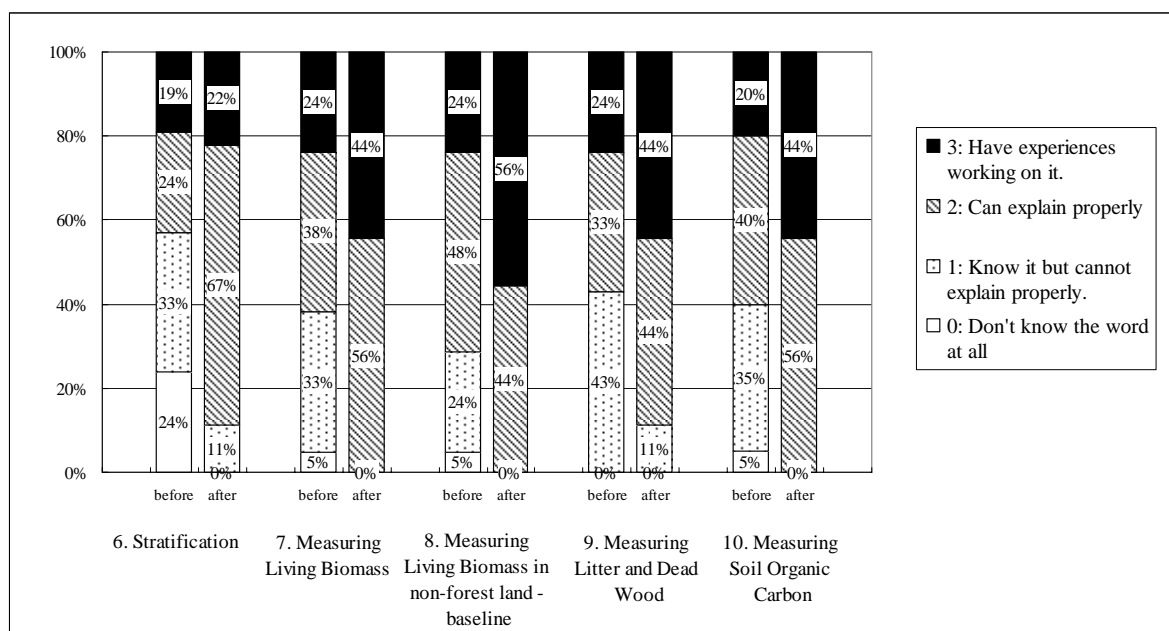


Figure 3.7 Results of a questionnaire survey on the knowledge level of the counterparts (Baseline and Monitoring Methodologies [2])

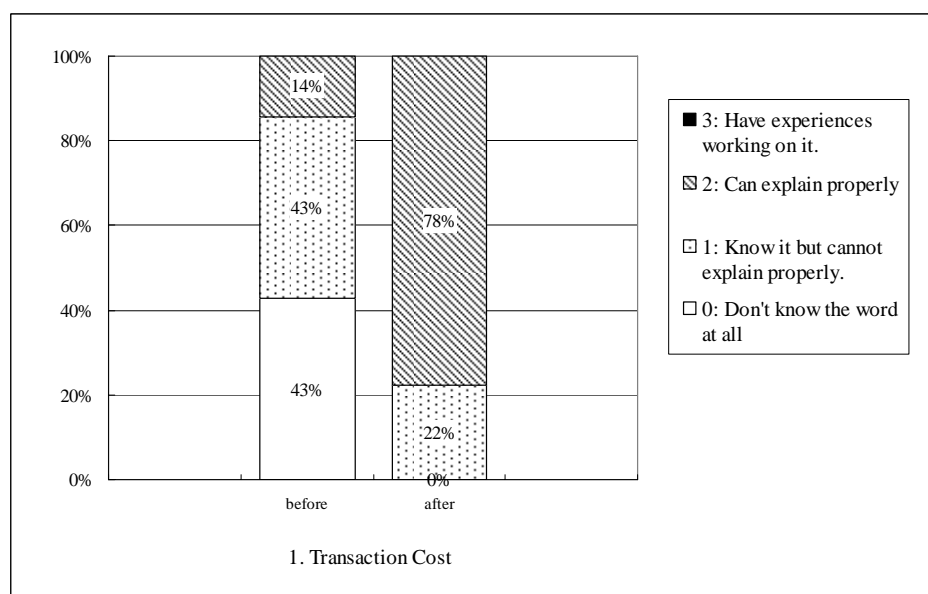


Figure 3.8 Results of a questionnaire survey on the knowledge level of the counterparts (Transaction Cost for AR-CDM)

3.3 AR-CDM Seminars for Potential AR-CDM Developers and Investors

The Study team and the counterpart organized seminars for potential AR-CDM developers and investors in Hanoi, Ho Chi Minh and Hue cities in November 2007. The objectives of the seminars were to introduce the small-scale AR-CDM pilot project formulated by the Study team and the counterpart and present the merits and demerits of AR-CDM in Vietnam. Aside from AR-CDM, the Study Team introduced the carbon offset and forest certification as a mechanism similar to AR-CDM and a value-added mechanism, respectively. The forestry researchers in the forestry

faculty of the Nong Lam University (Ho Chi Min city) and Hue University of Agriculture and Forestry, and representatives from provincial DARDs and forestry companies participated in the seminars.

1 st seminar	Date:	19 November 2007
	Venue	Guoman Hotel, Hanoi
	Participants:	25 participants: MONRE, DARDs, VINAFOR, forest companies
	Topics:	<ul style="list-style-type: none"> (1) CDM and CDM cycle (2) Basic Rules of AR-CDM (3) Introduction of the small-scale AR-CDM pilot project in Cao Phong district (4) AR-CDM and its beyond (5) Promotion of AR-CDM in Vietnam
2 nd seminar	Date:	21 st November 2007
	Venue	Nong Lam university, Ho Chi Minh city
	Participants:	22 participants: researchers in the Forestry faculty of the Nong Lam univ., DARDs and forestry companies
	Topics:	the same as the 1 st seminar
3 rd seminar	Date:	23 rd November 2007
	Venue	Hue University of Agriculture and Forestry, Hue city
	Participants:	20 participants: researchers in the Forestry faculty of the Hue univ., DARDs and forestry companies
	Topics:	the same as the 1 st seminar

3.4 AR-CDM Seminars for Donors and NGOs

The Study team and the counterpart organized a half-day seminar in Hanoi on 21st February 2008 for donors and international NGOs in order to promote small-scale AR-CDM in Vietnam by introducing the pilot project formulated by the Study. Major donors and international NGOs having their liaison office in Hanoi and working for forestry sector were invited.

CHAPTER 4 ESTABLISHMENT OF AR-CDM PROMOTION SYSTEM

4.1 AR-CDM Promotion System

The Study envisaged the establishment of an interactive AR-CDM promotion system composed of a helpdesk and website specific to AR-CDM. It is anticipated that the system could provide information and advisory services to developers and investors and contribute to the promotion of AR-CDM in Vietnam. The Study team supported the establishment of the AR-CDM helpdesk and website. In addition, The Study team prepared an AR-CDM Guidebook and booklet as reference materials for developers and investors.

4.2 AR-CDM Website

4.2.1 Establishment of a AR-CDM Website

A website is a convenient and inexpensive tool not only for information dissemination but also for interaction with visitors of the website. The AR-CDM website targets potential project developers and investors as well as those who are interested in AR-CDM in Vietnam. Therefore, the contents cover wide-ranging information and are separated into categories according to the level of information

(1) Contents of AR-CDM website

The contents of the AR-CDM website are presented in **Table 4.1**. In designing the website, due consideration was given to the following aspects:

- The website shall provide information both in English and Vietnamese to target not only Vietnamese but also foreigners all over the world.
- Basic information to beginners on AR-CDM shall be provided under the headings of "Background of CDM" and "Basics of AR-CDM." On the other hand, more technical and practical information on AR-CDM project development in Vietnam for project developers and investors shall be given under the heading of "AR-CDM development in Vietnam."
- The latest version of approved baseline and monitoring methodology for Small Scale AR-CDM (AR-AMS0001) and Guidelines for PDD preparation for Small Scale AR-CDM (F-CDM-SSC-AR-Subm) shall be translated into Vietnamese and posted in the website as a downloadable file. These documents shall be updated as needed when original documents are updated by UNFCCC.
- Vietnamese policies and regulations on CDM shall be translated into English and posted in the website as a downloadable file for non-Vietnamese visitors.

- To provide a concrete image of AR-CDM project in Vietnam, the information on the Small Scale AR-CDM Project in Cao Phong District, Hoa Binh Province should be posted on the website.

Table 4.1 Contents and structure of AR-CDM website

Headings	Sub-headings	Items
TOPPAGE	Introduction	-
BACKGROUND OF CDM	-	Global warming
		Countermeasures against Global Warming
		UNFCCC
		Kyoto Protocol
BASICS OF AR-CDM	What is AR-CDM?	What is AR-CDM?
	Basic Rules of AR-CDM	Eligibility of AR-CDM
		Project Boundary
		Baseline Scenario
		Additionality
		Crediting Period
		Certified Emission Reduction (CER)
		GHG Removal
		EIA and Socio-economic Impact Assessment
	Stakeholders Comments	
Small-scale AR-CDM	-	
Approved methodologies for AR-CDM	-	
AR-CDM projects in the World	-	
Glossary	-	
AR-CDM DEVELOPMENT IN VIETNAM	Institutions relevant to AR-CDM in Vietnam	DNA (Designated National Authority)
		CNECB (CDM National Executive and Consultative Board)
		MARD (Ministry of Agriculture and Rural Development)
		Vietnam Forestry University (VFU)
		Research Center for Forest Ecology and Environment (RCFEE)
		Department of Agriculture and Rural Development (DARD) at province
		District and Commune People's Committee
	Approval Criteria of CDM Projects	CDM Exclusive Criteria
		CDM Priority Criteria
	Approval Procedures of CDM projects	PIN (Project Idea Note)
		PDD (Project Design Document)
		Procedure for Approval
	Major CDM Policies and Regulations	-
Guidebook for Small Scale AR-CDM	-	
AR-CDM Potential in Vietnam	-	
Small-scale AR-CDM Pilot Project in Cao Phong district, Hoa Binh province	-	
TECHNICAL RESOURCES	Approved AR-CDM Methodologies	-
	Guidelines & Guidebooks	-
	Forms	-
	Government Policies and Regulations	-

Headings	Sub-headings	Items
	Data	-
LINKS	-	International Links Domestic Links
FAQs	-	-
AR-CDM HELPDESK	-	-
CONTACT US	-	Contact Address
SITE MAP	-	-

An image of the website is shown below:

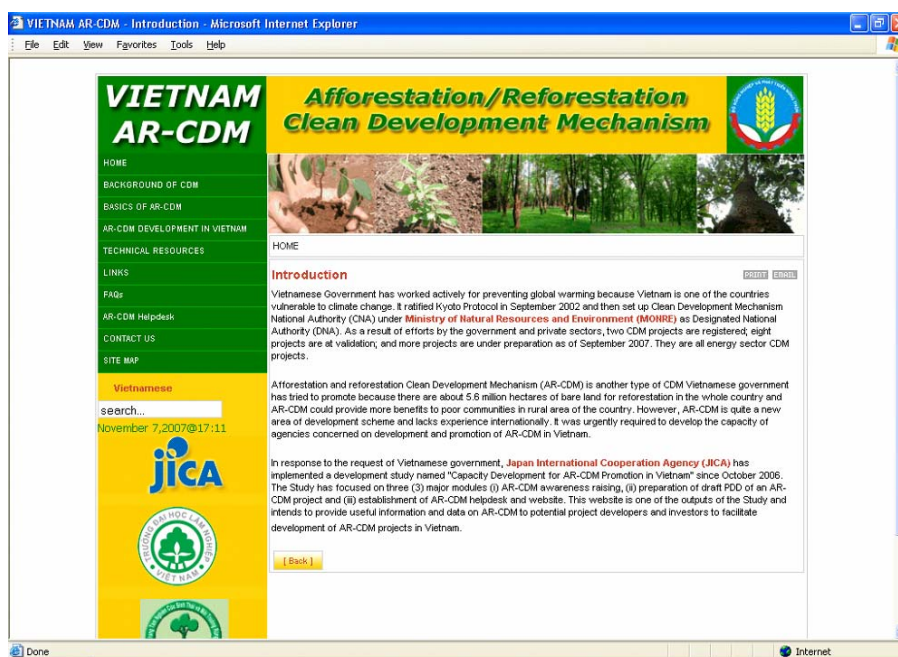


Figure 4.1 Image of the AR-CDM Website [http://ar-cdm.vfu.edu.vn/]

(2) Specification of web server

The Study team purchased the following web server, installed it under the host server of VFU, and created the website with close assistance from the information center of VFU.

Table 4.2 Specifications of web server installed in VFU

Item	Specification
Server	System: IBM Server System X3650 CPU: 1/2 Dual Core Xeon 5050 3.0GHz – 667 MHz/2x2M L2 Cache Disk Controller: Adaptec AIC – 9580W, RAID 0, 1 & 10 Memory: 2GB (4x512MB) 667MHz ECC Chipkill DDR2 FBDIMM Hard Disks: 03 x 73GB Hot Swap 3.5” 10K RPM Ultra320 SAS HDD Optical Driver: 8X-24X DVD/CD-RW Network: Dual Gigabit 10/100/1000 Power Supply: 835W HS 1/2

Item	Specification
Operation system	Microsoft Windows Server 2003 R2 Standard (English version)
Monitor	IBM/Lenovo Monitor 15" TFT
UPS	UPS SANTAK ON-LINE 1kVA (C1K)

4.2.2 Management of Website

After the JICA Study, ICD of VFU should be responsible for operation and maintenance of the website with the support of the Information Center of VFU. Information on the website shall be updated as required. Especially, information on AR-CDM methodologies, guidelines and tools provided by UNFCCC shall be monitored and updated on time. Similarly, government policies and regulations on CDM should be updated.

4.3 Establishment of AR-CDM Helpdesk

In order to facilitate AR-CDM promotion in Vietnam, it will be necessary to set up a Helpdesk, which, with appointed part-time staff, provides information and advisory services to developers and investors to promote AR-CDM in Vietnam. In other words, AR-CDM helpdesk shall act as a navigator of AR-CDM development in Vietnam.

(1) Specific functions to be performed by the Helpdesk

It is expected that the Helpdesk would provide the following services to AR-CDM stakeholders (those who are interested in or intend to develop and participate in AR-CDM projects).

- Provision of information and data on AR-CDM to developers and investors to assist AR-CDM development when requested and to the general public and potential participants for increasing awareness.
- Coordination with agencies concerned which implement activities related to AR-CDM (such as studies, missions, training, workshops, etc.) as well as provincial DARD that could provide information on the availability of potential sites for AR-CDM.
- Management and updating of the AR-CDM Web Site.
- Updating and maintenance of AR-CDM database in Vietnam (with regard to baseline biomass stock, tree growth, availability of potential sites, project information, etc.).
- Preparation and publication of guidebooks and booklets on AR-CDM for information dissemination.

(2) Responsible agency for the AR-CDM Helpdesk

It is recommended that the AR-CDM helpdesk should be managed by the ICD of VFU under the guidance of DOF/MARD (as AR-CDM focal point) and in coordination with agencies concerned. There are three main reasons for this: (i) the functions of helpdesk,

particularly dissemination of information are closely linked with the operation of the AR-CDM website installed in VFU; (ii) VFU has resources to carry out the operations of the helpdesk and website; and (iii) the national AR-CDM focal point (DOF) shall have the responsibility. But it has only one part-time member of staff, and has already been overloaded with regular and irregular tasks other than AR-CDM, and therefore cannot perform the function of a helpdesk.

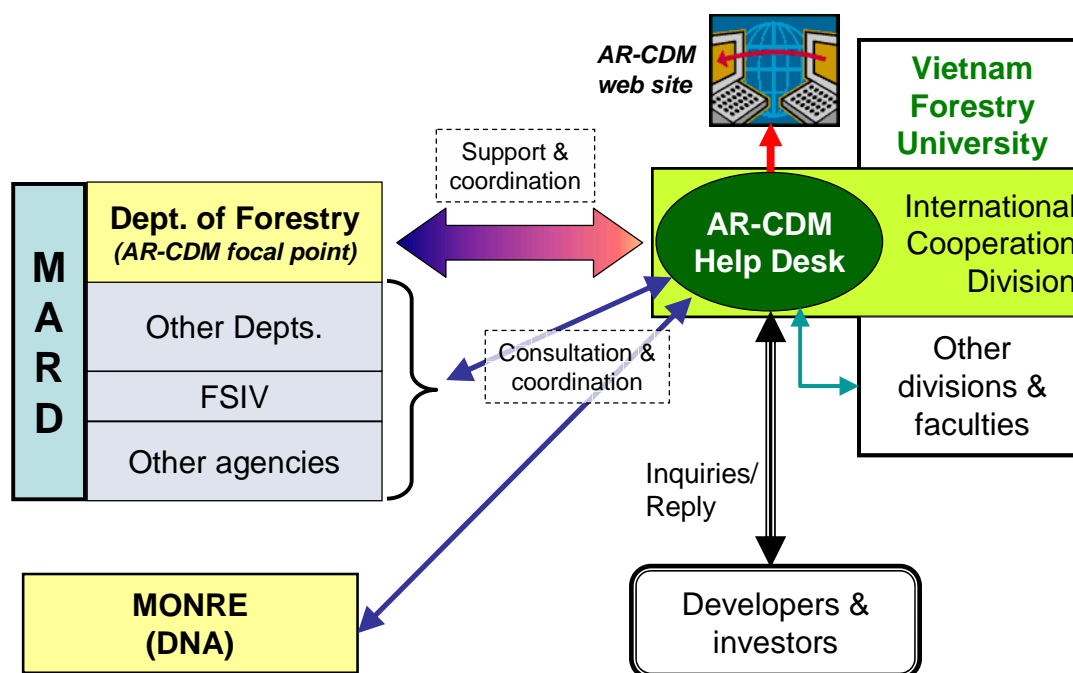


Figure 4.2 Functions of AR-CDM Helpdesk

(3) Actions needed

MARD shall issue an official decision regarding the establishment and operation of AR-CDM helpdesk for securing the budget and specifying the functions and responsibilities of the agencies concerned. VFU shall prepare budget request and appoint responsible personnel(s) based on the MARD's decision.

4.4 Preparation of AR-CDM Guidebook and Booklet

Formulation and implementation of AR-CDM projects require technical know-how on AR-CDM methodologies as well as domestic and foreign investment. Though AR-CDM has been becoming popular among Vietnamese foresters and those who have worked on forestry projects, very few of them know well about the technical aspects and have experience with AR-CDM project formulation. On the other hand, domestic and foreign investors who are interested in AR-CDM projects do not have enough information about the procedures for AR-CDM in Vietnam.

For promotion of AR-CDM in Vietnam, the Study produced two types of materials: "Guidebook for Small-Scale AR-CDM" and "AR-CDM Booklet" for information dissemination and increasing awareness for the potential developers and investors.

(1) Guidebook for Small-scale AR-CDM

The Guidebook mainly targets the counterpart of the Study, foresters, forest practitioners, and researchers/students of Forestry Universities or research institute who might engage in AR-CDM projects in the future. It covers all technical and operational aspects of AR-CDM ranging from the basic rules and implementation procedure of AR-CDM to validation, registration, verification, and trading of CERs. The Guidebook was prepared using the materials used in the training workshops for the counterpart. The contents and structure of the Guidebook are presented in **Table 4.3**.

Table 4.3 Contents of the Guidebook for small scale AR-CDM

Section	Contents
1. Basic Rules of Clean Development Mechanism	Global Warming
	Kyoto Protocol
	Kyoto Mechanism
	Clean Development Mechanism (CDM)
	Classification of CDM Project Activities
	Kyoto Protocol Units
	List of Annex I Parties and their Targets
	Greenhouse Gas (GHG) and Global Warming Potential (GWP)
	Afforestation/Reforestation CDM (AR-CDM)
2. Basic Rules of Small Scale AR-CDM	What is AR-CDM ?
	Particular Rules of Small Scale AR-CDM
	Stakeholder of AR-CDM
	Eligibility of AR-CDM
	Procedure to Define the Eligibility of Land
	Procedure to Define the Eligibility of Land (Normal Scale AR-CDM)
	Project Boundary and Project Activity
	Baseline Scenario
	Additionality
	Evaluation of Additionality (Small Scale AR-CDM)
	Evaluation of Additionality (Normal Scale of AR-CDM)
	Examples of Barriers for the Demonstration of Additionality (Normal Scale AR-CDM)
	GHG Removals, Emission and Leakage
	Estimation of GHG Removal
	Crediting Period
	Non-permanence
	tCER and ICER
	Issuance of CER
	Environmental Impact
	Socio-economic Impact
Stakeholder” s Comment	
Bundling and Debundling	
Remarks for AR-CDM	

Section	Contents
3. Operating Procedure of A/R CDM Project Activity	CDM Project Cycle
	Formation of Project Participants
	Selection of Project Site
	Outline of the Project Activity
	Project Participants and their Duties
	Delineation of A/R CDM Project Boundary and Stratification
	Plantation Planning, Estimation of Investment Cost and Benefit
	Application of Baseline and Monitoring Methodology (1)
	Application of Baseline and Monitoring Methodology (2)
	Estimation of Anthropogenic GHG Removals
	Demonstration of Additionality
	Survey on Environmental Impacts
	Socio-economic Survey
	Stakeholders Comments
	Determination of Forestation Management Rule for Forest Protection
	Capacity Building
Useful Link to Related Documents for Procedure of Small Scale AR-CDM	
Overall Project Decision	
4. Baseline and Monitoring Methodologies	What is Baseline Methodology?
	What is Monitoring Methodology?
	Carbon Pools
	Net Anthropogenic GHG Removals
	Baseline Net GHG Removals
	Actual Net GHG Removals
	Emission by Sources and Leakage
	Emission by Sources
	Leakage
	Flow of Methodologies
	Calculation and Estimation of C. Stock and GHG Emissions
	Project Boundary and Stratification
	Sampling
	Accurate, Precise, and Conservative
Methods for Estimation of C. Stock (biomass)	
Measuring Living Biomass (above and below ground biomass)	
5. Validation ~ Emission Trading	Validation
	Registration
	Monitoring and Verification
	Credit Issuance
	Credit Replacement Rule
	Emission Trading and Price Trend
	How Emission Trading Works
	Major Credit Buyers
	A Thought of I-CERs Price Structure -Minimize Replacement Risk of I-CER-
6. Transaction Cost for AR-CDM	What is Transaction Cost?
	Classification of Transaction Cost
	Example of Transaction Cost
	Measures to Minimize Transaction Costs

The cover page of the Guidebook is shown in **Figure 4.3**. The hard copy of the draft Guidebook was distributed to the participants of the 3rd training workshop held on 9th November 2007. A PDF of the Guidebook will be posted in the AR-CDM website for downloading.

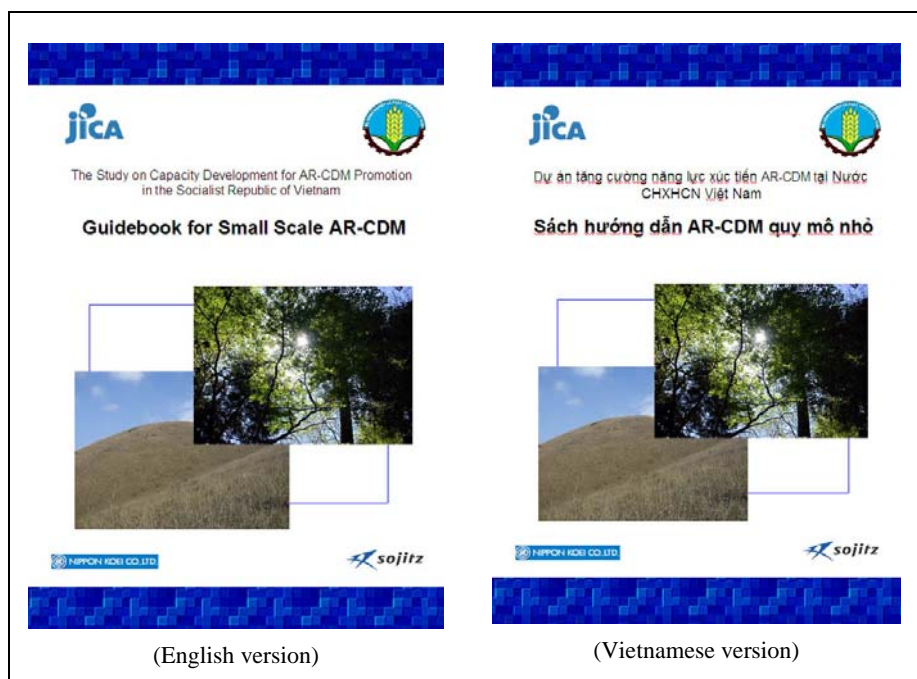


Figure 4.3 Cover pages of the Guidebook for Small-scale AR-CDM

(2) Booklet for small scale AR-CDM promotion

The Booklet was prepared and reproduced in English and Vietnamese to draw the attention of developers and investors as well as the general public. Unlike the Guidebook, the contents of the Booklet are as concise as possible and focus on the following matters:

- What is the CDM
- What is the AR-CDM
- Objectives and Potential of AR-CDM
- Basic Rules of AR-CDM
- Project Cycle of AR-CDM
- Small-scale AR-CDM
- Project Management Body
- Funds for AR-CDM Projects
- Approval Procedure of CDM Projects in Vietnam
- A Small-scale AR-CDM Pilot Project
- Development of AR-CDM Projects in Vietnam

The cover page of the Booklet are shown in **Figure 4.4**. A hard copy of the Booklet was distributed to participants of the Seminars for potential developers and investors held in Hanoi, Ho Chi Minh and Hue cities in November 2007. The PDF will be posted on the website for downloading.

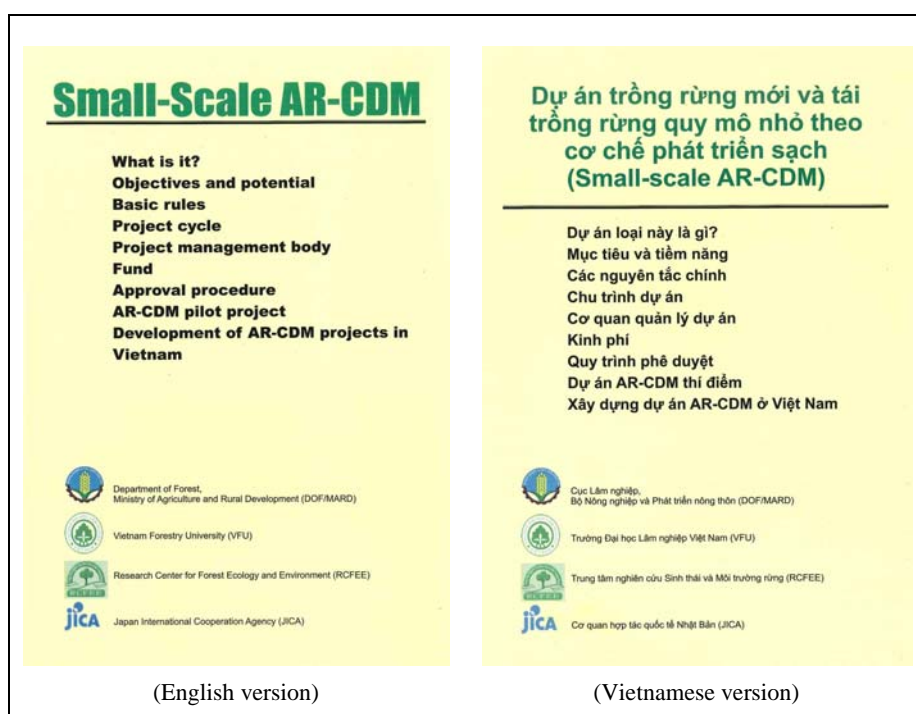


Figure 4.4 Cover page of the Booklet for small scale AR-CDM promotion

4.5 Searching Investors for the Small-scale AR-CDM Pilot Project

The Study team and the counterparts agreed to attempt to bring about the small-scale AR-CDM project being formulated for draft PDD preparation by finding investors. The implementation of the AR-CDM project is out of the scope of the Study. But it is worthwhile to do so and having an ongoing AR-CDM project is essential for the promotion of AR-CDM in Vietnam, since there are important lessons learned from the implementation process particularly from validation by DOE. In addition, the Study team and the counterpart considered that making appeals to the local communities about implementing the project is crucial to draw their active participation in the planning stage.

The Study team narrowed the potential investors to Japanese companies operating in Vietnam. With the advice of JICA Vietnam Office, the Study team contacted Japanese Business Association (JBA) in Vietnam in June 2007 to request for their cooperation to the dissemination of information that the JICA Study team and the counterpart have looked for companies which will provide funds for the project implementation. JBA agreed to disseminate the information to the member companies using the leaflet prepared by the Study team in Japanese language.

Three companies, namely MITSUI & Co. Vietnam Ltd., Honda Vietnam Co., Ltd., and Toyota Motor Vietnam Co., Ltd., informed the Study team of their interest in the project. The Study team and the counterpart visited each company to explain the project details. The Study team and the counterpart selected Honda Vietnam Co., Ltd. as an investor in the project because they made an official decision first for the financial support for the project implementation with a condition that they shall be an exclusive supporter of the project.

CHAPTER 5 DEVELOPMENT OF CAPACITY ON AR-CDM PROJECT FORMULATION

5.1 Selection of Small-scale AR-CDM Pilot Project Sites for Draft PDD Preparation

The JICA Study team and the counterpart selected the sites for a small-scale AR-CDM project for which a draft PDD would be prepared in the following manner:

- Initially selected a site from the list of proposed sites presented by the counterpart for further consideration (the list provided information on the features of the sites)
- Visited the selected site and collected data/information from the district and commune concerned
- Searched for additional sites within the same district
- Visited the additional sites and assessed the suitability for a small-scale AR-CDM project

Subsequent sub-sections describe the process of site selection.

5.1.1 Sites Proposed by the Counterpart

The counterpart, Vietnam Forestry University (VFU), proposed three (3) sites to the JICA Study team for draft PDD preparation based on field surveys and data collection (maps and aerial photo) conducted before commencement of the JICA study. Among the three sites below, the JICA Study team and the counterpart agreed to select the site in Dung Phong commune, Cao Phong district, Hoa Binh province.

(1) Nam Phuong Tien commune, Chuong My district, Ha Tay province

Estimated area: 400-500 ha

The area has several small hills surrounded by terraced paddy fields (abandoned). The land has not been covered by forest for many years and is covered mostly by grass and reeds. The land is distributed to households (without red certificate) for reforestation under the 327 program. But there are only a few households developing forest under the program. The trees have been planted scatteringly around the hills only.

The site is suitable and convenient for the capacity building for the counterpart on AR-CDM project formulation because of proximity to the Forestry University as well as Hanoi. But the site does not have the typical features of reforestation sites in Vietnam - shrub on sloping lands. This suggests the site is not appropriate for the development of a pilot AR-CDM project for promoting AR-CDM in Vietnam. Moreover, it is likely the abandoned paddy field now could be utilized for farming in the future by the local people due to the scarcity of agricultural land. Therefore, the site was not selected for draft PDD preparation under the JICA Study

(2) Lang Thip commune, Van Yen district, Yen Bai province

Estimated area: 300 ha

Yen Bai province is located at about 300km from Hanoi. The only means of access from Van Yen district to Lang Thip commune is by motorbike and from the commune center to the site (8km) foot. It takes two days to reach the site from Hanoi.

The proposed site is located in remote mountainous area with an altitude of 200-300m and the average slope of 35°-40°. Most of the area is bare land and managed by the commune people's committee (CPC).

The site is suitable for AR-CDM in terms of present land use (grass/shrub: low baseline biomass) and additionality (no other reforestation activities is possible). However, the remoteness and poor accessibility to the site are unacceptable obstacles for the capacity building activities in the JICA Study. Therefore, the site was not selected for draft PDD preparation.

(3) Dung Phong commune, Cao Phong district, Hoa Binh province

Estimated area: 90 ha

The proposed site is located at about 120km from Hanoi and 80km from VFU. It is possible to reach to the foot of the site by 4WD vehicle. The area was deforested a long time ago. The site is unused bare land on hills covered by grass and shrub and surrounded by sugarcane farms. The land is not allocated to households but managed by the CPC. In addition to 90ha of the site identified by the counterpart, there is about 500ha of bare land nearby which is covered mainly by grass.

According to the information supplied by the counterpart, the site is suitable for capacity building activities of the counterpart due to proximity to Hanoi and VFU. The site has typical features of reforestation sites in Vietnam and there is the possibility of finding additional sites nearby. Therefore, the site was selected for further consideration for draft PDD preparation in the JICA Study.

5.1.2 Selection of Sites in Cao Phong District

(1) Estimation of the scale of a small-scale AR-CDM project in Vietnam

Small-scale AR-CDM project activities result in net anthropogenic GHG removals by sinks of less than 8,000 tons of CO₂ per year. If a small-scale AR-CDM project activity results in greater than 8,000 ton of CO₂ per year of net anthropogenic GHG removals, the excess removals will not be eligible for the issuance of tCERs or ICERs (Decision 5/CMP.1)

According to the information from FSIV, the expected growth (MAI: Mean Annual Increment) of the plantation in Vietnam is about 5 m³/ha/yr for indigenous tree species and 15 m³/ha/yr for fast growing species. In the event of poor soil conditions, the growth rate would be less than these values.

Based on the information above, the area of an AR-CDM project which removes 8,000 ton of CO₂ per year was roughly estimated for different rates of MAI and in conditions of zero baseline carbon stock and leakage, as shown in the **Table 5.1**. It indicates the project area increases as MAI (Mean Annual Increment) decrease. In case of 15 m³/ha/yr of MAI, the estimated area of a project that could have net anthropogenic GHG removals of 8,000 ton of

CO₂ per year¹ is 582 ha. However, this estimation merely gives an idea to the Study team about the maximum scale of the sites for draft PDD preparation.

Table 5.1 Estimation of the Area of Small-Scale AR-CDM Projects

MAI (m ³ /ha/yr)	Dry matter (t/ha/yr)	Carbon (t/ha/yr)	CO ₂ (t/ha/yr)	Estimated Area for 8,000 CO ₂ ton/yr (ha)
20	10	5	18.3	436
15	7.5	3.75	13.75	582
10	5	2.5	9.2	873
5	2.5	1.25	4.6	1,745

Source: prepared by JICA Study Team based on information from FSIV

The scale of an AR-CDM project, which the JICA study will formulate together with the counterpart, should be appropriate in terms of the economic feasibility and the time required for formulation. In general, the economic feasibility of small-scale AR-CDM projects increases as the scale increases because the transaction costs per ha become smaller as the scale increases. On the contrary, the JICA study cannot work on a bigger projects because of time constraints. As a rule of thumb, the JICA Study team targeted a total of between 300 and 500ha of net planting area for site selection.

(2) Criteria used for site selection

The JICA Study team used several criteria synthetically when searching for suitable sites for draft PDD preparation. They are:

Land eligibility

- The land has not been “forested” since December 31, 1989
- The forest definition in Vietnam:
 - ◆ Minimum crown cover: 30%
 - ◆ Minimum tree height: 3m
 - ◆ Minimum area: at least 0.5ha
- Provision of the evidence is required
 - ◆ Aerial photo, satellite image, land use map prior to 1990.
 - ◆ Interviews with local stakeholders by PRA.

Current and historical land use/vegetation

- Grassland (non-forest land) and crop land are the applicable conditions of approved methodology for small-scale AR-CDM (AR AMS 0001).
- Unused land with a lower biomass is suitable for the AR-CDM.
- Historical land use data is necessary to assess the baseline scenario.

¹ The limit of net anthropogenic GHG removals from small-scale AR-CDM activities was revised to 16,000 ton of CO₂ per year at COP13 in December 2007.

Baseline Scenario

- The baseline approach should be described in the paragraph 22 (a) of AR AMS 0001 as “Existing or historical, as applicable, changes in carbon stocks in the carbon pools within the project boundary.”
- Make a hypothesis of future land use in the project area without AR-CDM project.

Baseline carbon stock change

- Simplified procedure was provided in AR AMS 0001:
 - ◆ If carbon stock change in the baseline scenario would decrease or undergoes no change, it is considered to be zero.
 - ◆ If carbon stock change under the baseline scenario would increase, it should be calculated according to the methodology.
 - ◆ Cases of “no change” are suitable for the obtainment of more credit and to facilitate the calculation process.

Additionality

- At least one of the following barriers should be explained (AR AMS 0001).
 - ◆ Investment barriers (other than economic/financial barriers)
 - ◆ Institutional barriers
 - ◆ Technological barriers
 - ◆ Barriers related to local traditions
 - ◆ Barriers due to prevailing practices
 - ◆ Barriers due to local ecological conditions
 - ◆ Barriers due to social conditions

Leakage

- Displacement of households or activities due to the AR-CDM project should be smaller than 50 % (an applicable condition of AR AMS 0001)
- The following assessment was required for AR AMS 0001
 - ◆ Percentage of families/households in the community involved in or affected by the project activity who are displaced due to the project activity;
 - ◆ Percentage of total production of the main agricultural produce within the project boundary that is displaced due to the project activity;
 - ◆ The time-average number of grazing animals per hectare within the project boundary who are displaced due to the project activity divided by the average grazing capacity of land for the area, expressed as percentage
- Simplified procedures are provided in AR AMS 0001
 - ◆ If the value of each of these indicators is lower than 10 %, leakage is considered to be zero

- ◆ If the value of one of these indicators is higher than 10 % and less than or equal to 50 %, leakage is considered to be 15 per cent of the actual net GHG removals by sinks
- ◆ If the value of any of these indicators is larger than 50 %, net anthropogenic removals by sinks cannot be estimated
- ◆ If N₂O emissions from fertilizers are less than 10 %, they can be ignored, otherwise, they should be estimated in accordance with the IPCC Good Practice Guidance
- A project area without leakage (= unused land) or small leakage is suitable for the AR-CDM

Involvement of low income communities

- Low income communities and individuals determined by the host party are required for participation in small scale AR-CDM

Land tenure

- A description of legal title to the land, right to access to the sequestered carbon, and current land tenure and land use is required in the PDD of small scale AR-CDM projects.

Consensus of local stakeholders

- Comments from the stakeholders are required in the PDD of small scale AR-CDM projects.
- Obtainment of consensus among the stakeholders is crucial for the success of AR-CDM project activities in general
 - ◆ Local government
 - ◆ Local people (land owners)
 - ◆ Local people (land users and others affected by the project)

Size and location of the land

- Small-scale AR CDM project activities are expected to result in net anthropogenic GHG removals by sinks of less than 8,000 CO₂ ton per year
 - ◆ Approximately 300-500 ha for the JICA study (depends on the site quality and tree species)
- Accessibility to the sites is important for the AR-CDM projects like regular reforestation projects because of the operational difficulty and high cost in cases where the project is in a remote area

(3) Collection of information on potential reforestation sites from local government

The site in Dung Phong commune, Cao Phong district was selected from the three (3) proposed sites provided by the counterpart. After the initial visit to the site and the commune office, the Study team and counterpart visited the Department of Agriculture and Rural Development of Hoa Binh province to explain the purposes of the JICA study and to collect maps of land use plan in Cao Phong district and information related to reforestation activities in the province as well as the district. The Study team also had meetings with Cao

Phong district and the concerned communes concerned for the same purposes and to request them proposals for potential sites for the Study within the district.

The office of Cao Phong district people’s committee particularly 661 program management board of the district was very cooperative and provided valuable information on the potential sites for the Study as well as statistical data of the district by commune.

The 661 program management board of the district proposed potential sites in three communes other than Dung Phong commune to the Study team and the counterpart, namely Xuang Phong, Yen Lap, and Bac Phong communes.

In addition to the location of the proposed sites, the 661 program office provided the following information to the JICA Study team and the counterpart:

Land eligibility:	Deforestation in the proposed sites was occurred more than 30 years ago - eligible for AR-CDM. (Confirmation by aerial photographs and interviews with local people would be necessary. Aerial photographs of the area taken in 1971 and 2004 are available at the Center of Survey and Mapping Documentation under MONRE.)
Land tenure:	The land in the district was mostly allocated to the local people and the information about land owners was available in the commune office.
Income level of the community:	In Cao Phong district, one third of the total household are considered as poor households. ² (It is necessary to collect more detailed information from the commune and conduct socio-economic surveys in each project area to confirm the poverty level of the potential project participants)

(4) Assessment and selection of sites for draft PDD preparation

The Study team and the counterpart conducted reconnaissance surveys for a total of 8 sites in four communes in Cao Phong district to assess their suitability for AR-CDM, considering the criteria mentioned in (2) above. Out of 8 sites, the Study team and the counterpart selected five (5) sites in two communes (Xuan Phong and Bac Phong communes) for draft PDD preparation. The total net area for reforestation in the five (5) sites is roughly estimated at about 310 ha.

The map below shows the location of 8 sites visited and assessed. Site pictures are presented in **Appendix-12. Table 5.2** shows the results of site assessment.

² According to the Prime Minister Decision No.170/2005/QĐ-TTg dated 8th July 2005, households with annual per capita income of less than 2.64 million VND are considered as poor in rural area during 2006-2010 period.

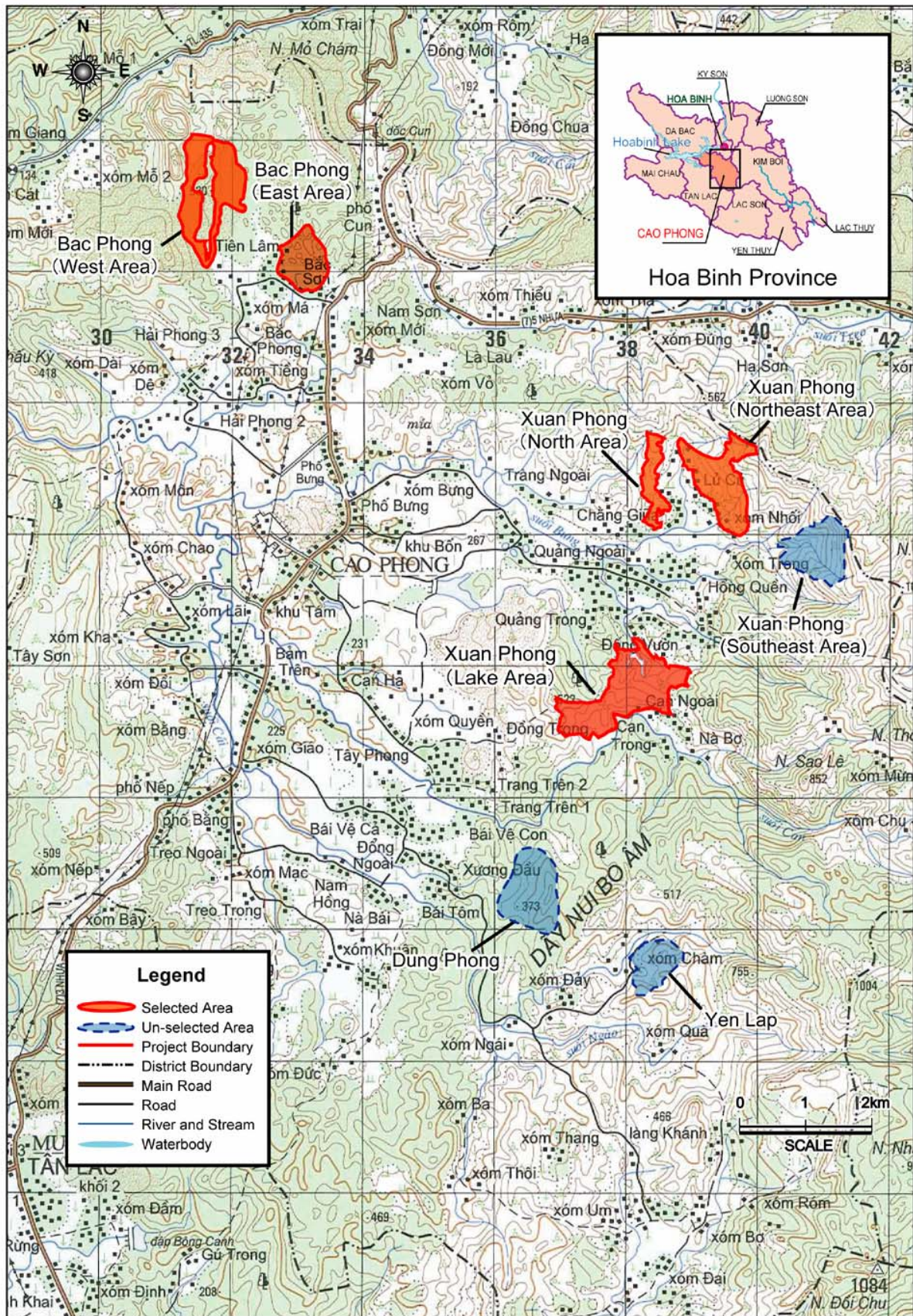


Figure 5.1 Location of the sites assessed

Table 5.2 Results of the Site Selection Assessment

	Dung Phong	Yen Lap	Xuan Phong (Lake)	Xuan Phong (North area)	Xuan Phong (Northeast)	Xuan Phong (Southeast)	Bac Phong (West)	Bac Phong (East)
Land Eligibility	△	△	△	△	△	△	△	△
Current land use/vegetation	Sugarcane Grassland	Shrub with trees	Grassland Shrub	Grassland Shrub	Grassland Shrub	Grassland	Grassland Shrub	Grassland Shrub
Baseline Scenario	× Economic attractiveness	× Natural regeneration	○ Current land use continues	○ Current land use continues	○ Current land use continues	○ Current land use continues	○ Current land use continues	○ Current land use continues
Baseline C stock Change	△ No change	× Increase	△ No change	△ No change	△ No change	△ No change	△ No change	△ No change
Additionality	△	△	△	△	△	△	△	△
Leakage	△ Grazing Fuel-wood	△ Grazing Fuel-wood	△ Grazing Fuel-wood	△ Grazing Fuel-wood	△ Grazing Fuel-wood	△ Grazing	△ Grazing Fuel-wood	△ Grazing Fuel-wood
Low income community	△	△	△	△	△	△	△	△
Land tenure	△ Clear	△ Clear	△ Clear	△ Clear	△ Clear	△ Clear	△ Clear	△ Clear
Consensus of Stakeholders	×	△	△	△	△	△	△	△
Area	50 ha	190 ha	100 ha	40 ha	70 ha	140 ha	50 ha	50 ha
Location	○	○	○	○	○	× Remote area	○	○
Result of the site selection	×	×	○	○	○	×	○	○

○: Information confirmed, △: Estimated to be suitable but further assessment and evidence collection necessary, ×: Condition doesn't meet the criteria

The general features of the sites are described below.

1. North area of Xuan Phong commune (40ha) - Selected	
Location:	The site is located in the north of Xuan Phong Commune and stretches from the foot of hills near residential area toward the top of the hills. It has a rather steep slope. Access to the site is easy.
Land use & vegetation:	The land was classified as protection forest land until 2005 but re-classified as production forest land in 2006. The area was deforested and used for the shifting cultivation. But now most parts of the area are not used for farming and are covered by grass and shrub. It was observed that local people graze cattle and collect fuel wood in the area. As it is close to the residential area, the intensity of those activities might be rather high. The fertility of the land is low with rocky soils and degraded by erosion.
2. Northeast area of Xuan Phong commune (70ha) - Selected	
Location:	The site stretches from the foot of mountain near a residential area toward the top and has a rather steep slope in the north of Xuan Phong Commune. Access to the site is easy.
Land use & vegetation:	The area was deforested a long time ago and is unused at present. Present vegetation is grass and shrub which is suitable for AR-CDM. The area of higher elevation was protection forest land before but re-classified as production forest land in 2006. There are scattered trees planted in 2003 by the 661 program in the adjacent area. Cattle grazing and fuel wood collection is not as high as in the North area because the slope is rather steep and grass is dominant. The fertility of the land is low with rocky soils and is degraded by erosion.
3. Lake area of Xuan Phong commune (100ha) - Selected	
Location:	This area is located in a hilly area in the western part of the Xuan Phong Commune and surrounds the lake which was constructed in 1967 for irrigation purpose. Access to the site is easy.
Land use & vegetation:	This area is covered by grass and shrubs and used for grazing and fuel wood collection. But the activities are not intensive compared to the north and northeast areas, as there is no residential area nearby. The soil erosion was observed and the land fertility seems to be very low. Bare lands with sparse shrub (without grass) exist in some parts.
4. Southeast area of Xuan Phong commune (140ha) - Not selected	
Location:	This area is located far from residential area of the commune and the altitude ranges from 700m to more than 1,000m ASL. No road exists to the area and it takes more than two hours to the site by foot.
Land use & vegetation:	The vegetation in this area is mostly low-grass and the soil fertility seems to be very low. Some of the area is used for grazing of goats but it is not intensive. The area is very suitable for AR-CDM considering current land use/vegetation and leakage. However, planting activities are difficult to implement and costly due to poor accessibility.
5. West area of Bac Phong commune (50ha) - Selected	
Location:	This site is located in the northwestern part of Bac Phong commune. There are many steep limestone hills in the area. Access to the site is good in general. But some areas scattered within the preliminary

	boundary are difficult to access because of complicated land features.
Land use & vegetation:	Most of the areas are covered by bush and grass such as Co Lao, Co Tranh and Lau Lach. The vegetation in the northern part of the area is characterized by tall Lao Lach. The southern part of the area is near a residential area and limited parts are used for sugarcane and cassava cultivation and fuel wood collection. Cattle and goat grazing is observed but it is not intensive.
6. East area of Bac Phong commune (50ha) - Selected	
Location:	The site is located in the eastern part of Bac Phong district and surrounds a reservoir for irrigation. Most parts are rugged hills.
Land use & vegetation:	Most areas are covered by shrub and grass such as Co Lao and Co Tranh. But cassava and sugarcane cultivation are observed in a limited area. Cattle grazing and firewood collection is observed but it is not done intensively.
7. Dung Phong commune (90ha) - Not selected	
Location:	This is the site proposed by the counterpart. It is located in the southeastern part of the commune. Access to the site is easy.
Land use & vegetation:	The site is unused bare land on hills covered by grass and shrub and surrounded by sugarcane farms. In terms of land use and vegetation, the site is suitable for AR-CDM. However, cultivation of sugarcane (for sugarcane juice) is prevailing in the commune due to high profitability and the cultivated area has been expanding to the top of the hills. The Study team and the counterpart also witnessed clearing and burning of the shrub within the proposed site by local people for sugarcane cultivation. In fact, local people invested a large amount to access road construction and development of sugarcane farms. Interviews with selected farmers revealed that they have no intentions to convert the farm into forest. Therefore, the Study team and the counterpart did not select the site for draft PDD preparation.
8. Yen Lap commune - Not selected	
Location:	The site is located in unused land on hills in the middle of Yen Lap commune.
Land use & vegetation:	The upper part of the hills is covered densely with high shrubs including the growing tree species. Mature trees also exist. The area has a very high biomass stock and is in the process of the natural regeneration to the secondary forest. Hence, this area is not suitable for the AR CDM project, as it project may not be additional.

5.2 Present Condition of Selected Sites in Cao Phong district

5.2.1 Natural Condition

(1) Geography

Cao Phong district is located in the middle of Hoa Binh province and borders Hoa Binh town and Da Bac district on the North, Kim Boi district on the East, Tan Lac district on the West, Lac Son and Tan Lac districts on the South. Hoa Binh is a mountainous province in the Northwestern Region. Cao Phong district lies along the national road No.6 from Hanoi to Hoa Binh, Son La and Lai Chau provinces. The district has a total area of 25,460 ha. Of which, the agricultural land is only 3,540 ha and un-used lands composed of mainly barren and hilly areas is 10,092 ha. Forest coverage in Cao Phong district was only 27% in 2006. The location of Cao Phong district is illustrated in

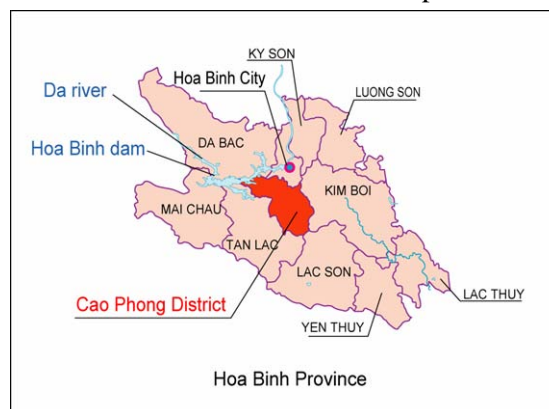


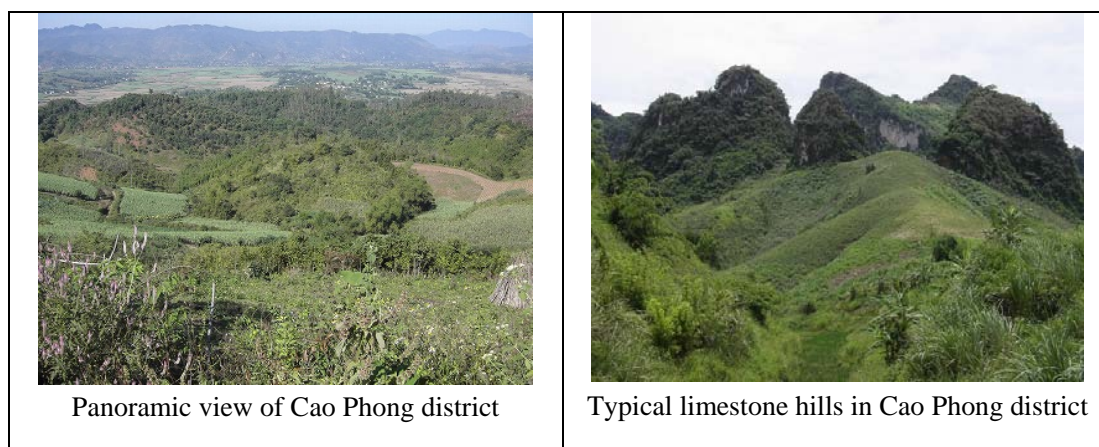
Figure 5.2.

Figure 5.2 Location of Cao Phong District and Administrative Boundary

(2) Topography

Cao Phong town is located at the altitude of more than 200 m. There are some high mountains with more than 1,000m ASL in the east of the district. The topography is characterized by gentle slopes in general. The slope of the mountains is about 10 - 25° and there are a lot of steep limestone hills.

Cao Phong district is divided into 3 main areas: a high mountainous area (including 2 communes: Ten Thuong and Yen Lap), a middle area (8 communes and Cao Phong town) and the area along the Da river (2 communes: Binh Thanh and Thung Nai).



Panoramic view of Cao Phong district

Typical limestone hills in Cao Phong district

Cao Phong district has a tropical monsoon climate: hot and rainy in summer, cold and dry in winter. The annually average temperature during 1975-2004 was 23.6°C. Average annual rainfall during 1975-2004 was also rather high, 1,845mm. The rainy season is from May to

October and has more than 90% of annual rainfall. In general, the climate of Cao Phong district is cooler and rainfall is higher than in other districts of Hoa Binh province. Temperature and precipitation in Hoa Binh province are illustrated in **Figure 5.3**.

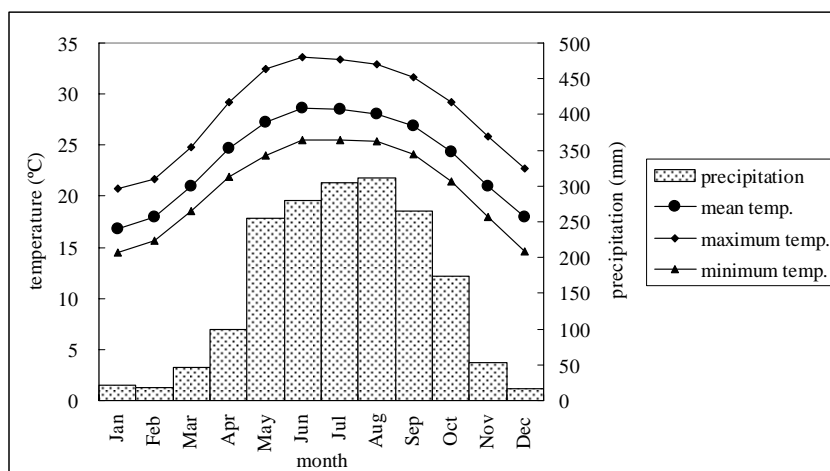


Figure 5.3 Temperature and Precipitation in Hoa Binh Province³

(4) Soil and land use

Due to diversified and complicated topography, Cao Phong has a lot of different land types. In the hilly and mountainous areas, the soils area is dominated by light yellow Feralit developed on neutral magma rocks and limestone with a thickness of more than 50cm. There are alluvial soils in the low land area. Generally, soils in the low land of Cao Phong district have relatively high fertility and therefore a variety of crops especially industrial and fruit crops are cultivated.

According to the land use data of Cao Phong district in 2006, agricultural land occupied only 14%, while unused land under forest land occupied a rather high ratio of 40%. Bac Phong and Xuang Phong communes show a different land use pattern: in Bac Phone, agricultural land occupied 22% while forest land 59% with unused land of 35%; in Xuan Phong, agricultural land occupied only 4% of the total area while forest land occupied the majority of the land, 90%, with unused forest land of 75%.

³ Source: "Meteorology & Hydrology Data", Agro-Meteorology Research Center, 2007

Table 5.3 Land Use of Cao Phong District in 2006

Types of land	Total area in district		Bac Phong Commune		Xuan Phong Commune	
	ha	%	ha	%	ha	%
I. FOREST LAND	16,916	66.4%	1,367	58.7%	2,783	89.5%
1 Natural forest	4,241	16.7%	381	16.4%	253	8.1%
2 Planted Forest	2,583	10.1%	170	7.3%	201	6.4%
3 Un-used land	10,092	39.6%	815	35.0%	2,330	74.9%
Ia Condition	4,954	19.5%	524	22.5%	1,214	39.0%
Ib Condition	1,913	7.5%	169	7.2%		0.0%
Ic Condition	2,516	9.9%	7	0.3%	1,116	35.9%
Others	709	2.8%	116	5.0%		0.0%
II. OTHER LANDS	8,544	33.6%	962	41.3%	328	10.5%
1 Agriculture land	3,540	13.9%	501	21.5%	120	3.8%
Cultivated Land	3,443	13.5%	499	21.4%	119	3.8%
Aquaculture land	77	0.3%	2	0.1%	1	0.0%
Other agriculture land	20	0.1%	-	0.0%	-	0.0%
2 Non- agri land	4,215	16.6%	366	15.7%	208	6.7%
Residence Land	1,727	6.8%	213	9.2%	105	3.4%
River, lake , water-surface	1,360	5.3%	27	1.2%	58	1.8%
Others	1,128	4.4%	126	5.4%	46	1.5%
3 Un-used Agri land	789	3.1%	95	4.1%	-	0.0%
Un- used plain land	15	0.1%	2	0.1%		0.0%
Rock mountain without tree	774	3.0%	94	4.0%		0.0%
TOTAL NATURAL AREA	25,460	100%	2,329	100%	3,111	100%

Source: Cao Phong District People's Committee (2007)

5.2.2 Socio-economic Conditions

(1) Population and labor

Population

Cao Phong district has 8,886 households with a total population of 41,597 in 2006. The annual average population growth rate in Cao Phong district was 1.6% during 2000-2006. The urban population (Cao Phong town) in 2006 was 4,484 persons and the rural population was 37,113 persons. The majority of the population are ethnic people, the Muong, in the Cao Phong district.

Bac Phong commune had 898 households with 4,392 people in 2006. The annual average population growth rate in the commune during 2000-2006 was 1.4%. On the other hand Xuan Phong commune had 696 households with 3,499 people in 2006. The annual average population growth rate in the commune during 2000-2006 was 1.2%.

Table 5.4 Household, Population and Labor in Cao Phong District

	2000	2006	Average annual growth ratio (2000-2006)
1 Number of household			
Total of Cao Phong district	8,063	8,886	1.63%
Bac Phong	816	898	1.61%
Xuan Phong	639	696	1.43%
2 Population			
Total of Cao Phong district	38,937	41,597	1.11%
Bac Phong	4,049	4,392	1.36%
Xuan Phong	3,265	3,499	1.16%
3 Labor			
Total of Cao Phong district	19,446	23,551	3.24%
Bac Phong	2,049	2,349	2.30%
Xuan Phong	1,631	1,980	3.28%

Source: Cao Phong District People's Committee (2007)

Labor

Total number of people engaged in labor in Cao Phong district in 2005 was 21,733 persons, of those engaged in labor in agriculture occupied a very high ratio of 87.6%.

Table 5.5 Labor Structure of Cao Phong District in 2005

Items	Non-state sector	State sector	Total	%
Total Labors	20,431	1,302	21,733	100.0%
Agriculture	19,003	38	19,041	87.6%
Forestry	13	-	13	0.1%
Fishery	35	-	35	0.2%
Industry, construction	450	6	456	2.1%
Service	930	1,258	2,188	10.1%

Source: People's Committee of Cao Phong district (2006)

(2) Economy and poverty

According to the master plan for socio-economic development of the Cao Phong district, the economic growth of the district in 2002 was 8.0%. The economic structure has changed slowly, production value of handicraft, construction and service sectors had relatively increased relatively, but still occupied a small ratio. Agriculture, forestry and fishery occupied a high ratio of 72.4% in 2002. GDP per capita in Cao Phong district was estimated at 3.0 million VND in 2002.

Table 5.6 Economic growth in 2002

Items	Value (billion VND, price 1994)	Growth rate (%)
1. Production value	95.19	-
Agriculture, forestry, fishery	68.87	-
Industry, construction	12.50	-
Service	13.82	-
2. Additional value	71.39	8.0%
Agriculture, forestry, fishery	52.80	6.5%
Industry, construction	8.35	12.0%
Service	10.24	11.0%

Source: "Master Plan for Socio-economic Development of Cao Phong district to 2010" (2003)

Table 5.7 Economic structure by sectors in 2002

Items	Value (billion VND, current)	Share (%)
1. Additional value	118.99	100.0%
Agriculture, forestry, fishery	86.09	72.4%
Industry, construction	14.20	11.9%
Service	18.70	15.7%
2. Additional value per capita	3.00	

Source: "Master Plan for Socio-economic Development of Cao Phong district to 2010" (2003)

(3) Agriculture

Major crops cultivated in the Cao Phong district are paddy, cassava, sweet potato, maize, sugarcane, peanuts, soybean and taro. The cultivated area of paddy is the largest, 1,569 ha, followed by sugarcane (1,616 ha) and maize (1,308 ha). The cultivated area of paddy in the district increased at 2.2% per year during 2000-2006 and maize showed the highest growth rate of 8.5%. On the contrary, cultivated area of cassava decreased at -2.1% during 2000-2006. In Bac Phong commune, the cultivated area increased significantly particularly for maize and sugarcane. The cultivated area of paddy in Xuan Phong also increased at 1.6% per year during 2000-2006 and maize showed high rate of 6.2%. On the other hand, the cultivated area of cassava significantly decreased at -5.5% per year.

Table 5.8 Planted Area of Major Crops

Crops	Cao Phong district			Bac Phong commune			Xuan Phong commune		
	2000 (ha)	2006 (ha)	#	2000 (ha)	2006 (ha)	#	2000 (ha)	2006 (ha)	#
Paddy	1,569	1,785	2.2%	151	188	3.7%	185	204	1.6%
Maize	800	1,308	8.5%	62	142	14.8%	50	72	6.2%
Cassava	329	290	-2.1%	15	15	0.0%	35	25	-5.5%
Sweet potato	169	212	3.9%	12	17	5.5%	13	15	2.4%
Sugarcane	1,275	1,616	4.0%	131	230	9.8%	50	62	3.7%

#: Average annual growth rate during 2000-2006

Table 5.9 Production of Major Crops in 2006

Crops	Total in Cao Phong			Bac Phong commune			Xuan Phong commune		
	Crop area (ha)	Unit yield (ton/ha)	Prod'n (ton)	Crop area (ha)	Unit yield (ton/ha)	Prod'n (ton)	Crop area (ha)	Unit yield (ton/ha)	Prod'n (ton)
Paddy	1,785	5.1	9,102	188	5.2	984	204	5.6	1,139
Maize	1,308	3.4	4,409	142	3.6	511	72	2.7	196
Cassava	290	8.2	2,364	15	8.2	123	25	8.2	205
Sweet potato	212	4.1	864	17	4.2	69	15	4.0	59
Sugarcane	1,616	70.0	113,099	230	70.5	16,215	62	68.5	4,247
Peanuts	49	1.0	49	8	1.1	9	3	10.0	30
Soybean	117	1.6	187	6	1.3	8	0	0.0	0
Taro	120	9.2	1,104	15	92.0	1,380	0	0.0	0

Source: People's Committee of Cao Phong district (2007)

(4) Livestock

The number of buffaloes and cows in the Bac Phong commune decreased during 2000-2006. On the other hand, the total number of livestock in Xuan Phong increased during 2000-2006. The number of pigs in both communes has increased faster than the average for Cao Phong district.

Table 5.10 Number of Livestock

	Cao Phong district			Bac Phong commune			Xuan Phong commune		
	2000	2006	#	2000	2006	#	2000	2006	#
Buffalo	10,157	8,453	-3.0%	902	813	-1.7%	936	957	0.4%
Cow	2,420	3,574	6.7%	254	146	-8.8%	366	545	6.9%
Pig	20,570	20,906	0.3%	1,962	2,644	5.1%	1,665	2,336	5.8%
Poultry	na	138,768	-	na	16,992	-	na	13,469	-

#: Average annual growth rate during 2000-2006

Source: People's Committee of Cao Phong district (2007)

(5) Social infrastructure

Cao Phong district has a health care center and all communes have health care stations, of which 4 stations have doctors.⁴ As for education, the number of pupils dropping out of school was small. The quality of education at all levels is rather good.

(6) Management of natural resources

Ministry of Agriculture and Rural Development (MARD) of Vietnam promulgated Circular No.56 dated 30 March 1999 related to the management of natural resources (forest, land, wildlife) in rural areas. In Cao Phong district, the natural resources have been managed following the regulations. All communes established their own regulations for natural resource management in 2001 based on the Circular No.56. The contents of the Circular are summarized in **Table 5.11**.

⁴ Master plan for socio-economic development of Cao Phong district up to 2010, 2003, Cao Phong

Table 5.11 Summary of the Circular related to Management of Natural Resources

Item	Contents
Obligation of tree planting	All village members have responsibility and obligation in forest protection and development to carry out tree planting in the Tet period following the example of Uncle Ho. Each household plants 10-15 trees per year.
Land use in forest area	Do not destroy forest for cultivation. Every household should be active in working out plans to plant trees with high economic values.
Prohibitory of burning off and cultivation	Any household practices involving burning for cultivation have to develop fire breaks to prevent forest fires from spreading to other areas. Any individual, organization who violates this regulation has to be reviewed, compensate for the damage and sign a commitment; in cases of a more serious violation or repeat offence, the violator has to compensate for the damage and be responsible to State Law.
Illegal collection	It is strictly prohibited to harvest, trade and transport forest products illegally. Any individual or organization violates and causes damage at low level shall have to compensate for the loss. In case of repeat offences or serious damage caused, a violation record/minutes shall be made with witness of relevant parties, the violator shall have to be responsible for compensating for the loss and be responsible to the State Law, and exhibit shall be confiscated accordingly. Village leader, police and security team in the commune are assigned to arrest.
Wild life protection	It is not allowed to hunt, trap or capture wildlife. In cases of repeat offences, great damage caused or a large amount of wildlife, violators shall be liable to the Law.
Grazing	Cattle should be grazed in areas designated by the village, commune. In any area without designated grazing land, households are responsible for closely managed grazing. In the event cattle damage cash crops, the owner shall compensate for the loss.
Prevention of forest fire	Any household practices involving burning for cultivation have to develop fire breaks to prevent fire from spreading to other areas. If using fire in forests, the fire must be put out before leaving. Anyone causing forest fire shall be subject to paying compensation. If a great deal of damage is caused, the violator shall be responsible to the existing Law. In case of the discovery of the forest fire, the finder is required to report this immediately to the person in charge and alert people to gather for fire extinguishment.
Responsibility for forest protection	Every household in the village is responsible for protecting forest, coordinating with other households allocated forest land to according to Decree 02 in watershed forest areas to protect this forest; any areas that have been deforested belong to any household, that household is responsible for replanting forest in that area to serve the living and production activities of local villagers.
Observation of rule and direction	Households contracted forests are responsible for active forest protection and development. They are required to follow direction of commune People's Committee (PC) and forestry agency at higher level in participating plans of forest planting and trading. Any violator causing damage is responsible to the Law and subject to be dealt with in line with existing Law. Discover and prevent any illegal forest destruction for cultivation; forest products harvesting, trading and transportation action. For limited damage caused: exhibit shall be confiscated, violator has to compensate for the loss and be required to reforest in the areas illegally harvested. For repeat offence with great damage caused: exhibit shall be confiscated, and violator has to be responsible to the existing Law.
Responsibility for forest protection, awareness rising and monitoring	Forest protection and development is not purely the mission of village but the responsibility and consciousness of all people to ensure highly effective forest management and protection. Any household which lets forest destruction occur shall be responsible for replanting forest in that areas. Village leaders are responsible for monitoring and coordinating with other organizations and associations to propagate, raise awareness and encourage villagers to properly carry out this regulation.
Revision of regulation	During implementation of this regulation, if there is any needs for revisions or adjustments to fit the actual situation, village leaders shall organize a village meeting. Constructive ideas or contributions from villagers must be approved by a majority of villagers and voted for approval by at least 2/3 of households.

Source: MARD, Circular No.56 (Forest Protection and Development of Regulation), 1999

5.3 Field Survey for Draft PDD Preparation

5.3.1 Boundary delineation

The project boundary geographically delineates AR-CDM project activities under the control of the project participants. An AR-CDM project activity may contain more than one discrete areas of land. If the project contains more than one discrete area of land:

- Each discrete area of land should have a unique geographical area of land
- The boundary should be defined for each discrete area and should not include the areas in between these discrete areas of land
- Boundary should contain only the area where the trees will be planted.

Based on the information collected during the site selection, the Study team and the counterpart conducted a preliminary boundary survey in January 2007. The survey team walked along the project boundary of the five (5) sites and traced the geographical coordinates using GPS. The officers of the 661 program office in the district, cadastral officer of the communes and village people accompanied the survey teams. Then the project boundary was mapped out using GIS. The information provided by the officers in charge of the 661 program and cadastral and village people was very helpful.

The part of the area where the trees will not be planted has to be excluded from the project boundary. For example:

- Areas where it is impossible to plant trees due to the physical and technical reasons, e.g.,
 - ◆ an area on very steep slope,
 - ◆ an area with very shallow soil
- A high carbon stock area with growing trees, e.g.,
 - ◆ in a sharp valley where eroded soils from slopes has accumulated
- The area where conflict of land use would occur, e.g.,
 - ◆ reforestation projects (by government, local people etc)
 - ◆ area where the activity displacement is impossible (ex. for religious reasons)

5.3.2 Vegetation classification for the baseline stratification

In the small-scale AR-CDM methodology AR AMS 0001, the stratification of the boundary was required according to the section 4.3.3.2 of the IPCC Good Practice Guidance. Adequate stratification makes the estimation of the GHG removals easy and accurate. Stratification of the project boundary is necessary:

- To estimate baseline GHG removals of the project. That would require information on:
 - ◆ baseline biomass and baseline carbon stock change

- climate, topography, and soil condition
- historical and current land use/vegetation
- ◆ ex ante GHG removals of the project
 - planting design (planting tree species, operation etc)
- To estimate ex post GHG removals of the project (by monitoring)
 - ◆ Re-stratification may be necessary during the monitoring

The condition of climate and topography was uniform in each discrete project area. The stratification for the baseline GHG removal estimation was conducted based on the land-use/vegetation types of the project area before the project starts. Though a land use planning map prepared by GIS was available, it could not be used for stratification because it did not reflect actual land use in the area. Therefore, classification of the land-use/vegetation types was conducted in the field. Pictures of the project area that were taken at a distance were used for reference during field survey.

Vegetation in the project area was not uniform. Four (4) land-uses such as grassland, shrub land, cropland and bare land were identified. The four types of land usage were further classified into 6 vegetation types, as follows:

- Grassland
 1. Grassland 1 (Co lao (*Eupatorium odoratum*) and/or Co tranh (*Imperata cylindrica*))
 2. Grassland 2 (Te gout (*Dicranopteris linearis*))
 3. Grassland 3 (Lao lac (*Erianthus arundinaceus*))
- Shrub land
 4. Shrub land with various species. Typical species that were found in the degraded land such as *Melastoma candidum*, *Rhodomyrtus tomentosa*, an *Randia dasycarp* were found.
- Crop land
 5. Cropland (local people occasionally planted annual crops such as cassava, maize and sugarcane by slash and burn)
- Bare land
 6. Bare land with no/sparse vegetation.

Field survey was conducted with GPS and the stratum was map out in the GIS. The area of each strata was shown in the **Table 5.12. Appendix-5** shows the vegetation classification maps of the project sites.

Table 5.12 The area of each stratum in the project area

Land-use identified	Stratum No	Area (ha)					
		Xuan Phong			Bac Phong		
		Site 1	Site 2	Site 3	Site 4	Site 5	Total
Grassland 1	1	10.37	64.07	23.14	15.19	10.81	123.58
Grassland 2	2	0.00	0.00	0.00	26.52	73.47	99.99
Grassland 3	3	0.00	0.00	9.81	2.36	0.00	12.17
Shrub	4	7.90	8.57	67.78	19.88	0.73	104.86
Cropland	5	0.00	0.86	0.00	1.25	4.96	7.07
Bare land	6	5.23	0.00	5.90	6.46	0.00	17.59
Total		23.5	73.5	106.63	71.66	89.97	365.26

- Grassland 1: Dominated by Co lao (*Eupatorium odoratum*) and Co trang (*Imperata cylindrica*)
 Grassland 2: Dominated by Te gout (*Dicranopteris linearis*)
 Grassland 3: Dominated by Lao lac (*Erianthus arundinaceus*)
 Shrub: Dominated by *Melastoma candidum* with *Rhodomyrtus tomentosa*, *Randia dasycarp* etc.
 Cropland: Cassava, maize and sugarcane are planted occasionally by slash and burn

Lessons learned

- Baseline stratification is difficult without basic information such as current vegetation in the project area and its biomass.
 - ◆ There are no clear guidelines on the details of how vegetation should be classified for stratification.
 - ◆ Use of high resolution aerial photographs and satellite images might help to make vegetation classification and stratification easier.
 - ◆ Review and revision of stratification is necessary based on the biomass survey.
- Stratification is difficult where the vegetation is not uniform
 - ◆ Land use maps do not reflect the actual situation.
 - ◆ Classification of the vegetation type in the field is difficult because we tend to see too many details.

5.3.3 Baseline biomass measurement

To calculate the baseline net GHG removals according to the applied methodology, biomass data for the baseline vegetation is necessary. In general, biomass data of the baseline such as grassland and shrub land is more difficult to find than biomass data of natural forest and plantation forest because the grassland and shrub biomass have not been research topics. Especially data for grassland and shrub subjected human impact is few.

Considering the promotion of AR-CDM in Vietnam, the collection of basic data for the baseline is important. If the national and regional data necessary for AR-CDM are available, this is very helpful for the project developers as they don't have to conduct the field measurement. In this study, it was decided to conduct the baseline biomass survey in order to accumulate basic data for AR-CDM projects in the future. The biomass was measured in each vegetation type identified in the stratification of the boundary. According to the AR AMS 0001, it is not necessary to measure the

soil Carbon stock. But, it is helpful to assess the soil property for developing planting designs and to confirm low soil fertility as evidence of baseline scenario determination and explanation of additionality. Therefore, the Study team took soil samples at selected biomass sampling sites for the analysis of chemical characteristics.

Detailed descriptions on the method of baseline biomass measurement were not found in any approved methodologies for AR CDM. Hence, the Study team and the counterpart applied the standard procedures for biomass measurement in forestry and ecology under the direction VFU and FSIV expert.

(a) Sample plots

In total, 158 sample plots were randomly selected for each vegetation type. The sample plot size was a square of 2m x 2m for aboveground biomass and 1m x 1m for belowground biomass.

(b) Measurement of aboveground biomass in the field

All the aboveground biomass inside the sample plot was collected and then sorted into grass and shrub. Further, shrubs was separated into leaves and stems. The total fresh weight of each was measured. Then about 500g of fresh samples for analyzing the ratio of dry weight to wet weight were randomly collected from each separated part and weighed. In addition, litter was collected for reference in the same way as with the aboveground biomass sampling. Soil samples were also collected from the top soil.

(c) Measurement of belowground biomass in the field

After measuring the aboveground biomass, a smaller sub sample plot of 1m x 1m was set inside of the aboveground biomass sample plot for below ground biomass measurement. All roots were collected inside of the sub plot and soils were carefully removed from the roots. The total fresh weight was measured and samples for analyzing the ratio of dry weight to fresh weight were randomly collected and weighed.

(d) Analysis in the laboratory

Samples for analyzing the ratio of dry weight to fresh weight collected in the field were oven-dried until the weight became constant in the laboratory of FSIV and VFU. Using the ratio of dry weight to fresh weight, the total dry weight biomass in the sample plot was calculated for each part of biomass (grass, shrub stem, shrub leaf and root). The biomass in cropland and bare land is assumed to be zero. The project area is classified as production forest land by the land use plan of the communes and district and it is required to terminate the cultivation before the commencement of plantation activity. The local people who would join the project agreed to do so. The results are shown in **Table 5.13**.

Table 5.13 Results of field measurement of baseline biomass

Land-use identified	Stratum No	Area (ha)	Plot number	Above-ground biomass woody		Above-ground biomass grass		Below-ground biomass woody + grass	
				(t dry matter / ha)		(t dry matter / ha)		(t dry matter / ha)	
				average	SD	average	SD	average	SD
Grassland 1	1	124.09	52	0.02	0.09	3.32	2.13	1.68	1.45
Grassland 2	2	104.68	8	0.00	0.00	3.38	1.41	4.57	1.77
Grassland 3	3	12.6	32	7.28	5.15	0.77	0.81	6.58	3.46
Shrub	4	109.67	66	3.16	2.44	0.87	1.10	3.79	4.83
Cropland	5	7.11	0	0		0		0	
Bare land	6	17.67	0	0		0		0	

Source: JICA Study Team

5.3.4 Soil analysis

The soils in the proposed project sites were analyzed to grasp the fertility conditions. A total of 36 soil samples were taken from surface layers (0-30cm) at selected baseline biomass survey sites in January and March 2007. The samples were then analyzed at laboratories of VFU and FSIV.

The results of the analysis are shown in the table below. The soils have medium acidity but have low to very low fertility indicated by low cation saturation and low contents of exchangeable cations and available K and P.

Table 5.14 Chemical characteristics of soils in the Project sites

Items		Xuan Phong commune		Bac Phong commune	
		Average	SD	Average	SD
pH (H ₂ O)		6.1	0.3	5.6	0.3
pH (KCl)		4.5	0.4	4.6	0.3
Exchangeable cations (meq/100g)	Total	3.33	3.60	1.53	2.68
	Ca ²⁺	1.97	2.15	1.02	0.29
	Mg ²⁺	1.36	1.50	0.51	0.15
CEC (mol/kg)		26.14	6.50	14.31	2.99
Humus contents (%)		3.92	1.51	3.01	0.73
Total Carbon (%)		1.54	0.67	-	-
Available K (K ₂ O)		20.2	12.5	40.0	36.6
Available P (P ₂ O ₅)		4.0	3.0	7.4	1.4
Total N (%)		0.10	0.03	0.10	0.02
Total K ₂ O(%)		0.46	0.41	1.35	0.34
Total P ₂ O ₅ (%)		0.17	0.12	0.03	0.02

Source: JICA Study Team

5.3.5 Demonstration of land eligibility

(1) Land eligibility criteria

According to the modality⁵ of the UNFCCC as of November 2007, project participants shall provide evidence that the land within the planned project boundary is eligible for an AR-CDM project activity by following the steps outlined below:

- (a) Demonstrate that the land at the moment the project starts does not contain forest by providing transparent information that:
 - (i) Vegetation on the land is below the forest threshold (tree crown cover or equivalent stocking level, tree height at maturity in situ, minimum land area) adopted for the definition of forest by the host country under decisions 16/CMP.1 and 5/CMP.1 as communicated by the respective DNA; and
 - (ii) All young natural stands and all plantations on the land are not expected to reach the minimum crown cover and minimum height chosen by the host country to define forest; and
 - (iii) The land is not temporarily unstocked, as a result of human intervention such as harvesting or natural causes.
- (b) Demonstrate that the activity is a reforestation or afforestation project activity:
 - (i) For reforestation project activities, demonstrate that the land was not forest by demonstrating that the conditions outlined under (a) above also applied to the land on 31 December 1989.
 - (ii) For afforestation project activities, demonstrate that for at least 50 years vegetation on the land has been below the thresholds adopted by the host country for definition of forest.

Non-Annex I countries selected definition of forest suitable for each country from following range and reported it to the CDM-EB through its DNA.

- (a) A single minimum tree crown cover value between 10 and 30%;
- (b) A single minimum land area value between 0.05 and 1 ha; and
- (c) A single minimum tree height value between 2 and 5m.

In case of Vietnam, DNA reported following values as definition of forest in Vietnam⁶,

- (a) A single minimum tree crown cover value of 30%;
- (b) A single minimum land area value of 0.5ha; and
- (c) A single minimum tree height value of 3m.

⁵ UNFCCC, "Procedure to demonstrate the eligibility of land for AR-CDM project activity", Annex 18, EB35

⁶ UNFCCC, Designated National Authorities (<http://cdm.unfccc.int/DNA/index.html>)

The small-scale AR-CDM pilot project in Cao Phong district is a "reforestation" project. Therefore, the Study had to demonstrate that the project sites had not been forest since December 31, 1989.

(2) Procedure to demonstrate land eligibility

According to the modality⁷ of UNFCCC as of November 2007, “*project participants shall provide information that reliably discriminates between forest and non-forest land according to the particular thresholds adopted by the host country in order to demonstrate land eligibility*”:

- (a) *Aerial photographs or satellite imagery complemented by ground reference data; or*
- (b) *Land use or land cover information from maps or digital spatial datasets; or*
- (c) *Ground based surveys (land use or land cover information from permits, plans, or information from local registers such as cadastre, owners registers, or other land registers).*

If options (a), (b), and (c) are not available/applicable, project participants shall submit a written testimony which was produced by following a Participatory Rural Appraisal (PRA) methodology or a standard Participatory Rural Appraisal (PRA) as practiced in the host country.

In the case of the pilot AR-CDM project in Cao Phong district, reliable documents of (a), (b), and (c) were not available. Therefore, at the beginning, the Study selected PRA as a method to demonstrate land eligibility.

(3) Demonstration of land eligibility by PRA

The methods of the PRA employed by the Study team are summarized below:

Table 5.15 Methods of PRA to demonstrate land eligibility

Site	Site-1,2&3	Site-4&5
Commune	Xuan Phong	Bac Phong
Date	September 6, 2007	September 7, 2007
Place	Xuan Phong commune office	Bac Phong commune office
No. of participant	10	10
Condition of participants	More than 35 years old and had lived in the village for more than 20 years.	
Purpose	To clarify the vegetation and land use of the project area at the end 1989	
Method	1. Maps and pictures of each Project site were prepared and shown. 2. To share the same idea on the forest, the photos of the trees filling forest definition of Vietnam (minimum crown cover: 30%, minimum tree height: 3m, minimum area: 0.5ha) were shown. 3. The facilitator moderated the meeting to discuss the history of vegetation and the current vegetation in the Project area following PRA method. 4. The participants were encouraged to use the map freely for indicating place, drawing and writing, as needed.	

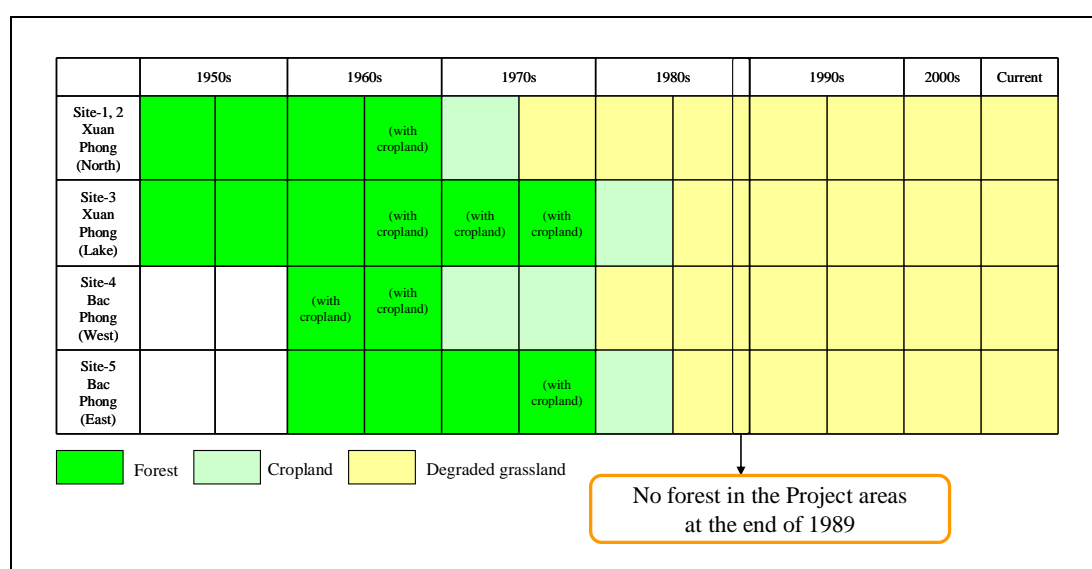
⁷ UNFCCC, Procedure to demonstrate the eligibility of lands for AR-CDM project activities (http://cdm.unfccc.int/EB/035/eb35_repan18.pdf)

As results of the PRA, the following are clarified;

- The project areas were not forest according to the definition of forest in Vietnam at the end of 1989.
- The land use history was different among the project sites. But it was common that the forested was lost before 1980 and intensive cultivation caused severe land degradation.
- As the land was laid fallow, the area became common access land and was used mainly for grazing and firewood collection. Because of continuous use of the land for grazing and firewood collection and severe land degradation, natural regeneration of the forest was not occur.

History of land use and vegetation clarified through the PRA are shown in Table 5.16

Figure 5.4 History of land use and vegetation of the Project areas



(4) Demonstration of land eligibility by satellite data analysis

According to the decision by UNFCCC, only a result of PRA may be enough to demonstrate land eligibility, but at present no precedent projects are approved using the PRA results. In addition, the results of PRA are hardly acceptable to some DOEs according to unsourced information. Therefore, the Study team decided to conduct satellite data analysis additionally to complement the result of PRA. The procedure and results for the satellite data analysis are summarized below. The details are described in **Appendix-6**.

(a) Procedure for satellite image analysis

The procedure for satellite image analysis is as follows:

- (i) Confirmation of current vegetation: Confirming current vegetation through field survey and analysis of existing aerial photo taken in 2003 and 2004
- (ii) Analysis of spectrum pattern and establishment of training data: Analyzing correlation between spectrum pattern, actual vegetation and establishment of training data
- (iii) Image conversion: Classifying each pixel into forest area and non-forest area following training data
- (iv) Identification of forest area based on forest definition of Vietnam: Excluding forest area of less than 0.5ha (definition of forest in Vietnam is more than 0.5ha), preparing maps of forest area at the end of 1989 and identifying eligible land for AR-CDM
- (v) Modification of project boundary: Modifying original project boundary based on the maps of forest area at the end of 1989

(b) Results of satellite image analysis

Results of satellite image analysis are summarized below:

Table 5.16 Results of satellite image analysis to demonstrate land eligibility

Site	Result
Site-1&2: Xuan Phong (North&Northeast area)	No forest at the end of 1989 was identified.
Site-3: Xuan Phong (Lake area)	8 massive forest areas at the end of 1989 were identified within original project boundary.
Site-4: Bac Phong (East area)	No forest at the end of 1989 was identified.
Site-5: Bac Phong (West area)	8 massive forest areas at the end of 1989 were identified within original project boundary.

Maps with revised project boundary based on the identified forest areas at the end of 1989 are shown in **Appendix-7**.

5.3.6 Organizing village meetings to disseminate the Pilot Project

(1) 1st Village Meeting (stakeholder meeting)

The 1st Village Meetings were held in June 2007. The purposes of the meetings are to explain about global warming, AR-CDM, and the preliminary plan of the pilot AR-CDM project in Cao Phong district to stakeholders of the project (villagers and commune officers) and seek suggestions and questions from them on the pilot project. All the households having land use right of the project sites, village leaders and commune officers were invited to the meetings. The outline of the explanation is shown below:

1. Principles and Influence of Global Warming
2. Global Warming related Damage in Vietnam
3. Institution of CDM
4. Location and Current Land Use of the Pilot Project Sites
5. Preliminary Plan of the Pilot AR-CDM Project
6. Project Cost & Funding Mechanism

There were a total of 287 participants in the 1st village meetings.

Table 5.17 Summary of 1st village meetings (stakeholder meetings)

	Site-1&2	Site-3	Site-4	Site-5
Site:	Xuan Phong (North&Northeast area)	Xuan Phong (Lake area)	Bac Phong (East area)	Bac Phong (West area)
Date:	June 7, 2007	June 8&11, 2007	June 13&14, 2007	June 12, 2007
Venue:	A farmer's house in Nhoi village	Xuan Phong commune office	Bac Phong commune office	Bac Phong commune office
No. of participants:	75	102	48	62

(2) 2nd Village Meeting (stakeholder meeting)

The 2nd Village Meetings were held in October 2007. The purposes of the meetings are to give explanations about the plans for AR-CDM pilot projects in Cao Phong district and to get comments and agreement from the stakeholders. All the households having land use right of the project sites, village leaders and commune officers were invited to the meetings. The counterpart explained the following items to the participants, answered questions and clarifications from them.

1. Location of the Pilot Project Sites
2. Plan of AR-CDM Pilot Project
3. Reforestation plan
4. Support of the project for reforestation
5. Estimated income from forest products per ha
6. Plan for green fodder production
7. Sharing ratio of cost and benefit
8. Responsibilities of project stakeholders
9. Implementation Procedures & Schedule

There were a total of 285 participants in the 1st village meetings.

Table 5.18 Summary of 2nd village meetings (stakeholder meetings)

Site:	Site-1&2	Site-3	Site-4	Site-5
	Xuan Phong (North&Northeast area)	Xuan Phong (Lake area)	Bac Phong (East area)	Bac Phong (West area)
Date:	Oct. 23, 2007	Oct. 24, 2007	Oct. 26, 2007	Oct. 25, 2007
Place:	A farmer's house in Nhoi village	Xuan Phong commune office	Bac Phong commune office	Bac Phong commune office
No. of participants:	76	110	42	57

After the explanation of the pilot project, a questionnaire was conducted to get to know the opinions of the participants and level of agreement on the pilot project. The results of the questionnaire are shown below. All the participants except one who did not answer understood the features of the pilot project and agreed on the project plan.

Table 5.19 Summary of answers at 2nd village meetings (stakeholder meetings)

Question	Option	(person)
Total Number of the Interviewees	-	285
Owner of the Project Site?	Yes	283
	No	1
	No answer	1
If NO, who are you?	Living in the village where the project will be implemented	1
	Leader of a village	0
	A representative of local organization	0
	Other	0
Do you understand the features of the proposed project?	Yes	284
	No	0
	No answer	1
Do you agree with the Project plan?	Yes	284
	No	0
	No answer	1

5.3.7 Socio-economic questionnaire survey

The Study team and counterparts conducted a socio-economic questionnaire during the 1st village meetings held in June 2007. The main purposes of the survey were 1) to study the socio-economic situation of the households in the project sites, 2) to understand the current condition of land tenure and land use, 3) to extract problems faced by the households and 4) to confirm the intention of stakeholders to participate in the small scale AR-CDM pilot project. All the participants of the 1st village meetings (287 households), mostly the head or representative of the households having land use right of the project sites cooperated in the survey. The questionnaire used and the results are presented in **Appendix-8**. A summary of the results is described below.

(1) Basic information of respondents

With respect to ethnicity, 77% of the respondents were Muong followed by Kinh and Dao as follows,

Table 5.20 Composition of participants of the socio-economic survey

Number	287 persons (Male:171/Female:116)		
Average age	40.7 years old		
Ethnicity	Muong	221	77.0%
	Kinh	34	11.8%
	Dao	31	10.8%
	Thai	1	0.3%

(2) Composition of labor force in households

Average number of household members was 5.0 persons and average number of working age members (15-60 years old for male, 15-54 years old for female) was 3.3 persons. Distribution of household members are shown in the following figures,

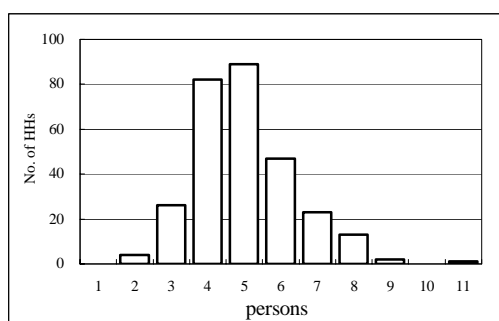


Figure 5.5 Number of household members

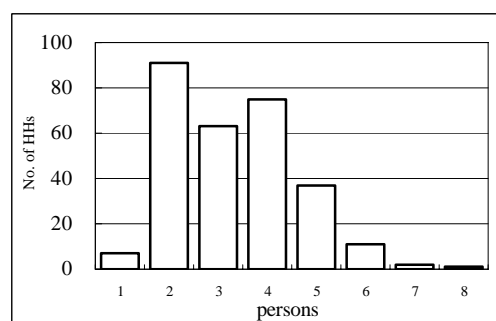


Figure 5.6 Number of household members in working age

(3) Land use in December 1989 and land tenure

Answers on land use in December 1989 are illustrated below. There were no respondent who answered that the project sites were forest with large trees at the end of 1989 in sites 1 and 3. The percentage of those who answered the project site was forest in December 1989 was 2.4%, 9.4% and 6.1% in sites 2, 4 and 5, respectively.⁸

⁸ The Study team considered that those who answered the project sites were forest in December 1989 might misunderstand the location of the site. The land use of the project sites was surveyed more carefully through PRA and satellite data analysis.

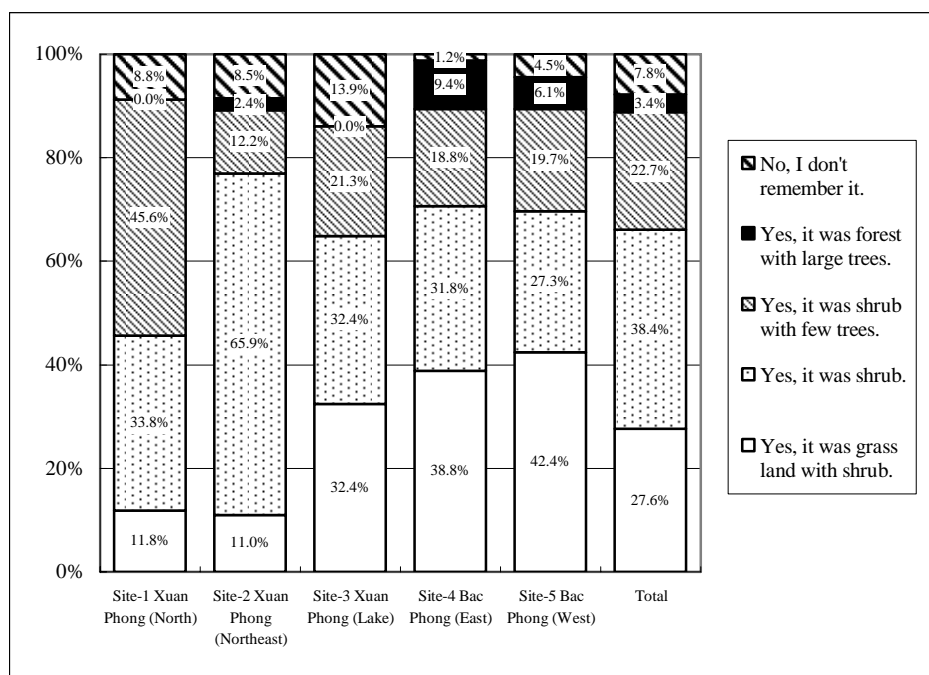


Figure 5.7 Answers on land use in the Project areas at the end of 1989

Regarding the land use right, 99.7% of the respondents had it and its average area per household was 0.25 ha for agricultural land and 1.6 ha for forest land. With respect to land use of allocated land in the project sites, 44.4% of the respondents selected "Not used at all" followed by "For tree plantation supported a project/program" and "For crop production".

Table 5.21 Current land use of allocated land in the Project areas

Option	Ratio in total answers
Not used at all	44.4%
For tree plantation (supported by Project/program)	12.8%
For crop production (slush and burn)	11.9%
For crop production (use as permanent crop land)	11.7%
For tree plantation (invested by myself)	11.1%
For grazing of livestock	4.2%
For collection of firewood	2.5%
Other	1.4%

(4) Crop cultivation and reforestation

For crop production, 83% of respondents cultivated paddy followed by 68% for maize, 60% for cassava, and 51% for sugarcane.

Table 5.22 Average cultivated area of crops

Crop	HHs	HHs in total	Average area (ha/HH)*
Paddy (irrigated)	238	82.9%	0.16
Maize	196	68.3%	0.15
Cassava	173	60.3%	0.14

Crop	HHs	HHs in total	Average area (ha/HH)*
Sugarcane (for eating)	145	50.5%	0.25
Sugarcane (for processing)	119	41.5%	0.23
Paddy (rainfed)	73	25.4%	0.13
Upland rice	18	6.3%	0.29
Watermelon	14	4.9%	0.29
Other	23	8.0%	0.98

*Average area means average area per household cultivating.

The survey asked the respondents why they don't plant trees in their forest land. "Lack of capital" was the main reason followed by insufficiency of financial support from governmental reforestation programs. Other reasons include unproductive land condition, lack of knowledge and experience in reforestation, long gestation period of forest, and shortage of labor force.

Table 5.23 Reasons affecting the planting of trees on the allocated lands

Option	Score		No. of respondents who selected 1st priority	
	Score	Order	Person	%
Lack of capital	2187	1	249	82.7%
Financial and material support from government program is not sufficient.	1680	2	10	3.3%
The land is not productive enough.	1458	3	7	2.3%
Don't know how to manage forest.	1437	4	12	4.0%
Forest does not generate income quickly.	1406	5	9	3.0%
Shortage of labor force	1342	6	9	3.0%
Unclear boundary	42	7	0	0.0%
Difficulty in access	39	8	1	0.3%
Other (Forest cannot be protected, etc.)	31	9	2	0.7%
Can not select suitable species	30	10	2	0.7%

Despite difficulty in planting trees due to financial reasons, 86.6% of the respondents desired to plant trees including fruit trees on their allocated land.

Table 5.24 Desired land use for the allocated land in the AR-CDM Project

Option	Ratio in total answers
Plant trees	77.5%
Plant fruit trees	9.1%
Cultivate annual crops	8.5%
No idea	2.7%
Plant grass or fodder trees for livestock feed	1.6%
Keep it as grazing land	0.3%
Other (tea cultivation)	0.3%

(5) Livestock and grazing

The respondents raise 1.59 heads of buffalo and 0.87 heads of cow on average. Buffalo were mainly raised as working animals and cows for selling. On average, 3.81 heads of pig were raised per respondent mainly for selling or self consumption.

Table 5.25 Numbers of livestock in the Project areas

Livestock	Average number of livestock per household (heads/HHs)	Total number of livestock in the Project areas (heads)
Buffalo	1.59	456
Cattle	0.87	248
Pig	3.81	1,093
Goat	0.79	227
Poultry	27.73	7,959
Dog (for consumption)	0.12	35

Cows and buffaloes had been grazed almost every day for more than 6 hours per day on average. 44.5% of the respondents answered the grazing was carried out in the AR-CDM project sites. More than 90% of the respondents intend to increase the number of livestock in the future. 4

(6) Household economy

Average monthly income of households was 1,596,000VND. The average monthly income of respondents in Bac Phong East area (site-4) was the largest (2,439,000VND) which was nearly twice the amount of Xuan Phong North (site-1) and Northeast (site-2) areas (1,243,000VND). About 52% of the respondents answered that income had been unstable in these years.

Table 5.26 Annual and monthly income in the Project areas

Annual/ Monthly	Unit	Site-1&2	Site-3	Site-4	Site-5	Average
		Xuan Phong (N&NE)	Xuan Phong (Lake)	Bac Phong (East)	Bac Phong (West)	
Annual income	1000VND/year · HHs	14,915	17,724	29,271	18,978	19,157
	1000VND/year · capita	2,989	3,601	6,030	3,609	3,831
Monthly income	1000VND/month · HHs	1,243	1,477	2,439	1,581	1,596
	1000VND/month · capita	249	300	502	301	319

It is assumed that the income in the Bac Phong East area is higher than other areas because many households have members receiving salary from companies/public offices, private business and labor due to proximity to the main road (national road no.6) and have cultivated sugarcane in larger areas.

Monthly income was mainly derived from selling agricultural products (46.3%). In particular, sugarcane production contributed the highest ratio of 26.5%. Sugarcane production contributed significantly to the cash income of households

Average monthly expenditure per household was 1,207,000VND which was mainly for food expenses (39.7%) followed by agricultural input (16.8%). Bac Phong East area showed largest amount for expenses (1,808,000VND) which was nearly twice the amount in Xuan Phong North and Northeast area (915,000VND).

(7) Fuel and firewood collection

Nearly 90% of the respondents were using firewood as a main fuel source. In Xuan Phong and Bac Phong West area, nearly 95% of households used firewood. On the contrary, the percentage was lower (65%) in Bac Phong East area where the ratio of households who used coal and electricity was relatively higher than the other areas.

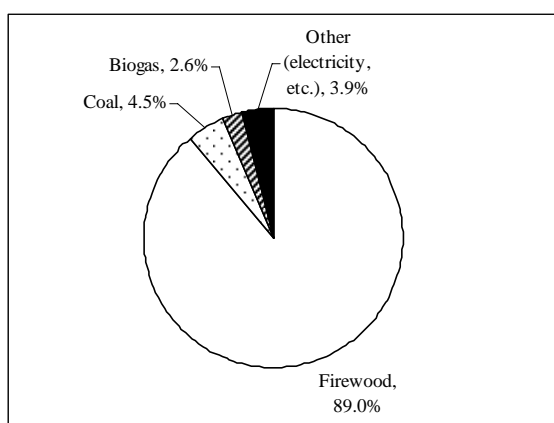


Figure 5.8 Main fuel used in the Project areas

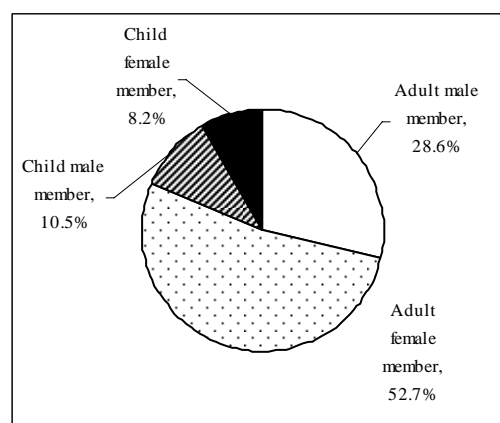


Figure 5.9 Household member collecting firewood in the Project areas

As for firewood consumption, the survey results indicated that households consumed 5 tons of firewood per year. About 44% of the respondents answered they collected firewood twice a week, and this was mainly by adult females. They collected firewood mainly in slope areas. However, about 93% of the participant answered that firewood in the area had decreased year by year.

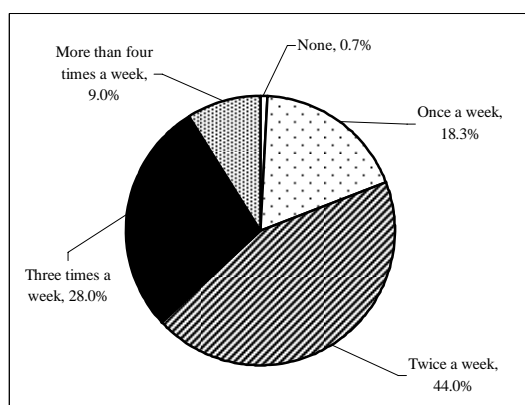


Figure 5.10 Frequency of firewood collecting in the Project sites

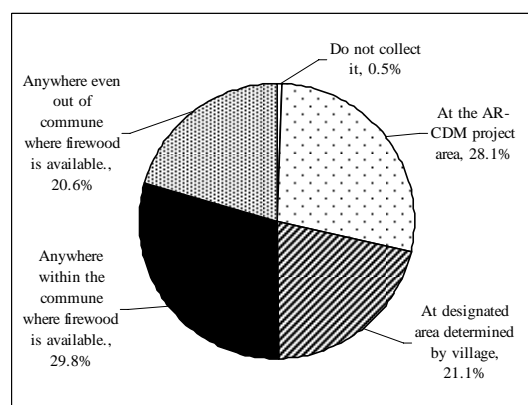


Figure 5.11 Location of firewood collection

(8) Current problems

The survey asked the respondents the problems currently faced by them regarding crop production. Among several problems, "shortage of capital to buy inputs" was the most serious problem in agriculture in the areas followed by "poor soil conditions" and "insufficient land to cultivate".

Table 5.27 Results of questionnaire survey on current problems

No	Option	Scoring		No. of those who selected 1st priority	
		Score	Order	Person	%
1	Shortage of capital to buy inputs	1,826	1	125	37.3%
2	Poor soil conditions	1,592	2	51	15.2%
3	Diseases and insect damage	1,453	3	36	10.7%
4	Insufficient land to cultivate	1,338	4	42	12.5%
5	Unstable weather condition	1,322	5	31	9.3%
6	Shortage of work force	1,234	6	18	5.4%
7	Unstable selling process of crops	1,223	7	6	1.8%
8	Unstable production	1,211	8	11	3.3%
9	Lack of water	185	9	14	4.2%
10	Quality of seeds	22	10	1	0.3%
11	Difficulty in access to market	6	11	0	0.0%

Source: Socio-economic Survey by JICA Study team

As for current problems in livestock production, "shortage of feed" was the most serious problem followed by "breeding technique" and "diseases".

Table 5.28 Results of questionnaire survey on current problems in livestock production

No	Option	Scoring		No. of those who selected as 1st priority	
		point	order	person	%
1	Shortage of feed	1,428	1	161	49.1%
2	Breeding technique	1,178	2	59	18.0%
3	Diseases	1,074	3	51	15.5%
4	Unstable selling price of livestock	1,006	4	20	6.1%
5	Shortage of grazing land	973	5	25	7.6%
6	Shortage of work force	826	6	9	2.7%
7	Lack of capital	22	7	2	0.6%
8	Other	6	8	1	0.3%

Source: Socio-economic Survey by JICA Study team

(9) Intention to participate in the AR-CDM pilot project and expectation

About 87% of the respondents answered they were willing to participate in the AR-CDM project even if the project requires collective protection and management of forest under specified rules. The rest of the respondents answered that they would participate in the project depending on its support for reforestation and the rules. In general, 100% of the participants answered positively with regard to the implementation of and participation in the AR-CDM pilot project.

With regard to the preferred tree species for planting, about 67% of the respondents answered they want to plant fast growing species and about 56% of them selected *Acacia mangium*. The respondents who want to plant fruit trees and fodder trees accounted for 14%

and 8% of the total respondents. About 4% of the respondents wanted to plant indigenous species for environmental protection.

If the AR-CDM pilot project will be implemented, grazing and firewood collection within the project area will be restricted. In such a situation, about 73% of the respondents answered that they will graze their livestock in an other area (outside of the project area) and about 12% of them answered that they would reduce the number of livestock or stop grazing. For firewood collection, about 73% of them answered that they would collect firewood in other area and 25% answered that they would use other type of fuel instead of firewood.

Regarding the project plan, the respondents answered they want to know the most about "financial and material support for reforestation from the project" followed by information on "benefit sharing rules" and "forest protection and management." On the other hand, the survey made clear the expectations of the respondents: they expected "financial and material support for reforestation from the project," mostly followed by "technical support (training) for reforestation and forest management" and "technical support (training) for income generation/improvement". Furthermore, the respondents commented that they expected early commencement of the project.

5.3.8 Survey on leakage

Leakage refers to emissions outside of the project boundary caused by the project implementation. In the case of the small scale A/R CDM project on grassland and cropland, the methodology (AR-AMS 0001) only considers emissions from the displacement of cropping and grazing activity inside of the project area to the outside. The sources of the leakage should be identified and the amount of leakage should be calculated following the applied methodology.

(1) Basic information

If an updated and accurate land use map of the project area is available, this is very helpful to help gauge the leakage of a project. It can be possible to determine the size of the permanent cropland and grazing area from the land use map. However, it is difficult to identify all sources of leakage in the area because the temporal or illegal activities would not be reflected on the official land use map.

(2) Field Observation

Even when an area is classified as "unused land" on the official land use map, it is possible that the local people currently use the land temporary and/or illegally (slash and burn cultivation, firewood collection, grazing etc). Careful observation is necessary to identify the sources of leakage in the field at the same time as surveys for boundary delineation, vegetation classification and baseline biomass. If an area was used for firewood collection, we can find the shrubs and trees cut by a knife and the distinctive tree form with coppicing and see the people collecting woods. If "free grazing" was conducted in the area, we can see animals or find feces of the animals in the area. It is recommended to talk directly with some of the local people working in the project area.

In this project, it was observed that free grazing and fire wood collection were conducted in the most of the project area and the local people occasionally cultivate some parts of the area by the slash and burn method.

(3) Data collection for quantifying the leakage

Based on the possible land use identified from the basic information and in the field observation, a questionnaire was prepared to interview the local people. The requirements of the applied methodology have to be considered such as quantifying the displacement of grazing. When the “free grazing” was conducted, it is impossible to count the number of animals in the project area directly. It is recommended to estimate it using the information collected in the interview.

The applied methodology requires calculating “*the time-average number of grazing animals per hectare within the project boundary.*” Hence it is necessary to collect data on the number of grazing animals; the time, frequency and location of the grazing activity. In the project, the following questions were asked in the socio-economic survey (section 5.3.7).

- How many livestock do your household raise?
- How many hours do you graze your buffalo and cattle in a day?
- How many days a week do you graze your buffalo and cattle?
- Where do you graze your buffalo and cattle? (% in project area and outside)
- Do you or your village designate grazing lands for buffalo and cattle?
- Does your household plan to increase livestock?

Those questions should be asked to the owners of the animals when free grazing is conducted in the project area. The results of the survey were described in section 5.3.7. It is remarkable that about 90 % of the respondents were planning to expand grazing activity.

The time-average number of grazing animals which was required in the methodology was calculated based on the answers to the questions above. The procedure of calculation for the time average number of grazing animals per hectare is shown in Section 5.7.4.

The amount of the fire wood collection is not required to describe in the PDD according to the methodology. But it would be useful information to understand the livelihood of the local people. In our project the amount of firewood which the local people collected was asked. The result indicated that the grassland and shrub land including the project area in the two communes are severely affected by human activity because most of the local people use firewood and collect it in the area. The productivity of the area seems to be decreasing because 90 % of the interviewees felt that firewood collection has become more difficult than before (section 5.3.7).

(4) Possibility of displacement and/or termination of activities in the project area

After understanding how the local people are using the project area, the possibility of displacement and/or termination of the current activities in the area was assessed. The current activities in the project area were:

- Occasional slash and burn cultivation
- Free grazing
- Firewood collection

In principle, the activities in the project area should be terminated according to the regulations as the land is classified as production forest land in the land use plan of the communes. However, it is important to discuss about the realities of this with the local people and get agreement with regard to displacement and termination of the activities after the commencement of the project. The agreement of the local people would strongly affect the long term management of the plantation project. It is important to consider alternative measures for the displacement and termination of the activity, so that it might be possible to reduce leakage in the project and assure sustainable management of the project.

The issues which would be possibly raised after the project implementation were discussed at the key informant interviews for land eligibility (section 5.3.5). Main potential issues and comments raised in the interview were:

- Termination of temporal cultivation is not so difficult because the productivity of the land is low and the profits are not very high.
- Grazing animals would come into the project area and damage the plantation. It happened in the plantation project in the past.
- Village regulations are necessary and accepted and observed by villagers.
- Designated area for grazing is necessary
- It is not possible to watch the area for protection.
- As it is a common access area, not only the villagers but outsiders also come to the area for grazing and firewood collection. They may destroy the plantation. Having regulations that only apply to villagers is not enough.
- Grazing is one of the main income sources of the villagers. They expected to increase income from grazing. Because all flat land has been already used for the paddy production, there is no way to increase income from crop production.
- There is a trial project of fodder production for cattle implemented by Cao Phong district and a bio gas installation project supported by an international NGO.

The results related to leakage in this project were summarized as follows:

- a) Occasional cultivation would be terminated before the project starts.
- b) The current grazing and firewood collection would be possibly displaced in the surrounding area at the project starts
 - Considering the current grazing pressure and the potential grazing capacity of the land, it would be possible to relocate the displaced activity in the surrounding area. (see details in section 5.7.4)
 - The regulation related to grazing is important. Local people including non-project participants should discuss before the project starts on how to protect the project area.
- c) The fodder production program would be included in the project activity (section 5.6)
 - The improvement of the fodder production would reduce displacement of the grazing animals (leakage) as it would make it easier for the local people to keep their cattle in the stall.
 - Local people are interested in increasing cattle for income but the current free grazing is not efficient.
 - The fodder production would reduce the grazing pressure on the unused land. It would contribute to the efficient land use which is important in the mountainous area where the area of flat land is limited.
- d) Biogas installation would be considered in the future in the project.
 - It is a good idea to reduce land use pressure from firewood collection and improve the livelihood of the local people.

The calculation of leakage is shown in section 5.7.4.

5.4 Justification of Additionality

According to the approved methodology (AR-AMS0001 / Version 04), additionality of the proposed project can be justified by providing an explanation that the project activity would not have occurred anyway due to at least one of the seven (7) barriers:

- (1) Investment barrier, other than economic/financial barriers
- (2) Institutional barrier,
- (3) Technological barrier,
- (4) Barriers related to local traditions,
- (5) Barriers due to prevailing practices,

(6) Barriers due to local ecological conditions

(7) Barriers due to social conditions

Additionality of the proposed project can be justified as follows:

(a) Barriers due to local ecological conditions

The project area and its surroundings had been deforested in 1970s in order to expand the area of cropland. The intensive cultivation on the slopes which took place without soil erosion measures resulted in land degradation, and the land was abandoned by the middle of the 1980s. Since then, the area has been occasionally used for fuel wood collection and free grazing of cattle and buffalo. The owners of the land use rights also sometimes conduct slash and burn cultivation of annual crops for a short period of time and abandon the land after that. Due to the soil degradation and the pressure of human activities, natural regeneration of forest in the degraded grassland is not expected and the area would remain as it is or will be more degraded without tree planting activities.

(b) Barriers due to social conditions

The project area is classified as “production forest land” in the land use plan approved by the local government but the land has not been reforested. One reason is the lack of investment opportunities that are attractive and affordable to the local people, as mentioned in “investment barriers” below. Other reasons include the widespread practice of free-grazing. Even if an individual wishes to plant trees in his allocated land within the project area, it would be difficult to protect the trees from free grazing animals without the cooperation of the villagers. Plantation projects launched in the past in other areas of the village were not successful because of this problem according to the villagers.

(c) Investment barriers

According to the results of the socio economic survey conducted in the villages, the main reason that the villagers don’t plant trees is lack of money for forestry investment. They cannot afford to invest in tree planting in production forest land since financial support from the government is very small. It is difficult for individuals to access loans for forest development since the gestation period of forest development is long and there are risks involved in forest development, such as damage to the trees by natural disasters.

There are cases in which a private forestry company has invested in wood chip plantations in Vietnam, but it is not realistic to expect similar investments in the proposed project area because the proposed project is located in an inland mountainous area and is far from sea ports. Furthermore, the condition of the road from the main road to the proposed project area is not good.

5.5 Preparation of Reforestation Plan

5.5.1 Planting design

Pursuant to MARD Decision No.16/2005/QD-BNN dated 15/03/2005 regarding the list of main tree species for production forest in 9 forestry ecological zone (FEZ) and the soil conditions of the sites, *Acacia mangium* and *Acacia auriculiformis* were selected for planting in the project area. *Acacia auriculiformis*, a species tolerable to highly degraded soils but lower productivity than *Acacia mangium*, is proposed to be planted for a total of 31.96 ha in site-2 because the soils there are severely degraded. In other areas, *Acacia mangium* is proposed for planting.

The proposed planting and tending designs for the two species are shown below:

Table 5.29 Proposed Design for Forest Planting and Tending (*Acacia mangium*)

#	Techniques	Technical requirements		
1.	Vegetation treatment			
1.1	Procedures	Entire vegetation clearing		
1.2	Method	Use knife to chop trees near their root, stump is less than 10cm, cut them into small sections, put along contour lines		
1.3	Timing of treatment	1 month before planting (in March-April)		
2.	Soil preparation			
2.1	Procedures	By individual hole		
2.2	Method	Manual hoeing, quincunx-shape		
2.3	Hole size	40 cm x 40 cm x 40 cm		
2.4	Timing	10-15 days before planting		
2.5	Backfilling	Backfilling with topsoil, 2/3 of the hole		
3.	Bed-dressing application			
3.1	Type of fertilizer	NPK-S Lam Thao (5.10.3-11)		
3.2	Quantity of fertilizer	0.1 kg/hole		
3.3	Timing of application	At least 10 days before planting		
4.	Forest planting			
4.1	Tree species	<i>Acacia mangium</i>		
4.2	Planting practices	Pure planting		
4.3	Planting method	Use potted stock		
4.4	Planting season	May - August		
4.5	Planting spacing (tree/ha)	1,600 trees/ ha; Row to row (2.5m); Tree to tree (2.5m)		
4.6	Criteria of seedlings	Age of seedlings	Height	Diameter of cingulum
		Size ≥ 6 months old	≥ 30 cm	≥ 3,0 mm
	Quality	Free of insects, pests; unbroken		
8	Quantity of seedlings	1,760 tree/ ha, (including 10% for replacement of failures)		
5.	Tending & protection in year 1			
5.1	Tending: Sep. - Oct.	Entire vegetation clearing, soil scarification around the trees (D = 0.6-0.8 m), top-dressing of NPK-S Lam Thao (5.10.3-11) : 0.1 kg/ hole. Replacement of dead seedlings		
5.2	Protection	Protection from all types of forest destruction and forest fire		

Table 5.30 Proposed Design for Forest Planting and Tending (*Acacia auriculiformis*)

#	Techniques	Technical requirements
1.	Vegetation treatment	
1.1	Procedures	Entire vegetation clearing
1.2	Method	Use knife to chop trees near their root, stump is less than 10cm, cut them into small sections, put along contour lines
1.3	Timing	1 month before planting (in March-April)

#	Techniques	Technical requirements		
2.	Soil preparation			
2.1	Procedures	By individual hole		
2.2	Method	Manual hoeing, quincunx-shape		
2.3	Hole size	40 cm x 40 cm x 40 cm		
2.4	Timing	10-15 days before planting		
2.5	Backfilling	Backfilling by topsoil, 2/3 of the hole		
3.	Bed-dressing application			
3.1	Type of fertilizer	NPK-S Lam Thao (5.10.3-11)		
3.2	Quantity of fertilizer	0.1 kg/hole		
3.3	Timing of application	At least 10 days before planting		
4.	Forest planting			
4.1	Tree species	<i>Acacia auriculiformis</i>		
4.2	Planting practices	Pure planting		
4.3	Planting method	Use potted stock		
4.4	Planting season	May - August		
4.5	Planting spacing (tree/ha)	2,000 trees/ ha; Row to row (2.5m); Tree to tree (2.0m)		
4.6	Criteria of seedlings	Age of seedlings	Height	Diameter of cingulum
		Size ≥ 4 months olds	≥ 25 cm	≥ 2.5 mm
	Quality	Free of pests, insects; unbroken		
8	Quantity of seedlings	2,200 seedlings/ ha (including 10% for replacement of failures)		
5.	Tending & protection in year 1			
5.1	Tending: Sep. - Oct.	Entire vegetation clearing, soil scarification around the trees (D = 0.6-0.8 m), top-dressing of NPK-S Lam Thao (5.10.3-11): 0.1 kg/ hole. Replacement of dead seedling.		
5.2	Protection	Protection from all types of forest destruction and forest fire		

Appendix-9 provides the maps showing planting design of the project sites. The estimated area of planting is shown below. The planting will be commenced in 2009 and completed in 2010.

Table 5.31 Estimated Planting Area by Species

Commune	Site	Village	Total Project Area (ha)	Estimated Net Planted Area (ha)		
				Acacia mangium	Acacia Auriculiformis	Total
Xuan Phong	Site-1	Lu cu	23.50	20.68	-	20.68
	Site-2	Nhoi	73.50	36.56	28.12	64.68
	Site-3	Can	106.63	93.83	-	93.83
	Sub-total			203.63	151.07	28.12
Bac Phong	Site-4	Bac Son	71.66	57.33	-	57.33
	Site-5	Ma	89.97	71.98	-	71.98
	Sub-total			161.63	129.30	-
			365.26	280.37	28.12	308.50

5.5.2 Plan for forest maintenance

The proposed maintenance of plantation is given below:

Table 5.32 Proposed Maintenance of Plantation

Species	Plantation maintenance	
Acacia mangium	Rotation:	15 years
	Tending:	1 st : Vegetation clearing in Sep-Oct. in the year planted and replacement of dead seedlings.

		2 nd : Vegetation clearing in Mar. in the next year 3 rd : Vegetation clearing in Sep. in the next year 4 th : Vegetation clearing in Mar. in two years after planting 5 th : Vegetation clearing in Sep. in two years after planting 6 th : Vegetation clearing in Mar. in three years after planting
	Thinning:	Thin 50% of stands at Year 9
	Harvesting	15 years after planting.
Acacia auriculiformis	Rotation:	15 years
	Tending:	1 st : Vegetation clearing in Sep-Oct. in the year planted and replacement of dead seedlings. 2 nd : Vegetation clearing in Mar. in the next year 3 rd : Vegetation clearing in Sep. in the next year 4 th : Vegetation clearing in Mar. in two years after planting 5 th : Vegetation clearing in Sep. in two years after planting 6 th : Vegetation clearing in Mar. in three years after planting
	Thinning:	Thin 20% of the original stands at 8 years after planting. Thin 25% of the original stand at 12 years after planting
	Harvesting	15 years after planting

5.6 Plan for Green Fodder Production

The socio-economic questionnaire survey revealed that the local communities in the project area have raised buffalo and cattle as working animals as well as for cash income. The total number of buffalo and cattle owned by the project participants is estimated at 456 and 258 heads, respectively. However, the survey also found out that shortage of fodder is the most serious problem in livestock raising. Therefore, the Study team decided to prepare a plan to lessen the problem.

For the plan preparations, the counterpart (RCFEE) conducted a survey to look into the fodder shortage problem in and around the project area and study ways to overcome the problem.

According to the survey, natural grass is the main source of livestock feed in the project site. It accounts for 75-80% of total daily requirement of livestock feed. Although farmers combine several types of feed, the rate of crop residue and planted grass remains low, accounting for approximately 10% of total requirements for feed, respectively. Crop residue used as livestock feed include maize leaf or stem, top of sugarcane and cassava.

During the survey, it was learned that several households in Bac Phong and Xuan Phong have planted Co voi (*Pennisetum purpureum*) and Co sua (*Panicum maximum*), a high yielding green

fodder. They succeeded in supplementing to or being self-sufficient in livestock feed. Since the yield of such green fodder is very high (60-100 ton/ha/year), cultivation of these fodders even at a limited area per household could lessen the shortage of livestock feed problem.

There are unused lands around the project sites where green fodders could be planted, such as the back yards of houses, community land, ridges of paddy field, etc. According to the survey and the opinions of the staff of Cao Phong district, it is not difficult to find about 30ha of land around the project site (it is equivalent to about 0.1 ha per household for participation in the project).

The project will support green fodder production by the local farmers up to 30ha in total. The high cost of green fodder production (refer to Section 5.12), limitations of the project fund and probable limitations of the area available for green fodder production around the project area are the main reasons for limiting the project support up to 30ha only. According to the computations below, green fodder production from 30ha could satisfy 30% of the total fodder requirements for livestock owned by the project participants.

Table 5.33 Estimation of the Area of Greed Fodder Production to Supply the Total Fodder Requirement

	Xuan Phong commune	Bac Phong commune	Total
1. No. of buffalo owned by project participants	263	193	456
2. No. of cattle owned by project participants	205	43	248
3. Total No. of livestock (1+2)	468	236	704
4. Fodder requirement for mature buffalo/cattle	30kg/day/head = 11 ton/year/head		
5. Total requirement of fodder for all buffalo and cattle	5,148 ton/year	2,596 ton/year	7,744 ton/year
6. Minimum yield of green fodder	Co voi: 100ton/ha/year (fresh weight) Co sua: 60ton/ha/year (fresh weight) Co ruzi: 70ton/ha/year (fresh weight)		Average: 77ton/ha/year
7. Area to produce total requirement of fodder	66.9 ha	33.7 ha	100.6 ha
8. Planed area of green fodder cultivation supported by the project	20 ha (30% of 7.)	10 ha (30% of 7.)	30 ha (30% of 7.)

The eligible participants of the green fodder production plan should be not only the owners of the project sites who will participate in tree planting but also those who live in the villages covered by the project. This would reduce the unfairness between the owners of the project sites and others in the villages.

The productivity and production technique of two fodder species are summarized below:

Table 5.34 Productivity and proposed production technique of two fodder species

Species	Item	Practices
Co voi	Productivity:	100 - 120 ton/ha/year (fresh weight). It can be harvested 6-7 times per year.
	Planting and	Planted in March - April using 70-100 days old cuttings

Species	Item	Practices
	tending	Planted at a rate of 400-500kg cuttings per sao (360 m ²) Ploughing, tilling and bed dressing before planting. Bed dressing: Farm manure: 360kg/sao Lime: 360kg/sao Phosphorus: 9kg/sao Pottasium: 2.5kg/sao Top dressing: Farm manure: 180kg/sao Urea: 5.5kg/sao after every harvesting
	Harvesting:	1 st harvesting can be done at 60-70 days after planting with grass height of 1.2-1.5m. 2 nd harvesting can be done 30-55 days after the 1 st harvesting
	Replanting:	Replant new cutting when productivity is declined.
Co sua	Productivity:	60-90 ton/ha/year. It can be harvested 6-7 times per year.
	Planting and tending	Planted in March - April using seeds. Planted at a rate of 0.22kg seeds per sao (360 m ²) Ploughing, tilling and bed dressing before planting. Bed dressing: Farm manure: 360kg/sao Lime: 360kg/sao Phosphorus: 9kg/sao Pottasium: 2.5kg/sao Top dressing: Farm manure: 180kg/sao Urea: 5.5kg/sao after every harvesting
	Harvesting:	1 st harvesting can be done at 60 days after planting with grass height of 45-60 cm. Cut top part leaving 15 cm of root part. 2 nd harvesting can be done 30-55 days after the 1 st harvesting
	Replanting:	Replant when productivity is declined.

In addition to support for green fodder production, the project will promote use of crop residue as livestock feed. Currently crop residues account for about 10% of livestock feed. There is more room to increase the use of crop residue. The project will provide extension services on and demonstrate efficient use of crop residues in cooperation with extension sub-department of the district.

5.7 Estimation of Net Anthropogenic GHG Removals by Sinks

5.7.1 Methodology used

There is one approved methodology for the small scale AR-CDM project activity implemented on grasslands or croplands and two methodologies for small scale project on settlements and wetlands were approved at COP/MOP in December 2007.

As our project is implemented on the grassland and cropland, the approved methodology, the latest version of "Simplified baseline and monitoring methodologies for small-scale afforestation and reforestation project activities under the clean development mechanism implemented on grasslands or croplands (AR-AMS0001 / Version 04)" should be applied.
 (<http://cdm.unfccc.int/methodologies/SSCAR/index.html>)

The project should meet all four applicability conditions listed in the methodology (paragraph 1).

- (a) *Project activities are implemented on grasslands or croplands;*
- (b) *Project activities are implemented on lands where the area of the cropland within the project boundary displaced due to the project activity is less than 50 per cent of the total project area;*
- (c) *Project activities are implemented on lands where the number of displaced grazing animals is less than 50 per cent of the average grazing capacity of the project area;*
- (d) *Project activities are implemented on lands where $\leq 10\%$ of the total surface project area is disturbed as result of soil preparation for planting.*

The methodology AR-AMS0001 was applicable to our project as the project satisfied all the conditions.

5.7.2 Baseline net GHG removals by sinks

(1) Most likely baseline scenario and baseline stratification

Most likely baseline scenario of the project should be considered to be the land-use prior to the implementation of the project activity (paragraph 5 in the methodology).

It was found in the field observation and by expert judgment that the land-use prior to the implementation of the project is grassland and cropland, and the carbon stock in the living biomass pool of both woody perennials and grass is expected to decrease in the absence of the project activity. The most likely baseline scenario falls under category (b) “If the carbon stock in the living biomass pool of woody perennials and in below-ground biomass of grasslands is expected to decrease in the absence of the project activity, the baseline net GHG removals by sinks shall be assumed to be zero.” In the above case, the baseline carbon stocks in the carbons pools are constant and equal to existing carbon stocks measured at the start of the project activity” (paragraph 6 in the methodology), because:

- The project area was deforested before 1980 for agricultural land expansion under the national policy (Hop Tac Xa). The intensive forest clearance and cultivation on the slope left the land degraded.
- The project area is severely degraded and continues degrading in the absence of the project activities. Nutrients in the soil are decreasing because of soil erosion and the living biomass of the project area tends to be decreasing year by year.
- Currently, the area is always under pressure of human activities such as grazing, fuel wood collection and occasional slash and burn cultivation. These activities lead to decreases in carbon stock in the living biomass and the degradation of the land.
- About 90 % of the local people interviewed in the socio economic survey (section 5.3.7) were feeling that the fuel wood collection in the communes became more difficult than before. This indicates that the productivity of the land is decreasing.

In the baseline calculation of this project activity, “the baseline net GHG removals by sinks shall be assumed to be zero.” In this case, “the baseline carbon stocks in the carbon pools are constant and equal to existing carbon stocks measured at the start of the project activity.”

The baseline stratification was conducted following to paragraph 7 of the methodology. According to the methodology, the project area should be classified into 2 stratum, “(a) Area of cropland with changes in the carbon stocks in the living biomass pool of woody perennials and in below-ground biomass of grasslands expected not to exceed 10% of ex ante actual net GHG removals by sinks multiplied by share of the area in the entire project area” and “(b) Area of grassland with changes in the carbon stocks in the living biomass pool of woody perennials and in below-ground biomass of grasslands expected not to exceed 10% of ex ante actual net GHG removals by sinks multiplied by share of the area in the entire project area.” However, the Study team classified the project area into 6 strata, 3 types of grassland and shrub, cropland and bare land, for the baseline based on the vegetation/land-use classification in the field survey for more accurate estimation (for the detail, see section 5.3.2).

(2) Baseline carbon stock determination

The field survey for the baseline biomass measurement was conducted in grassland and shrub in the project area (for the detail, see Section 5.3.3).

The biomass in cropland and bare land is assumed to be zero. The project area is classified as production forest land by the land use plan of the communes and district and it is required to terminate crop cultivation before commencement of plantation establishment. The local people who would join the project agreed to do so.

The baseline carbon stock was determined by equation (1) in the methodology as follows:

$$B_{(t)} = \sum_{i=1}^I (B_{A(t)i} + B_{B(T)i}) \times A_i \quad (1)$$

Where

$B_{(t)}$ = carbon stocks in the living biomass within the project boundary at time t in the absence of the project activity (t C)

$BA_{(t)i}$ = carbon stocks in above-ground biomass at time t of stratum i in the absence of the project activity (t C/ha)

$BB_{(t)i}$ = carbon stocks in below-ground biomass at time t of stratum i in the absence of the project activity (t C/ha)

A_i = project area of stratum i (ha)

i = stratum i (I = total number of strata)

Above-ground biomass was calculated by equation (2) in the methodology as follows;

$$BA_{(t)} = M_{(t)} * 0.5 \quad (2)$$

Where:

$BA_{(t)}$ = carbon stocks in above-ground biomass at time t in the absence of the project activity (t C/ha)

$M(t)$ = above-ground biomass at time t that would have occurred in the absence of the project activity (t d.m./ha)

0.5 = carbon fraction of dry matter (t C/t d.m.)

Below-ground biomass was calculated by equation (6) in the methodology as follows;

$$BB_{(t=0)} = BB_{(t)} = 0.5 * (M_{grass} * R_{grass} + M_{woody (t=0)} * R_{woody}) \quad (6)$$

Where:

$BB_{(t)}$ = carbon stocks in below-ground biomass at time t that would have occurred in the absence of the project activity (t C/ha)

M_{grass} = above-ground biomass in grass on grassland at time t that would have occurred in the absence of the project activity (t d.m./ha)

$M_{woody (t=0)}$ = above-ground biomass of woody perennials at $t=0$ that would have occurred in the absence of the project activity (t d.m./ha)

R_{woody} = root to shoot ratio of woody perennials (t d.m./t d.m.)

R_{grass} = root to shoot ratio for grassland (t d.m./t d.m.)

Root to shoot ratio for grass and woody perennials were obtained from table 3.4.3 in the IPCC Good Practice Guidance for LULUCF and the values for sub-tropical/tropical grassland (= 1.6) and shrubland (= 2.8) were used, respectively.

The values for the parameters used in the calculation are shown in **Table 5.35**. The baseline living biomass was calculated to 1903 tC, totally in the project area.

Table 5.35 Parameters used and process of the calculation of the baseline carbon stock in biomass

i	Ai	Mgrass	Mwoody	Rgrass	Rwoody	M(t)	BA(t)	BB(t)	(BA(t)+BB(t)))*A
	ha	d.m.	d.m.			d.m.	tC/ha	tC/ha	tC
1	123.58	3.32	0.02	1.58	2.83	3.34	1.67	2.65	533.84
2	99.99	3.38	0.00	1.58	2.83	3.38	1.69	2.67	435.74
3	12.17	0.77	7.28	1.58	2.83	8.05	4.03	10.92	181.85
4	104.86	0.87	3.16	1.58	2.83	4.03	2.01	5.15	751.57
5	7.07	0.00	0.00			0.00	0.00	0.00	0.00
6	17.59	0.00	0.00			0.00	0.00	0.00	0.00
Σ								B(t) ->	1902.99

Finally the baseline net GHG removals by sinks were calculated by equation (10) in the methodology as follows:

$$\Delta CBSL_t = (B(t) - B(t-1)) * (44/12) (10)$$

Where:

$\Delta CBSL_t$ = baseline net GHG removals by sinks (t CO₂-e)

$B(t)$ = carbon stocks in the living biomass pools within the project boundary at time t in the absence of the project activity (t C)

In this project, $B(t)$ is conservatively assumed constant thus, the baseline net GHG removals by sinks ($\Delta CBSL_t$) was calculated to be zero.

5.7.3 Actual net GHG removals by sinks

The project area should be stratified by tree species and age class according to the planting plan for the ex-ante calculation following paragraphs 15 and 16 in the applied methodology (Table 5.36). To estimate the Carbon stock in biomass, the discounted area was conservatively applied (12 % and 20 % discount for the site 1, 2, and 3 in Xuan Phong commune and the site 4 and 5 in Bac Phong commune, respectively), because the soil of the project area contains a lot of rock and it would not be possible to plant trees in some parts of the project area.

Table 5.36 Stratification for ex-ante actual net GHG removals by sinks

Site no	Total area	Area of each stratum (ha)			Area discounted for estimation (ha)		
		Stratum 1	Stratum 2	Stratum 3	Stratum 1	Stratum 2	Stratum 3
Site 1	23.50	11.75	11.75	0.00	10.34	10.34	0.00
Site 2	73.50	20.77	20.77	31.96	18.28	18.28	28.12
Site 3	106.63	53.32	53.32	0.00	46.92	46.92	0.00
Site 4	71.66	35.83	35.83	0.00	28.66	28.66	0.00
Site 5	89.97	44.99	44.99	0.00	35.99	35.99	0.00
Total	365.26	166.65	166.65	31.96	140.19	140.19	28.12

The actual net GHG removal by sinks (ex-ante) was calculated according to the paragraph 17 to 26.

(1) Above-ground biomass

Above-ground biomass was calculated by the equation (13) and (14) in the methodology and the parameters and values applied to the calculation are shown in Table 5.37.

$$NA(t)_i = T(t)_i * 0.5 \quad (13)$$

Where:

$NA(t)_i$ = carbon stocks in above-ground biomass at time t under the project scenario (t C/ha)

$T(t)_i$ = above-ground biomass at time t under the project scenario (t d.m./ha)

0.5 = carbon fraction of dry matter (t C/t d.m.)

$$T(t)_i = SV(t)_i * BEF * WD \quad (14)$$

Where:

$T(t)_i$ = above-ground biomass at time t under the project scenario (t d.m./ha)

$SV(t)_i$ = stem volume at time t for the project scenario (m^3 /ha)

BEF = biomass expansion factor (over bark) from stem to total above-ground biomass (dimensionless)

WD = basic wood density (t d.m./ m^3)

Table 5.37 Parameters used in the above biomass calculation

Parameter	A. mangium	A. auriculiformis	Reference
SV	Growth table and Equation	Growth table and Equation	Khuc Dinh Thanh (2002) Establishment the growth table and productivity of <i>Acacia mangium</i> plantation for mine-timber purpose in North-East region of Viet Nam Vu Tien Hinh et al. (1996) Establishment the growth table of <i>Acacia auriculiformis</i>
BEF	1.4	1.4	Table 3A.1.10 of the IPCC good practice guidance for LULUCF
WD	0.500	0.515	Nguyen Dinh Hung et al. (1995) Overall Report on research: Study on value of resources of main Forest Plant species and develop some new special product species which meet demands of export market

The estimated stem volume ($SV(t)_i$) in each strata (i) at time t from the national standard yield table is shown in **Tables A10-9 and A10-10 in Appendix-10** for *Acacia mangium* and *Acacia auriculiformis*, respectively. Thinning would be operated at year 8 in stratum 1 and at year 9 in stratum 2 and stratum 3. The thinning intensity is rather high in Stratum 1 and 2, so that the SV decreases at year 8 and year 9, respectively.

(2) Below-ground biomass

The equation developed by Cairns et al. was used to estimate the below-ground biomass (paragraph 23 and equation 16 in the applied methodology). The result is shown in **Table A10-11 in Appendix-10**.

$$NB(t) = \exp(-1.085 + 0.9256 * \ln T(t)) * 0.5 \quad (16)$$

Where:

$NB(t)$ = carbon stocks in below-ground biomass at time t achieved by the project activity during the monitoring interval (t C/ha)

$T(t)$ = estimate of above-ground biomass at time t achieved by the project activity (t d.m./ha)

0.5 = carbon fraction of dry matter (t C/ t d.m.)

(3) Project GHG removals by sinks

Project GHG removal by sinks was calculated by equation (17) in the methodology as follows and the result is shown in **Table A10-11** in **Appendix-10**.

$$\Delta C_{PROJ,t} = (N_t - N_{t-1}) \cdot (44/12) / \Delta t \quad (17)$$

Where:

$\Delta C_{PROJ,t}$ = removal component of actual net GHG removal by sinks per annum (t CO_2-e / year)

$N(t)$ = total carbon stocks in biomass at time t under the project scenario (t C)

Δt = time increment = 1 (year)

(4) Project Emissions

According to the applied methodology, the project emissions to be taken into account are limited to emission from the use of fertilizers (in paragraph 3), however, the applied methodology indicated in paragraph 25 that:

“If project participants consider that the use of fertilizers would result in significant emissions of N_2O (>10 per cent of the actual net greenhouse gas removals by sinks) project emissions (GHG_{PROJ}, (t – t CO_2e / year) should be estimated in accordance with the IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories (hereinafter referred to as IPCC good practice guidance).”

In the project, 0.1 kg of the synthetic fertilizer “NPK-S Lam Thao (5.10.3-11)” would be applied to every seedling when planting, and additionally another 0.1 kg in the first year. In total 101 ton of fertilizer would be applied (**Table 5.38**).

Table 5.38 The amount of the fertilizer which will be used in the project

year	planting density	area	fertilizer	number of seedling planted	total amount of fertilizer
	(/ha)	ha	kg/seedling		t
0	1600	140.19	0.2	224304	44.86
1	2000	28.12	0.2	56240	11.25
1	1600	140.19	0.2	224304	44.86
Total		308.5			100.97

Significance of the N_2O project emissions from the fertilizer was tested using “A/R Methodological tool: Estimation of direct nitrous oxide emission from nitrogen fertilization” (http://cdm.unfccc.int/EB/033/eb33_repan16.pdf). The amount of the N_2O project emission from the fertilizer is calculated by the equation (1) – (3) in the tool as follows and the parameters applied in the calculation are shown in **Table 5.39**. Organic fertilizer will not be used in the project.

$$N_2O_{direct-N,t} = (F_{SN,t} + F_{ON,t}) \cdot EF_1 \cdot MW_{N_2O} \cdot GWP_{N_2O} \quad (1)$$

$$F_{SN,t} = \sum_i^I M_{SF_i,t} \cdot NC_{SF_i} \cdot (1 - Frac_{GASF}) \quad (2)$$

$$F_{ON,t} = \sum_j^J M_{OF_j,t} \cdot NC_{SF_j} \cdot (1 - Frac_{GASM}) \quad (3)$$

Where:

$N_2O_{direct-N, t}$ = Direct N_2O emission as a result of nitrogen application within the project boundary, t- CO_2 -e in year t

$F_{SN,t}$ = Mass of synthetic fertilizer nitrogen applied adjusted for volatilization as NH_3 and NOX , t-N in year t

$F_{ON,t}$ = Mass of organic fertilizer nitrogen applied adjusted for volatilization as NH_3 and NOX , t-N in year t

MSF_i,t = Mass of synthetic fertilizer type i applied, tonne in year t

MOF_j,t = Mass of organic fertilizer type j applied, tonne in year t

EF_1 = Emission Factor for emissions from N inputs, tonne- N_2O -N (t-N input)-1

$Frac_{GASF}$ = Fraction that volatilizes as NH_3 and NOX for synthetic fertilizers, dimensionless

$Frac_{GASM}$ = Fraction that volatilizes as NH_3 and NOX for organic fertilizers, dimensionless

MW_{N_2O} = Ratio of molecular weights of N_2O and N (44/28), tonne- N_2O (t-N) -1

GWP_{N_2O} = Global Warming Potential for N_2O , kg- CO_2 -e (kg- N_2O) -1 (IPCC default = 310, valid for the first commitment period)

NC_{SF_i} = Nitrogen content of synthetic fertilizer type i applied, g-N (100 g fertilizer)-1

NC_{OF_j} = Nitrogen content of organic fertilizer type j applied, g-N (100 g fertilizer) -1

I = Number of synthetic fertilizer types

Table 5.39 The parameters used and the process of calculation in the estimation of N_2O emission from the fertilizer

year	M_{SF_i}	NC_{SF_i}	$Frac_{GASF}$	F_{SN}	EF_1	MW_{N_2O}	GWP_{N_2O}	$N_2O_{direct-N}$
	t							t- CO_2 -e
0	44.86	0.05	0.1	2.02	0.01	1.57	310	9.83
1	56.11	0.05	0.1	2.52	0.01	1.57	310	12.30
Total								22.13

References:

EF_1 : IPCC 2006 Guidelines (table 11.1)

$Frac_{GASF}$: IPCC 2006 Guidelines (table 11.3)

MW_{N_2O} : Ratio of molecular weights of N_2O and N (44/28)

GWP_{N_2O} : IPCC default valid for the first commitment period

The estimated total project emission of N_2O from the fertilizer application in the project was 22 t CO_2 -e and it was less than 10 % of the actual net greenhouse gas removal by sinks, thus it could be considered non-significant.

(5) Actual net GHG removal by sinks

Consequently the actual net GHG removal by sinks (ex-ante) was calculated by the equation (18) in the methodology as follows and estimated to be 41,832 tCO₂ in total during the first crediting period. The detail result of estimation of the actual net GHG removals by sinks (ex-ante) is shown in **Table A10-11** in **Appendix 10**.

5.7.4 Leakage

The project area was deforested for the expansion of the agricultural land before 1980. The intensive clearance and cropping left the land degraded and the land was abandoned because it is no longer suitable for production activities such as agriculture. Even if land use rights were allocated to villagers, they had not used these constantly and so the land became a “common access” area, which meant that not only the land-use-right-owner but other villagers could access the land for free-grazing and fuel wood collection. In addition, some of the land-use-right-owner ‘s occasionally plant annual crops using slash and burn cultivation, but this is only a temporary activity and the area is limited because of the degradation.

If evidence can be provided that there is no displacement, or that the displacement of pre-project activities will not cause deforestation attributable to the project activity, or that the lands surrounding the project activity contain no significant biomass and if evidence can be provided that these lands are likely to receive the shifted activities, leakage can be considered zero. In all other cases, project participants should assess the possibility of leakage from the displacement of activities by considering the following indicators (paragraph 28 and 29 in the methodology):

- (a) *Area under cropland within the project boundary displaced due to the project activity;*
- (b) *Number of domesticated grazing animals within the project boundary displaced due to the project activity;*
- (c) *For domesticated roaming animals, the time-average number of grazing animals per hectare within the project boundary displaced due to the project activity.*

Considering the current situation of the project area, the displacement of cropland and grazing activities, which are (a) and (c) above, have to be estimated as leakage.

(1) Displacement of cropland

Some small parts of the project area (7 ha) were defined as temporary cropland in the baseline by the on-site land use survey (**Table 5.40**). The land use right owners who are cultivating in the project boundary and who are the participants of the project agreed to terminate the activity when the project starts and it would be difficult for them to start new cultivation outside of the boundary because most of the land in the communes has been already allocated to households. Then, even if the owners start new cultivation outside of the project boundary, the significant decrease in the carbon pools would not occur because the unused land surrounding the project area is mostly degraded with low biomass.

However, for a conservative estimation, the displacement of cropland was taken into account and calculated following the applied methodology (paragraph 29-31). The cropland to be displaced is 2 % of the total area as shown below.

Table 5.40 Percentage of the cropland to total project area in the baseline

Cropland area	Total project area	%
7.07	365.26	1.94

(2) Displacement of grazing

It was confirmed that there were no domesticated grazing animals which stay permanently in the project area. Most of the villagers keep cattle (buffaloes and cows) in stalls and take them out for grazing in areas with grass and shrubs in the village for several hours every day. As the project area is common access, an indefinite number of villagers including both project participants and non-participants come for grazing. So that only “*the time-average number of grazing animals per hectare within the project boundary displaced due to the project activities*” ((c) of paragraph 29 of the methodology) should be determined to estimate the leakage from the displacement of grazing activity. It is difficult to count directly the number of domesticated animals when “free grazing” is conducted in the project area. To estimate the time-average number of grazing animals, information on the number of cattle, frequency of the grazing and location of the grazing was collected in the socio-economic survey (section 5.3.7). The procedure to calculate the time-average number of grazing animals is not provided in the methodology. In the project it was calculated as follows;

The grazing frequency inside of the project area of each interviewed household is calculated as follows:

$$GF_{inside} = GF_{hour} \times 1/24 \times GF_{day} \times 1/365 \times R_{location} \times 1/100$$

where

GF_{inside} = grazing frequency inside of the project area of each interviewed household y
 (animal year/year)

GF_{hour} = grazing frequency of each interviewed household (h/day)

GF_{day} = grazing frequency of each interviewed household (times/year)

$R_{location}$ = ratio (percentage) of grazing hours inside of the project area over the total grazing hours

The time average number of grazing animals of the interviewed households in each project site (heads/ha, $TAN_{interview}$) is calculated as follows. According to a key informant interview, the intensity of grazing is different among the project sites because of the topography and land use history. There is rather larger flat land which is suitable for the paddy rice production in Xuan Phong commune than in Bac Phong. commune. The people in Bac Phong hope to increase their income by grazing as there is not enough land for cultivation

and consequently, the intensity of grazing becomes higher. Therefore the time average number was calculated in each project site.

$$TAN_{interview} = \sum (N_{G,interview} \times GF_{inside}) \times \frac{1}{A_{site}}$$

where

$TAN_{interview}$ = time average number of grazing animals of the interviewed households in each project site (head/ha)

$NG_{interview}$ = number of grazing animals owned by the interviewed households in each project site (head)

A_{site} = Area of project site (ha)

The time average number of grazing animals of the total households (heads/ha, TAN_{total}) in the project sites was calculated as follows;

$$TAN_{total} = TAN_{interview} \times \frac{N_{HHtotal}}{N_{HHinterview}}$$

where

TAN_{total} = time average number of grazing animals of the total households in each project sites (heads/ha)

$N_{HHtotal}$ = total number of household in each project sites

$N_{HHinterview}$ = number of interviewed household

The time-average number of grazing animals in the project area was estimated in each project site and the parameters and results were shown in **Table 5.41**. The average Grazing Capacity (GC) of the project area was calculated to be 1.03/ha following appendix D in the methodology (**Table 5.42**). The values for $ANPP$ and DMI were found in the table 1, 2 and 3 in appendix D in the methodology, the values for Asia were selected for the calculations.

$$GC = \frac{ANPP * 1000}{365 * DMI} \quad (37)$$

where:

GC = grazing capacity (head/ha)

$ANPP$ = above-ground net primary productivity in tonnes dry biomass (t d.m./ha/yr)

DMI = daily dry matter intake per grazing animal (kg d.m./head/day)

Table 5.41 Time average number of grazing animals in each project site

Project Site	Project Area (A _{site})	Result from interview			Village total (estimated)			GC	TAN _{total} /GC
		N of household (N _{hhinterview})	N of cattle (N _{gainterview})	time-average N of grazing animals (TAN _{interview})	N of household (N _{hhtotal})	N of cattle (N _{gtotal})	time-average N of grazing animals (TAN _{total})		
	ha			/ha			/ha	%	
Site 1 & 2	97.00	75	182	0.07	157	291	0.12	1.03	11%
Site 3	106.63	102	286	0.07	293	513	0.13	1.03	13%
Site 4	71.66	48	125	0.26	116	171	0.35	1.03	34%
Site 5	89.97	62	111	0.13	287	289	0.34	1.03	33%
Total	365.26	287	704		853	1264			

Table 5.42 Grazing capacity of the project area

DMI	ANPP	GC
21.9	8.2	1.03

The percentage of the time-average number of domesticated roaming animals displaced to the average grazing capacity of the project area varied among the project sites, from 11 % to 33 % (Table 5.41).

- (3) Total leakage considered in the project

As the cropland was 2 % of the total project area and the time-average number of domesticated roaming animals displaced is higher than 10 % and less than or equal to 50 % to the average grazing capacity, the entire leakage shall be equal to 15 % of the *ex-ante* actual net GHG removals by sinks achieved during the first crediting period (paragraph 31 of the methodology). The average annual leakage was calculated following the equation (20) in the methodology and as a result, the total leakage during the first crediting period was estimated to 10,356 tCO₂.

$$L_t = \Delta C_{ACTUAL,t} * 0.15 \quad (20)$$

Where:

L_t = average annual leakage attributable to the project activity at time t (t CO₂-e / year)

$\Delta C_{ACTUAL,t}$ = *ex-ante* actual net greenhouse gas removals by sinks in year t (t CO₂-e / year)

5.7.5 Net anthropogenic GHG removal by sinks

The net anthropogenic GHG removal by sinks for each year during the first crediting period is calculated as follows (paragraph 31 and equation (21) of the methodology) and the results are shown in the table below:

$$ER_{AR\ CDM,t} = \Delta C_{PROJ,t} - \Delta C_{BSL,t} - GHG_{PROJ,t} - L_t \quad (21)$$

Where:

$ER_{AR\ CDM, t}$ = net anthropogenic GHG removals by sinks (t CO₂-e / year)

$\Delta C_{PROJ, t}$ = project GHG removal by sinks at time t (t CO₂-e / year)

$\Delta C_{BSL, t}$ = baseline net GHG removal by sinks (t CO₂-e / year)

$GHG_{PROJ, t}$ = project emissions (t CO₂-e / year)

L_t = leakage attributable to the project activity at time t (t CO₂-e / year)

The result is summarized in the table below:

Table 5.43 The net anthropogenic GHG removal by sinks in the proposed project

Year	Estimation of baseline net GHG removals by sinks (tonnes of CO ₂ e)	Estimation of actual net GHG removals by sinks (tonnes of CO ₂ e)	Estimation of leakage (tonnes of CO ₂ e)	Estimation of net anthropogenic GHG removals by sinks (tonnes of CO ₂ e)
0	0	0	0	0
1	0	-5,986	0	-5,986
2	0	2,051	308	1,743
3	0	4,178	627	3,551
4	0	7,109	1,066	6,043
5	0	8,553	1,283	7,270
6	0	9,203	1,380	7,822
7	0	9,442	1,416	8,026
8	0	-3,634	0	-3,634
9	0	-6,226	0	-6,226
10	0	5,212	782	4,430
11	0	4,763	715	4,049
12	0	4,696	704	3,992
13	0	3,411	512	2,900
14	0	4,197	630	3,567
15	0	4,098	615	3,484
Total (tonnes of CO ₂ e)	0	51,066	10,037	41,029

This net anthropogenic GHG removals of this project for the credit period of 16 years would be 41,029 t CO₂ e.

5.8 Project Management Unit

5.8.1 Requirements of management units for AR-CDM projects

Management units of AR-CDM project must be legal entities based on Vietnamese Laws to register the projects in UNFCCC under their name, keep an account book of the projects in line with regulations, contract with DOE for validation, registration and verification of the project, officially receive CERs from UNFCCC, and trade CERs with buyers under legal contracts. In addition, management units should have sufficient technical and financial capacity to implement and manage the AR-CDM project activities mentioned below. The management units could be assisted by service providers or consultants to perform the technical aspects of the activities.

- a) Preparation of project plan and PDD
- b) Application of AR-CDM projects to DNA
- c) Contact and conclude a contract with a DOE for validation, registration, verification, certification and issuance of CERs.
- d) Implementation and monitoring of AR-CDM projects (reforestation)
- e) Trade of CERs

5.8.2 Alternative types of management units for AR-CDM project in Vietnam

Legal entities in Vietnam are defined as the following organizations in Article 110 of Vietnamese Civil law.

- State agencies, units of armed forces
- Political organizations, socio-political organizations
- Economic organizations (state enterprises, cooperatives, limited companies and corporations)
- Social organizations / socio-professional organizations (associations)
- Social funds / charitable funds

Among them, State agencies, economic organizations (cooperatives, limited companies and corporations), social organizations/socio-professional organizations (associations), social funds/charitable funds could be management units of AR-CDM projects. Armed forces units, political organizations and socio-political organizations are not suitable types of organizations for AR-CDM project implementation. Since privatization of state enterprises has been promoted in Vietnam, state enterprises are also not suitable as the management units.

The legal background and features of the organizations are shown in the table below for reference.

Table 5.44 Features of alternative management units of AR-CDM projects

Types	Company	Co-operative	Social fund	Association	State agency
Related law	Civil Code Sect 110, 113 Enterprize Law No.59/2005/GH11 No.60/2005/GH11	Civil Code Sect 110, 113 No.18/2003/QH11 Decree No.177/2004/ND-CP	Civil Code Sect 110, 115. Decree No.148/2007/ND-CP	Civil Code Sect 110, 114 Decree No.88/2003/ND-CP Circular No.1/2004/TT-BNV	Civil Code Sect110
Status	Private (public)	Private	NGO	NGO	Government
Types of organizations	✓ Special purpose company(SPC) ✓ Forest company	✓ Foresters' or farmers' co-operative	✓ Social Fund ✓ domestic or international NGO	✓ Association of foresters (farmers)	✓ Management boards of protection forest and special use forest
Purpose	(economical purpose) ✓ Profit from AR-CDM project	(fulfill common interest)	(community development) ✓ income	(members' interest, socio-economic development)	✓ Improvement of farmers' income ✓ Forest recovery

Types	Company	Co-operative	Social fund	Association	State agency
		✓ income improvement of farmers	improvement of farmers ✓ forest recovery	✓ income improvement of farmers ✓ Forest recovery	
Structure	✓ Board of members ✓ Chairman ✓ General Director ✓ Supervisory board	✓ Congress ✓ Managing board ✓ Manager, deputy manager ✓ Control board (supervise)	✓ Fund Management Board (Chairman, Vice-Chairman) ✓ Fund director, chief accountant ✓ Fund Control board (supervise)	✓ Organization of same professions ✓ Congress ✓ Control Board ✓ President, vice-president, secretaries	✓ Management boards of protection forest and special use forest etc.
Main activities	✓ To implement AR-CDM project for the purpose of profits	✓ To coordinate activities among members for common interests	✓ To implement AR-CDM project for the purpose of community development	✓ To coordinate activities among members for common interests	✓ To implement AR-CDM project for the purpose of community development
Capital, income	✓ Capital ✓ Income from the project	✓ Capital contribution by members ✓ Income from the project	✓ Contribution, donation ✓ Income from the project	✓ Contribution, donation ✓ Income from the project ✓ Member fee	✓ State budget ✓ Income from the project
Tax	✓ Income tax	✓ Income tax	✓ No tax (operate for non-profit purpose)	✓ No tax (operate for non-profit purpose)	✓ No tax

5.8.3 Proposed management unit for the AR-CDM pilot project

Proposed management unit for the AR-CDM pilot project is a social fund. Major reasons for selecting a social fund as a project management unit are follows:

- a) The operational purposes of Social Fund include “community development” and “environmental improvement” for non-profit purposes. The purposes fit the objectives of the project.
- b) The counterpart in the JICA study and local governments concerned are willing to implement the project. They can directly involve in the project implementation as board members of the Social Fund.
- c) It is envisaged that the project will be implemented with donations from private sectors. Donations are admitted as sources of social fund’s income.
- d) The social fund is allowed to gain income from project activities (such as from timber and CERs) and use this for the fund’s purpose.
- e) The social fund is exempted from income tax because it operates on a non-profit basis.

- f) The social fund can also carry out missions assigned by the State. This means that the project could receive financial support from the state, e.g., for community development and environmental protection.

The structure of the proposed project management unit (Social Fund) and supporting entities are shown in **Figure 5.12**. Cao Phong district PC, VFU, and RCFEE are suitable for founding members and members of management and control boards of the fund. Hoa Binh province PC is also willing to involve in the fund operation. But they declined because of a conflict of interest (Hoa Binh PPC has authority to permit establishment of the fund). The organization and functions of the Social Fund are shown in **Figure 5.13**.

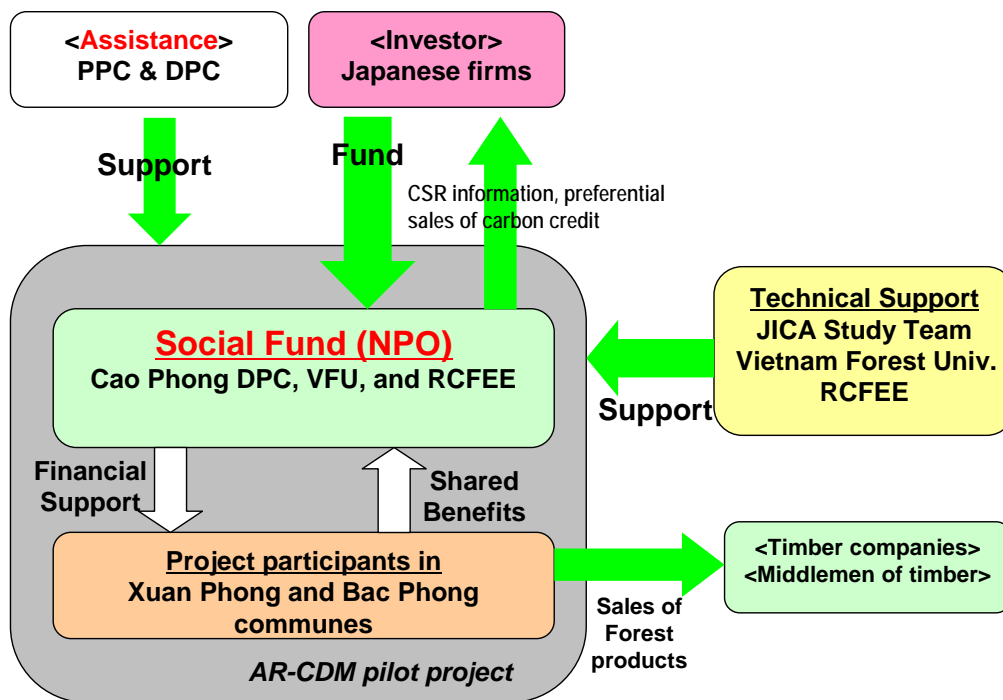


Figure 5.12 Structure of project management body and supporting entities

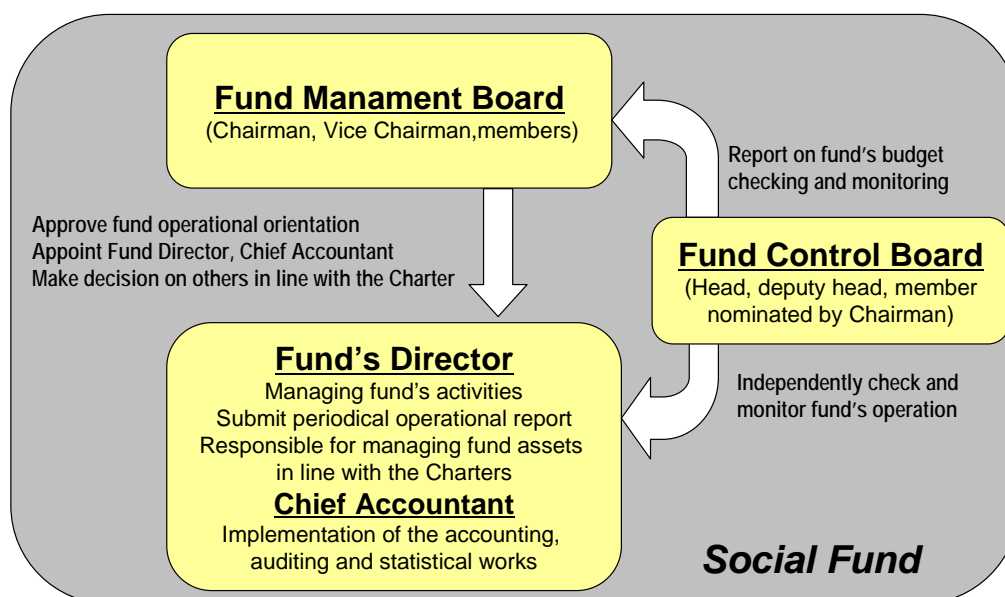


Figure 5.13 Organization of the Social Fund

5.8.4 Procedure of establishing the social fund

According to Decree No.148/ND-CP dated 25th September 2007, the procedures of establishing the social fund are follows:

- 1) Founding members set up fund founding board with a head, vice-head and founding members
- 2) Founding board prepares following application dossiers and send them to provincial People's Committee.
 - application letter
 - draft charter
 - establishment and operational plan
 - commitment on available head office
 - commitment to contribute assets/property
 - background/ status/ quality of founding member
 - copy of testament or trusted contract
- 3) Authorized state agency (PPC) permits establishment of the fund and recognize charter of Fund.
- 4) The founding member recommends Fund Management Board which consists of Chairman, Vice-Chairman and members.
- 5) Fund Management Board proceeds to undertake the tasks below:
 - set up fund

- issue regulations on fund revenue management and utilization
 - approve cost norm of fund management, financial plan
 - appoint fund director, chief accountant
 - make decisions on fund organizational structure
 - establish Fund Control Board
- 6) Conditions for Fund operation:
- Authorized state agency (PPC or DPC) permit establishment of Fund and recognize charter of Fund.
 - Its bank account is active in the bank with available sufficient amount of money that listed in financial contribution commitments by founding members.
 - Fund office is available.
 - Publication on fund establishment is done properly.

5.9 Monitoring Plan

Monitoring of baseline net GHG removal by sinks is not necessary according to the applied methodology (paragraph 36). The items to be monitored is in Table 1 of the applied methodology.

- (1) Monitoring of forest establishment
- (a) Location of the project boundary and strata

Location of the area where the project activity has been implemented will be measured in the field using GPS and checked and recorded by GIS. It will be conducted every 5 years before verification.

The stratification for the ex ante actual green house gas removals estimation should be carried out to improve the accuracy and precision of the biomass estimates. The methodology requests the target precision level of $\pm 10\%$ of the mean at a 95% confidence level for the stratification approach (paragraph 38). However this target can be achieved not only by stratification but by a combination of the stratification and number and size of permanent sample plot.

The project area will be stratified into 3 strata according to the project planting plan by tree species and age classes as shown below:

Table 5.45 Stratification for the ex ante Actual GHG removals estimation

Strata	Species	year of planting
stratum 1	<i>A. mangium</i>	year 0
stratum 2	<i>A. mangium</i>	year 1
stratum 3	<i>A. auriculiformis</i>	year 1

The planted area will be visited by forest experts at least once every year for checking the condition and quality of the plantation. If the area with underperformance is identified, a new stratum or substratum will be additionally created.

(b) Size of planted area

The size of the area where the project activity has been implemented for each stratum will also be measured in the field using GPS and checked and recorded by GIS. It will be conducted every 5 years before verification. The planted area will be visited by forest experts at least once every year for checking the condition and quality of the plantation.

(c) Size and location of permanent sample plot

The size of the permanent sample plot is at least 20m x 20m which is considered the standard area for the sample plot. The number of the permanent sample plot of each stratum to estimate the project biomass stocks to target precision of level of $\pm 10\%$ of the mean at a 95% confidence level will be determined according to the methodological tool, "Calculation of the number of sample plots for measurements within A/R CDM project activities". Pre-monitoring will be conducted to obtain the parameter necessary for the calculation with the tool such as standard deviation of the diameter at breast height of trees for each stratum before the first monitoring.

The location of permanent sample plot will be determined using GPS and GIS and marked on GIS maps. It will be checked every 5 years as the monitoring operation for the verification.

(2) Monitoring of Carbon stock

The monitoring of the carbon stock in above and below ground biomass pools will be conducted according to the applied methodology.

(a) Aboveground biomass

To estimate stem volume (SV) used in the equation (26) of the applied methodology, the diameter at breast height (1.3m, DBH) and the height (H) of all trees in the permanent sample plots will be measured every 5 years before verification. At the same time, the mortality will be checked. The locally developed allometric equation for each planted species of corresponding site index will be used with the measured DBH and H. The same values for BEF and WD will be used in the ex-post and ex-ante calculation (paragraph 44 in the applied methodology).

$$E_{(t) i} = SV_{(t) i} * WD \quad (26)$$

Where:

$E_{(t) i}$ = estimate of above-ground biomass of stratum i at time t achieved by the project activity (t d.m./ha)

$SV_{(t) i}$ = Stem volume (m^3 /ha)

WD = basic wood density (t d.m./ m^3)

BEF = biomass expansion factor (over bark) from stem to total aboveground biomass (dimensionless)

(b) Below ground biomass

Carbon stock in the below ground biomass will be estimated from the aboveground biomass using the equation (28) in the applied methodology.

$$P_{B(t) i} = \exp(-1.085 + 0.9256 * \ln E(t) i) * 0.5 \quad (28)$$

Where:

P_{B(t) i} = carbon stocks in below-ground biomass at time t achieved by the project activity during the monitoring interval

E_{(t) i} = estimate of aboveground biomass at time t achieved by the project activity (t d.m./ha)

0.5 = carbon fraction of dry matter (t C/t d.m.)

(3) Monitoring of Project emission

The amount of fertilizers used in the project will be monitored. The amount and the name of fertilizer will be recorded every time the fertilizer is applied. The significance of N₂O emission from the fertilization will be assessed by “A/R Methodological tool: Estimation of direct nitrous oxide emission from nitrogen fertilization” in accordance with the methodology (paragraph 47 in the applied methodology).

(4) Monitoring of Leakage

The items to be monitored are in Table 2 of the applied methodology.

In accordance with the paragraph 48 of the applied methodology, each of the following indicators should be monitored during the first crediting period:

- (a) Area under cropland within the project boundary displaced due to the project activity;
- (b) Number of domesticated grazing animals within the project boundary displaced due to the project activity;
- (c) For domesticated roaming animals, the time-average number of domesticated grazing animals per hectare within the project boundary displaced due to the project activity.

As (a) and (c) were identified in the baseline activities, these two indicators will be monitored in the proposed project activity. The data for the ex post leakage estimation would be treated as follows:

(a) Displacement of cropland

It was agreed with land-use-right-owners to terminate their cultivation in the project boundary before the project starts. Afterwards it would be difficult for them to start new cultivation outside of the project boundary because most of the land in the communes has been allocated to

households. However, in the proposed project, the cropland existed in the project area before the project starts (= in the baseline) was all considered as leakage and the area was measured in on-site assessment before the project starts. It would be conservative to apply the area to estimate the ex post leakage and unnecessary to monitor the cropland area displaced. But, it will be confirmed at the time of monitoring the size of planted area that the all the cultivation activity is terminated inside the project boundary.

(b) Displacement of domesticated grazing animals

There were no domesticated (settled) grazing animals within the project boundary before the commencement of the project. Therefore, this type of displacement would not be necessary to monitor

(c) Displacement of domesticated roaming animals

The number of domesticated roaming animals within the project boundary was estimated before the starting of the project in ex ante leakage estimation and it was assumed that this number of animals would be displaced. As we would take optional measures to minimize the displacement of roaming animals such as fodder production described in Section 5.6, this number would be considered a potential maximum number of animals to be displaced. Therefore it would not be necessary to monitor the number of the displaced domesticated roaming animal and it is conservative to apply the numbers of animals estimated in ex ante estimation. However, it will be confirmed at the same time the size of planted area is monitored that all the grazing activity is terminated inside of the project area.

Finally the leakage would be estimated following the paragraph 49 of the applied methodology.

5.10 Quality Control (QC) and Quality Assurance (QA) Procedure

All data will be kept for two years after the end of the last crediting period in the form of papers and electronic files. The provisions for quality assurance (QA) and quality control (QC) will be applied. For the sake of data quality, following QA and QC measures should be implemented. The procedures should be described in the Standard Operating Procedures (SOP) according to the IPCC Good Practice Guidance for LULUCF. It is recommended that the project participant prepare the SOP for the project as an independent document from PDD because the SOP would be changed according to the situation of the project. The revision of the PDD requires the complicated procedures through DOE.

(1) Operational and management structure

The operational and management structure for monitoring of the proposed project is indicated in **Figure 5.14**. The Monitoring Unit organized with well-trained members will conduct field surveys and collect data from the permanent sample plot. The data will be processed and calculated in accordance with the applied methodology. The supervisor of the Monitoring Unit who is an expert in forestry will review the compiled data and complete the monitoring report for verification, then submit it to the director of the Social funds. The monitoring report will be reviewed by the director and sent to the DOE for verification when the quality of the report is

assured.

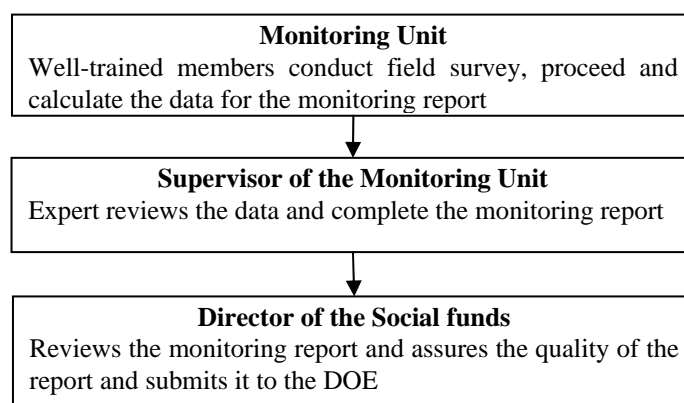


Figure 5.14 Operational and management structure for the monitoring

(2) The Standard Operating Procedures (SOP)

The draft of SOP of the project was developed based on the IPCC Good Practice Guidance for LULUCF as follows and it would be adjusted to the project and revised in the future.

For the sake of data quality, the following QA and QC measures should be implemented. The procedures below should be followed in the monitoring.

(a) Staff Training

Monitoring activity should be carried out by trained staff. Training on the monitoring activity should be given based on the text book “Vu Tien Hinh & Pham Ngoc Giao (1997) Dieu Tra Rung (Forest Inventory)” to nominated staff from parties involved in this project activity. After completion of the training, names of the staff should be recorded in the staff training record. The Monitoring Unit should be composed of the persons listed in the staff training record. Among the trained staff, those who have forestry academic degree holders should be nominated and named as supervisors of the Monitoring Unit. If the number of forestry degree holders is insufficient, the director of the Social Fund determines which academic degree can be substituted for the forestry degree and names the individual personnel upon his responsibility. Names of the supervisors should be recorded on the list of supervisors with his/her academic degrees.

(b) Filed Measurement Activity

Field measurement activity should be planned by the director of the Social Fund to collect appropriate data outlined in sections B.8.1.1.1 and B.8.1.2.1 of the PDD. The field measurement activity should be conducted as per the following procedures in “Vu Tien Hinh & Pham Ngoc Giao (1997) Dieu Tra Rung (Forest Inventory)”.

The data should be randomly re-measured every 8-10 plots of the sample plot area and compared between measurement records to verify data. At the end of the field measurement, a minimum 10% of data will be compared with the authorized referenced materials to identify any errors. Identified errors should be corrected and the correction should be recorded with counter-measures.

(c) Verification of Data Entry and Analysis

Data entry should be analyzed by a supervisor who is not involved in field measurement. All the data entry should be in document format to avoid miscommunication. If any problem arises in monitoring plot data that cannot be resolved, the plot should not be used in the analysis.

(d) Data Archive

Corrected data should be archived in paper and electronic format. Copies of all field data, data analysis results, GIS records copies of measuring and monitoring reports should all be stored in the office of the Social Fund and backup data should be stored in VFU. All data and reports should have an identifiable specific reference number and stored in designated place. The supervisor should confirm the storage of the documents at the end of each monitoring session.

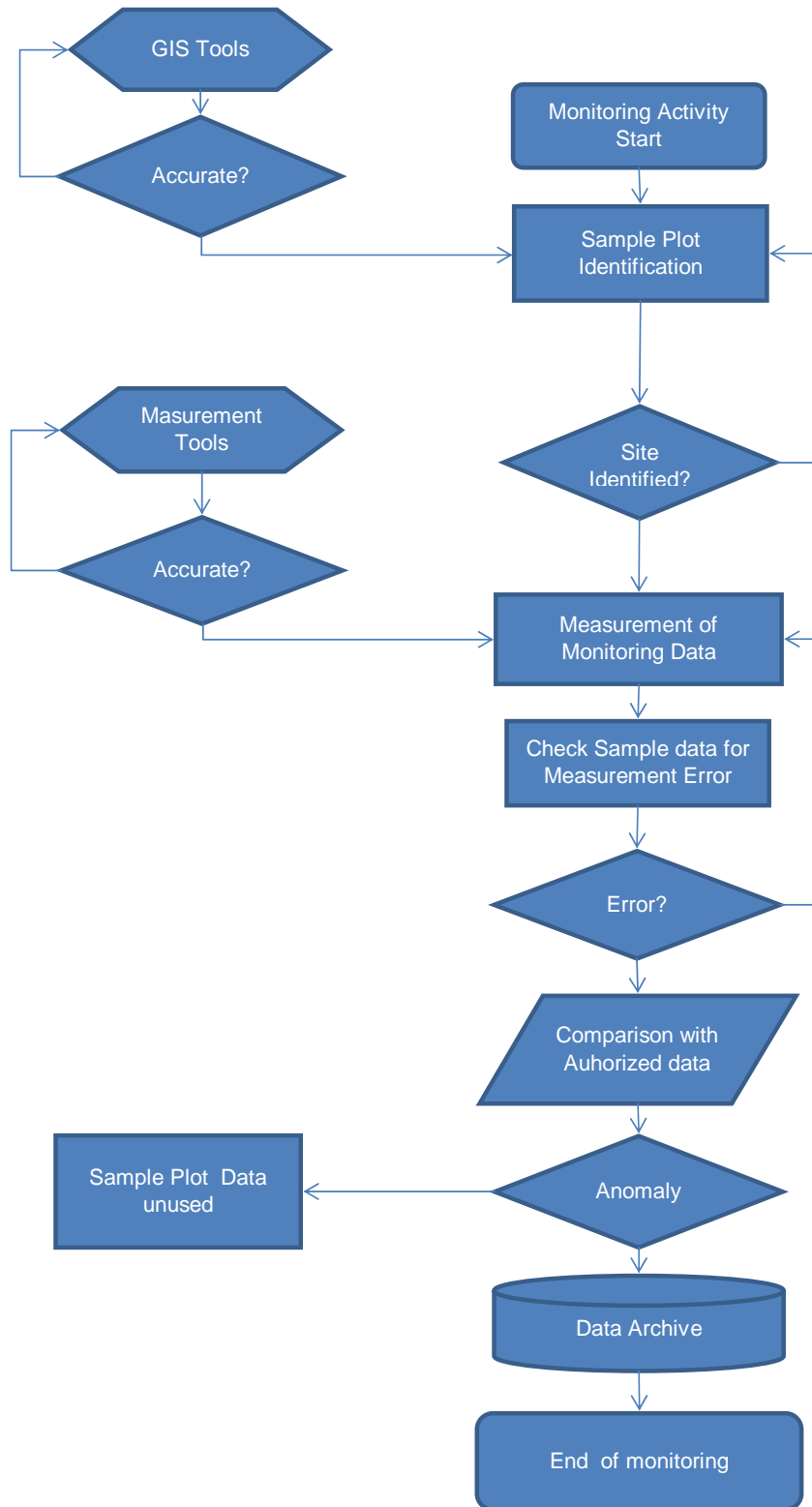


Figure 5.15 Flow of QC/QA in the project activity

5.11 Environmental and Socio-economic Impacts of the AR-CDM Project Activities

5.11.1 Environmental Impacts of the AR-CDM Project Activities

No significant negative environmental impact is foreseen. An environmental impact assessment is not required for reforestation projects with an area of less than 1,000 ha, according to Appendix I of Government Decree No.80/2006/ND-CP dated 9/8/2006 regarding detailing and guiding the implementation of a number of articles of the Law on Environmental Protection.

The proposed project will restore forest in degraded land. It is expected that the project will provide positive environmental impacts such as reducing surface run-off and erosion as a result of the vegetation cover to be developed and increasing soil fertility by increasing soil organic matter as well as by planting nitrogen-fixing leguminous tree species (*Acacia* sp.). In general, forest development is accompanied by minor risks of forest fire and disease. But the risk of forest fire will be minimized through increasing the level of awareness of the local people, organizing a forest fire control force at the village level, and patrolling that will be implemented by the proposed project. Pest management will be conducted through proper thinning and pruning, removal of branches infected by disease, and use of pesticides only when it is necessary.

5.11.2 Socio-economic Impacts of the AR-CDM Project Activities

The proposed project will have significant positive socio-economic impacts. It will contribute to an increase in the income of the local people through payment of economic incentives for planting/tending by the proposed project and sharing of benefits from thinned and harvested forest products and tCER. Green fodder production to be implemented outside of the project area will also lessen the workloads of the local people for grazing control and carrying fodder from far away. In addition, the proposed small-scale AR-CDM project is the first of its kind in the province as well as in Vietnam, and will draw much public attention because it is unique in terms of source of funding (from the private sector) and benefits (including CER). The ripple effect of the implementation of the proposed project will be large in the forestry sector of Vietnam.

5.11.3 Environmental and Social Considerations

Table 5.46 shows the scoping results of environmental and social considerations for the small scale AR-CDM pilot project in accordance with the guidelines of JICA. Table 5.47 briefly describes each environmental impact identified in Table 5.46. The project would not cause significant negative impacts on environment and socio-economy of the area. Most of the impacts predicted are positive ones.

This Study did not go beyond the scoping of environmental impacts because the Study has been implemented for capacity development of Vietnamese counterpart, no significant negative environmental impact of the pilot project is predicted, and the regulation of the Vietnamese government on EIA (Decree No.80/2006/ND-CP dated 9/8/2006) does not require reforestation projects of less than 1,000 ha in area to conduct EIA.

Table 5.46 Scoping matrix of environmental impacts of each project activity

	Item	Overall Rating	Project activity						
			Vegetation clearing	Land preparation	Fertilizer application	Tree planting	Tending & protection	Thinning:	Harvesting
Social Environment	Involuntary resettlement	-	-	-	-	-	-	-	-
	Local economy	A	A	A	A	A	A	A	A
	Land use and utilization of local resources	B	B	-	-	B	B	B	B
	Social institutions	-	-	-	-	-	-	-	-
	Existing social infrastructures and services	-	-	-	-	-	-	-	-
	The poor, indigenous and/ or ethnic people	A	A	A	A	A	A	A	A
	Misdistribution of benefit	-	-	-	-	-	-	-	-
	Cultural heritage	-	-	-	-	-	-	-	-
	Local conflict of interests	-	-	-	-	-	-	-	-
	Water usage or water rights and rights of common	-	-	-	-	-	-	-	-
	Sanitation	-	-	-	-	-	-	-	-
Infectious diseases such as HIV/AIDS etc.	-	-	-	-	-	-	-	-	
Natural Environment	Topography and geographical features	-	-	-	-	-	-	-	-
	Soil erosion	B	-	B	-	B	B	B	B
	Ground water	B	-	-	-	-	B	B	B
	Hydrological situation	B	-	-	-	-	B	B	B
	Coastal zone	-	-	-	-	-	-	-	-
	Flora, Fauna and biodiversity	B	-	-	-	B	B	B	B
	Meteorology	-	-	-	-	-	-	-	-
	Landscape	B	-	-	-	B	B	B	B
Global warming	-	-	-	-	B	B	B	B	
Pollution	Air pollution	-	-	-	-	-	-	-	-
	Water pollution	-	-	-	-	-	-	-	-
	Soil contamination	-	-	-	-	-	-	-	-
	Waste	-	-	-	-	-	-	-	-
	Noise and vibration	B	-	-	-	-	-	B	B
	Ground subsidence	-	-	-	-	-	-	-	-
	Offensive odors	-	-	-	-	-	-	-	-
	Bottom sediment	-	-	-	-	-	-	-	-
	Accidents	C	C	-	-	C	C	C	C

Note: Rating "A" : Significant environmental impact is predicted
 Rating "B" : Some impacts is predicted
 Rating "C" : Extent of impact is unknown so far
 "-" : No impact is predicted

Table 5.47 Brief Descriptions of Environmental and Socio-economic Impacts

Item	Rating	Description
Local economy	A	The implementation of the small scale AR-CDM pilot project will improve economic condition of the project participants by economic incentives for planting activities, sales of thinned and harvested forestry products and sales of CER. The impact is significant and positive one.
Land use and utilization of local resources	B	The pilot project implementation will improve the land use and utilization of the land resources in the project area by planting trees.
The poor, indigenous and/or ethnic people	A	Nearly 90% of the project participants are ethnic peoples (Muong, Dao and Thai). The pilot project will improve their economic condition as described in “local economy.” The impact is significant and positive one.
Soil erosion	B	The pilot project will induce both negative and positive impacts on soil erosion. Land preparation, planting, thinning and harvesting activities will disturb soil surface to some extent and induce soil erosion. But the erosion will be temporal in nature and be reduced as the land surface will be covered by tree canopy.
Groundwater	B	The pilot project will improve groundwater recharge through reforestation in bare and bush land.
Hydrological situation	B	The pilot project will stabilize hydrological situation in the downstream of the project area due to improved water retention capacity of the project area.
Flora, Fauna and biodiversity	B	The pilot project will convert the bare land and bush land into forests. The forests will be habitats of some small animals including bird and contribute to biodiversity of the area. But the impact is not significant because the project area is small.
Landscape	B	The landscape of the project area will be changed from bare land/ bush land to forests by the project implementation.
Noise and vibration	B	Thinning and harvesting of trees in the project area will cause noise because of the use of chainsaw. But the impact will not be significant because of the distance between the plantation sites and residents.
Accidents	C	The project might cause some minor accidents during vegetation clearing, planting, tending, thinning and harvesting due to misuse of equipment and carelessness of the project participants.

5.12 Financial Project Evaluation

5.12.1 Estimation of reforestation cost

Three (3) technical formulas and one (1) technical formula were prepared to estimate the unit cost of establishing one hectare of *Acacia mangium* and *Acacia auriculiformis* plantations, respectively, based on the condition of soils and vegetation in the sites as well as the distance from villages to the

project sites.⁹ Details of unit cost estimation are given in **Tables A10-2 to A10-8** in **Appendix 10** and summarized below. On average, about 90% of the total cost (Years 1-15) is labor cost. On the other hand, the cost of Years 1-4 accounts for about 80% of the total cost.

Table 5.48 Cost per hectare of plantation establishment

	Unit cost of Acacia mangium (mil. VND/ha)				Unit cost of Acacia auriculiformis (VND/ha)
	F4D3L4	F3D4L4	F4D5L2	Total/ Weighted ave.	
Area	61.36 ha	177.86 ha	41.15 ha	280.37 ha	28.12 ha
Cost in Years 1-4	11.88	11.48	14.58	12.02	13.14
Cost in Years 1-15	15.01	14.61	17.71	15.15	16.27
Total Cost (Years 1-15)				4,248	458
				4,706	

Note: The cost includes the cost of planting, tending and protection but does not include the cost of thinning and harvesting.

5.12.2 Estimation of the cost of green fodder production

The cost per hectare of green fodder production is estimated in **Table A10-12** in **Appendix 10** and summarized below. The project will subsidize the production cost of the first two years only apart from labor and tillage costs.

Table 5.49 Cost per hectare of green fodder production

	Labor & tillage costs	Farm manure cost	Fertilizer cost	Total
Year 1	5.1	6.0	4.5	15.6
Year 2	5.4	-	7.7	13.1
Total	10.5	6.0	12.2	28.7

5.12.3 Estimation of other project costs

- (1) Cost of thinning, harvesting and internal transport of timber

The cost of thinning, harvesting and internal transport of timber is estimated at unit cost per m³ of tinned and harvested chip wood and round wood (VND 100,000/m³) multiplied by the estimated volume. The estimated volume of chip wood and rounded wood is presented in **Table A10-16** in **Appendix 10** and summarized below:

⁹ The following regulations were referred to estimate the unit cost:

- ◆ Decision No. 295/KTLN dated 21 May 2003 on guideline of Hoa Binh DARD to develop cost estimate of silvicultural works within framework of the 661 project and projects using supporting budget in Hoa Binh province.
- ◆ Decision No. 38/2005/QĐ-BNN dated 6 July 2005 of MARD on issuance of technical and economic norms for forest planting, forest zoning for regeneration and forest protection.

Table 5.50 Cost per hectare of green fodder production

	Year 9	Year 10	Year 14	Year 16	Year 17	Total
Cost (mil. VND)	496	516	57	1,693	2,073	4,834

(2) Cost of extension and demonstration

The project will disseminate information on the project and provide extension services to the project participants on the techniques of reforestation, forest management, use of crop residue for livestock feed, among others. The cost was roughly estimated below:

Table 5.51 Estimated cost of extension and demonstration activities

	Cost of extension and demonstration (mil. VND)					
	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Technical guidance by local experts	9.0	9.0	9.0	9.0	9.0	45.0
Cost of materials	10.0	10.0	5.0	5.0	5.0	25.0
Total	19.0	19.0	14.0	14.0	14.0	70.0

(3) CDM-related expenses

The CDM-related expenses include the cost of validation by DOE, technical assistance by experts for monitoring and verification/validation, and the cost of verification, certification, and CER issuance. For the cost of validation and verification/certification/CER issuance, the minimum cost offered by a DOE was used (US\$ 15,000 = VND 240 million). The cost of technical assistance was estimated as shown in **Table A10-16 (2/2) in Appendix 10**. It ranges from US\$ 1,000 to 3,000 per year: higher at the initial stage and at the time of verification.

(4) Management cost of social fund

The management cost of social fund consists of the salary or allowance of the fund director, chief accountant, members of management and control boards of the fund and direct costs including the cost of equipment. The annual management cost of the fund is estimated in **Table A10-13 in Appendix 10**.

5.12.4 Estimation of project benefit and revenue

The project benefits and revenue are composed of the sales of forest products and t-CERs, donations, subsidy/external support, and bank interest. The sales value of forest products was estimated based on the estimated production of chip wood and round wood from thinning and harvesting and the estimated prices of them. The prices of different sizes of timber obtained from Hoa Binh Forest Company were used for the estimation of the sales value (**Table A10-14 in Appendix 10**). The t-CERs to be obtained at Years 5, 10, and 15 were estimated at 5,450, 18,608, and 37,546, respectively, as shown in **Table A10-11 in Appendix 10**. The value was computed using a very

conservative price of US\$2.0/t-CER. The estimation of the sales value of forest products and t-CERs is shown in **Tables A10-15 to A10-18 in Appendix 10.**

The project will rely on donations from Japanese companies for the implementation. The amount of donations required is estimated at 3.5 billion VND based on the assumed sharing of the project cost and benefit between the social fund and the project participants. The amount will be given on the installment plan in four years to reduce the financial burden of the donor. Meanwhile, the support from JICA for validation scheduled in 2009 is estimated at US\$15,000 (VND 240 million). The amount is also counted as revenue for the purpose of financial analysis of the project. The bank interest is also counted as revenue.

Table 5.52 Estimated benefits/revenue of the project

Items	Benefits/revenue of the Project (mil. VND)					
	Year 0 (2008)	Year 1 (2009)	Year 2 (2010)	Year 3 (2011)	Years 4-17 (2012-25)	Total
Sales of forest products	-	-	-	-	22,535	22,535
Sales of t-CERs	-	-	-	-	1,968	1,968
Capital/ donations	500	1,000	1,000	1,000	-	3,500
Subsidy/support	240	-	-	-	-	240
Bank interest	-	18	31	27	318	394
Total	740	1,018	1,031	1,027	24,821	28,638

See Tables A10-15 to A10-18 for detail.

5.12.5 Sharing of the cost and benefit of the project

It is envisaged that the Social Fund would implement and manage the project for at least the duration of AR-CDM credit period (16 years) under the proper sharing of the costs and benefits with the project participants. The Study team paid due attention to two points when determining the sharing ratio: (a) to provide sufficient cash incentives to the project participants at the initial stage of the project implementation following the suggestion of Cao Phong DPC; and (b) to minimize cash expenditures of the project participant as much as possible. The sharing ratio of the cost and benefit recommended by the Study team and agreed by the project participants are shown below:

Table 5.53 Sharing of the cost and benefit between Social Fund and project participants

Cost items		The Project (Social Fund)	Participants
Reforestation cost	Labor cost (Years 1-4)	30%	70%
	Material cost	100%	-
Green fodder production	Labor	-	100%
	Farm manure	50%	50%
	Fertilizers	100%	-
Thinning, harvesting and internal transportation		-	100%
Extension and demonstration		100%	-
CDM related cost		100%	-
Project management (Social fund)		100%	-
Items of benefits/products		The Project (Social Fund)	Participants
Forest products	Firewood	-	100%
	Chip wood	25%	75%
	Round wood	25%	75%
Carbon credit (t-CER)		50%	50%
Others (such as livestock benefit)		-	100%

5.12.6 Financial project evaluation

Financial internal rate of return (FIRR) of the project was calculated for the following two cases:

- Case-1: Counting the donation from a Japanese company and financial support for validation by JICA as benefits.
- Case-2: Exclusion of the donation from a Japanese company and financial support for validation by JICA from the benefit and addition of the assumed cost of PDD preparation (VND 100 million) in Year 0

In each case, the FIRR was calculated for different price of t-CER to understand its effect on the project feasibility. FIRR calculation of the two cases is shown in **Tables A10-19 and A10-20 in Appendix 10**. The results are presented below:

Table 5.54 Financial internal rate of return and NPV of the project

	FIRR		NPV of B-C (mil. VND) #	
	Case-1	Case-2	Case-1	Case-2
Price of t-CER: US\$2.0	15%	5%	1,456	-2,765
Price of t-CER: US\$5.0	18%	7%	2,229	-1,993
Price of t-CER: US\$10.0	22%	9%	3,517	-704

#: Net present value of benefit minus cost at 10% discount rate

In the case-1, FIRR of the project is high because of the large amount of donations sufficient to implement the project at the beginning of the project implementation. The donation from a Japanese company is counted as benefit here since the company would pay the money to the project to improve the public image of the company, i.e., the project would contribute to improving the public

image of the company. This is a new type of forestry benefit and the number of private companies in industrialized countries which support reforestation and forest protection has been increasing. On the contrary, FIRR of the project is low in case-2 because funds for the project implementation have to be borrowed from banks.

The effect of the change of t-CER price on the project feasibility is not significant since the benefit from t-CER is only a part of the total monetary benefit of the project, and the benefit from forest products would be much larger than that of t-CER.

5.12.7 Cash flow analysis of the project management body

The cash flow analysis of the Social Fund, the project management unit of the project, was conducted to see if the fund could implement and manage the project financially.

Table A10-15 in Appendix 10 shows three tables: the flow of the total project cost and revenue (benefit) on the top; cash flow of the fund in the middle; and cash flow of the project participants on the bottom. The cash flow table of the social fund is prepared considering the sharing ratio of the project cost and benefit explained in Section 5.12.5. The reforestation cost shouldered by the fund would be limited to 30% of the labor cost for four years after planting and 100% of material cost. The donation from a Japanese company is put under revenue. Similarly, the expected financial support of JICA for validation is also put under revenue. But the same amount is also put as a CDM-related cost under O&M cost.

The cash flow of the social fund is summarized below. With the donation from a Japanese company at an early stage of the project as well as expected support for validation by JICA, the fund could operate the project without financial burden. The shared benefit of t-CER (at year 6 and 11) and thinned timber (at year 9, 10 and 14) would also contribute to financially stable operation of the fund. Though the fund shows a deficit of 369 million VND at the end of Year 15, the fund could overcome the problem by, for example, borrowing funds from banks. The debt could be repaid next year by the shared benefit of harvested timber.

Table 5.55 Cash Flow of the Social Fund

(Unit: mil. VND)

Year	O&M Cost	Revenue	Cash Flow	Cash at end of year
Year 0 2008	374	740	366	366
Year 1 2009	767	1,018	251	617
Year 2 2010	1,102	1,031	-71	546
Year 3 2011	480	1,027	548	1,094
Year 4 2012	300	55	-246	848
Year 5 2013	490	42	-448	400
Year 6 2014	138	106	-32	368
Year 7 2015	138	18	-119	249
Year 8 2016	138	12	-125	123
Year 9 2017	138	304	166	289
Year 10 2018	407	323	-83	206
Year 11 2019	138	308	170	376
Year 12 2020	138	19	-119	257
Year 13 2021	138	13	-125	132
Year 14 2022	138	41	-97	35
Year 15 2023	407	2	-405	-369
Year 16 2024	122	2,860	2,738	2,369
Year 17 2025	145	2,833	2,688	5,057

5.12.8 Anticipate benefits of the project participants

The anticipated benefits to be received by the project participants were estimated under the following assumptions:

1) Average area of plantation established by a participating household is 1.0 ha.	<u>Basis of assumption</u> A total of 320 households would participate in the project and establish 308.5 ha (net area) of plantation and 30 ha of green fodder.
2) Average area of greed fodder planted by a participating household is 0.1 ha.	

The anticipated benefits (revenue) of the all project participants are estimated in **Table A10-15 in Appendix 10**. The anticipated benefit per participating household is calculated based on the above assumption and shown in **Table 5.56** and **Figure A10-1**. A participating household could receive material supply equivalent to 3.14 million VND and also 61.9 million VND of incentive and shared benefit in cash by the time of harvesting all the plantations in Year 17. Each household could receive 3.11 million VND of cash incentives for planting and tending activities on average.

Table 5.56 Anticipated benefit of the project per household

	Material support (mil. VND)		Cash incentive and benefit (mil. VND)		
	Reforestation	Green fodder production	Planting and tending	Shared benefit of forest products	Shared benefit of t-CER
Years 1-5	1.71	1.40	3.11	-	-
Years 6-10	-	-	-	5.90	0.28
Years 11-17	-	-	-	48.89	2.91
Total	1.71	1.40	3.11	54.79	3.19
	3.14		61.09		

Note: The figures indicate the anticipated benefit for 1.0 ha of reforestation and 0.1 ha of green fodder production

Table 5.57 indicates the estimated value of labor to be spent on the project implementation per household. The total value of the labors per household is estimated at 30.65 million VND, about a half of the anticipated cash incentive and benefit. A labor cost of 39,115 VND per day is used for the estimation of the labor value. Assuming the opportunity cost of labor in the project area may be smaller than that, the project would provide a good return to the participants by reforestation of the unused bare land.

Table 5.57 Estimated value of labor to be spent on the project her household

	Value of labor (mil. VND)			
	Planting and tending	Green fodder production	Thinning, harvesting and internal transportation	t-CER acquisition
Years 1-5	10.51	1.47	-	-
Years 6-10	1.42	-	3.28	-
Years 11-17	1.58	-	12.39	-
Total	13.52	1.47	15.67	-
	30.65			

5.13 Implementation Schedule of the Pilot Project

Figure A10-2 in Appendix 10 shows the implementation schedule of the project. Preparation for project implementation will be done in 2008 including the establishment of the project management unit (Social Fund), conclusion of an agreement with the donor (Japanese company), organization of the participant, and preparation of the detailed work plan of the project. The planting activities will be conducted in two years, 2009 and 2010, and tending will continue for three years after planting. The planting of green fodder will also be done in two years from 2009.

Validation of the pilot project is scheduled in the 3rd quarter of 2008. The 1st verification and certification is planned at Year 5 (2013) and the 2nd and 3rd ones in Year 10 (2018) and Year 15 (2023). The credit period of the project is set at 16 years, a year after the 3rd verification.

It is expected that the project will continue a second rotation of reforestation after harvesting trees in Year 16 and 17.

CHAPTER 6 VISION AND ACTION PLANS FOR AR-CDM PROMOTION

6.1 Recent Movements on Climate Change Mitigation

6.1.1 Growing awareness of global warming

Awareness of global warming is growing. Not only governments but the general public recognizes that climate change and its impact are an urgent topic. Because the developing world is vulnerable to climate change, this topic is widely promoted and the Vietnamese government also launches TV commercials to call for energy saving through daily habits. While these programs' contribution is hard to measure, the movements have accelerated after COP13 in December 2007 and are entering the first commitment period (2008-2012).

6.1.2 Intensified discussion on post Kyoto regime

The first commitment period of the Kyoto protocol has started. The successive framework for the Kyoto Protocol is contentious, particularly the point of whether reduction targets should be set for major emitters among the developing nations namely India and China. A comprehensive reduction target plans developed by EU or other developed nations are highly challenging, and sharing burden with developing countries is unavoidable given the economic growth trajectory of developing nations.

Substantial discussions were launched in COP13 held in December 2007, reaching agreement between developed and developing nations were even harder than Kyoto Protocol. Nevertheless, it was agreed on a two-year process called "Bali roadmap" to finalize post-Kyoto regime by December 2009. However, the uncertainties of the successive framework might draw back the Kyoto mechanism based projects and also cool down the investors' sentiment for project development.

6.1.3 Expansion and Linkage of Emission Trading

Efforts to mitigate global warming through market based mechanisms began to be implemented in Europe from 2005 and entered into a 2nd phase from 2008. The contribution of emission trading is difficult to measure and not analyzed, yet. Since the EU-ETS allows the use of CERs from CDM to achieve reduction targets, almost 70% of CERs are purchased by European players. The price of CERs is also largely driven by the price of EU allowances. The development of trading mechanisms is spreading to other regions and nations. In October 2007, the International Carbon Action Partnership, ICAP was launched with the participation of 21 nations and states. The partnership intends to discuss linkage and compatibility of regional based emission trading schemes and seek solutions. These efforts induce expansion of CER demand globally and assist promotion of CDM project development as a whole.

6.2 Present Forest Policies and Programs Related to AR-CDM

(1) Five-Year Socio-economic Development Plan 2006-2010

The five-year Socio-economic Development Plan 2006-2010 specifies directions and tasks for a 10 year (2001-2010) strategy based on the accomplishments and assessment of the previous five year (2001-2005) plan.

The country maintained rapid and stable economic growth in the previous five years (2001-2005). The estimated annual average growth rate of GDP during the period was 7.5%, reaching the target set for the five year plan of 2001-2005. In the agriculture, forestry and fishery sectors, the growth in production value (5.5%) during the five year period (2001-2005) was higher than the planned target of 4.8%. More specifically, the production value of agriculture went up by 4.2%, forestry up by 1.3%, and fishery up by 12.2%. But, the average annual growth rate of GDP (3.8%) in the sector was lower than that of production value (5.5%) due to high production costs.

The growth rate of production value in the forestry sub-sector was low compared with other sub-sectors mainly because the government focused attention on reforestation and the preservation of natural forests in 2001-2005. Though the contribution to the national economy was small during this period, forest coverage rose from 33.7% in 2000 to 37.4% in 2005 (target: 38-39%). Also there was a gradual shift in forest management and development from State management to the participation of various economic sectors.

There was a shift in the labor structure along with the shift of economic structure to industrialization and modernization. The ratio of industry and construction in economic and labor structures in 2005 increased to about 41% and 17.9%, respectively, while the ratio of the agriculture, forestry, and fishery sectors decreased to about 20.9% and 56.8%.

Table 6.1 Selected Economic Indicators

Indicators	1995	1996-2000	2001-05	2006-10 (target)
1. Economic growth rate (GDP)	-	6.9	7.5	-
<i>Of which</i>				
Agriculture, forestry and fishery	-	4.4	3.8	-
Industry and construction	-	10.6	10.2	-
Services	-	5.7	7.0	-
2. Growth rate in production value				
Agriculture, forestry and fishery	-	5.8	5.5	-
Industry	-	13.9	15.9	-
Services	-	6.8	7.6	-

Indicators	1995	2000	2005	2010 (target)
3. Economic structure (GDP)	100.0	100.0	100.0	100.0
<i>Of which</i>				
Agriculture, forestry and fishery	27.2	24.5	20.9	15-16
Industry and construction	28.8	36.7	41.0	43-44
Services	44.0	38.8	38.1	40-41
4. Labor structure	100.0	100.0	100.0	100.0
<i>Of which</i>				
Agriculture, forestry and fishery	71.1	68.2	56.8	50.0
Industry and construction	11.4	12.1	17.9	-
Services	17.5	19.7	25.3	-

Source: The Five-Year Socio-Economic Development Plan 2006-2010, MPI (March 2006)

The five-year plan (2006-2010) does not specifically refer the plan for CDM or AR-CDM implementation. The following development orientations are related to AR-CDM:

- (i) Fundamentally reform the forestry sector with stronger links between protective and economic functions,
- (ii) Reduce forest areas directly managed by State agencies,
- (iii) Plant forest to increase forest coverage (43%) and to establish raw material supply areas for paper mills and artificial plank factories, process wood into export products, enabling forestry workers to benefit from forest protection and development,
- (iv) Organize examination and inspection of product quality to protect the consumers and guarantee the prestige of Vietnamese agricultural and forestry products exported,
- (v) Improve the Five Million Reforestation Program (5MHRP) in the orientation of multi-purpose afforestation both for wood and protection of the ecological environment, and
- (vi) Complete land allocation and forest allocation mainly for people and other economic sectors.

(2) Five Million Hectare Reforestation Program

The Government of Vietnam launched the Five Million Hectare Reforestation Program (5MHRP) in 1998 with the Prime Ministerial Decision No. 661/QD-TTg (dated 29th July 1998). The program aims to achieve three major objectives as follows:

- (i) To speed up reforestation: re-green bare land; protect existing and new forests ; increase the protective function of the forests and protect the environment and biodiversity; create favorable conditions for sustainable national development; and increase the forest coverage ratio of the country by 43%,
- (ii) To create areas for producing raw materials necessary for the development of the timber processing industry, and

- (iii) To create employment, increase incomes of local people and thus contribute to hunger elimination and poverty reduction, create conditions to secure livelihood, and ensure national defense and security.

The specific target of 5MHRP up to 2010 was to establish:

- (i) About 2.0 million hectares of protection and special-use forests composed of 1.0 million hectares of newly established forests and 1.0 million hectares of rehabilitated forests,
- (ii) About 2.0 million hectares of new production forest, and
- (iii) About 1.0 million hectares of industrial trees and fruit trees.

The 5MHRP has been implemented mainly by management boards established at provincial and district levels.¹ These management boards prepare plans and detailed designs and contract out project activities to State Forest Enterprises, management boards of protection forest, forest companies, communities and individuals. The accomplishments of the 5MHRP from 1998 to 2006 are shown below.

Table 6.2 Accomplishments of 5MHRP by 2006

Reforestation	Program Target (ha)	Accomplishment (ha) (1998-2006)	%
Protection and Special-use forest (<u>New reforestation only</u>)	1,000,000	705,300	71%
Production Forest	2,000,000	777,600	39%
Industrial Trees and Fruit Trees	1,000,000	115,800	12%
Total	4,000,000	1,598,700	40%

Prime Minister Decision No.100/2007/QD-TTg dated 6th July 2007 sets the revised reforestation target in the period of 2006-2010: 250,000 ha for protection and special-use forest, 750,000 ha for production forest, and zero for industrial trees and fruit trees.

The cost of each contract is determined by the detailed design. But the government sets the ceiling cost for each activity. The Prime Ministerial Decision No.210/2006/QD-TTg dated 12th September 2006 indicates the principles of the State's investment for 2007-2010. The Decision indicates slight increase of the ceiling cost for the activities under 5MHRP compared with the previous one: 5.0 million VND per hectare for new reforestation in protection and special-use forest land, 2.0 million VND per hectare for new reforestation in production forest land, 1.0 million VND per hectare for assisted natural regeneration (ANR) and 100,000 VND per hectare per year for protection of existing forest. The ceiling cost for reforestation in protection and special-use forest land is further increased to about 6.0 million VND/ha by the Prime Minister Decision No. 100/2007/QD-TTg dated 6th July 2007.

¹ MARD, Ministries of Defense, Security and Industry and Youth League also have directly implemented the program.

According to MONRE, there is no restriction on the use of public funds for CDM. CDM projects would be evaluated by DNA based on exclusive and priority criteria as mentioned in Sub-section 2.1.3. Therefore, the fund could be used for AR-CDM projects as long as the projects satisfy the criteria.

(3) National Forest Strategy for 2006-2020

The National Forestry Strategy (NFS) for 2006-2020 was approved by the Prime Ministerial Decision No.18/2007/QĐ-TTg dated 5th February 2007. The overall objective is to establish, manage, protect and use 14.3 million hectares of forest land sustainably by 2020 while ensuring wider participation from various socio-economic sectors in forest development to increase their contribution to socio-economic development, environmental protection, bio-diversity conservation and provision of environmental services in order to reduce poverty and to improve the livelihood of rural people in mountainous areas. The specific objectives and targets of NFS are shown below:

Table 6.3 Specific objectives and targets of NFS

Specific objectives	Targets by 2020
<p>1. Economic objectives: Existing natural forests should be well-managed; forest plantations should be expanded and their productivity should be improved; agroforestry extension should be strengthened; bare land should be used more effectively to develop forest. Processing of timber and NTFP must be more competitive and sustainable to meet the domestic and export demands.</p>	<ul style="list-style-type: none"> ◆ Increase 4-5%/year in forest production growth, ◆ Maintain 2.3-2.4 mil. ha of industrial plantations and 4.0 mil. ha of natural forest, ◆ Plant 200 mil. trees/year of scattered trees, ◆ Produce 20 mil. m³/year of timbers including 10 mil. m³/year of large timber, ◆ Export US\$ 4.0 bil. of forest products including US\$3.2 bil. of timber products and US\$0.8bil. of NTFP, ◆ Improve environmental services of forest (CDM, eco-tourism, erosion prevention, watershed protection, etc.) by US\$9.0 bil., and, ◆ Certify 30% of production forest area for sustainable forest management.
<p>2. Social objective: Livelihood of forest-dependent people should be improved through socialization and diversification of forest activities. Employments should be generated, capacity and awareness of people should be improved particularly minor groups, poor households and women in remote areas so that step by step they could basically live on forest and contribute to poverty alleviation, social security and national defense.</p>	<ul style="list-style-type: none"> ◆ Generate 2.0 mil. of labors, ◆ Improve income and contribute to poverty alleviation, ◆ Completely allocate and lease forest/forest land to forest owners by 2010, and ◆ Increase vocationally trained workers up to 50% with special focus on ethnic groups, poor households and women in remote and isolated area.

Specific objectives	Targets by 2020
3. Environmental objective: Forest protection, nature protection and bio-diversity conservation should be well undertaken to effectively contribute to protection of watershed, coastal and urban area, mitigation of natural disaster, prevention of erosion, and protection of water sources while creating income from environmental services (environmental fee, CO ₂ market, eco-tourism, etc.)	<ul style="list-style-type: none"> ◆ Increase forest cover by 43% by 2010, paying attention to forest quality, ◆ Efficiently manage and utilize 5.7 mil. ha of protected forest and 2.3 mil. ha of special use forest, ◆ Minimize forest violation, and ◆ Develop payment mechanism for environmental services of the forest starting early 2006 to re-invest in forest management and protection.

Table 6.4 Orientation on forest plan for 3 forest categories (mil. ha)

Land categories	2004	2010	2020
Total area planned for forestry	16.2	16.2	16.2
1. Permanent national forests:	<u>12.3</u>	<u>14.0</u>	<u>14.3</u>
a. Protection forest	5.9	5.7	5.7
b. Special use forest	1.9	2.3	2.3
c. Production forest	4.5	6.0	6.3
2. Other production forest areas	=		<u>1.9</u>
3. Non-forested area	<u>3.9</u>	<u>2.2</u>	<u>0</u>
Forest cover %	36.7%	43%	48%

In NFS, AR-CDM is expected to contribute to the improvement of payment mechanisms for the environmental services of forests. There are no quantitative targets mentioned in NSS for AR-CDM.

(4) Vietnam Agenda 21

The Prime Minister issued the Strategic Orientation for Sustainable Development in Vietnam (so-called Vietnam Agenda 21) by the Decision No.53/2004/QD-TTg dated 17th August 2004. It aims to sustainable development of the country on the basis of close, reasonable and harmonious coordination of economic and social development and environmental protection. It is the framework strategy composed of broad orientations, which are the legal foundation for the Ministries, sectors, localities, organizations and relevant individuals to follow and express Vietnam's commitments to the international community.

The Agenda 21 is composed of five parts:

Part 1: Sustainable development, Vietnam's anticipated path

Part 2: Priority economic areas for sustainable development

Part 3: Priority social areas for sustainable development

Part 4: Priority areas in natural resource utilization, environmental protection and pollution control for sustainable development

Part 5: Sustainable development implementation arrangements

In the part 4, the Agenda 21 states clearly that the implementation of measures for mitigating climate change, limiting the negative impact of climate change, and preventing and controlling natural disasters is a priority activity related to UNFCCC. It also mentions the followings as priority activities aiming at prevention of land degradation, effective and sustainable utilization of land resources, and forest protection and development:

- (i) Continuously promote land and forest allocation to households and communities
- (ii) Formulate, issue and implement policies that attract investment in forest development and protection
- (iii) Protect and develop forest resources with the active participation of the community
- (iv) Assist people in planting and protecting forests using forest land allocated
- (v) Encourage livelihood improvement through sustainable community-based use and management of forests

6.3 Institutions Relevant to AR-CDM

6.3.1 Administrative/Governmental Bodies to Promote AR-CDM

(1) Central Government: MARD

DOF of MARD is primarily responsible for the promotion of AR-CDM activities. DOF is appointed as an AR-CDM focal point and has communicated with DNA for AR-CDM project's approval processes. DOF is also responsible for implementing forest recovery under 661 program particularly with regard to comprehensive forest planning and budgetary matters.

(2) Provincial Government: DARD

Provincial government rather than the central government would play a pivotal role in project identification and management due to proximity to the project site and jurisdictional responsibility. For example, provincial DARD (Department of Agriculture and Rural Developments) could assist project identification and oversee financial and corporate management of AR-CDM projects to some extent. Matters related to environment management are fall under the Department of Natural Resources and Environment (DONRE).

(3) District and Commune People's Committee

People's committee is a governing and decision-making body at district and commune level. The Project needs to go through people's committee regardless, in order to secure project sites, consult with local people and ask for support and cooperation to carry out AR-CDM. Given its limitation in the capacity to carry out CDM project, trainings and technical assistance should be provided by consultants or appropriate government agencies with respect to monitoring of the project and maintaining CDM project integrity.

6.3.2 Research Institutes and Universities

VFU (Vietnam Forestry University) and FSIV (Forest Science institute in Vietnam) is the counterpart of the JICA Study. They have wide range of capacity in forestry research and development and human resources to deal with AR-CDM project formation and implementation. Specifically, the following data, skills and know-how of VFU and FSIV are vital for AR-CDM project formation.

- Data on baseline carbon stock by vegetation types
- Data on growth rate (MAI) and carbon stock by tree species
- Determine suitability of forest species depending on land characteristics
- Biomass measurement to determine baseline carbon stock of the project
- GPS survey

There are two other universities which have a Forestry Faculty: Nong Lam University in Ho Chi Minh City and Hue Agriculture and the Forestry University in Hue. The Forestry Faculty of Nong Lam University participated in Capacity Development Project for CDM in Vietnam.² The universities participated in AR-CDM seminar organized by the JICA Study team in November 2007.

6.3.3 International Financial Institutions and Aid Agencies

SNV, Netherlands development organization, has been active in AR-CDM field in Vietnam and has assisted A Luoi district PC of T.T. Hue province in developing a normal scale AR-CDM project.

The World Bank purchases tCER/ICERs through its Bio Carbon Fund in elsewhere. The project formation and its development is a highly encouraged. Asia Development Bank is financing a large scale forestry project in central highlands. The ADB project has a plan to develop small scale AR-CDM project.

These IFIs (International Financial Institutions) and aid agencies have substantial roles in AR-CDM aside from providing fund to the potential projects. Because possible project participants of

² The project was implemented in 2003-2005 by UNEP Risoe Center on Energy, Climate and Sustainable Development with the fund of the government of Netherlands through UNEP. The project assisted in establishment of CNECB, developed a guideline on identification, formulation and registration of CDM projects for Vietnam, established website, edited CDM booklet, organized workshops and training courses, etc.

AR-CDM do not have proper capabilities unlike those of energy-base CDM projects, these organizations are expected to assist in project management capabilities until the project participants have an autonomous management capacity.

6.4 Potential of AR-CDM Development in Vietnam

6.4.1 Potential benefits of AR-CDM in Vietnam

There is a tendency that people expect relatively large additional economic benefits from AR-CDM and do not fully recognize the risks and costs involved. For promotion and development of AR-CDM, it is necessary to clearly recognize the benefits as well as constraints and risks described below.

(1) International contribution to global environmental protection

Vietnam ratified the United Nation Framework Convention on Climate Change (UNFCCC) on 16th November 1994 and Kyoto Protocol (KP) on 25th September 1997. By implementing CDM activities, Vietnam can express its willingness to contribute to global environment protection. Promoting and implementing CDM projects in Vietnam would enhance the Vietnamese position in international arena regarding environmental protection.

(2) Additional investment (from foreign countries)

Implementing CDM projects would increase investment opportunities by foreign countries, particularly Annex I countries.

(3) Technology transfer (from foreign countries)

Technology transfer is one of the merits for host country in implementing CDM projects. Unlike energy sector CDM, few particular new technologies are noted at present for AR-CDM. But the emergence of new technology applicable to AR-CDM in the near future should be taken into account.

(4) Environmental protection in Vietnam

AR-CDM is made up of reforestation projects. It would increase forest cover in bare lands and denuded hills and contribute to watershed protection, biodiversity restoration, erosion reduction, and prevention of land slide.

(5) Additional economic benefits through the sale of CER acquired

This is a typical economic benefit of CDM projects. But the level of additional economic benefit depends on the price of tCER/ICER and the transaction cost required for CDM process. It is quite difficult to project the price of tCER/ICER, the transaction cost and the benefit. It is, therefore, not recommendable to develop AR-CDM project focusing on the economic benefit alone.

(6) Creation of jobs

Formulation and implementation of AR-CDM projects will require the technical assistance of consultants with PDD preparation, interaction with investors and DOE, and monitoring of biomass removals. Implementation will also require the setting up of a project management body with part-time staff.

(7) Provision of short- and long-term incomes to rural communities

Rural communities participating/engaging in the project implementation could receive wages for planting and tending activities. They could also obtain incomes from forest and agro-forest products from AR-CDM projects like regular reforestation projects.

(8) Improvement of forestry projects in terms of mapping, stakeholder participation, benefit sharing and monitoring

Many regular reforestation projects have been implemented with inadequate planning, inaccuracy in mapping, insufficient stakeholder participation and regular monitoring, and unclear benefit sharing between project participants and the project proponents. Such projects would likely fail to achieve the objectives because the project beneficiaries (local people) do not feel ownership of the project and valuable data and information from the project like maps, growth data of trees, and socio-economic impacts of the project could not be accumulated. On the contrary, AR-CDM projects are required to ensure the fulfillment of such aspects in their planning and implementation stages. Therefore, AR-CDM implementation would contribute to gradual improvement of these aspects in regular forest projects as a ripple effect.

(9) Improvement in accuracy of data on forest and land

As mentioned in (8), AR-CDM projects would be planned and implemented more deliberately than regular forestry projects particularly on map preparation and monitoring of tree growth. This would result in the production of accurate data on forest and land use from the project.

(10) Providing lessons learned to design GHG emission reduction policies and measures

The fourth assessment report of IPCC (International Panel on Climate Change) made public in 2007 states with increased confidence that global warming over the last 50 years is due to the observed increase GHG concentration. It also states that continued GHG emissions at or above current rates would cause further warming and induce many changes in the global climate system during the 21st century that would very likely be larger than those observed during the 20th century. At present, only Annex-I countries have targets for GHG emission reduction under the Kyoto Protocol. However, pressure on developing countries to reduce domestic GHG emissions has been increasing due to the emergent need for GHG emission reduction.

The land use, land use change and forestry sector (LULUCF) is a significant source of GHG emissions, while monitoring and reducing GHG emissions in the sector is the most difficult.

Implementing AR-CDM projects could provide good lessons for designing GHG emission reduction policies and measures in the LULUCF sector in Vietnam.

6.4.2 Types of AR-CDM projects suitable in Vietnam

Forest and forest land in Vietnam is classified into production forest, special-use forest, and protection forest. Some of them, especially production forest, have been gradually allocated to individuals. Others are mainly owned by the management boards of special-use forest and protection forest and district and commune people's committees.

Considering fragmentation of the lands suitable for reforestation and of the land ownership of forest land, development of small-scale AR-CDM projects³ is recommended in Vietnam rather than normal scale AR-CDM. The sample methodology applied to small-scale AR-CDM is another of the main reasons for recommending it.

Two types of small-scale AR-CDM project could be envisaged in Vietnam:

- Projects in production forest land with longer rotation
- Projects in protection and special-use forest land.

(1) Projects in production forest land

In general, production forests in Vietnam have short rotation cycle of 7 to 10 years. But for AR-CDM, longer rotation is better in terms of the amount of credit. It is likely that AR-CDM projects with short rotation of trees could not recover the CDM transaction cost due to smaller amount of CER the project could obtained. The charts below show the estimation of CER in production forest projects with short and long rotations, respectively, assuming that the condition of baseline carbon and tree growth is the same as that of the pilot project. They indicate that the CER obtained from a short rotation project is less than half of that of a long rotation project.

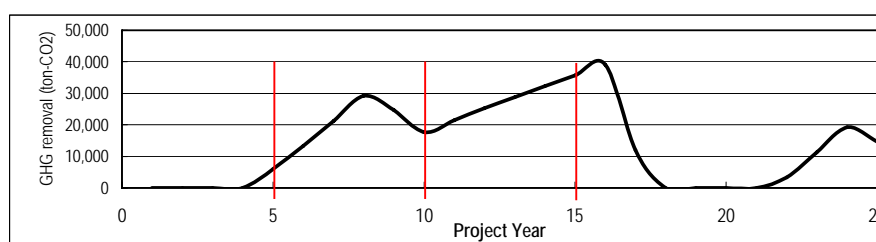
Production forest (1)

Acacia mangium: 300 ha

15 years rotation

Credit period: 16 years

t-CER = 59,297



Production forest (2)

Acacia mangium: 300 ha

8 years rotation

Credit period: 16 years

t-CER = 25,334

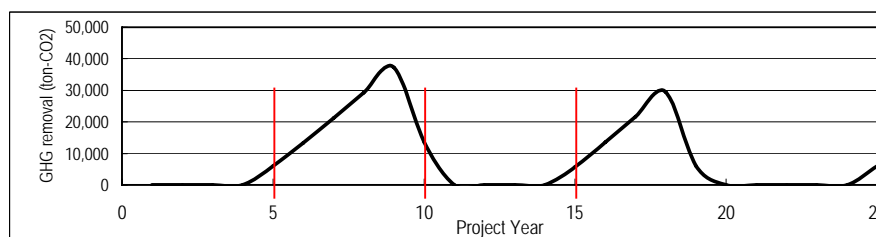


Figure 6.1 Estimation of t-CER in projects for production forest with long and short rotation

³ The limit of net GHG removal by a small-scale AR-CDM project was changed from 8.0 kt of CO₂ per year to 16.0 kt of CO₂ per year by COP/MOP in December 2007.

There are alternatives for the management body of the projects as mentioned in Section 5.8.2. The developers should choose proper organization considering the project specific characteristics.

(2) Projects in protection and special-use forest lands

Many protection and special-use forests have been managed and protected by the state agencies, the management boards. If AR-CDM projects are developed in protection and special-use forest and managed by the boards, the boards could lessen their reliance to the state budget for operation. The hypothetical CER estimation is shown below. If t-CER is selected, the project proponent could receive the credit every five years.

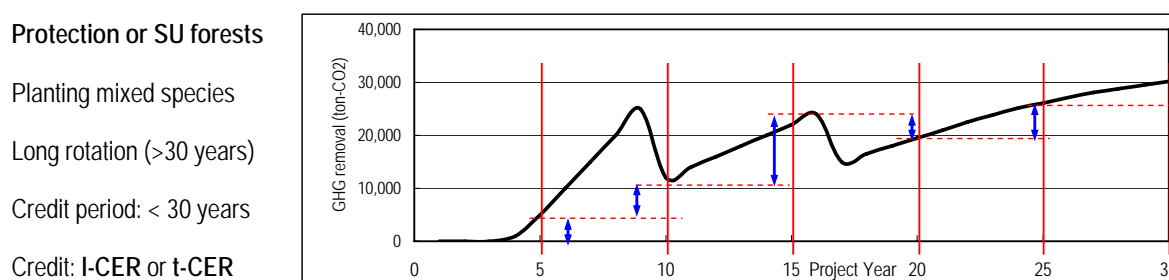


Figure 6.2 Estimation of t-CER for the projects in protection and special-use forests

Regarding the investment cost of the projects, it is not easy to attract private investment for AR-CDM because of the long gestation periods and the risk inherent in forestry projects. Instead, public funds including ODA could be used for development of AR-CDM projects under loan-funded forestry projects unless it causes ODA diversion.

6.4.3 Potential of AR-CDM development in Vietnam

During the period from 1980-1990, forest area in the country decreased at the rate of more than 100,000 ha/year on average. In 1990, there was only 9.3 million ha of forest land with forest cover - only 27.2% of forest coverage. Since 1990, the area of rehabilitated forests and plantations has increased via re-generation and the implementation of reforestation programs funded by the government such as the 327 Program (1993-1997) and the 661 Program (Five Million Hectare Reforestation Program, 1998-2010). By 2006, the total forest area of the country was 12.8 million ha, including 10.3 million ha of natural forest and 2.4 million ha of plantation forest.

Table 6.5 Forest Area by Functional Classification (2006)

Land category	Forest Area by functional classification (ha)			
	Total	Special-use	Protection	Production
I. Forested land	12,797,409	2,026,476	6,004,960	4,765,973
A. Natural forests	10,373,616	1,937,123	5,179,394	3,257,099
B. Plantations	2,423,793	89,353	825,566	1,508,874
II. Bare land and denuded hills	5,649,061	375,069	3,145,118	2,128,875
1. Ia (grass, reed)	1,626,305	118,571	951,858	555,876
2. Ib (bush, scattered timber, bamboo)	1,549,258	91,776	818,109	639,373
3. Ic (regenerated timber...)	1,723,605	127,778	980,065	615,761
4. Others	438,435	36,787	254,722	146,926

Source: DOF/MARD 2007 (unofficial/tentative figures). See Table A11-1 in Appendix 11 for detail.

Though forest area in the country has increased constantly in the recent years, the forests are still under great pressure from the following and fail to fulfill the requirements of environmental protection⁴:

- Long wars have destroyed several forest ecological systems.
- Demands for fuel wood and timber for the market added to the huge profits that can be made from illegal logging, have led to arbitrary extraction, disregarding biological principles and this has caused losses to forest resources, especially old jungles and watershed forests.
- Nomadic lifestyles, slash and burn practices, and the high competitiveness of agricultural production in relation to forestry have caused forest areas to shrink and forest quality to degrade. In coastal regions, the destruction of mangrove forests to make way for shrimp farms has also increased.
- Forest fires are frequent, devastating thousands of hectares every year.
- Logging and timber production technology is backward and barely efficient. On the other hand, non-timber alternative products cannot satisfy the demands of consumers. Therefore, forests continue to be cut down.

According to **Table 6.5**, not all but some of 5.6 million ha of the bare land and denuded hills are potential areas for reforestation in the future. Among them, bare land IA and IB (3.2 million ha in total) could be subject to AR-CDM due to lower baseline biomass. Northwest, northeast, north central, south central coastal and central highland regions have big potential for forest development including AR-CDM.

Table 6.6 Area and proportion of bare land (IA+IB) in 3 categories of forest lands

Regions	Special-use forest		Protection forest		Production forest	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
1. Northwest	93,765	31%	745,991	32%	148,838	56%
2. Northeast	24,638	6%	290,551	13%	370,316	19%
3. Red river basin	6,285	13%	24,295	30%	3,394	31%
4. North central	27,365	4%	246,488	16%	232,890	18%
5. South central coastal	24,758	9%	329,346	19%	159,383	20%
6. Central highlands	14,089	3%	115,107	12%	268,207	13%
7. Southeast	10,070	6%	12,192	4%	2,893	1%
8. Mekong delta	9,377	12%	5,998	6%	9,329	4%
Total	210,348	9%	1,769,967	19%	1,195,249	17%

Source: DOF/MARD 2007 (unofficial/tentative figures). See Table A11-2 in Appendix 11 for provincial detail.

The area readily available for small-scale AR-CDM development must be much smaller than the total area in the above (3.2 million ha) due to (a) poor accessibility to the sites, (b) land eligibility problem, (c) additionality problems, (d) fragmentation of the sites, (e) unclear ownership of the lands, etc. There is no way to estimate the area where AR-CDM could be developed based on the

⁴ Vietnam Agenda 21

available data. Visiting an area with high potential and contacting the forest department of local governments to collect information on the area for reforestation are the starting points for AR-CDM development.

6.5 Constraints for AR-CDM Development and Promotion in Vietnam

The constraints for AR-CDM development and promotion in Vietnam are described below. They are common to developing countries in Southwest Asia.

6.5.1 Constraints for forest development in general

(1) Long gestation period despite of large initial investment

Forest development is costly particularly at the initial stage and the investment does not generate benefits quickly. Therefore, commercial viability of the forest development is low despite of the high contribution to sustainable development. On the other hand, most rural people are poor and thus have a tendency to invest in farming because they can receive benefits from it much earlier and more quickly than investment in forest.

(2) Risks of forestry investment

Forestry investment is subject to many risks caused by natural and man-made disasters such as forest fire, land slides, and typhoons. Therefore, private investment in the forestry sector is still limited.

(3) Poor access to reforestation sites

Because of the government's reforestation programs, much land where access to the sites was relatively easy and available for planting has been planted already. There is a large area of unused bare land in Vietnam. But most of the land is located in remote areas with no or limited access and have a limited population. This makes reforestation more costly and hardly feasible economically. Unless the government invests in or provides financial support for forest development, reforestation in such land cannot be achieved.

6.5.2 Constraints specific to AR-CDM

(1) Uncertain additional economic benefits of AR-CDM

CERs from AR-CDM are temporal in nature due to the non-permanence of AR-CDM. Hence, the projected price is low at present. It is hardly to say that the benefits from the sale of CER could be higher than the transaction cost for developing small-scale AR-CDM, such as for PDD preparation, validation, verification, and monitoring.

(2) High transaction cost

The costs for PDD preparation, validation and verification are high because the project participants rely on experienced consultants for PDD preparation and all DOE right now are foreign-based companies.

(3) Ambiguity of AR-CDM methodology

The AR-CDM methodology approved by CDM-EB ambiguous because it requires qualitative and professional judgments in some parts. For example, even if developers assess the additionality of proposed projects following the approved methodology, they cannot be confident of whether the DOE will accept their assessment or not. Land eligibility is explained following the method mentioned in the approved methodology, either by satellite data analysis or PRA. But developers do not know how the DOE assesses it. Another example is with the accuracy of estimation. The approved methodology suggests that developers estimate GHG emission reductions conservatively and as much as accurately. Developers attempt to simplify field surveys such as stratification and sampling of baseline biomass measurement to have conservative results.

(4) Lack of consultant with experience in PDD preparation and validation

Many Vietnamese foresters and forestry consultant have knowledge about AR-CDM. But very few of them have experience in preparing PDD of AR-CDM projects and none of them in involving in validation.

(5) Lack of experiences on implementing AR-CDM projects and marketing of t-CER/ I-CER

AR-CDM is quite a new type of forestry projects. A project must satisfy CDM requirements and be validated by third party to be an AR-CDM. The tree growth must be precisely monitored. In addition the project activities include interaction with investors and trading of carbon credit, which the forest projects in the past have never conducted. Due to lack of experiences and probable risks, developers as well as local people hesitate to participate in AR-CDM projects.

(6) Unclear land ownership

Clear ownership of the project sites is one of the important requirements for small-scale AR-CDM project. But much of bare land is not yet allocated officially to individuals, organizations, groups, etc. This hinders or delays the development of AR-CDM projects.

(7) Lack of data and information on the location of lands suitable for AR-CDM

Data and information on land which satisfies the requirements of AR-CDM are not readily available. This is the information which developers and investors desire to obtain the most. Lack of it discourages the promotion of AR-CDM.

6.6 Vision and Action Plans for AR-CDM Promotion in Vietnam

6.6.1 Vision statement

Public awareness of global climate change and its mitigation has been rapidly growing all over the world. GHG emission reduction is not the sole responsibility of industrialized countries anymore, since emissions from developing countries has grown as their economies grow. In this regard, Vietnam will also be one of the major emitters of GHGs in the near future due to its rapid industrial development.

Forestry is the only sector that could achieve CO₂ sequestration in CDM. It has to play an important role in Vietnam in suppressing GHG emission of the country. Forest development also provides short and long-term benefits directly to poor rural communities and contributes to sustainable development, unlike industrial development. No other country in Indochina is active in promoting AR-CDM. Considering this, a vision of AR-CDM development in Vietnam was prepared as follows:

Vietnam plays a leading role in Indochina in demonstrating GHG abatement by the implementation of AR-CDM, sustainable development and environmental protection in mountain areas.

6.6.2 Countermeasures against the constraints

Table 6.8 indicates the countermeasures against the constraints of AR-CDM development described in Section 6.5. The countermeasures against the constraints common to forestry projects are mainly financial. But MARD has already implemented the measures by promoting and assisting the implementation of forestry projects and programs including those assisted by ODA. They are expected to strengthen the effort and expand it for promotion of private funds for forestry development in Vietnam.

There are several countermeasures specific to AR-CDM. Among them, the most important and urgent to implement is the materialization of the small-scale AR-CDM pilot project formulated by the Study. The implementation of the pilot project is expected to resolve other constraints or lessen the degree of the constraints such as the ambiguity of the methodology and lack of experiences.

Unclear land ownership is an important constraint for AR-CDM development and promotion. It shall be resolved by the on-going activities of local governments or along with formulation of AR-CDM projects.

A survey to identify land suitable for AR-CDM will help the development of AR-CDM projects. The survey should look into at the very least additionality, land eligibility, accessibility to the sites, land ownership, and willingness of local government and local community in order to implement AR-CDM projects. It is recommended to conceptualize a plan for small-scale AR-CDM projects for the area with high potential and disseminate this to potential developers and investors directly after the survey.

6.6.3 Action plans for AR-CDM development and promotion

Action plans for AR-CDM development and promotion were prepared for the important countermeasures against the constraints specific to AR-CDM discussed in the previous sections. It is noted that some actions have been already taken via the initiatives of the counterpart and the JICA Study team.

Table 6.7 Action plans for AR-CDM development and promotion

Plan	Actions required	Responsible agency	Timing
1. Implementation of the small-scale AR-CDM pilot project formulated by the Study	Securing the funds required for the project implementation	JICA Study team and the counterpart (CP)	Done. (Honda Vietnam Co., Ltd. made a commitment to support.)
	Establishment of NPO (Social Fund)	Cao Phong district PC assisted by VFU	By March 2008
	Application of the approval of PDD to DNA	NPO assisted by CP	2 nd quarter 2008
	Validation of the pilot project in Cao Phong district	NPO assisted by JICA Study team and CP	3 rd Quarter of 2008
	Organizing project participants	NPO assisted by CP and Cao Phong district PC	2 nd to 3 rd Quarter of 2008
	Concluding contracts between NPO and project participants	NPO and project participants assisted by Cao Phong district PC	3 rd to 4 th Quarter of 2008
	Preparation of detail work plan for the project implementation	NPO assisted by CP and Cao Phong district PC	3 rd to 4 th Quarter of 2008
2. Accumulation of AR-CDM experiences through project implementation (including the pilot project)	Documenting the experiences of AR-CDM planning and implementation and disseminating it through AR-CDM website or seminars	DOF/MARD (through AR-CDM helpdesk)	After validation and registration of the pilot project
3. Survey the lands suitable for small-scale AR-CDM	Request JICA for technical assistance	DOF & ICD/MARD	Done in August 2007
	Negotiation with JICA on the scope of works	DOF & ICD/MARD	Depend on JICA

Unlike energy sector CDM, development of AR-CDM is not active yet in the world due to the complicated procedures and uncertainty on the popularity of t-CER/ l-CER in carbon market in the future. Meanwhile, the framework of the post Kyoto regime (after 2012) will be discussed and determined by 2009. Some change or modification of the current regime might facilitate the promotion of AR-CDM. Therefore, other action plans should be prepared later, taking the expected changes into account.

Table 6.8 Constraints of AR-CDM development and the countermeasures

Classification	Constraints for development	Countermeasures	Responsible agency
Constraints common to forestry projects	Large investment required at initial stage of the projects; long gestation period (leading to difficulty to attract private investment)	<ul style="list-style-type: none"> ◆ Investment and financial support by the government including promotion of ODA forestry projects ◆ Promotion of CSR activities on forestry by private sector 	DOF/MARD, MPI, MOF
	Risk of natural and man-made disasters	<ul style="list-style-type: none"> ◆ Ensuring the implementation of preventive and mitigation measures against disasters ◆ Financial support of the government on recovery 	Project proponents, MARD, local government
	Poor access to the project sites	<ul style="list-style-type: none"> ◆ Investment and financial support by the government including promotion of ODA forestry projects 	DOF/MARD, MPI, MOF
Constraints specific to AR-CDM			
Cost and economic feasibility	Unclear additional benefits from the sales of t-CER/ l-CER	<ul style="list-style-type: none"> ◆ Study on the market price of CER ◆ Study application for VER 	MONRE, MOF
	High transaction cost of CDM procedures (reliance to foreign DOEs)	<ul style="list-style-type: none"> ◆ Promotion of bundling ◆ Financial support by ODA projects ◆ Promotion of CSR support for transaction cost of AR-CDM 	Project proponents
Lack of experience	Unclear if justification of additionality is acceptable or not	<ul style="list-style-type: none"> ◆ Implementation of the AR-CDM pilot project ◆ Study the experiences of other AR-CDM projects 	DOF/MARD, MONRE
	Unclear if justification of land eligibility is acceptable or not		
	Ambiguity of AR-CDM methodology		
	Lack of consultant with experiences in PDD preparation and validation	<ul style="list-style-type: none"> ◆ Capacity building of local consultants through their participation in succeeding AR-CDM projects ◆ Donors' support for development of PDD of AR-CDM projects 	VFU, FSIV, RCFEE
	Lack of experiences on implementing AR-CDM projects and marketing of t-CER/ l-CER	<ul style="list-style-type: none"> ◆ Accumulation and dissemination of AR-CDM experiences through the implementation of projects ◆ Study the experiences of other AR-CDM projects in other countries 	DOF/ MARD
Others	Unclear land ownership	<ul style="list-style-type: none"> ◆ Conduct cadastral survey and land allocation when developing AR-CDM ◆ Involvement of local governments in the planning of AR-CDM to resolve problems associated with land ownership 	Local governments
	Lack of data and information on location of the lands suitable for AR-CDM	<ul style="list-style-type: none"> ◆ Identification of the lands suitable for small-scale AR-CDM ◆ Dissemination of the survey results to developers and investors 	DOF/MARD, local governments