Workplan for Restoration Component under the AFoCo Landmark Program:

REHABILITATION AND DEVELOPMENT OF MANGROVE FOREST ECOSYSTEM IN THAI BINH PROVINCE, VIET NAM

Approved on 25 November 2015
Under
AOA between VNFOREST and AFoCo Secretariat

(Revised as 25 March 2016)

ACRONYMS AND ABBREVIATIONS

AFoCo	ASEAN-ROK Forest Cooperation
AKECOP	ASEAN-Korea Environmental Cooperation Project
ASEAN	The Association of Southeast Asian Nations
DARD	Department of Agriculture and Rural Development
MARD	Ministry of Agriculture and Rural Development
PPC	Provincial People Committee
PMB	Project Management Board
PMR	Project Manager for Restoration Projects under the Landmark Program
PSC	Project Steering Committee
The Project	Rehabilitation and Development of Mangrove Forest Ecosystem in Thai Binh province, Viet Nam under AFoCo Landmark Program
The Secretariat	AFoCo Secretariat
USD	US Dollar
VNFOREST	Viet Nam Administration of Forestry

LIST OF TABLES

LIST OF FIGURES

LIST OF CONTENTS

Rehabilitation and Development of Mangrove Forest Ecosystem in Thai Binh Province, Viet Nam

1. Background

Viet Nam isone of the countries expected to be most severely impacted by climate change. According to climate changepredictions, at the end of the 21st century, the average temperature of the country may increase by 2 – 3 degree Celsius and the sea level may increase 75 to 100 cm above the water level recorded in the period between 1980 and1989. If the sea level rises by 100 cm, 39% of the Cuu Long river delta area, 11% of the Red river delta area, and 3% of the coastal areas in other provinceswill be flooded. In addition, 10 – 12% of the population in these regions will be directly affected. The impacts of climate change will also cause the loss of 10% GDP tothe country. Climate change will also lead to a change in the rainfall regime, annual thermal regime, and increase the numberheavyfloods and typhoons moving to Viet Nam, which directly affect to the livelihood of the locals, especially those living in thecoastal areas of Viet Nam (National Strategy on Coping with Climate Change, 2011).

Thai Binh is a coastal province located in the Red River Delta. The total area of the province is 154,650 hectares. The province is divided into a city and 7 districts, in which there are two coastal districts Tien Hai and Thai Thuy. The province has a 54-km coastal line and four big river mouths where mangrove forests and small areas of *Casuarina equisetifolia*(Australian Pine tree)plantations can be found.

Mangrove forest ecosystemsfoundin the river mouth and in coastal areas of Vietnam and in particular, Thai Binh, play very important roles in human life and the maintenance of the ecological environment. The forests provide a large number of products including wood, firewood, charcoal, tannin, honey and others. In addition, these forests are also the habitats ofaquaculture species, flora and fauna. Moreover, mangrove forests play an irreplaceable role in protecting the ecological environment. Theyreduce the impact of floods, whirlwinds, and tides, limit erosion and the penetration of salty water, fix silt, protect biodiversity, and reduce greenhouse gas emissions.

Despite the very important role of the mangrove forestsin Thai Binh province, mangrove forest areas and quality have been reduced. In 2000, the mangrove forest area (and a small area of forests planted in sandy soils) of the province was 6,987 hectares.In 2012,this number reduced by 19%, to only 5,688 hectares. There are large areas of mangroves remaining in low density with a single-layer structure, consequentlylimits the protection capacity of the mangrove forests (Report of Department of Agricultural and Rural Development of Thai BinhProvince, 2013). The main cause of loss of mangrove forests were annual floods and typhoons combined with flood tides in 2007, 2008, and 2012. Furthermore, aquaculture activities, land use change, insufficient management, protection and development strongly contributed to the loss of mangrove forests in the Thai Binh province.

In recent years, Thai Binh province has been engaged in severalprojects and programs involving the restoration, protection and afforestation of mangrove forests. These include projects and programs under the Government of Viet Nam and international donors, including a mangrove research from ASEAN-Korea Environmental Cooperation Project (AKECOP).However, the investment from the government and donors has not been able tomeet the high demand for maintenance and development of the area in order to protect ecological environment and coastal

line,limit the penetration of salty water, limit the effects of natural disasters, and reduce the impacts of climate change. The demand for capacity building oflocal authorities and local people on mangrove forest restoration, afforestation and protection, climate change mitigation, environment protection, and biodiversity conservation is also crucial.

Under the scheme of AFoCo Agreement, a long term project under the“Landmark Program” with the title: “Degraded forest restoration in Southeast Asian countries for a greener ASIA” has been raised in order to support ASEAN Member States. Viet Nam is one of the four countries in the Mekong area, which has beenselected to participate in Component 3 of the Landmark Program, “Restoration of Degraded Forest Regions”. Based on the background and the eagernessof the Vietnamese government to participate in mangrove forest restoration and development in the coastal areas to cope with climate change, the VNFOREST has proposed **the Project**: “**Rehabilitation and Development of Mangrove Forest Ecosystem in Thai Binh Province, Viet Nam**”.

As such, the Project: “Rehabilitation and Development of Mangrove Forest Ecosystem in Thai Binh Province, Viet Nam” is crucial and necessary to enhance the protection function of the mangrove forest, protect ecological environment and biodiversity, reduce greenhouse gas emissions, and contribute to the improvement of livelihood for local farmers. The Project includes two main components: (i) new planting, supplementary planting (enrichment) and protection of mangrove forest; (ii) training for capacity building and communication.

2. Objectives

The major objectives of Restoration Component of Landmark Program in Viet Nam are to: 1) afforest, rehabilitate and sustainably manage mangrove forest ecosystems in Thai Binh province; and, 2) raise awareness and enhanceknowledge and capacityoflocal communities on rehabilitation, protection and sustainable development of mangrove forests, biodiversity conservation, climate change mitigation and livelihood improvement strategies. The specific targets for each objective are as follows:

2.1. Objective 1: To afforest, rehabilitate and sustainably manage mangrove forest ecosystems in Thai Binh province

a. Survey, develop a detailed design with maps on the new afforestation, supplementary planting and the protection of mangrove forest: 960 ha

b. Planting of a new mangrove forest: 80 hectares

c. Supplementary planting of mangrove forests in the areas designed for the sites for planting are single-layer and low density forest areas, and/or the areas remaining high number of gaps: 80 hectares

d. Protect new afforestation and supplementary planting areas and existing mangrove areas: 800 hectares (including the new afforestation and supplementary planting areas)

2.2. Objective 2: To raise awareness and enhance knowledge and capacity for local communities on rehabilitation, protection and sustainable development of mangrove forests, biodiversity conservation, climate change mitigation and livelihood improvement strategies.

a. Developa training plan based on training needs assessment.

b. Create elaborate publications for local communities (leaflets, booklets, etc.), training documents on relevant technical topics such as seed selection, seedling production, planting and tendering techniques, protection of mangrove forests...)

c. Develop and operate the community regulations on management and protection of mangrove forest in the communes of the Projects (4 regulations, one for each commune)

d. Organise ten(10) 1-day training courses (lectures and field practices) for provincial technical staff and local communities and one (1)thematic technical workshop on payments forecosystem services and sustainable mangrove management

e. Conducttwo (2) study-tours to Thailand and Indonesia to learn from experiences on sustainable mangrove management and conservation and management of ecotourism for improving local livelihoods

f. Develop and implement communication activities in the project areas.

g. Provide equipment for mangrove forest protection and development

3. Expected Outcomes

The project is expected to sustainably rehabilitate and develop mangrove forest ecosystems, protect biodiversity, reduce greenhouse gas emissions, minimize impacts of climate change, protect the costal dyke system, enhance knowledge related to mangrove forests, and improve livelihoods of local communities in thelong-run.

3.1. Planting, supplementary planting and protection of mangrove forest

- Planting 80 ha of new mangrove forest
- Supplementary planting (enrichment) of 80ha
- Protect 960ha of mangrove forest (including new areas of afforestation and supplementary planting, and existing mangrove areas)
- Utilize 2 maps to monitor the project's achievements for respective commune, including 1) present land use map and 2) project intervention map
- Produce a technical survey report and detailed design for the new planting, supplementary planting, protection of mangrove forest

3.2. Training for capacity building and communication

- Training packages for ten (10)training courses on mangrove restoration and management, including nursery management, planting techniques, protection and conservation.
- Four (4) commune regulations on the management of mangrove forest
- Reports on domestic and international study tours
- Develop and operate publicity activities in the project sites, including the use of signboards andposters, and the distribution of leaflets and booklets, etc.
- Provincial plan on mangrove development and protection will be prepared and submitted to the Competent Authority for approval

4. Project Site

The project sites are located in four (4) communes in Thai Binh Province, including 1) Dong Long, 2) Dong Hoang from Tien Thai District,3) Thuy Xuan and 4) Thuy Hai from Thai Thuy District.The total area of all the project sites is **960ha**.The map of the project sites is presented in Figure 1.

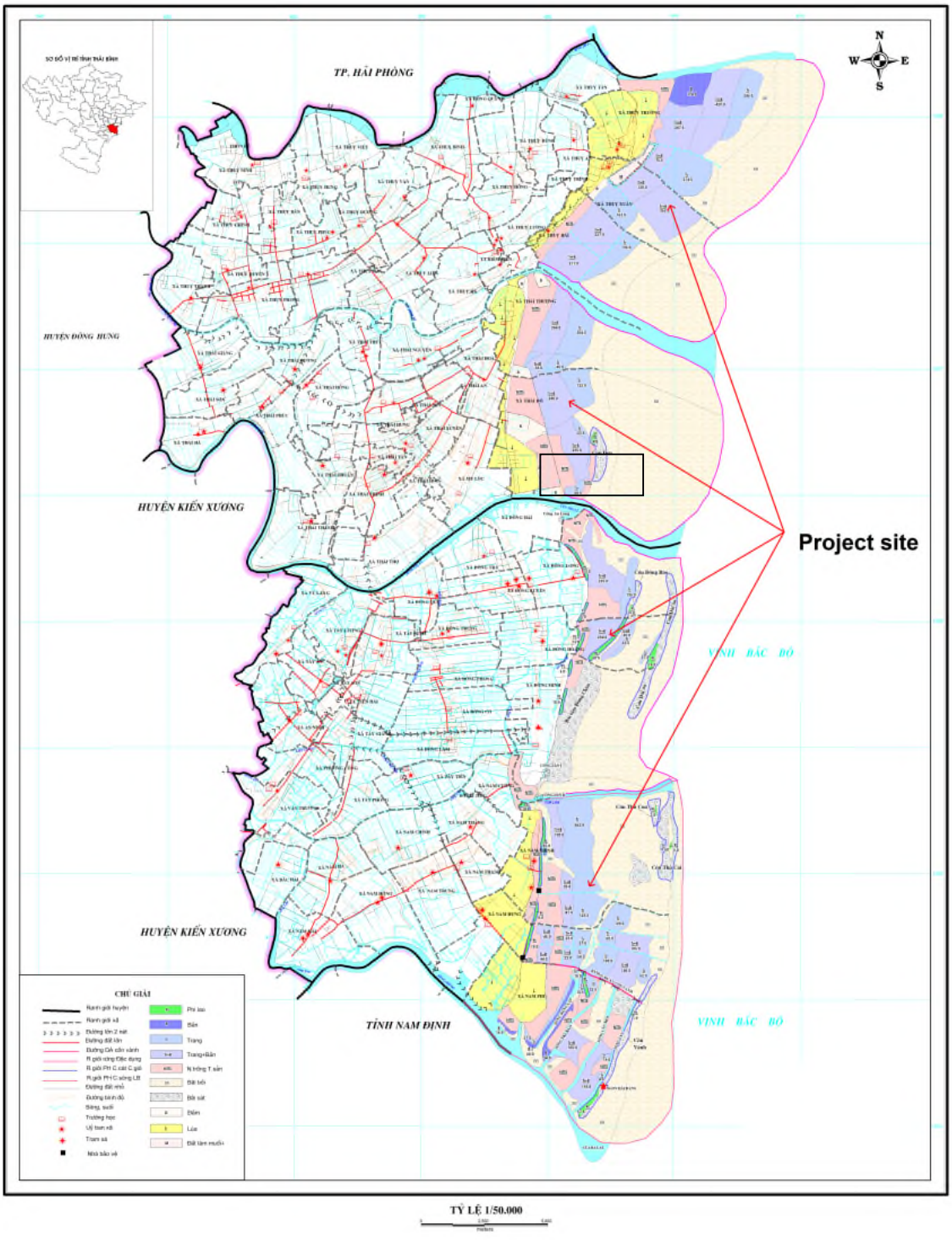
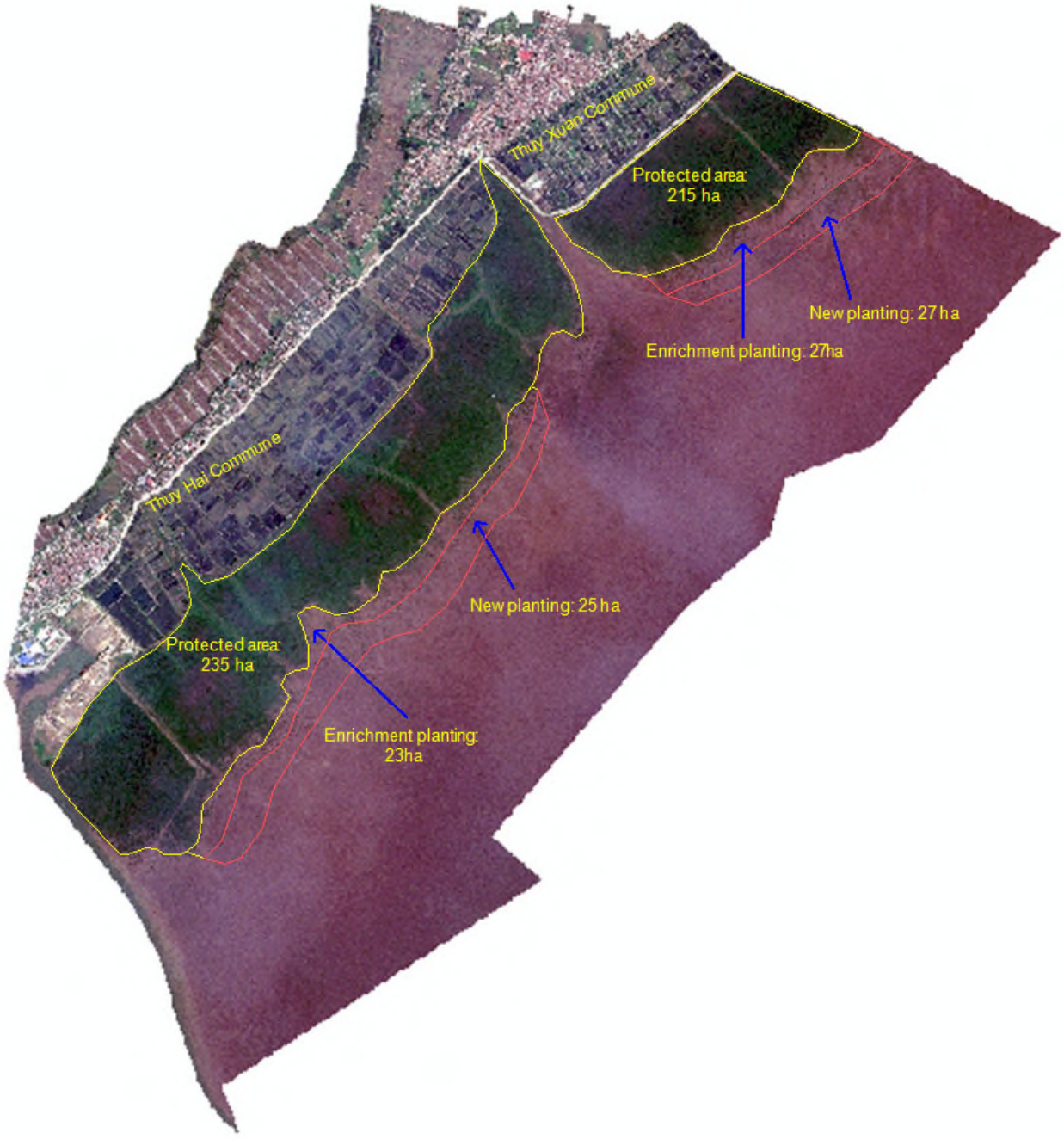


Figure 1: Map of the project site

Figure 2.Relative location of the project site



<Two (2) communes of Thai Thuy District in Thai Binh Province>

<Two (2) communes of Tien Hai District in Thai Binh Province>

Areas for new planting, supplement planting and protecting

No	Area	Forest planting		Protected
		Planting new	Supplementary planting	
I	Thai Thuy district	***52***	***50***	***450***
1	Thuy Xuan commune	27	27	215
2	Thuy Hai commune	25	23	235
II	Tien Hai district	***28***	***30***	***350***
3	Dong Long commune	28	25	225
4	Dong Hoang commune		5	125
Total		**80**	**80**	**800**

a. Planting new mangrove forest: 80 ha

Item	New Plantation Area (80ha)
Accessibility	From the dyke to the plantation area: normally 1 kilometer walking
Plantation season	Early March (the end of spring) to September(the end of autumn)
Reason to afforestation	To protect rice fields, aqua-cultural areas and dykes against typhoons
Major vegetation/ tree species	Three (3) species of: 1) *Sonneratia caseolaris*; 2) *Kandelia candel*; and 3) *Avicennia marina*[1] The species are being used in the province to have high survival rate of restoration. The species are also known as common species of mangrove restoration in Viet Nam.
The most risky zone	The area near the river let in Dong Long Commune due to the long hours of high tide
Distance to Nurseries	Two (2) nurseries per district (3-4 km away from the plantation sites), Moving seedlings by boat through canal

b. Supplementary planting of mangrove forests in the areas designed for the sites for planting are single-layer and low density forest areas, and/or the areas remaining high number of gaps: 80 ha

[1] Information of each species are in **the Annex-1**.

Item	New Plantation Area (80ha)
Accessibility	From the dyke to the plantation area: ~ 1 kilometer walking
Plantation season	Early March (end of spring season) to September (end of autumn)
Reason to afforestation	To protect rice fields, aqua-cultural areas and dykes against typhoons
Major vegetation/ tree species	Three (3) species of: 1) *Sonneratia caseolaris*; 2) *Kandelia candel*; and 3) *Avicennia marina* The species are being used in the province have high survival rates The species are also known as a common species of mangrove restoration in Viet Nam.
The most risky zone	Area near the river let in Dong Long Commune due to the long hours of high tide
Distance to the Nursery	Two (2) nurseries per District (3-4 km away from the plantation sites), Moving seedlings by boat through canal

c. **Protect the new afforestation and supplementary planting areas and existing mangrove areas:** 960ha (including the new afforestation and supplementary planting areas)

4.1. Geographical backgrounds

Thai Binh is a coastal province located in the Red River Delta. The total area of the province is 154,650 hectares. The Province is divided into a city and 7 districts, in which there are two coastal districts including Tien Hai and Thai Thuy. The province has a 54-km coastal line and four big river mouths that to be the place for distribution of mangrove forests and small areas of *Casuarina equisetifolia*(common name: Australian pine tree) plantations. The total area allocated for mangrove plantation in Thai Binh is around 9,000ha, whereasthe existing mangrove forest area is around 6,000ha.

Soil in Thai Binh coastal area is divided into 2 main groups:

- Coastal sandy soil group: It is distributed mainly in the coastal areas of Tien Hai district. This type of soil is created from accumulation of river and sea materials. The soil has a soft physical component, is incoherent, has no texture, has adepth of more than 100 cm and haspoor humus and nutrition. Planting forests in this type of soil requires suitable silviculture techniques, such as using seedlings that are between 12 to 24 months old and more than 60 cm in height. If the nutrition of the soil is too poor, addition of rich soil and/or alluvium to holes in the soil is necessary before planting. Seedlings also need piles to confront the sea-breeze and tide.
- Coastal warp soil group: This type of soil is rich in humus and is impacted directly by tide regimes, sea-breeze and storm. Therefore, forest plantation in these regions needs to adhere to seedling standards and in early planted years, it is necessary to protect seedlings from waves and sea-breeze.

Nowadays, mangroves in Thai Binh coastal areas mainly consist of plantations with *Sonneratia caseolaris* and *Kandelia obovata*. Some areas are experimenting with *Avicennia germinans* plantation. Generally, mangrove plantations in Thai Binhhavelow survival rates (below 50%),

especially mangroves planted in sites with hazardous or unfavorable conditions (e.g., sandy soil, gravelly soil and deep tide).

The main reason forlow survival rates in newly planted mangroves are that seedling sprouts and bare-rooted plants with normal standards (tree height is from 20cm to 40 cm) are used. These seedlings cannot confront to wave and sea-breeze. In addition, these seedlings can only survive for a short period of time after planting. The impacts of rainstorm and tide, and the movements of sand-bank, mud and sand uproot the seedlings. Besides, in sites with unfavorable conditions and no supporting mechanisms, such as structures to confront wave, humus accumulation and shipworm, the survival level is low.

Forabove reasons, mangrove plantation and supplement plantation have to follow technical requirements associated with scientific research results such as AKECOPand local experience. The selection ofplantation sites, planting scale and tree types have to be carried out according to thelocal plan on mangrove development to ensure project effectiveness.

List of district	Location	Geographic coordinates	Abutting	Natural area (ha)
Thai Thuy	North eastern of the province, a distance of 30 km from the City	Within $20^0$27'-$20^0$50' north latitude and within $106^0$25'-$106^0$50'east longitude	- The north side: bordering Hai Phong City - The east side: bordering the East Sea - The west side: bordering Dong Hung and Quynh Phu district - The south side: bordering Kien Xuong and Tien Hai district	26,584.18
Tien Hai	Southeast of the province, a distance of 30 km from the City	Within $20^0$17'–$20^0$28' north latitude and within $106^0$27'-$106^0$35'east longitude	- The north side: bordering Thai Thuy district - The east side: bordering the East Sea - The west side: bordering Kien Xuong district - The south side: bordering Giao Thuy district, Nam Dinh province	22,604.47

4.2. Land use

List of districts	Type of soil	Area (ha)	Note
Thai Thuy	Nursery areas	01	
	Bare land areas	0	

	Flooded land areas	2,046.01	
	Protected forest areas	3,373.32	
	Other forest areas	0	
	Other land areas	21,163.85	
	Total	**26,584.18**	
Tien Hai	Nursery areas	01	
	Bare land areas	0	
	Flooded land areas	1,663.84	
	Protected forest areas	2,314.63	
	Other forest areas	0	
	Other land areas	18,625	
	Total	**22,604.47**	

4.3. Weather and climate conditions

- Annual Rainfall

	Annual rainfall (mm)
Maximum (mm)	2,200
Average (mm)	1,700
Minimum (mm)	1,400

Mean annual rainfall (Maximum, Average, and Minimum) recorded at Thai Binh province from 2014 through 2015, in millimeters.

- Monthly Rainfall

	1	2	3	4	5	6	7	8	9	10	11	12
Maximum (mm)	6.8	7.3	19.6	66.8	34.3	51	40.5	71.5	136.9	81.9	40.3	7.3
Average (mm)	5.6	6.3	15.6	55.4	28.2	44.1	33.7	59.5	110.2	67.9	31.4	6.1
Minimum (mm)	0.1	0.2	0.2	0.1	0.1	0.2	2.2	3.6	0.2	1.4	0.1	0.1

- Monthly Temperature

	1	2	3	4	5	6	7	8	9	10	11	12
Maximum (^{0}C)	24.5	25	27.2	29.4	34.5	36.7	34.5	35.2	33.5	31.6	30.2	25

Minimum (^{0}C)	7.7	7.9	14.2	19.4	19.4	24	25.1	23.4	22.8	22.5	18	7.5

4.4. Socioeconomic backgrounds

District	Information requested	Description
Thai Thuy	Population	280,385 people
	Industry	400 businessses, 24 villages in operation, with 29 now issued business licenses, with registered capital of 105 billion VND
	Education	- Five high schools in Thai Thuy include Thai Ninh, Thai Phuc, Dong Thuy Anh, Tay Thuy Anh, and the Democratic school of Diem Dien - In addition, there are two regular education centers such as No 01 and No 02 and a vocational training center
	Local Government	One district and 48 communes and towns
	The main income	- Cultivation - Aquaculture and Processing - Commercial
Tien Hai	Population	234,427 people
	Industry	- Value of manufacturing and constructtion industry in the first 6 months of 2014 reached 2,086 billion VND, meanwhile, it is expected in 2014 reached 4,336 billion VND, an increase of 16% in comparison to the amount initially request
	Education	- Archieving establishment of uninversal primary and secondary education in all communes and towns. Reaching the national standard any 70 of the 101 schools, in which 13 cases at level 2 of national standard
	Local Government	One district and 35 communes and towns
	The main income	- Cultivation - Aquaculture and Processing - Commercial

5. Detailed Activities

5.1. Objective 1: New planting, supplementary planting (enrichment) and protection of mangrove forest

The specific targets and activities under this component are as follows:

a. Survey, develop a detailed design with maps on the new afforestation, supplementary planting and the protection of mangrove forest: 960 ha

- Survey, develop a detailed design with maps on the new afforestation, supplementary planting and the protection of mangrove forest
- Collect relevant data and documents from previous programs, projects, and studies.
- Carried outsurveyon the current mangrove forest status, social and economic conditions in two project districts (Tien Hai and Thai Thuy) of Thai Binh province
- Develop detailed design for new planting, supplementary planting, and forest protection.
- Organize meetings with Thai Binh Province for the assessment of the technical report

No	Activity	Unit	Qty	Description
Project mapping (forest status map, project map, project achievement map)				
1	Forest land use map	map	1 set	2 copies of maps in each commune
2	Project activity map	map	1 set	2 copies of maps in each commune

b. Planting new mangrove forest: 80 hectares.

Methodology:Mono plantation

Plantation area: 80ha

- ***Sonneratiacaseolaris*: 80ha(interval space:2x3m)**

Table 1: 80ha of Mangrove forest new planting

No	Activity	Unit	Qty	Description
1	Surveying, designing and validating	ha	80	
2	Seedlings	seedling	160,000	80 ha x 2,000 seedlings/ha (1st year: 1,667 seedlings/ha) (2nd year: 333/ha for the supplementary plantation for the previous new plantation area)
3	Piles	m	480,000	160,000 seedlings x 3 m/1 seedling
4	Cord	kg	320	4kg/1ha x 80 ha
6	Tending	ha	240	80 ha x 3 years
6.1	Trash picking, piles re-arranging	ha	240	80 ha x 3 years
6.2	Removing shipworm on the trees	ha	240	80 ha x 3 years
7	Forest protection	ha	80	
7.1	First year	ha	20	20 ha

No	Activity	Unit	Qty	Description
7.2	Second year	ha	50	50 ha
7.3	Third year	ha	80	80 ha
7.4	Fourth year	ha	60	60ha
7.5	Fifth year	ha	30	30ha

c. Supplementary planting of mangrove forests in the areas designed for the sites for planting are single-layer ad low density forest areas, and/or the areas remaining high number of gaps: 80 hectares

Methodology: Mono plantation

Plantation area:80ha

- ***Sonneratiacaseolaris*(interval space: 2x3m)**
- ***Kandeliacandel* (interval space: 2x3m)**
- ***Avicennia marina*(interval space: 2x3m)**

Table 2: 80ha of Mangrove forest supplementary planting

No	Activity	Unit	Qty	Description
1	Surveying, designing and validating	ha	80	
2	Seedlings	seedling	52,800	80 ha x 660seedlings/ha (1st year: 600 seedlings/ha) (2rd year: 60seedlings/ha for the supplementary plantation for the previous new plantation area)
3	Piles	m	158,400	52,800 seedlings x 3 m/1seedling
4	Cord	kg	160	2kg/1ha x 80 ha
5	Labor for planting	ha	80	80 ha
6	Tending	ha	240	80 ha x 3 years
6.1	Trash picking, piles re-arranging	ha	240	80 ha x 3 years
6.2	Removing shipworm on the trees	ha	240	80 ha x 3 years
7	Forest protection	ha	80	
7.1	First year	ha	20	20 ha
7.2	Second year	ha	50	50 ha
7.3	Third year	ha	80	80 ha
7.4	Fourth year	ha	60	60ha
7.5	Fifth year	ha	30	30ha

d. Protect the new afforestation and supplementary planting areas and existing mangrove areas: 960 hectares (including the new afforestation and supplementary planting areas)

Table 3: Mangrove forest protection areas

No	Activities	Unit	Qty	Calculation
1	Thai Thuy district	ha	450	450 ha x 9 years
1.1	Thuy Xuan commune	ha	215	215 ha x 9 years
1.2	Thuy Hai commune	ha	235	235 ha x 9 years
2	Tien Hai district	ha	350	400 ha x 9 years
2.1	Dong Long commune	ha	225	250 ha x 9 years
2.2	Dong Hoang commune	ha	125	150 ha x9 years
3	Protecting new planted area in 2016 (20ha) and supplementary planting (20ha) from 2019-2024 (6years)	ha	40	40 ha x 6 years
4	Protecting new planted areas in 2017 (30ha) and supplementary planting (30ha) from 2020-2024 (5years)	ha	60	60 ha x 5 years
5	Protecting new planted areas in 2018 (30ha) and supplementary planting (30ha) from 2021-2024 (4years)	ha	60	60 ha x4years
Total		**ha**	**960**	

5.2. Objective 2: Training for capacity building and communication

The specific targets and activities under this component are as follows:

a. Developa training plan based on training need assessment.

- Conduct a survey on the training needs assessment
- Prepare one (1) plan for capacity building for the project areas
- Develop the training evaluation forms for ten (10) training courses

b. Elaborate publications for local communities (leaflets, booklets, etc,), trainingdocuments on relevant technical topics

- At least ten (10) training documents and ten (10) communication productswill be producedon the topics of seed selection, seedling production, planting andtendering techniques, protection of mangrove forests...).

c. Develop and operate the community regulations on management and protection of mangrove forest in the communes of the Projects: 4 regulations,one for each commune

- Organize meetings at the commune level to discuss the idea and prepare the regulations
- Finalize the regulations with communes and submit them to the Competent Authority for approval
- Support four (4) communes to implement the regulations on the mangrove forest management in each commune.
- Monitor and review the implementation of the regulations for further revision

d. Organise training courses, technical workshops:10 training courses and 1 technical workshop will be organized

- Nominate relevant participants to training courses and workshops
- For each training, the number of participants should not exceedtwenty (20)
- Fifty (50) people will be invited to the thematic workshop

e. Conducttwo (2) studytours to Thailand and Malaysia/Indonesia to learn experiences on establishment and management of mangrove forests.

- Conducttwo (2)studytours to Thailand and Malaysia/Indonesia to learn experiences on sustainable mangrove management and conservation and management of ecotourism for improving local livelihoods
- Aroundten (10) people will join the study tours
- AFoCo Member Countries can participate in the tours at their own expense.
- Tentatively, Viet Nam is willing to host two (2) exchange visit (study tours) in Thai Binh Province in the Phase 2 between 2019 to 2022

Table 4: Number of events

Year	Number of events (number of participants)			
	Training courses	Workshop	Study tour	Remarks
2016	3 (20)			
2017	2 (20)		1 (10)	
2018	2 (20)	1 (50)	1 (10)	
2019	1(20)			1 Exchange visit to Viet Nam
2020	1(20)			1 Exchange visit to Viet Nam
2021	1(20)			
Total	**10 (100)**	**1 (50)**	**2 (20)**	**2**

f. Develop and implement advocational activities in the project areas.

- Prepare the communication plans based on surveys and assessments on communication means which may be more affective using media tools such as TV, radio, warning posters, propaganda posters for mangrove forest in the project sites; release publications, technical guidelines, brochures, movies, pictures, poster
- Implement the communication activities usingthe results from the surveys

g. Provide equipment for mangrove forest protection and development*(please see 7.2)*

6. Technical Support by the Research Institute for Forest Ecology and Environment (RIFEE)[2]

Research Institute for Forest Ecology and Environment (RIFEE) under the Vietnamese Academy of Forest Sciences has provided technical support for planting and protecting mangrove forests in Thai Binh province are as follows:

- Verifyproject mapping (forest status map, project map, project achievement map);
- Verify technical designs for forest planting, tending and protecting;
- Develop workshop, training documents;
- Monitor, evaluate and report on progress and quality of project activities;
- Develop criteria and indicators for checking silvicuture activities;
- Re-check the silviculture activities and report to PMB (10% of total area of forest planting, tending and protecting);
- Develop relevant reports and submit to Project Management Board.

[2]The information of the RIFEE is in the **Annex-2**.

7. Project Implementation Arrangement

7.1. Project organizational structure

The organizational structure of the project is presented inFigure 2. For the successful management and completion of the Project, a Project Steering Committee (PSC) and a Project Management Board (PMB) will be set up. PSC's members shall include Viet Nam Administration of Forestry (VNFOREST), AFoCo Secretariat, sub-partners and any other organizations deemed appropriate by the Secretariat and the VNFOREST.

The national PMB, underVNFOREST, will be established by MARD upon the approval of the project document. Its members include National Project Director, Project Coordinator and Project Accountant. All members of the national PMB will be seconded from VNFORESTand theirsalaries will be paid by VNFOREST. To support national PMB, one supporting staff in charge of translation and administrative work will be contracted and covered by the project budget. The national PMB will have a separate stamp (official seal) during the project implementation and will be the focal pointof communication between the donor and the Secretariat.

The provincial PMB under Thai Binh's DARD will be established by Thai Binh's PC. Its members will include the Project Director, Project Deputy Director or Coordinator and Project Accountant. All members of provincial PMB will be seconded from Thai Binh's DARDand their salaries will be paid by Thai Binh's DARD. The provincial PMB will be under the technical instruction and management of the national PMB and will also regularly report to the national PMB.

The National Project Director, in cooperation with the Project Manager for Restoration Projects (PMR) under the Landmark Program assigned by the Secretariat,has following tasks and responsibilities:

- Managing the project office, staff and financial matters to ensure the operation of the Project and delivery of service in atimely manner;
- Coordinating with the relevant officials for operation of the Project;
- Supporting timely implementation ofthe activities at the national and regional levels identified in the Project Document;
- Providing necessary assistance in organizing activities, workshops and training courses of the Project;
- Preparing and submitting financial reports with a balance sheet, annual report and the final report in a timely manner as required in the implementation of the Project
- Keeping record ofactivities implemented and accomplished including technical documents, recommendations and consultancy reports;
- Ensuring managerial and financial accountability in accordance with the approved Project Document;
- Undertaking other duties as may be assigned as appropriate in implementing the Project.

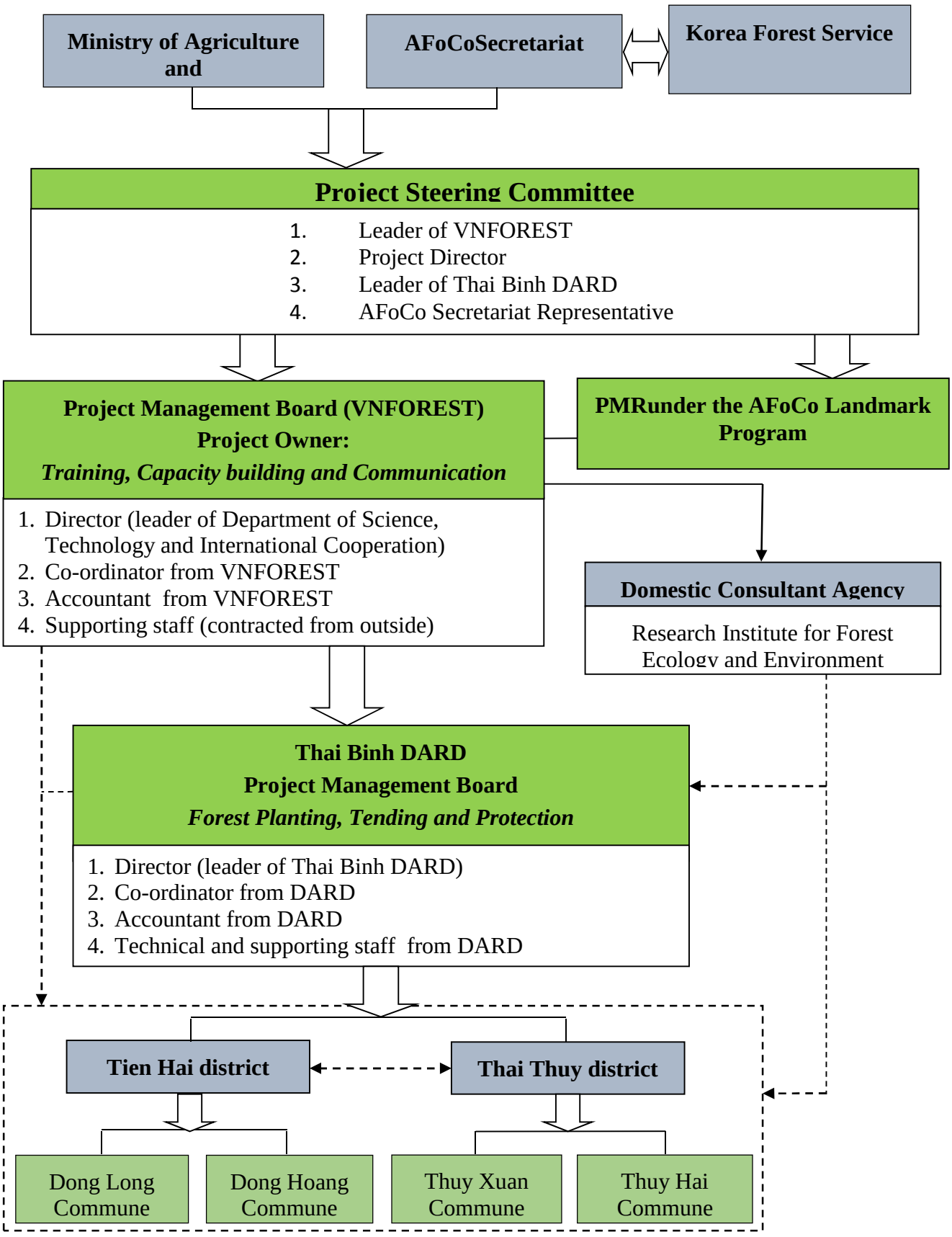


Figure 3: Project organizational structure

7.2. Project office and equipment

Office of the national PMB will be shared with VNFOREST.

Office of the provincial PMB will be located at the provincial DARD or Forest Protection Sub-Department which expectedly includes 2 or 3 rooms. Expenses of provincial PMB's office maintenance and repair and equipment procurement will be covered by the project.

In implementation of Restoration component of AFoCo Landmark program/ Thai Binh mangrove forest in Viet Nam, it is necessary to provide transportation means such as vehicle,boat,motorcycles,office and field equipment.

The project transportation means and equipment will be purchased as detail below.

Table 5: List of transportation means and equipment to be purchased

No.	Item	Unit	Quantity
1	Vehicle	7-seat car (4WD type)	1
2	Motorcycles	Honda (110cc)	4
3	Speedboat	Yamaha	1
4	Laptop	Dell Inspiron Core i7 or Samsung Activ book 9 or Sony Vaio	8
5	Desktop computer	Dell Inspiron Core I5 or Samsung or LG	4
6	Printer	Samsung Laser Printer SL series or or Canon Laser Printer LBP3370	2
7	Photocopier	Samsung or Recoh	1
8	Camera	Nikon or Canon	2
9	Office equipment (tables, chairs, TV, sound system, etc)	Including table, chairs, air-conditioner, sound system, lights, scanner, fax machine, telephone…	1 package
10	GPS, binoculars, field equipment	GPS: Garmin Oregon Binoculars: PF65ED	1 set

8. Project Time Schedule

8.1. Annual time schedule

No	Activity	2016	2017	2018	2019	2020	2021	2022	2023	2024
1	Inception workshop									
2	Project mapping (forest status map, project map, project achievement map									
3	Planting new mangrove forest (80ha) including tending and protection	20	30	30	Tending	Tending				
4	Supplementary planting of mangrove forest (80ha) including tending and protection	20	30	30	Tending	Tending				
5	Mangrove forest protection (960ha in total)	800	800	800	840	900	960	960	960	960
6	Study tours in Thailand and Malaysia or Indonesia (02 study tours)									
7	Training courses (10 courses)	3	2	2	1	1	1			
8	Technical workshop (01 workshop)			1						
9	Communication									
10	Equipment supply									
11	Project management									
12	National Technical Consultancy Agency									
13	Audit									
14	Final workshop									
15	Report					Interim				Final

8.2. Time schedule for Objective 1 (forest planting, tending and protection)

No	Activity	2016				2017				2018				'19÷'24	
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
1	**Project mapping (forest status map, project map, project achievement map)**														
1.1	Forest status map														
1.2	Project map														
1.3	Project achievement map														
2	**Planting new mangrove forest (80ha) including tending and protection**														
2.1	Surveying, designing and validating														
2.2	Seedlings, land and materials preparation														
2.3	Planting			20 ha				30ha				30ha			
2.4	Tending the new planted forest														
2.5	Protection new planted forest														
3	**Supplementary planting of mangrove forest (80ha) including protection**														
3.1	Surveying, designing and validating														
3.2	Seedlings, land and materials preparation														
3.3	Planting			20ha				30ha				30ha			
3.4	Tending the new planted trees														
3.5	Protection supplementary planted forest areas														
4	**Mangrove forest protection 960ha (800ha existing + 160ha new areas)**														

8.3. Time schedule for Objective 2 (workshops, training courses, study tours and project management)

No	Activity	2016	2017	2018	2019	2020	2021	2022	2023	2024
1	**Inception workshop**									
2	**Study tours in Thailand and Indonesia or Malaysia (02 study tours)**									
2.1	Study tour in Thailand									
2.2	Study tour in Indonesia or Malaysia									
3	**Training courses (10 courses)**									
4	**Thematic workshops (01 workshop)**									
4.1	Workshop on Mangrove forest for PES and livelihood of local communities									
5	**Communication**									
5.1	Project signs									
5.2	Designing and printing documents, posters, leaflets,…									
5.3	Broadcasting									
6	**Equipment supply**									
7	**Project management**									
8	**National Technical Consultancy Agency**									
9	**Audit**									
10	**Final workshop**									
11	**Report**									
11.1	Annual reports									
11.2	Interim and final report									

8.4. Time schedule for 2016

No	Activities	2016			
		Q1	Q2	Q3	Q4
1	**Inception workshop**				
2	**Project mapping (forest status map, project map)**				
2.1	Forest status map				
2.2	Project map				
3	**Planting new mangrove forest (20ha) including tending and protection**				
3.1	Surveying, designing and validating				
3.2	Seedlings, land and materials preparation				
3.3	Planting			20 ha	
3.4	Tending the new planted forest				
3.5	Protection new planted forest				
4	**Supplementary planting of mangrove forest (20ha) including protection**				
4.1	Surveying, designing and validating				
4.2	Seedlings, land and materials preparation				
4.3	Planting			20ha	
4.4	Tending the new planted trees				
4.5	Protection supplementary planted forest areas				
5	**Mangrove forest protection (800ha)**				
5.1	Signing forest protection contracts				
5.2	Mangrove forest protection (800ha)				
6	**Training courses (03 courses)**				
6.1	Preparation				
6.2	Organizing 03 training courses				
7	**Communication**				
8	**Equipment supply**				
9	**Project management**				
10	**National Technical Consultancy Agency**				
10.1	Signing contract				
10.2	Providing consultant services				

9. Project Budget

Total budget for the project based on the Agreement of Operational Arrangement is US$1,500,000 andAFoCo Secretariat shall transfer to VNFOREST in accordance with the approved Work Plan. The project budget shall be dominated in USD. Detailed annual budget by year is presented in the Annex 5.

In-cash and in-kind contribution from the Government of Viet Nam is estimated at least USD 150,000, in which in-cash contribution is US$65,000to be managed in accordance with Vietnamese laws and regulations. This amount shall cover salaries of the project's seconded staff, national PMB's office maintenance and repair and equipment procurement as well as fees of vehicle registration.

9.1. Annual budget plan

Unit: 1,000 USD

No	Activites	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
1	Inception workshop	7.5	-	-	-	-	-	-	-	-	**7.5**
2	Project mapping (forest status map, project map, project achievement map)	4	-	-	-	-	-	-	-	2	**6.0**
3	Planting new mangrove forest (80ha) including tending and protection	106.375	187.138	209.025	53.513	12.15	-	-	-	-	**568.2**
4	Supplementary planting of mangrove forest (80ha) including tending and protection	38.17	65.475	73.245	17.82	5.49	-	-	-	-	**200.2**
5	Mangrove forest protection (800ha)	16	16.0	16.0	16.8	18.0	19.2	19.2	19.2	19.2	**159.6**
6	Study tours in Thailand and Malaysia/Indonesia (02 study tours)	-	22.5	22.5	-	-	-	-	-	-	**45.0**
7	Training courses (10 courses)	6	4	4	2	2	2	-	-	-	**20.0**
8	Technical workshops (01 workshop)	-	-	10	-	-	-	-	-	-	**10.0**
9	Communication	4.5	1.8	1.0	0.5	0.3	0.3	0.3	0.3	1	**10.0**
10	Equipment supply	100	-	-	-	-	-	-	-	-	**100.0**
11	Project management	45	45	45	40	23	15	13	13	17	**256.0**
12	National Technical Consultancy Agency	21	13.5	13.5	8	5.5	4.5	3.5	3.5	12	**85.0**
13	Audit	-	-	-	7.5	-	-	-	-	7.5	**15.0**
14	Final workshop	-	-	-	-	-	-	-	-	7.5	**7.5**
15	Contingency										**10.0**
Total		**348.55**	**355.41**	**394.27**	**146.13**	**66.44**	**41.0**	**36.0**	**36.0**	**66.2**	**1,500.0**

*The investment rate per hectare of new plantation and its budget estimation are in **Annex-3** and **Annex-4**.

9.2. Budget for mangrove forest protection (800ha + 160 ha new and supplementary planting from 4th year)

No	Activities	Unit	Qty	Calculation	Total
1	Thai Thuy district	ha	450	450 ha x USD 20/1 ha/1 year x 9 years	81,000
1.1	Thuy Xuan commune	ha	215	215 ha x USD 20/1 ha/1 year x 9 years	38,700
1.2	Thuy Hai commune	ha	235	235 ha x USD 20/1 ha/1 year x 9 years	42,300
2	Tien Hai district	ha	350	350 ha x USD 20/1 ha/1 year x 9 years	63,000
2.1	Dong Long commune	ha	225	225 ha x USD 20/1 ha/1 year x 9 years	40,500
2.2	Dong Hoang commune	ha	125	125 ha x USD 20/1 ha/1 year x 9 years	22,500
3	Protecting new planted area in 2016 (20ha) and supplementary planting (20ha) from 2019-2024 (6years)	ha	40	40 ha x USD 20/1 ha/1 year x 6 years	4,800
4	Protecting new planted areas in 2017 (30ha) and supplementary planting (30ha) from 2020-2024 (5years)	ha	60	60 ha x USD 20/1 ha/1 year x 5 years	6,000
5	Protecting new planted areas in 2018 (30ha) and supplementary planting (30ha) from 2021-2024 (4years)	ha	60	60 ha x USD 20/1 ha/1 year x 4years	4,800
Total		**ha**	**960**		**159,600**

9.3. Budget for workshops, training courses and study tours *Unit: USD*

No	Activity	Unit	Number	Unit cost	Total
I	**Workshops: Kick off (inception) and Closing (01 day)** **50 participants** **Venue: Thai Binh province**	**Workshop**	**2**	**7,500**	**15,000**
1	Workshop venue (include: teabreak, lunch)	per person	50	35	1,750
2	Equipment	per set	1	300	300
3	DSA (15 persons x 2days)	per day	30	35	1,050
4	Hotel (15 persons x 2 nights)	per night	30	40	1,200
5	Travel for participants from Ha Noi capital (01 car)	per day	3	200	600
6	Travel for participants from the districts of Thai Binh province (20 persons)	per person	20	10	200
7	Copy documents	per person	50	3	150
8	Dinner	per person	50	30	1,500
9	Communication product: T-shirt	per unit	50	15	750
	Subtotal				**7,500**
II	**Training course (01 day)** **20 participants** **Venue: Thai Binh province**	**training course**	**10**	**2,000**	**20,000**
1	Training course venue (include: teabreak, lunch)	per day	20	27	540
2	Equipment	per set	1	90	90
3	DSA(1 person x 2days)	per day	2	35	70
4	Hotel (2 nights x 3 persons)	per night	6	40	240
5	Travel for participants from Ha Noi capital (01 car)	per day	3	150	450
6	Travel for participants from the districts of Thai Binh province (15 persons)	per person	15	10	150
7	Copy documents	per person	20	8	160
8	Trainer (01 person x 2 days)	per day	2	150	300
	Subtotal				**2,000**

III	**Professional (Technical) workshops on related topics (01 day) 60 participants Venue: Thai Binh province**	**Workshop**	**1**	**10,000**	**10,000**
1	Workshop venue(include: tea-break, lunch)	per day	60	35	2,100
2	Equipment	per set	1	425	425
3	DSA (15 person x 2day)	per day	30	35	1,050
4	Hotel (17 person x 2 night) (include moderators)	per night	34	40	1,360
5	Travel for participants from Ha Noi capital (01 car)	per day	3	200	600
6	Taxi for participants from Ha Noi capital	per person	17	15	255
7	Travel for participants from the districts of Thai Binh province (20 person)	per person	20	10	200
8	Copy documents	per person	60	8.5	510
9	Dinner	Per person	60	30	1,800
10	Moderators (01 person x 2 days)	per day	2	150	300
11	Honorarium for presenters	per person	5	100	500
12	Communication product: T-shirt	per unit	60	15	900
	Subtotal				**10,000**
IV	**Study-tour (Thailand and Malaysia or Indonesia): 10 participants, 6 days**	**trip**	**2**	**22,500**	**45,000**
1	Travel: Airfare, taxi airport	per person	10	560	5,600
2	DSA (10 participants x 6day)	per day	60	105	6,300
3	Hotel (10 person x 5 night)	per night	50	105	5,250
4	Insurance	per person	10	30	300
5	Airport charges	per person	10	25	250
6	Car rental	per day	6	600	3,600
7	Interpreter	per day	4	300	1,200
	Subtotal				**22,500**
	TOTAL				**90,000**

9.4. Budget for communication

Unit: USD

No	Activities	Unit	Qty	Unit cost	Calculation	Total
1	Project signs	per unit	4	500	For 04 communes in 02 districts	2,000
2	Designing and printing documents, posters, leaflets, etc.	per pack	1	3,000		3,000
3	Broadcasting	per bulletin	10	500	Radio bulletins on Thai Binh Radio and Television	5,000
Total						**10,000**

9.5. Budget for equipment supply

Unit: USD

No	Activities	Unit	Qty	Unit cost	Calculation	Total
1	Vehicle	car	1	37,000	7-seat car (4WD type)	37,000
2	Motorcycle	motor	4	2,000	Honda (>110cc)	8,000
3	Motor speedboat	boat	1	10,000	YAMAHA	10,000
4	Laptop computer	laptop	8	1,500	Core i5 - Core i7	12,000
5	Desktop computer	desktop	4	1,000	Core i5	4,000
6	Printer	Printer	2	500	Samsung or Canon Laser Printer LBP3370	1,000
7	Photocopier	machine	1	2,500	Samsung or Recoh	2,500
8	Camera	camera	2	1,000	Nikon or Canon	2,000
9	Office maintenance and equipment procurement	set	1	18,500	Including table, chairs, air-conditioner, sound system, lights, scanner, fax machine, telephone,…	18,500
10	GPS, Binoculars, field equipment	set	1	5,000	GPS: Garmin Oregon Binoculars: PF65ED	5,000
Total						**100,000**

9.6. Budget for Project Management

Unit: USD

No	Activities	Unit	Qty	Unit cost	Calculation	Total
1	Central Project Management Board for 09 years	package	1	130,000	01package x USD130,000	130,000
2	Provincial Project Management Board for first 5 years	package	1	64,000	01package x USD64,000	64,000
3	Provincial Project Management Board for second 4 years	package	1	26,000	01package x USD26,000	26,000
4	Contracted staff (1person x 5 years)	year	5	7,200	1 staff x USD 600/month x 12 months	36,000
Total						**256,000**

9.7. Budget for National Technical Consultancy Agency

Unit: USD

No	Activities	Unit	Qty	Unit cost	Calculation	Total
1	Verify project mapping	map	3	2,000		6,000
2	Verify technical designs for forest planting, tending and protecting	package	1	8,000		8,000
3	Develop workshop, training documents	set	12	1,000		12,000
4	Monitor, evaluate and report on progress and quality of project activities	package	1	40,000		40,000
5	Develop criteria and indicators for checking silvicuture activities	package	1	3,000		3,000
6	Re-check the silviculture activities and report to PMB	package	1	6,000	10% of total area of forest planting, tending and protecting	6,000
7	Develop relevant reports and submit to PMB	package	1	10,000		10,000
Total						**85,000**

9.8.Budget for 2016

Unit: USD

No	Activites	Total	2016			
			Q1	Q2	Q3	Q4
1	Inception workshop	7,500	7,500	-	-	-
2	Project mapping (forest status map, project map)	4,000	4,000	-	-	-
2.1	Forest status map (2copies x 4communes = 8maps)	2,000	2,000	-	-	-
2.2	Project map (2copies x 4communes = 8maps)	2,000	2,000	-	-	-
3	Planting new mangrove forest including tending and protection (20ha x USD5,318.75/ha)	106,375	10,000	40,000	40,000	16,375
4	Supplementary planting of mangrove forest including protection in first 3years (20ha x USD1,908.5/ha)	38,170	5,000	12,000	12,000	9,170
5	Mangrove forest protection (800ha x USD20/ha)	16,000	4,000	4,000	4,000	4,000
6	Training courses (03 courses)	6,000	-	2,000	2,000	2,000
7	Communication	4,500	2,000	1,000	1,000	500
8	Equipment supply	100,000	-	50,000	50,000	-
9	Project management	45,000	5,000	10,000	15,000	15,000
10	National Technical Consultancy Agency	21,000	4,000	6,700	5,900	4,400
	Total	**348,545**	**41,500**	**125,700**	**129,900**	**51,445**

ANNEXES

Annex-1. Species information of 3 main species for mangrove restoration in Thai Binh Province

BAN

(Sonneratia caseolaris)

Scientific description

With the height of 10 to 15 meter, this tree is a pioneering species in brackish water areas. It includes numerous branches with wide canopy. It has developed preumatophores that are cone-shaped spreading around the root. This species is distributed throughout the country from the Northern to the Southern Viet Nam. Especially in Nothern Viet Nam, this species are used for plantations for wind breaks and coastal protection.

Leaves are rounded with long young leaves and reddish petioles. They are fallen during cold water.

The tree starts flowering in March and April. Flowers are solitary at the top of branches or at axillary, buds are chartreuse green ovoid shape. Flowers are bisexual and radial symmetry. Receptacle includes 6 sepals which are green outside and pinkish-purple inside. A flower, with slightly rounded stigma and long style, consists of numerours long white stamens.

The fruit (with diameter of 4 to 5 cm) is globular leathery with calyx top flat at the stem, calyx lobes flat, spreading out horizontally. Many bouyant seeds are embedded in fleshy pulp.

Wood are used for paper pulp production and firewood. Flowers are used for beefeeding. Sour fruits are used to flavour crurries and chutnies. Prematophores are used for hat kernels. As the root system is firmly rooted in the mud, this species is planted in newly-formed warp in order to stablize soil, and protect seadykes and riverdykes.

TRANG

(Kandelia candel)

Scientific description

This species of mangrove is 4 to 8 meter tall with flat buttresses or some stilt-roots, usually met on alluvial or sandy mud soil, flooded by salty or brackish water. It mainly grows in areas where are under high or medium tides. It prefers the salinity of the seawater from 20 to 34%. It can withstand cold winter in theNothern Viet Namand harsh tempreature in the central. This species is distributed throughout the country, from the Nothern to the Southern Viet Nam.

Leaves are simple, opposite and elliptic with spiky apex. It has umbel flowers with disk head-shaped and small pear-shaped, smooth and golden brown fuits.

The tree starts flowering in May and June. It is under *Rhizophoraceae* family so seeds are viviparous, seedlings are cylindrical-shaped hypocotyl.

Wood are used as firewood, making tools of salt production. Flowers are used for beefeeding. As the root system is firmly rooted in the mud, this species is planted in order to protect seadykes and riverdykes.

Seedlings and barks contain tannin which is used in netdyeing. Leaves are used as food for cattle raising or in protein-rich compost production.

MAM

(Avicennia marina)

Scientific description

This is a species of small-sized tree with the height of 2 to 3 meter, rounded canopy and aerial roots, includes multiple branches. Young branches are grey or silvery-white with very small matted hairs on the surface. This species well adapts to mud soil, mainly grows in areas where are under low or medium tides or are newly-formed warp. It prefers the salinity of the sea water from 20 to 35%. It occurs in deep intertidal zones and can withstand cold winter in the the Nothern Viet Nam as well as hot dry climate up to 41^{o}C. It is distributed throughout the country, from the Northern to the Southern Viet Nam.

Leaves are oval or ovatelance-shaped, tapered at both ends, margin is slightly revolute, shining and pale green above, silvery beneath, pubescent on veins. They are 5 – 6cm long and 2-4 cm wide.

The tree starts flowering in April and May with the inflorescence of a terminal panicle. Each receptacle has 3 unequal bracts, petals are united at the base into a tube, 5 cm long with matted hairs on the surface.

Fruits are capsule-shaped with spiky apex, containing one seed. Fruits are cracked into 2 pieces when being yellowish ripe.

Wood are used for paper pulp production and firewood. Flowers are used for beefeeding. As the root system is firmly rooted in the mud, this species is planted in newly-developed warp in order to stablize soil, and protect seadykes and riverdykes.

Decomposed leaves become an important food source for shrimp larvae.

Seedlings contain starch used as food for cattles, barks contain tannin used in netdyeing, leaves are used in protein-rich compost production.

Annex-2. Research Institute for Forest Ecology and Environment (RIFEE)

RIFEE was established following Decision 3132/QD-BNNPTNT-TCCB dated 13 December 2012 of the Minister of Agriculture and Rural Development on the basis of consolidation of Research Center for Forest Ecology and Environment (established in 1990) and a part of Research Center for Forest Biotechnology.

RIFEE has a team of well- trained technicians and experts with diverse experiences in consulting and supervising implementation of project and providing training courses on mangroves and related issues.

- **Selected projects/researches implemented by RIFEE in reference to rehabilitation and development of mangroves since 2000**

No	Title	Donor organization	Time period
I	**National project and scientific research**		
1	Integrated technical and economic solutions for rehabilitation and development of mangroves and *Melaleuca leucadendra* forests	National project – MOSTE	2000-2002
2	Developing standards for plantations under the Clean Development Mechanism (CDM) in Vietnam	661 Program - MARD	2003-2005
3	Developing standards for protection and production mangroves in Vietnam	Basic level research project - MARD	2005
4	Economic valuation of main forests in Vietnam	Ministry level research project - MARD	2004-2006
5	Development of *Melaleuca leucadendra* forest models in semi-flood areas in Ninh Binh and Ha Tay provinces	661 Program - MARD	2004-2008
6	Assessment of current status of and recommendations of management models for mangrove ecosystems in Vietnam	Ministry level research project - MARD	2004-2008
7	Forest pricing in Vietnam	Ministry level research project - MARD	2006-2007
8	Planting techniques for plantation of wave-break protection mangroves on harsh condition sites.	Basic level research project - MARD	2007-2009
9	Solutions for coastal mangrove rehabilitation and development	Basic level research project - MARD	2007
10	Assessment of and solutions for degraded situation of mangroves in QuangNinh to Hai Phong: Development a pilot model in selected area of Dong Rui	Ministry level research project - MARD	2008-2010
11	Guidelines on environmental impact assessment of afforestation projects	Ministry level research project - MARD	2010
12	Mangrove plantation on harsh condition sites for seadyke protection	Ministry level research project - MARD	2009-2012
13	Development of methods for greenhouse gases inventory in forestry sector	Ministry level research project - MARD	2010-2011
14	Economic valuation of coastal protection forests in Coastal South Central and South regions of Vietnam	Ministry level research project - MARD	2010-2012
15	Survey, assessment and identification of climate change response solutions, development and implementation of	VNFOREST - MARD	2010-2012

	action plans to respond to climate change in forestry sector		
16	Develop breeds of some species for afforestation in estuaries and coastal areas in the North of Vietnam	Breeding project – MARD	2012-2015
17	Developing technical solutions for integrated management of coastal protection mangroves in response to climate change	Forest Science Institute of Vietnam	2012-2013
18	Implementation supervision: Review and planning of coastal protection forests of the country until 2020.	VNFOREST - MARD	2013
II	**International cooperation**		
1	Mangroves Component – Prevention of environmental degradation in East Sea and Gulf of Thailand	UNEP	2002-2007
2	Assessment of current status of and recommendations for aquaculture practice in Thai Binh province.	TREELINK	2002-2003
3	Forestry policy in Vietnam and the role of communities in forest protection and development	IGES	2002
5	Ecological zoning for forest land in Vietnam	FAO	2010-2011

- **Selected publications of RIFEE**

1. Assessment of production potential of forest land, 2001. Agriculture publishing house, Hanoi, 203 pages.
2. Method of indigenous knowledge collection and use, 2001. Agriculture publishing house, Hanoi, 178 pages
3. Rehabilitation and development of mangroves and *Melaleuca leucadendra* forests in some eco-regions of Vietnam, 2003. Agriculture publishing house, Hanoi, 188 pages.
4. Manual for soil assessment for afforestation, 2005. Science and Techniques Publishing House. Hanoi, 39 pages.
5. Overview of mangroves ofViet Nam, 2005. Agriculture publishing house, Hanoi, 136 pages
6. Soil classification for production forests of main species in key regions of Vietnam, 2010. Agriculture publishing house, Hanoi.
7. Assessment of forest land of Vietnam, 2005. Science and Techniques Publishing House. Hanoi, 116 pages.
8. Soil classification, land use planning and land allocation, 2005. In “Manual for forestry sector”. Transport Publishing house.
9. Software for assessment of forest land, 2005.
10. Criteria for classification of watershed protection forests in Vietnam, 2010. Science and Techniques Publishing House. Hanoi

Annex-3 Investment rate per hectare of mangrove plantation

No.	Category	Unit	Quantity	Labour (mandate)	Cost-norm (USD)	Sum-up cost (USD)
First stage: Planting, tending and protection in the first year						**5,318.75**
I	**Indirect costs: Surveying, designing and validating**	ha	1		360	**360.00**
II	**Materials**					**3,758.25**
1	Seedlings	tree	1,667		1.5	2,500.50
2	Piles (1,667seedlings x 3piles/seedling x 0.7m/pile)	pile	5,001		0.25	1,250.25
3	Cord	kg	3		2.5	7.50
III	**Labour**				-	**795.50**
1	Hole digging	hole	1,667	22	18.5	407.00
2	Tree planting	tree	1,667	16	18.5	296.00
3	Piling and cord tying	tree	1,667	5	18.5	92.50
IV	**First year tending**					**370.00**
1	Trash picking, pile rearranging (twice a year)	ha	1	10	18.5	185.00
2	*Chthamalusstellatus* removing (twice a year)	ha	1	10	18.5	185.00
V	**Forest protection**	**ha**	1		**35**	**35.00**
Second stage: Supplement planting, tending and protecting in the 2rd year						**1,378.750**
I	**Materials**				-	**751.75**
1	Seedlings	tree	333		1.5	499.50
2	Piles (333seedlings x 3piles/seedling x 0.7m/pile)	pile	999		0.25	249.75
3	Cord	kg	1		2.5	2.50
II	**Labour**				-	**222.00**
1	Hole digging	hole	333	6	18.5	111.00
2	Tree planting	tree	333	4	18.5	74.00
3	Piling and cord tying	tree	333	2	18.5	37.00
III	**Second year tending**					**370.00**
1	Trash picking, pile rearranging	ha	1	10	18.5	185.00
2	*Chthamalusstellatus* removing	ha	1	10	18.5	185.00
IV	**Second year protecting**	**ha**	**1**		**35**	**35.00**
Third stage: Tending and protecting in the third year						**405.00**
1	Trash picking, pile rearranging	ha	1	10	18.5	185.00
2	*Chthamalusstellatus* removing	ha	1	10	18.5	185.00
3	Forest protecting	ha	1		35	35.00
Total cost per ha						**7,102.50**

(* For the first three years after planation, more manpower to patrol the site, regular report on the management status, and activities to prevent mangroves from trash, shipworms are required.)

Annex-4 Investment rate per hectare of supplement plantation of mangroves

No.	Category	Unit	Quantity	Labour	Cost-norm (USD)	Sum-up cost (USD)
First stage: Planting, tending and protection in the first year						**1,908.5**
I	**Indirect costs: Surveying, designing and validating**	**ha**	**1**		**130**	**130.0**
II	**Materials**					**1,355.0**
1	Seedlings	tree	600		1.5	900.0
2	Piles (600seedlings x 3piles/seedling x 0.7m/pile)	pile	1,800		0.25	450.0
3	Cord	kg	2		2.5	5.0
III	**Labour**				**-**	**240.5**
1	Hole digging	hole	600	7	18.5	129.5
2	Tree planting	tree	600	4	18.5	74.0
3	Piling and cord tying	tree	600	2	18.5	37.0
IV	**First year tending**					**148.0**
1	Trash picking, pile rearranging (twice a year)	ha	1	4	18.5	74.0
2	*Chthamalusstellatus* removing (twice a year)	ha	1	4	18.5	74.0
V	**Forest protection until approved (1 year)**	**ha**	**1**		**35**	**35.0**
Second stage: Supplement planting, tending and protecting in the second year					**-**	**411.0**
I	**Materials**				**-**	**135.5**
1	Seedlings	tree	60		1.5	90.0
2	Piles (60seedlings x 3piles/seedling x 0.7m/pile)	pile	180		0.25	45.5
3	Cord	kg	0.2		2.5	0.5
II	**Labour**				**-**	**92.5**
1	Hole digging	hole	60	2	18.5	37.0
2	Tree planting	tree	60	2	18.5	37.0
3	Piling and cord tying	tree	60	1	18.5	18.5
III	**Second year tending**					**148.0**
1	Trash picking, pile rearranging (twice a year)	ha	1	4	18.5	74.0
2	*Chthamalusstellatus* removing (twice a year)	ha	1	4	18.5	74.0
IV	**Second year protecting**	**ha**	**1**		**35**	**35.0**
Third stage: Tending and protecting in the third year					**-**	**183**
1	Trash picking, pile rearranging (twice a year)	ha	1	4	18.5	74.0
2	*Chthamalusstellatus* removing (twice a year)	ha	1	4	18.5	74.0
3	Forest protecting	ha	1		35	35.0
Total cost per ha					**-**	**2,502.5**

(* For the first three years after planation, more manpower to patrol the site, regular report on the management status, and activities to prevent mangroves from trash, shipworms are required.)

Annex-5 Budget estimation for new plantation

Unit: USD

No	Location	Area (ha)	Cost norm	Sum-up cost
I	**Thai Thuy district**	**52**		**369,330**
1	Thuy Xuan commune	27	7,102.5	191,768
2	Thuy Hai commune	25	7,102.5	177,563
II	**Tien Hai district**	**28**		**198,870**
1	Dong Long commune	28	7,102.5	198,870
2	Dong Hoang commune	0	0	0
	Total	**80**		**568,200**

Annex-6 Budget estimation for supplement plantation

Unit: USD

No	Location	Area (ha)	Cost norm	Sum-up cost
I	**Thai Thuy district**	**50**		**125,125.0**
1	Thuy Xuan commune	27	2,502.5	67,567.5
2	Thuy Hai commune	23	2,502.5	57,557.5
II	**Tien Hai district**	**30**		**75,075.0**
1	Dong Long commune	25	2,502.5	62,652.5
2	Dong Hoang commune	5	2,502.5	12,512.5
	Total	**80**		**200,200.0**

REFERENCES

1. Decision No. 2139/QD-TTg dated December 5, 2011 of the Prime Minister on NationalClimate Change Strategy
2. Decision No. 120/QD-TTg dated January 22, 2015 of the Prime Minister on approving the Project on protection and development of coastal forests to cope with climate change in 2015-2020 periods
3. Decision No. 158/QD-TTg dated February 2, 2008 of the Prime Minister on National Target Program to Respond to Climate Change
4. Decision No. 57/QD-TTg dated January 9, 2012 of the Prime Minister on approval of the Forest Protection and Development Plan for the period 2011-2020
5. National Forestry Development Stratery 2006-2020
6. National Strategy on Coping with Climate Change, 2011
7. Report of Department of Agricultural and Rural Development of Thai Binh province, 2013