AFoCo/010/2016

PROJECT ANNUAL REPORT

[January to December 2018]

<Project Profile>	
Project Title	Domestication of Endangered, Endemic and Threatened Plant Species in Disturbed Terrestrial Ecosystem in Malaysia and Thailand
Project Duration	Start date: 19th May 2016 End date: 18th May 2022
Implementing Agency	Royal Forest Department, Thailand
Participating Countries	Malaysia and Thailand
Project Site	Mae Moh Mine, Lampang, and Takuapa, Phang Nga, Thailand
Budget and Source of Finance	Total: US$ 707,520 - Secretariat: US$ 167,150 - National budget (in-kind): US$ 540,370

<Implementing Agency Profile>	
Name	Royal Forest Department
Address	61 Phahonyothin road, Lardyao subdistrict, Jatujak District, Bangkok 10900
Project Manager	Ms. Phuangphan Whuangplong
Contact	Tel.: +66-6 3271 5998 Fax: +66 2 5614 292 ext. 5449 Email: pyf49@hotmail.com
Declaration	☑This report includes all the essential information on executed activities, achieved outputs, issues and challenges encountered in the period covered by the report meant for higher level of administration. ☑This report was prepared by the Project Manager and the staffs.

Contents

1. Project Overview

Mining is an inherently invasive process that can cause damage to a landscape in an area much larger than the mining site itself. With open cast mining, the overburden, which may be covered in forest, must be removed before the mining can commence. The environmental impacts of mining include erosion, formation of sinkholes, loss of biodiversity, and contamination of soil, groundwater and surface water by chemicals from mining processes.

Soil texture and water content can be greatly modified in disturbed sites, leading to changes of plant communities in the area. Most of the plants have low tolerance for metals in the soil, but sensitivity differs among species. Contaminants can modify or disturb microorganisms, thus modifying nutrient availability, causing a loss of vegetation in the area. Endemic species are especially sensitive since they need very specific environmental conditions. Destruction or slight modification of their habitat puts them at the risk of extinction. Habitats can be damaged when there is not enough terrestrial as well as by non-chemicals products such as large rocks from the mines that are discarded in the surrounding landscape with no concern for impacts on natural habitat. Besides creating environmental damage, the contamination resulting from leakage of chemicals also affects the health of local population.

Remediation takes time, and in most cases will not enable the recovery of the diversity present before the mining activity. Some invasive and native woody species with little commercial or ecological value are more resistant and will survive these levels, and some non-native species that can tolerate these concentrations in the soil will migrate in the mine surrounding lands to occupy the ecological niche. For these lands to become productive forests, intervention is needed to loosen compacted mine soils, correct chemical or nutrient deficiencies and replace their current vegetation. If no action is taken to remediate the many environmental problems inherent to modern mining, the end cost for governments and communities would be devastating.

The project entitled “Domestication of Endangered, Endemic and Threatened Plant Species in Disturbed Terrestrial Ecosystem in Malaysia and Thailand” is thus proposed for funding by AFoCo to address some of the impacts resulting from mining. Forests and biodiversity degradation are mostly under control by the good governance and forestry practices in Malaysia and Thailand but disturbed sites in the early years need to be rehabilitated and enriched with the national red-list and IUCN species. 12 to 30 species of endangered, endemic and rare tree species (EETS) from the lists shall be domesticated in this project. The project therefore promotes biodiversity conservation through domestication of EETS in each disturbed site involving collaborative activities between Malaysia-Thailand scientists. Results from the project can also be used for training and technology transfer to other ASEAN member countries.

2. Implementation Progress

2.1. Overall Progress

Output/ Activity No.	Key Activity	Progress Description	Timeline		Percentage Executed
			plan	actual	
Site Characterization					
Activity A.1Selection of planting sites in denuded and disturbed forest, and identification of EETS for domestication					
Activity A.1.2	GPS mapping	GPS mapping of 2018 plot at Mae Moh and Takuapa site is in the process of tendering. GPS mapping at both sites and 2016 plot at Takuapa site have been finished (completed) are showed as **Annex I**.	Apr-Dec 18	February and July 18	50
Activity A.1.3	Producing Site Locality Map	Site locality maps at Mae Moh mine plot include boundary map, existing trees map and planted EETS map were produced as in **Annex II**.	Apr-Dec 18	February and July 18	70
Activity A.2 Procurement of EETS					
Activity A.2.1	Purchase of seedlings or saplings	Seedlings of each 10 EETS were purchased. 1,000 banana shoots were bought and used as nursing plants. - *Dalbergia cochinchinensis,* - *Dalbergia oliveri,* - *Aquilaria crassna,* - *Dalbergia cultrate*, - *Magnolia sirindhorniae*, - *Dillenia ovata*, - *Magnolia rajaniana*, - *Pakia sumatrana,* - *Aquilaria malaccensis* and - *Neobalanocarpus heimii*.	Apr-Sep 18	July 18	91
Activity A.3 Establishment of model plots (Site preparation, planting stock, planting, tending, monitoring)					
Activity A.3.1	Irrigation	Irrigation is carried out manually at Mae Moh site while drip	Oct-Dec 18	Jan-Apr and	50

Output/ Activity No.	Key Activity	Progress Description	Timeline		Percentage Executed
			plan	actual	
		irrigation system is installed at Takuapa site. Watering at Mae Moh site was carried out 6 times, Drip-irrigation for 2018 plot at Takua pa has not yet installed and in the process of approving the TOR for contractor.		Nov-Dec 18	
Activity A.3.2	Fire protection line and inspection road	Road for fire protection and watering route was built on both sides of the2018 planting plot.	Jan-Mar 18	Jan and Nov 18	100
Activity A.3.3	Demarcation and wind protecting and fence	The site is not windy but has more than 10,000 cattle roaming. Fencing made from cement post with barbed wire installed to prevent cattle from encroaching into the both planting plots at Mae Moh.(completed) Takuapa site is in the process of approving the TOR for the contractor.	Jan-Mar 18	July 18	95
Activity A.3.4	Planting & Tending	Details of site preparation and EETS planting and tending at Mae Moh site appear as in **Annex III**. Due to limited of seedling number for some species, when the plants died, refilling will be done using *Dillenia ovate* or *Magnolia rajaniana*. The *Dillenia ovat*a and *Magnolia rajaniana*, seedlings are too small to be planted in 2018, therefore refilling will be conducted in 2019. Planting and tending at Takuapa are in the process of approving the TOR for contractor.	Apr-Sep 18	Jul 18	70
Activity A.3.5	Tending of 2016 planting	The detail of this activity is shown in **Annex IV**.			
Activity A.3.7	Monitoring/supervising of site preparation, planting and tending	Every step of work during site preparation, planting and tending was photographed and reported by Project staff as appear in Annex III. Monitoring/supervising committees consist of Director of Forest Research and Development Bureau, Director of State	Jan-Dec 18	Jan – Dec 18	80

Output/ Activity No.	Key Activity	Progress Description	Timeline		Percentage Executed
			plan	actual	
		Reforestation Division, Director of Silvicultural Research Division, Expert on Forest Management Research and Director of International Forestry Cooperation Division were appointed to visit the site twice a year.			
Activity A.4 Documentation of biophysical site properties, planting techniques and assessment of growth					
	Documentation of biophysical site properties, planting techniques and assessment of growth	Survival rates and growth measurement of plants at 25 months after planting at Mae Moh site were recorded while at Takuapa the records at 17 and 22 months were also conducted. The data appear as in **Annex V**.	Jan-Jun 18	Jan-Dec 18	80
Activity A.4.1	Soil analysis	Soil analysis is in the process of approving the TOR for contractor	Apr-Jun 18	-	0
Activity A.4.2	Purchase of microclimate sensors / rain gauge	All data loggers are out of order. New sets of data will be purchased.	Jan-Mar 18	0	0
Activity A.4.3	Purchase of height meter (vertex) / shredder machine	A shredder machine was purchased as shown in Annex VI.	Jan-Mar 18	Oct 18	100
Activity A.4.4	Purchase of diameter tapes / insect sprayer	2 insect sprayers were bought as shown in Annex VII.	Jan-Mar 18	Oct 18	100

Output/ Activity No.	Key Activity	Progress Description	Timeline		Percentage Executed
			plan	Actual	
B. Regional Workshop					
Activity B.1	Domestication of EETS in ASEAN countries	Thailand hosted a Regional Workshop titles "Domestication of Endangered, Endemic and Threatened Plant Species in Disturbed Terrestrial Ecosystem" was held during 28th November to 1st December 2018 at Duangtawan Hotel Chiang Mai, in Chiang Mai Thailand. 43 participants and observers from Korea, Myanmar, Malaysia, Cambodia, The Philippines, Indonesia, Laos and Thailand attained the workshop. Participants joined the field trip to Mae Moh mine and the 2016 and 2018 Project planting sites, in Lampang, Thailand.	Oct-Dec 18	Nov-Dec 18	100
C. Technology Transfer and Capacity Development					
Activity C.1	Cross visits	Thai could not join the Malaysian team to Indonesia because of the timing difference in budget request. Cross visit for Thailand has not been accomplished.	Jul-Sep 18	-	0
Activity C.2 Knowledge and technology transfer					
Activity C.2.1	Manual	250 copies of manual titles "Weed manual of Mae Moh mine project site" were published.	Oct-Dec 18	Nov 18	100
Activity C.2.2	Leaflet	Leaflet is not be printed.	Oct-Dec 18	-	0
Activity C.2.3	Poster and roll up	Posters and roll up have not been printed.	Oct-Dec 18	-	0
Activity C.2.4	Website maintaining	The Project website was maintained and can be accessed through http://afocothailand-malaysia.com/. More data need to be added.	Oct-Dec 18	Dec 18	100

Output/ Activity No.	Key Activity	Progress Description	Timeline		Percentage Executed
			plan	actual	
D. Local Operation					
Activity D.2	Attending overseas meetings	The staff of Royal Forest Department (Mr.Montri Intasen) was attended the 14th Meeting of the Conference of the Parties to the Convention on Biological Diversity (CBD COP 14) takes place in Sharm during, Egypt between 13-23 November 2018.	Oct-Dec 18	Nov 18	100
Activity D.3	Inception Meeting				
Activity D.4	Annual report	30 copies of 2017 Annual report has been printed.	Oct-Dec 18	2019	100
Activity D.5 Miscellaneous					
Activity D.5.1	Office supply	Office supplies	Jan -Dec 18	Jan-Dec 18	100
Activity D.5.2	Phone, Fax, Mailing costs	12 monthly payment for the calling and internet fee for 3 Samsung Galaxy S7 edge using by Project Director, Project Manager and Project Account Officer with registered number as +66-63982516991, +66-632715998 and +66-819257119, respectively.	Jan -Dec 18	Jan -Dec 18	100
Activity D.5.3	Office automation		Jan -Dec 18	Jan-Dec 18	100
Activity D.5.4	Local part-time Coordinator	Miss Suphansa Chatmueang was contracted as an Local part-time coordinator	Jan -Dec 18	Jan –Dec18	100
Activity D.6	PCC Meeting	Thailand hosted the 4th PCC Meeting during 25th-28th November 2018 at Asia Lampang Hotel, Lampang Thailand. Participants at the meeting were AFoCO Secretariat Korea, Malaysian staff and Thai staff. Minutes and ROD of these meetings appear as Annex VIII	Oct – Dec 16	Sep-Dec 16	100

2.2 Key Decisions of Project Steering Committee /Coordination Meeting

The AFoCO Secretariat requested the implementing countries to officially inform the AFoCO Secretariat for any update or change of project personal especially the country project manager or country project coordinator for smooth communication among the parties.

The Meeting recalled the project document (Schedule 1 in MOA) and highlighted that Malaysia and Thailand, shall establish the domestication sites at least 6 ha for each country and at least 12 EETS species shall be domesticated in those sites. Each country should have at least 3,000 saplings in total at the completion of the project.

In order to enhance project implementation, the Meeting agreed to hold the 5th and 6th PCM meetings in Malaysia. The Regional Workshop shall be organized back to back before or after the 6th PCM.

The AFoCO Secretariat informed that the project monitoring shall be organized in 2019. The Secretariat will inform time and venue of the monitoring in due course.

The Meeting discussed and agreed for the implementing countries to interchangeably transfer the remaining budget between the project activities categories. The changes shall be presented in yearly work and budget plan. The Meeting agreed for the implementing countries to expand the Activity C.1 (Cross visits) beyond ASEAN Member Counties.

The Meeting approved Thailand to allocate the remaining budget of 2018 Activity D.6 (PCC meeting) to 2018 Activity B. (Regional Workshop).

The Meeting agreed for the leading country to compile the progress and annual reports before the submission to the AFoCO Secretariat.

2.3 Review of Performance Indicators and Activities

Output/ Activity No.	Key Activity	Indicators (Planned)	Indicators (Achieved)	Comments
A. Site Characterization				
Activity A.1 Selection of planting sites in denuded and disturbed forest, and identification of EETS for domestication				
Activity A.1.1	Site selection and identification of EETS for domestication	1 site 3 ha and 6 EETS	2 sites 5.3 ha and 10 EETS -Mae Mot 4.8 ha 8 EETS -Takuapa 0.5 ha 4 EETS	In 2016 planted 6 EETS In 2018 planted 10 EETS (4 EETS same as 2016 planted species includes 6 new species), altogether (2016 and 2018) is 12 EETS. Planting area plan is 3.5 ha.but in 4thPCC meeting Dr. Ho Li Ang had commented that If Thailand have opportunity increased planting area should be increased because of enough budget.
Activity A.1.2	GPS mapping	3 ha	4.8 ha	0.5 ha at Takuapa will be done in 2019.
Activity A.1.3	Producing Site Locality Map	60	60	A map at Takuapa site will be produced by April 2019.
Activity A.2 Procurement of EETS				
Activity A.2.1	Purchase of seedlings or saplings	4,800 EETS seedlings	There are 4,368 seedlings in total. 600 *Dalbergia cochinchinensis,* 240 *Dalbergia oliveri,* 528 *Aquilaria crassna,* 540 *Dalbergia cultrate*, 80 *Magnolia sirindhorniae*, 180 *Dillenia ovata*,	The remained seedlings will be purchased later depend on availability in market.

Output/ Activity No.	Key Activity	Indicators (Planned)	Indicators (Achieved)	Comments
			600 *Magnolia rajaniana*, 360 *Pakia sumatrana,* 120 *Aquilaria malaccensis,* and 120 *Neobalanocarpus heimii.* 1,000 banana shoots were purchased.	
Activity A.3 Establishment of Model plots (Site preparation, planting stock, planting, tending, monitoring)				
Activity A.3.1	Irrigation	3.5 ha	Watering of 3.8 ha of 2016 plot and 4.8 ha of 2018 plot manually	0.5 ha irrigation system will be set up at Takuapa in May 2019. manual watering at Mae Moh site will be deployed from November 2018 to early May 2019.
Activity A.3.2	Fire protection line and inspection road	3 km	3 km	Inspection road was in-kind contributed by EGAT. (Mae Moh site)
Activity A.3.3	Demarcation and wind protecting	3 ha	4.8 ha at Mae Moh and 0.5 ha at Takuapa	Fencing and protection from direct sunlight installed at Mae Moh site.
Activity A.3.4	Planting & Tending	2,200 plants	2,420 EETS plants and 1,000 banana plants were planted at Mae Moh site and, another 400 EETS will be planted plants at Takuapa site.	-Mae Moh site planted 8 EETS by 4x4 m. spacing in 4.8 ha. -Takuapa planted 4 EETS by 2x5 spacing in 0.5 ha.
Activity A.3.5	Monitoring/supervising of site preparation, planting and tending	90 days	133 days	

Output/ Activity No.	Key Activity	Indicators (Planned)	Indicators (Achieved)	Comments
Activity A.4 Documentation of biophysical site properties, planting techniques and assessment of growth				
Activity A.4.1	Soil analysis	15 samples	0	In the process, collecting after planting.
Activity A.4.2	Purchase of microclimate sensors	2 set of rain gauge	0	5 sets of microclimate sensors has ordered because the old ones were out of order. (In September2019)
Activity A.4.3	Purchase of height meter (vertex) /shredder machine	1 set	1 set	
Activity A.4.4	Purchase of diameter tapes/ shredder machine	2 sets	2 sets	
B. Regional Workshop		**1 workshop**	**1 workshop**	
C. Technology Transfer and Capacity Development				
Activity C.1	Cross visits	9 persons for 36 days	13 persons 65 days	
Activity C.2 Knowledge and technology transfer				
Activity C.2.1	Manual	250	250	Manual on “Weeds at Mae Moh mine” was published in November 2018. (Completed) Poster and roll up before November 2019
Activity C.2.2	Leaflet	250	0	
Activity C.2.3	Poster and roll up	10 sets	0	
Activity C.2.4	Website maintaining	1 website	1 website	The website is maintained and update regularly.
D. Local Operation				
Activity D.2	Attending overseas meetings	1 person	1 person	
Activity D.3	Inception Meeting	-	-	
Activity D.4	Annual report	1 report	1 report	2017 annual report

Output/ Activity No.	Key Activity	Indicators (Planned)	Indicators (Achieved)	Comments
Activity D.5 Miscellaneous				
Activity D.5.1	Office supply	1 year		
Activity D.5.2	Phone, Fax, Mailing costs	1 year	1 year	
Activity D.5.3	Office automation	1 year		
Activity D.5.4	Local full-time administrative officer (contract)	1 person	1 person	
Activity D.6	PCC Meeting	1 meeting	1 PSC meetings & 1 PCC meeting	
Activity D.7	Stakeholder Meeting	-	-	

3. Financial Report

3.1 Statement of Cash Flow

Item	Received		Expensed(Baht)	Balance(Baht)	Remark
	Baht	$			
Brought forward				1,160,014.64	Reverse expensed Activity A.1, A.2 and D.5= 47,708.43
Tranfer09/02/18	2,577,600.00	81,200.00			
Transfer11/10/18	2,809,084.00	85,920.00			
Expensed 2018			1,762,638.66		
Total	5,386,684.00	167,120.00		4,784,059.98	

3.2 Balance Sheet

Balance Sheet (B/S)

Project Number:010/2016
Project Title: Domestication of Endangered, Endemic and Threatened Plant Species in Disturbed Terrestrial Ecosystem in Malaysia and Thailand

Reporting Period: **05/01/2018 to 28/12/2018**

B/S Number:

Component		Approved Budget (A)	Expenditures to Date			Available Funds (E = A - D)
			Committed (B)	Paid (C)	Total (D = B + C)	
Funds received						
I. Total AFoCo funds received by the reporting period 2018		167,150.00				
II. Committed AFoCo funds received by the reporting period 2016		7,444.48				
III. Committed AFoCo funds received by the reporting period 2017		25,209.22				
Total		199,803.70				
Expenditures by Implementing Country						
A. (Output 1)						
A1 Selection of planting sites in denuded and disturbed forest, and identification of EETS for domestication	2016	2,506.58	-	2,497.13	2,497.13	9.45
	2017	-	-	-	-	-
	2018	22,100.00	22,100.00	-	22,100.00	-
	Total	24,606.58	22,100.00	2,497.13	24,597.13	9.45
A2 Procurement of EETS	2016	-	-	-	-	-
	2017	-	-	-	-	-
	2018	31,110.00	30,956.18	153.82	31,110.00	-
	Total	31,110.00	30,956.18	153.82	31,110.00	-

Component		Approved Budget (A)	Expenditures to Date			Available Funds (E = A - D)
A3 Establishment of Model plots (Site preparation, planting stock, planting, tending, monitoring)	2016	900.00	584.27	315.73	900.00	-
	2017	11,134.23	3,742.36	7,391.87	11,134.23	-
	2018	53,380.00	52,300.35	1,079.65	53,380.00	-
	Total	65,414.23	56,626.98	8,787.25	65,414.23	-
A4 Documentation of biophysical site properties, planting techniques and assessment of growth	2016	1,860.00	1,860.00	-	1,860.00	-
	2017	-	-	-	-	-
	2018	9,535.00	4,816.89	4,718.11	9,535.00	-
	Total	11,395.00	6,676.89	4,718.11	11,395.00	-
II. Sub Total A		**132,525.81**	**116,360.05**	**16,156.31**	**132,516.36**	**9.45**
B. (Output 2)						
B1 Domestication of EETS in ASEAN countries	2016	-	-	-	-	-
	2017	43.42	-	-	-	43.42
	2018	13,605.00	2,851.17	10,753.83	13,605.00	-
	Total	13,648.42	2,851.17	10,753.83	13,605.00	43.42
III. Sub Total B		**13,648.42**	**2,851.17**	**10,753.83**	**13,605.00**	**43.42**
C. (Output 3)						
C.1 Cross visits (USD1700/person/trip TH, MY, IN,PH,SG)	2016	5.62	-	-	-	5.62
	2017	7,000.00	-	7,000.00	7,000.00	-
	2018	10,200.00	10,200.00	-	10,200.00	-
	Total	17,205.62	10,200.00	7,000.00	17,200.00	5.62
C.2 Knowledge and technology transfer	2016	2,015.07	-	2,015.07	2,015.07	-
	2017	1,656.12	1,568.64	87.48	1,656.12	-
	2018	4,250.00	4,250.00	-	4,250.00	-
	Total	7,921.19	5,818.64	2,102.55	7,921.19	-
VI. Sub Total C		**25,126.81**	**16,018.64**	**9,102.55**	**25,121.19**	**5.62**
D. (Output 4)						
D.2. Attending overseas meetings	2016	157.21	157.21	-	157.21	-
	2017	2,715.00	-	2,715.00	2,715.00	-
	2018	3,750.00	-	1,502.27	1,502.27	2,247.73
	Total	6,622.21	157.21	4,217.27	4,374.48	2,247.73

Component		Approved Budget (A)	Expenditures to Date			Available Funds (E = A - D)
D.4 Annual report	2016	-	-	-	-	-
	2017	400.00	400.00	-	400.00	-
	2018	900.00	900.00	-	900.00	-
	Total	1,300.00	1,300.00	-	1,300.00	-
D.5 Miscellaneous	2016	-	-	-	-	-
	2017	2,260.45	270.85	1,989.60	2,260.45	-
	2018	10,320.00	4,607.24	5,712.76	10,320.00	-
	Total	12,580.45	4,878.09	7,702.36	12,580.45	-
D.6 PCC Meeting	2016	-	-	-	-	-
	2017	-	-	-	-	-
	2018	8,000.00	3,878.14	4,121.86	8,000.00	-
	Total	8,000.00	3,878.14	4,121.86	8,000.00	-
VII. Sub Total D		**28,502.66**	**10,213.44**	**16,041.49**	**26,254.93**	**2,247.73**
F. Contingency/Other expenditure						
e.g. Bank charge		-	-	61.04	61.04	-61.04
VIII. Sub Total F		-	-	61.04	61.04	-61.04
XII. Total Funds Retained by AFoCo Secretariat:						
GRAND TOTAL		**199,803.70**	**145,443.30**	**52,115.22**	**197,558.52**	**2,245.18**

Note: Budget Components are those detailed in the Project Document.

I. Committed expenditure (B): expenditures incurred during the reporting period, but not yet settled.

II. Available funds (E) represent the unused budget and surplus budget combined.

III. Any contingency expenditures including bank charge should be listed under Component F and reflected underneath "Cash Out" of Statement Cash Flow.

IV In Activity A. some sub-activities have done but document of withdraw budget step in progress

3.3 Supplementary Funding (*country in-kind contribution*)

Description	Amount (USD)
Office car 2กฎ 5391 กทม 1 days	125
Office car บ 0753 สุโขทัย 9 days	1,125
Office car 2กน 2370 กทม 13 days	1,625
Office car พน 3123 กทม 1 days	125
Office car 1ฒท 6283 กทม 2 days	250
Watering truck 83-9051 นครราชสีมา	2,500
Office 6 wheels trucks 80-8543 ลำปาง and 80-7695 พะเยา	4,000
Office space at RFD	2,000
Office at NoNorthern Seed Center, Ngao Lampang	1,000
Planting area 4.8 ha. At Mae Moh mine	67,200
Electricity	1,000
Water supply for offices and planting sites	7,500
Telephone and internet for 24 officers	360
Salary for 24 officers for 12 months	444,960
Meeting room for workshop and evaluated committee meeting at Mae Moh mine 1 days (contribute by EGAT)	1,000
Cat Motor Grader 2 days (clearing inspection road and fire line) (contribute by EGAT)	500
EETS seedlings for refilling dead plants	5,000
Renovation of fence	100
Total	540,370

4. Issues & Lessons Learned

The internal process of approval and procurement of Royal Forest Department is take time. The project staff should carefully study the process to better understanding which will can make a time table accordingly with the approved work and budget plan of 2019

5. Conclusion and Recommendation

The results (Annex V) that show in the 2016 plot reveal that *Dalbergia cochinchinensis*, *Dalbergia oliveri*, *Aquilaria crassna*, and *Vatica diospyroides* survived and grew better than *Neobalanocarpus heimii* and *Cotylelobium lanceolatum*. The first four species therefore should be selected to plant at Mae Moh site.

Nursing plant

Banana is an effective nursing plant that can provide shade, soil moisture and cool atmosphere for the planted seedlings. More effective should be expected, if banana were planted and established before planting the seedlings. Spacing between the banana and the seedling must be concerned. 1 meter away was proved too close since the banana seems to overgrown the seedlings. Planting banana itself is also difficult if *Erionota thrax lava* has not been controlled. Once the banana established, pruning is necessary to keep the plant too much shade.

Shading

Plastic shading is necessary for EETS from rain forest such as *Aquilaria crassna*, *Vatica diospyroides*, *Neobalanocarpus heimii* and *Cotylelobium lanceolatum* but not for *Dalbergia cochinchinensis* and *Dalbergia oliveri* which are the species from dry deciduous forest. Partial cover of plastic sheet is less effective than overall cover.

Weeding

Herbicide or any chemical is not allowed at Mae Moh mine. More frequency of manual weeding therefore is needed to be performed. The weed, however, plays role as ground cover to prevent soil erosion in slope area like Mae Moh dumping site. Some weed flowers attract bee. Labors working in the area must be aware of this and prepare for the dangerous situation.

Watering

In the dry season, Mae Moh site is very dry. Watering as often as possible will be the best practice but costly. Mulching with rice straw is one thing to keep soil moisture content but is there any alternative? Study focuses on this matter should be conducted.

6. Annexes

Detailed Results of Key Activities are reported in 8 Annexes as the following:

Annex I Map of Location of Existing and planted of 2016 plot at Takuapa site

Annex II Site locality maps at Mae Moh site and Takuapa site

Annex III Details of site preparation and EETS planting and tending at Mae Moh site

Annex IV Tending of 2016 planting

Annex V Survival rates and growth measurement of plants

Annex VI Shredder Machine

Annex VII Insect Sprayers

Annex VIII Record of Discussion of the 4th PCM

Annex I Map of Location of Existing and Planted Trees of 2016 plot at Takuapa site

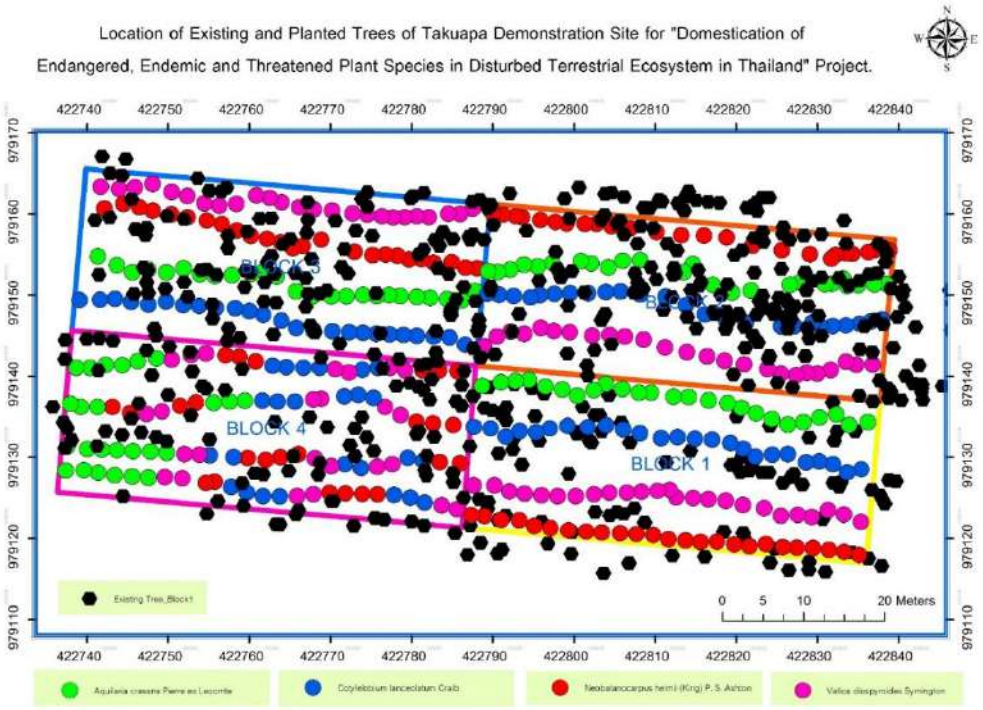

Figure1. Location of Existing and Planted Trees

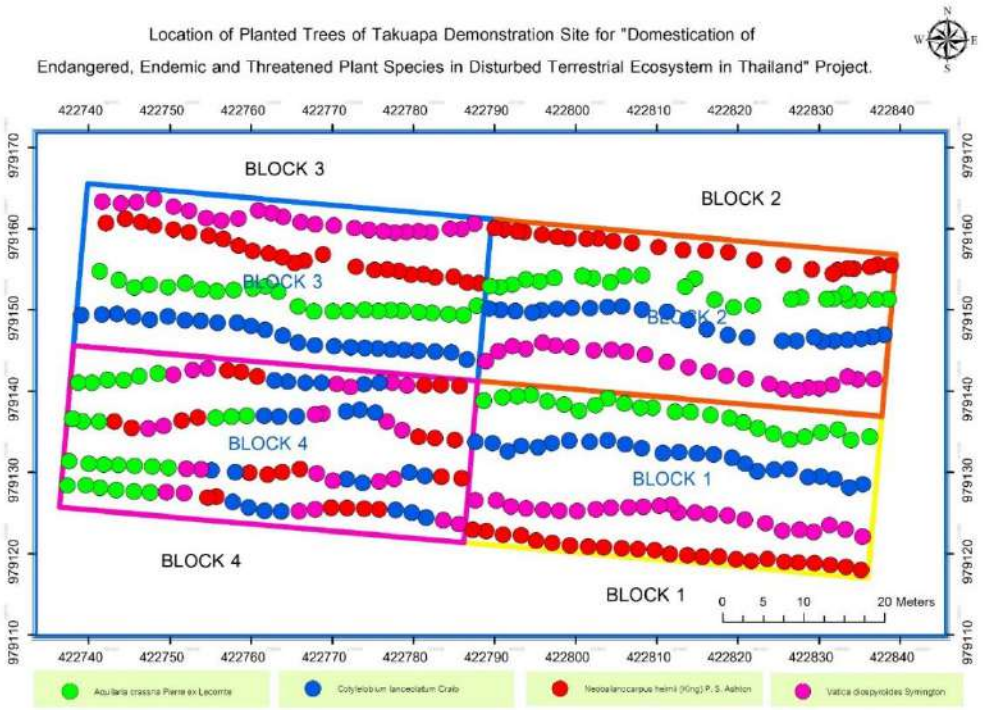

Figure 2. Location of Planted Trees

Annex II Site locality maps of planting area

Figure1. Site locality maps of 2018 Mae Moh plot

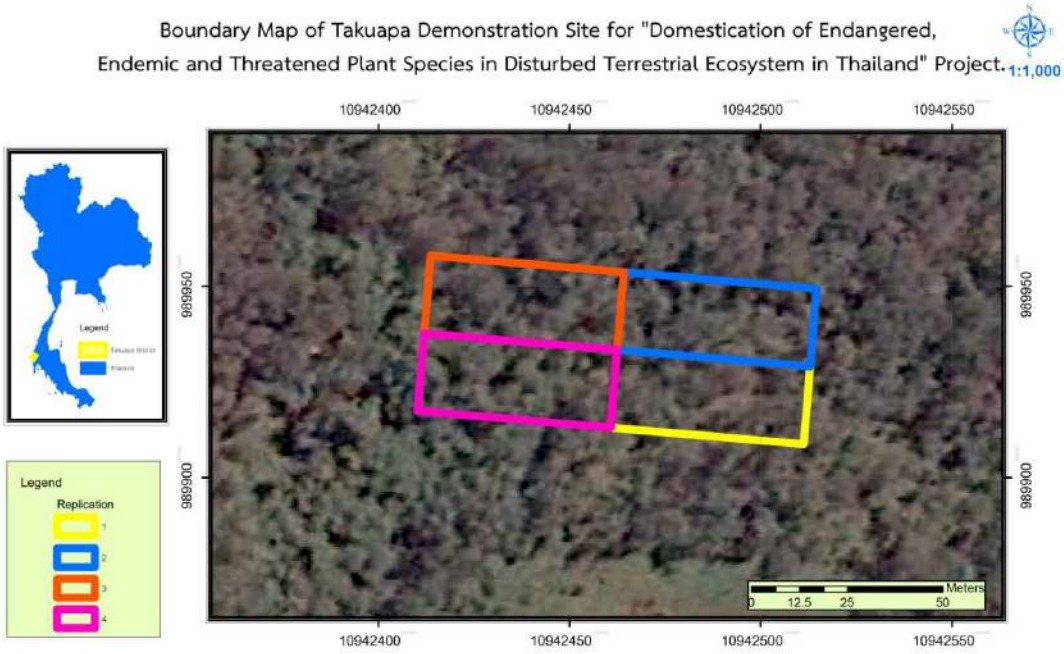

Figure2. Site locality maps of 2016 Takuapa plot

Annex III Details of site preparation and EETS planting and tending at Mae Moh site

1. Planting and Tending at Mae Moh site

1.1. Site preparation

At Mae Moh site, weeding and clearing debris was done prior to laying the plot. The 2018 plot is located next to the 2016 plot. Marking of planting holes was carefully done by GPS lining. Boundary was lined along road side. The first staking was marked at 1 meter away from boundary corner. Each hole was spaced approximately at 4x4 m. (**Figure 1**) and dug at 50x50x50 cm depth at the right hand side corner of the stake by using backhoe. Soil driller was used to loosen the soil further down at the bottom of each hole at least 30 cm in depth (**Figure 2**). Half bag of soil mix as described below was filled into the hole before planting EETS seedlings.

Figure 1. The weed was cleared before marking planting hole at 4x4 m. spacing.

Figure 2. planting holes were dug by using backhoe and loosening lower soil using soil driller..

Mixing of planting medium. Planting medium comprised a mixture of coconut peat, compost, rice husk ash and surface soil in a ratio of 9:6:2:6. The compost consists of cow dung, saw dust, rice straw and agricultural crop residual mixed together and left to decompose over 1 year. The materials were mixed using cement mixer. 40 liters of the mixed medium was filled into each planting hole.

1.2. Identification of EETS

There are 10 EETS to be planted in 2018. 8 species of EETS to be planted at Mae Moh site were *Dalbergia cochinchinensis, Dalbergia oliveri, Aquilaria crassna, Dalbergia cultrat*a, *Magnolia sirindhorniae*, *Dillenia ovata*, *Magnolia rajaniana and Pakia sumatrana. At* Takuapa, 4 EETS to be planted are *Aquilaria malaccensis, Neobalanocarpus heimii, Magnolia rajaniana and Pakia sumatrana.* There are 2 species planted at both sites which are *Magnolia rajaniana and Pakia sumatrana.* Some of these EETS were planted in 2016 plot. There are 12 EETS planted in both sites for 2016 and 2018 plots.

1.3. Lay out of EETS

The result of 2016 plot reveals that *Dalbergia* spp are more tolerate to drought and need less shade than other EETS. Lay out of EETS in 2018 therefore planted 3 Dalbergias (*D. cochinchinensis, D. oliveri*, and *D. cultata*) in the more open and drier zone while other EETS in the more shade of denser existing trees (**Figure 3**). *Magnolia sirindhorniae,* which indigenous to swampy area, was planted at lower zone where flood or more moisture is expected in rainy season*. Magnolia rajaniana* and *Dillenia ovata* will be planted later to refill the dead plants because the seedlings of these species are too small.

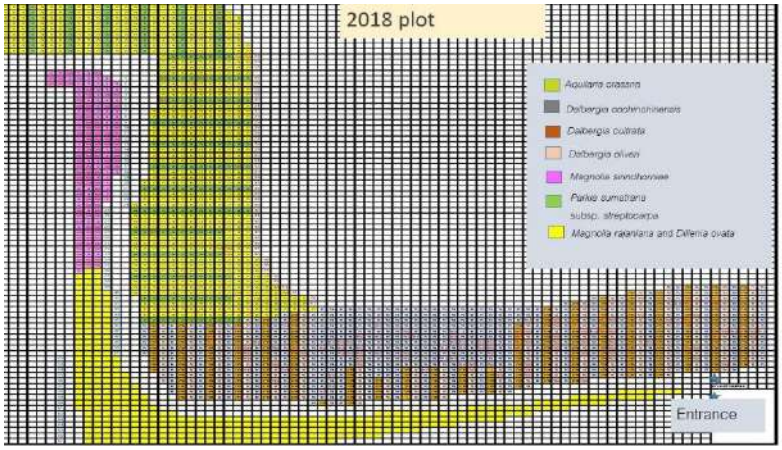

Figure 3 Lay out of EETS planting in 2018 plot.

1.4. Tree planting

In planting a seedling, soil around the hole was used to fill up the hole and mixed with the planting materials that already placed below. Small hole was then dug to suit the plant size. Plastic bag was removed from the seedling before placing the seedling into the hole. Soil around the plant was then collected to cover the hole around the seedling base. The soil was then pressed firmly. The plants were then watered.

1.5. Tending after planting.

To prevent moisture loss from soil during dry season, mulching with rice straw was used to cover soil around the base of seedling as 10 cm thick and 50 cm diameter wide (**Figure 4**).Banana shoot was planted as nursing plant at the center of planting space where no existing trees (**Figure 5**).

Figure 4 Rice straw was used as mulching material around seedling base to retain soil moisture content after watering.

Figure 5 Banana shoots were planted as nursing plants.

1.6. Watering and fertilizing.

Manual watering was deployed using water truck (**Figure 6**). Directly watering onto individual plant was recommended by Dr. Ang Li Ho, Project leader. Frequency of watering depended on the soil moisture. Compost fertilization was applied by broadcasting technique around seedling base every 2 months.

Figure 6. Procedures of watering the planted trees.

1.7. Weeding

Weed clearing was done twice before planting. After planting, weeding was done every 2 months in rainy season until October. Most of the weed in the area was *Chromolaena odorata*

(L.) R.M.King & H.Rob. The flowers of this weed attract *Apis dorsata* to live in the area. The labors were attacked by these bees when they were weeding. These, sometimes, cause the delay of work.

Figure 7. Weed *(Chromolaena odorata* (L.) R.M.King & H.Rob) in the area was very dense and attracts *Apis dorsata* (left corner) to live in the area.

1.8. Fire and cattle control

In this area forest fire is rather severe. Intensive fire control is a regular practice by the Mae Moh mine forest management. At the demonstration plot, fire lines were constructed around the plot to prevent forest fire and serve as watering route as well. There are more than 10,000 cattle feeding in the area. The animals are allowed to roam freely, strong fencing is therefore necessary. Barbed wire fence was installed around the area to prevent cattle roaming the plot (**Figure 8**).

Figure 8.Watering route was built to serve also as fire line both side of the plot. Barbed wire fencing was installed around the plot to keep cattle out.

Planting and tending at Takuapa site.

The planting site at Takuapa has been marked by the staff at Phang-Nga Research station. The planting at this site has been delayed due to the delay of tendering procedure. Planting at this site will be postpone to 2019. The EETS to be planted at this site are *Aquilaria malaccensis, Neobalanocarpus heimii, Magnolia rajaniana, and Pakia sumatrana.*

Annex IV Tending of 2016 planting areas

1. Tending of 2016 plot Mae Moh site

1.1. Weeding

Weed in the area is quite heavy, regularly weeding is necessary. Weeding every 2 months should be applied to control weed (**Figure 9**). Herbicide is not allowed at Mae Moh mine area, weeding must be done mannually. Due to slope of the area, weed also play role as ground cover to prevent soil erosion. Clearing of weed is done just 1 m in diameter around EETS plant base.

Figure 9. Weeding must be manually done every 2 months to control vigorous weed.

1.2. Shading

Most of species has already established and does not need shade except *Cotylelobium lanceolatum* and *Neobalanocarpus heimii* that grow slowly and show sign of heat affected. Shade were installed over these 2 spp. as shown in **Figure 10**.

Figure 10. Shading with plastic sheets were provided for more sensitive species as *Cotylelobium lanceolatum* and *Neobalanocarpus heimii*.

1.3. Watering

Drought is the more crucial condition than soil for the success of plantation at Mae Moh site. Watering is necessary during dry season. Installation of pipe or other equipment are risk of theft, watering manually is, therefore, applied (**Figure 11**).

Figure 11. Manual watering is applied to individual plant instead of broadcasting technique.

1.4. Soil loosening and fertilization

To promote root growth, loosening of soil around seedling bases were done both in rainy season and dry season prior to fertilizing and mulching. After clearing weed, the soil then loosening by hoe 1 meter in diameter around seedling base, compost were then applied around the seedlings (**Figure 12**).

Figure 12. Loosening of soil around seedling base and compost applied.

1.5. Mulching

Soil moisture content is very important during dry season at Mae Moh site. To keep moisture in soil after watering, mulching with coconut husk and rice straw is covered around seedling base (**Figure 13**).

Figure 13. Mulching with coconut peat and rice straw around seedling base to keep moisture in the soil.

1.6. Pruning of banana and existing trees.

Banana and existing trees act as nursing plants and provide shade for the seedlings. When they grow too big and dense they, however, dominate the seedlings and keep the seedlings from sunlight which necessary for their photosynthesis. Pruning the banana and existing trees is needed to open appropriate sunlight for seedlings (**Figure 14**).

Figure 14. Pruning of banana which grow too dense to open the area for sunlight.

1.7. Monitoring and evaluation.

Performance of plants were observed and photographed regularly. Survival rates and height growth were recorded at 25 months old (**Figure 15**). Survival and height growth of 6 EETS at 1, 3 and 25 months old were illustrated in Figure 16 and 17 respectively.

Figure 15. Survival rate and height assessment of EETS at 25 months old.

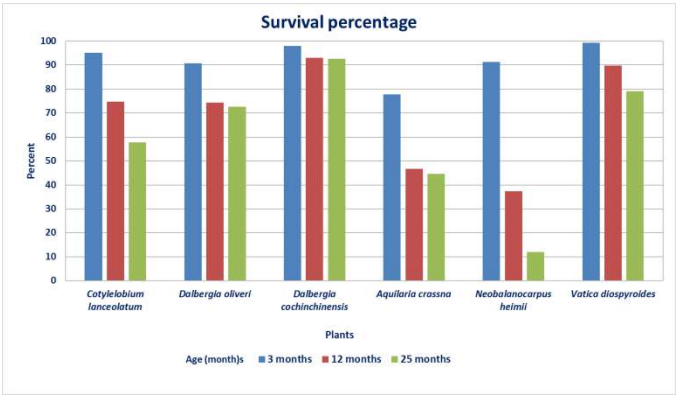

Figure 16. Survival of 6 EETS planted at Moe Moh mine at different ages.

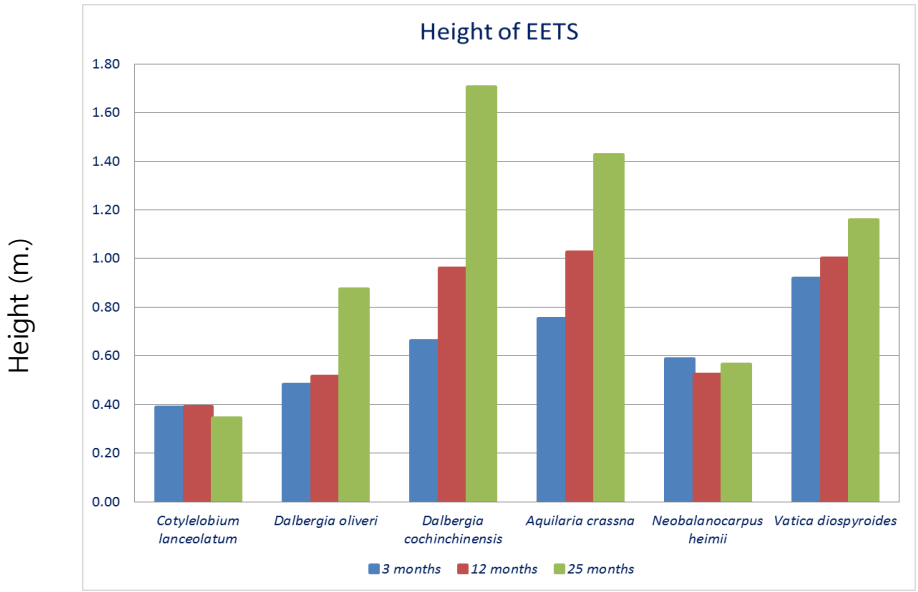

Figure 17. Height growth of 6 EETS planted at Moe Moh mine at different ages

2. Tending of 2016 plot at Takuapa site

Weeding was done regularly by clearing weed of 1 meter stripe wide along planting line. Soil was loosened around seedling base. Survival rates and height growth were recorded at 17, 22 and 25 months old (Figure 18). Survival rate and high growth of 4 EETS at 1, 6, 12, 17. 22 and 25 months old were illustrated in Figure 19 and 20 respectively.

Figure 18. Monitoring and evaluation of 4 EETS performance at Takua Pa ex-tin mine plot

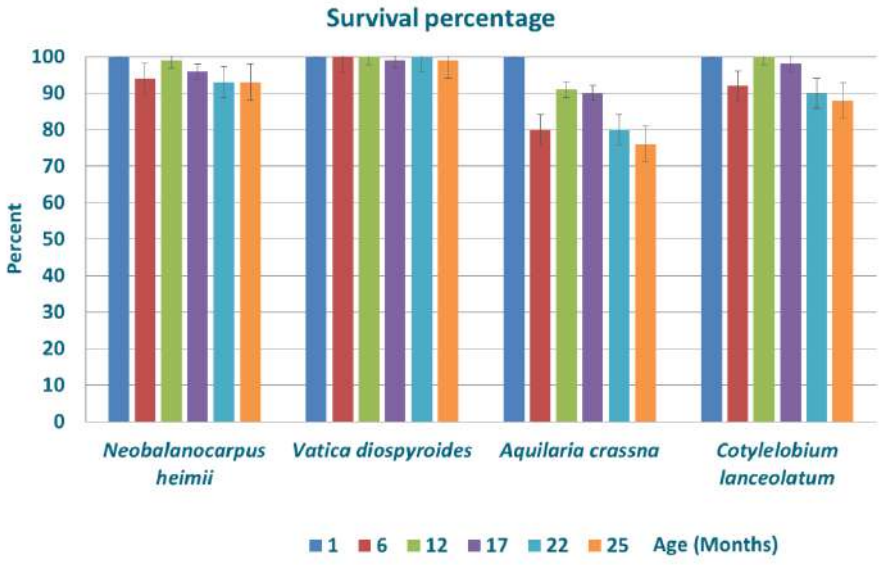

Figure 19. Survival of 4 EETS planted at Takua Pa ex-tin mine at different ages.

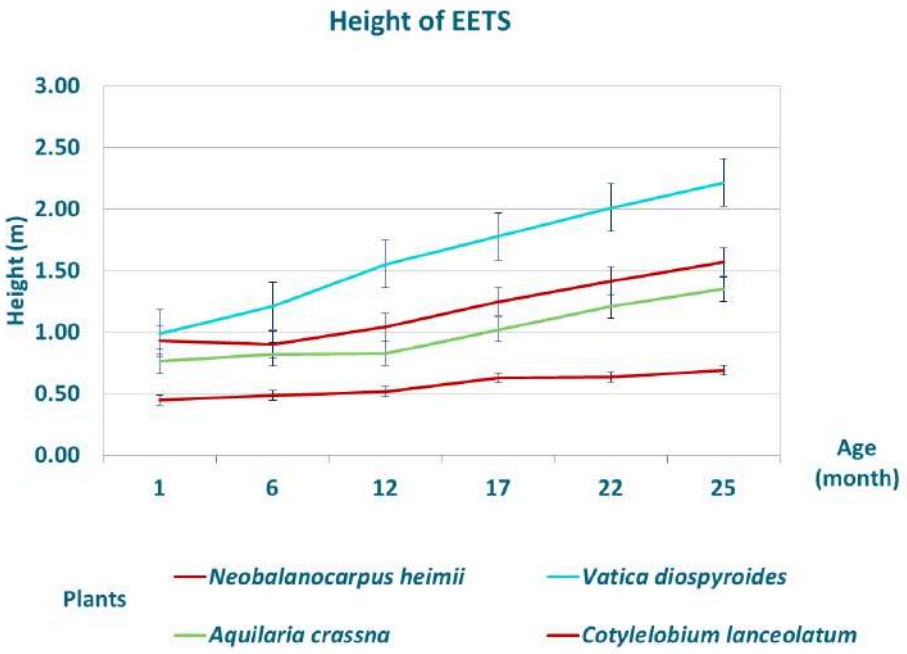

Figure 20. Height growth of 4 EETS planted at Takua Pa ex-tin mine at different ages.

Annex V Survival rates and growth measurement of plants

In both planting site, Collecting and Measuring data of EETS in 3, 12 and 25 months after planted. Survival and height growth planting trees were collected and analyzed. The result of Mae Moh site has shown in Figure 1 and 2, Takua Pa ex-tin mine site has shown in Figure 3 and 4. And Table 1

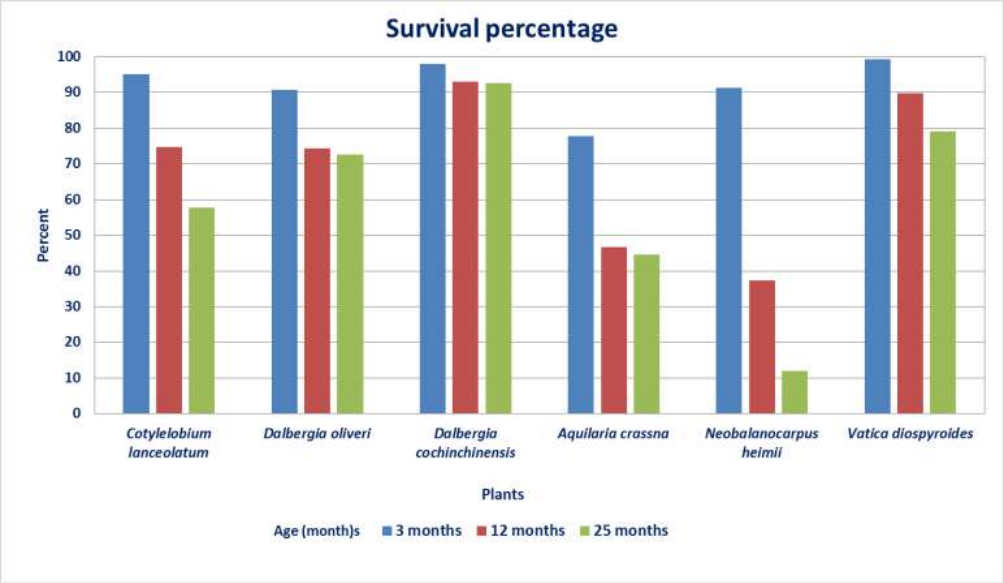

Figure 1. Survival of 6 EETS planted at Moe Moh mine at different ages.

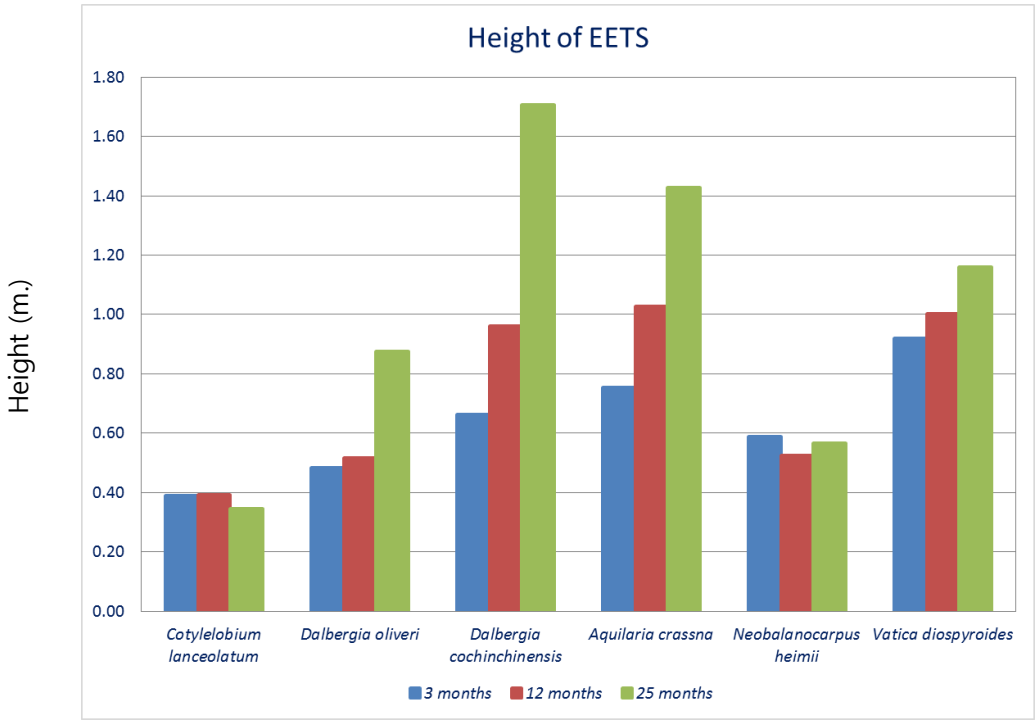

Figure 2. Height growth of 6 EETS planted at Moe Moh mine at different ages

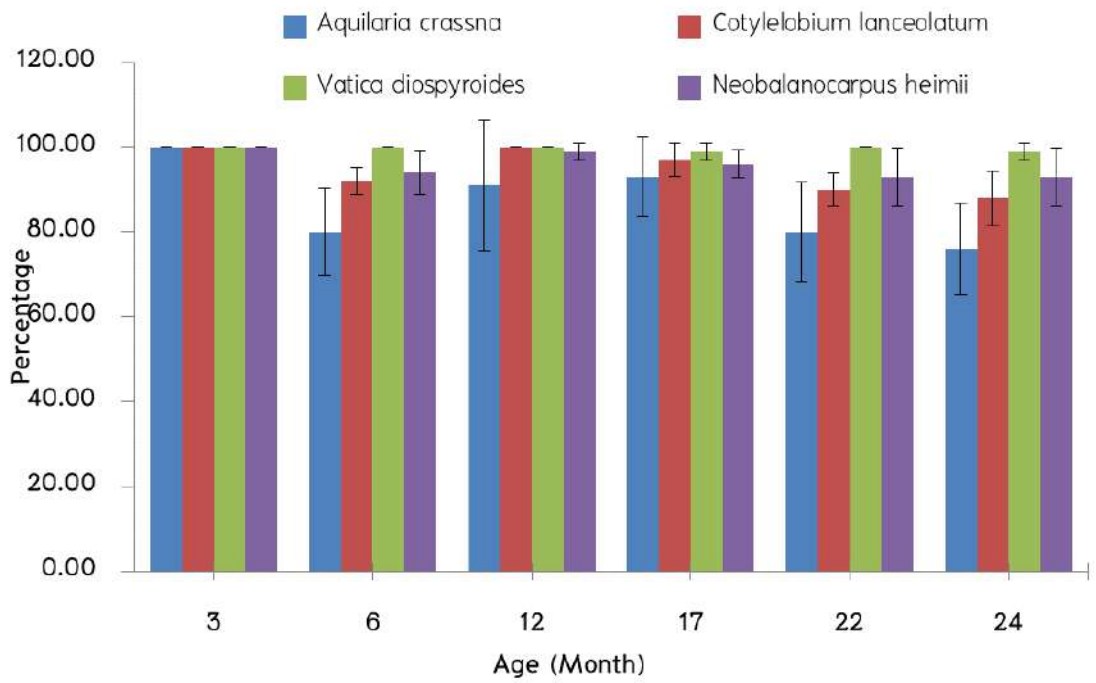

Figure 3. Survival of 4 EETS planted at Takua Pa ex-tin mine at different ages.

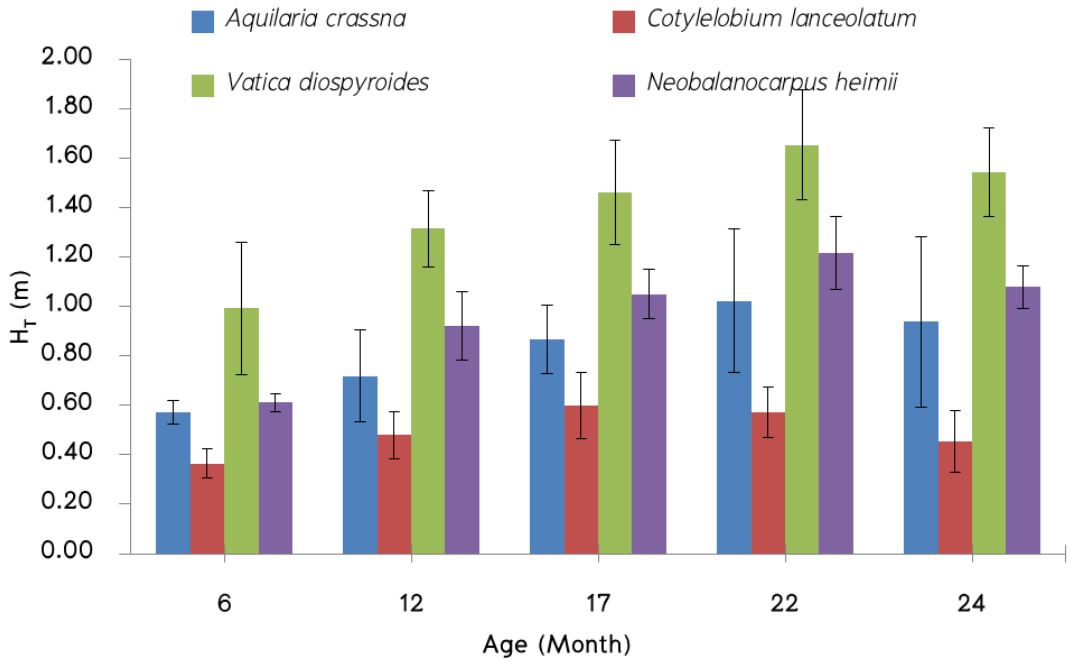

Figure 4. Height growth of 4 EETS planted at Takua Pa ex-tin mine at different ages.

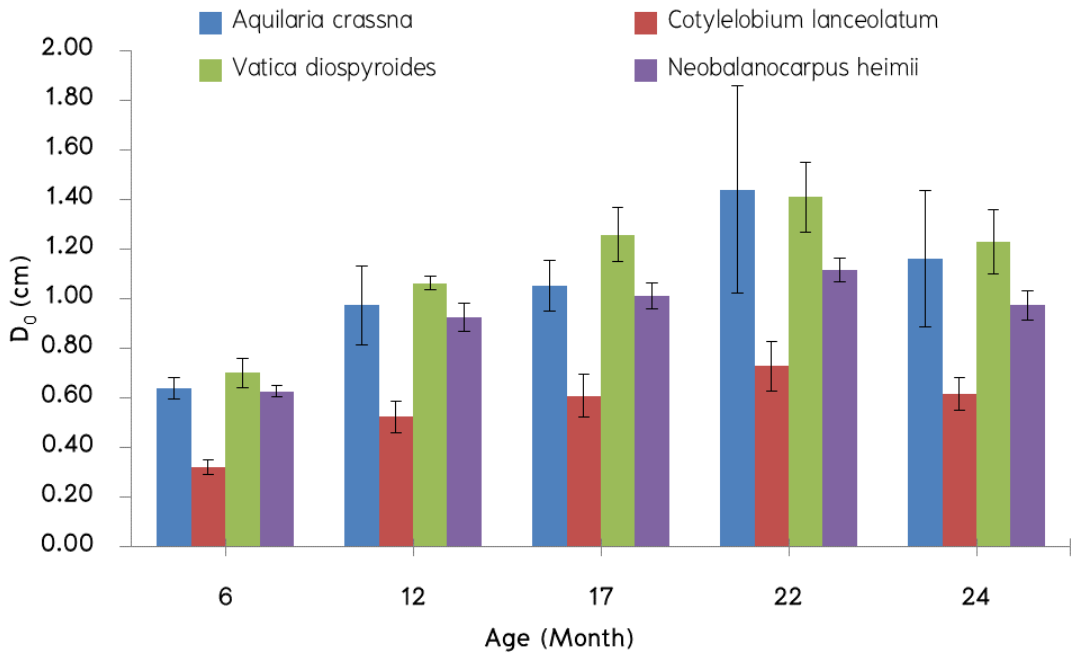

Figure 5. DGL growth of 4 EETS planted at Takua Pa ex-tin mine at different ages.

Table 1. Diameter at breath Height Growth Average of EETS at Takua Paex-tin mine plot at different ages

Species	DBH (cm.)/months.		
	17	22	24
Aquilaria crassna	0.58±0.06	0.90±0.07	0.86±0.19
Cotylelobium lanceolatum	0.07±0.14	0.24±0.28	0.31±0.21
Neobalanocarpus heimii	0.43±0.05	0.59±0.10	0.67±0.08
Vatica diospyroides	0.69±0.11	0.87±0.15	0.92±0.17

Annex VI Shredder Machine

Project's Equipment

1set of shredder machine.

Annex VII Insect Sprayers

2 sets of insect sprayer

Annex VIII Record of Discussion of the 4th PCM

Domestication of Endangered, Endemic and Threatened Plant Species in Disturbed Terrestrial Ecosystem in Malaysia and Thailand

(AFoCo/010/2016)

4th Project Coordination Meeting

25-28 November 2018, Lampang Province, Thailand

Record of Discussion

Introduction

1. The 4th Project Coordination Meeting (PCM) for the regional project "Domestication of Endangered, Endemic and Threatened Plant Species in Disturbed Terrestrial Ecosystem in Malaysia and Thailand" (AFoCo/010/2016) was held on 25-28 November 2018 in Lampang Province, Thailand. The main objectives of this Meeting were to review the progress of project implementation in 2016-2018 and finalize the work and budget plan for 2019. The Meeting was attended by the officials responsible for implementation of the Project from Malaysia and Thailand as well as from the Asian Forest Cooperation Organization Secretariat (AFoCO Secretariat). The list of participants is attached in **ANNEX 1**.

Opening session

2. Dr. Lai Hoe Ang, Senior Research Officer, Forest Research Institute Malaysia (FRIM) as outgoing chair, appreciated Thailand for hosting this meeting and the AFoCO Secretariat to attend this meeting. He further recommended the Meeting to elect new chair of the Meeting in next Agenda item. He looked forward to the successful implementation of the project.

Agenda 1: Election of Chair

3. Mr. Suchat Kalyawongsa, Director of Forestry Research and Development Bureau, Royal Forest Department (RFD), was unanimously elected as the chairman of the Meeting. In his opening remarks, he warmly welcomed all delegates to the Meeting. He had briefly informed the Meeting of the objectives of the PCM as well as welcomed all suggestions and recommendations from the PCM to improve the implementation of the project. He looked forward to the successful implementation of the project.

Agenda 2: Adoption of Agenda

4. The Meeting considered and adopted its agenda, which is attached in **ANNEX 2**. ROD of 4th PCM for AFoCo/010/2016 page 2

Agenda 3: Review on the progress of implementation over the year 2016 - 2018

5. Dr. Lai Hoe Ang, National Project Coordinator of Malaysia presented the financial report and the progress of project activities (**ANNEX 3**). In statement of Cash Flow as of 30 June 2018 showed that the budget was 40,126 USD while the budget transfer for Q3 and Q4 was received in October 2018 shall be accounted in the Q1 and Q2 financial statement of 2019.

6. The project implementation for 2016-2017 was completed as planned but in 2018, the project implementation is delayed due to the internal process for tendering the establishment of the plot. This has resulted in postponement of activities A1 (A.1-A.4) to Q1 and Q2 of 2019.

7. This year, Malaysia also engaged an external auditor for the 2016-2017 financial audit of the project. The report of financial audit was officially submitted to the AFoCO Secretariat.

8. Ms. Chumnun Piananurak, the former project manager of Thailand (2016-2017), presented the progress of project activities. There are two (2) project sites located in Mae Moh lignite mine, Lampang province and Takua Pa ex-tin mine, Phang Nga province with the area of 8.5 ha and 1.1 ha respectively. Ten EETS species were planted in the sites. The Meeting noted on the low survival rate of some EETS species which shall be replaced with other suitable species. The project manager will regularly inform progress of project activities to the monitoring and supervising committee.

9. Ms.Phuangphan Whuangplong, Project Manager of Thailand, presented the financial report of 2018, Q1 and Q2. She informed the Meeting Thailand has committed 88% of the budget and 12% has been spent.

10. The presentation by Thailand is attached in **ANNEX 4.**

Agenda 4: Technical discussion on the implementation of the project

11. The AFoCO Secretariat requested the implementing countries to officially inform the AFoCO Secretariat for any update or change of project personal especially the country project manager or country project coordinator for smooth communication among the parties.

12. The Meeting recalled the project document (Schedule 1) and highlighted that Malaysia and Thailand, shall establish the domestication sites at least 6 ha for each country and at least 12 EETS species shall be domesticated in those sites. Each country should have at least 3,000 saplings in total at the completion of the project.

13. In order to enhance project implementation, the Meeting agreed to hold the 5th and 6th PCM meetings in Malaysia. The Regional Workshop shall be organized back to back before or after the 6th PCM.

14. The AFoCO Secretariat informed that the project monitoring shall be organized in 2019. The Secretariat will inform time and venue of the monitoring in due course. ROD of 4th PCM for AFoCo/010/2016 page 3.

15. The Meeting discussed and agreed for the implementing countries to interchangeably transfer the remaining budget between the project activities categories. The changes shall be presented in yearly work and budget plan. The Meeting agreed for the implementing countries to expand the Activity C.1 (Cross visits) beyond ASEAN Member Countries.

16. The Meeting approved Thailand to allocate the remaining budget of 2018 Activity D.6 (PCC meeting) to 2018 Activity B. (Regional Workshop).

17. The Meeting agreed for the leading country to compile the progress and annual reports before the submission to the AFoCO Secretariat.

Agenda 5: Finalize the work and budget plan for the year 2019

18. Malaysia and Thailand presented the Project Work and Budget Plans (WBP) for fiscal year 2019. The Meeting considered and approved total budget for fiscal year 2019 which is USD 105,780 and USD 74,305 for Malaysia and Thailand, respectively. The quarterly breakdown for Malaysia and Thailand in attached as **ANNEX 5** and **ANNEX 6**. The Meeting agreed to submit WBP for 2019 by 31 December 2018 to the Secretariat.

Agenda 6: Adoption of the Record of Discussion of the Meeting

19. The Meeting considered and adopted the record of discussion of the 4th Project Coordination Meeting.

Closing Session

20. Mr. Suchat Kalyawongsa, as the chairman of the Meeting, thanked the Forest Research Institute Malaysia (FRIM) and the AFoCO Secretariat for the effort and contribution in the Meeting. The delegates thanked the Royal Forest Department, Thailand for the hospitality and excellent arrangement. The Meeting was held in the traditional spirit of AFoCO and cordiality.
