Document No.:
Receiving Date:
(For APFNet Secretariat)

Asia-Pacific Network for Sustainable Forest Management and Rehabilitation

COMPLETION REPORT

Sustainable Forest Rehabilitation and Management for the Conservation of Trans-boundary Ecological Security in Montane Mainland Southeast Asia– Pilot Demonstration Project of Lao PDR, Myanmar and China/Yunnan

(SFR-MMSEA)

2013-2015

United Nations University (UNU)

Yunnan Academy of Forestry (YAF)

Department of Agricultural Land Management (DALaM)

Forest Research Institute (FRI)

May 2016

BASIC INFORMATION

Project Title(ID)	Sustainable Forest Rehabilitation and Management for the Conservation of Trans-boundary Ecological Security in Montane Mainland Southeast Asia– Pilot Demonstration Project of Lao PDR, Myanmar and China/Yunnan		
Supervisory Agency			
Executing Agency	United Nations University (UNU)		
Implementing Agency	YAF, DALaM and FRI		
Date of Project Agreement: 8/11/2012			
Duration of implementation: 1/2013-12/2015			
Total project budget(in USD)	650,000	APFNet assured Grant (in USD)	500,000
Actual project cost(in USD)	638,953.23	APFNet disbursed Grant(in USD)	488,955.23

Disbursement Status	Date of disbursement	Amount(in USD)
Initial disbursement	22 Jan 2013	US$ 156,480
2nd disbursement	13 Nov 2013	US$16,216
3rd disbursement	28 Apr 2014	US$119,859.
4th disbursement	14 Nov 2014.	US$16,000
5th disbursement	15 Apr 2015	USD 111,433
Balance to be disbursed (minus cost of $30,000 for evaluation)		USD38,967.23

Reporting Status	Schedule [1]implementation	Project progress status[2]
First reporting (period covered: mm/yy-mm/yy)		
1st reporting (period covered: 1/2013-6/2013)	on track	satisfactory,
2nd reporting (period covered: 1/2013-12/13)	on track	satisfactory,
3rd reporting (period covered: 1/2014-6/2014)	on track	satisfactory,
4th reporting (period covered: 1/2014-12/2014)	on track	satisfactory,
5th reporting (period covered: 1/2015-6/2015)	on track	satisfactory,
6th reporting (period covered: 1/2013-12/2015)	on track	satisfactory,

[1] Schedule [1]implementation status could be on track/behind/ahead of schedule

[2] Project progress status could be ranked as satisfactory, dissatisfactory, moderately satisfactory, moderately dissatisfactory

Executive Summary

The Montane Mainland Southeast Asia (MMSEA) encompasses the northern region of Thailand, Lao PDR and Vietnam, the Yunnan Province of China, and the Kachin and Shan States of Myanmar extending to Northeastern India. MMSEA is home to a diversity of ethnic minority groups, tropical forests and endangered and endemic species of global significance. MMSEA serves as a watershed for a few large rivers in the sub-region, including the Lanchang-Mekong, the Ru-Salween, the Red River, the Yaluzangbu-Brahmaputra, the Irrawaddy, the Pearl and the Yangtze. However, MMSEA suffers from severe deforestation with negative impacts on ecology, hydrology and local livelihoods, resulting from inappropriate land use change under internal and external pressures. Past efforts to rehabilitate degraded land are often through mono-species plantations with limited contribution to restoration of ecosystem services.

The project aims to create new knowledge and alternative options for sustainable forest rehabilitation and management in the target areas among Laos, Myanmar and Yunnan of China for safeguarding the trans-boundary ecological security in the MMSEA region. The specific objectives are:

- Identify and adapt the best practice for forest rehabilitation in the target areas and around the MMSEA
- Experiment and demonstrate good practice for forest rehabilitation, especially use of locally preferred, rare and endangered native tree species as well as local knowledge
- Develop capacity in sustainable forest rehabilitation and reach out to farmers and policy makers
- Integrate project lessons and network with other initiatives for a regional strategy on sustainable forest rehabilitation

With support of APFNet, the project has been carried out through a partnership between United Nations University Institute for the Advanced Study of Sustainability (UNU-IAS), Yunnan Academy of Forestry of China (YAF) and Department of Agricultural Land Management of Lao PDR (DALaM) and Forest Research Institute of Myanmar (FRI) in four demonstration sites from 2013-2015: two in Yunnan Province of China (Puwen site in Xishuangbanna Prefecture in the border area with Northern Laos, and Ruili/Longchuan site in Dehong Prefecture in the border area with Northern Myanmar), one in Northern Lao PDR (Xiengngeun site in Luang Prabang Province) and one in Northern Myanmar (Nawnghkio site in Shan State).

These four project sites have similar ecological conditions but different capacities, approaches and socio-economic contexts in addressing forest degradation in mountainous regions, as a way of enabling exchange of experiences and knowledge, cross-fertilization of ideas and stimulation of innovative approaches and action. Selection of these four sites addresses two major land use change challenges in MMSEA: (a) shifting cultivation in transition toward sedentary agriculture for subsistence and market, resulting in loss of forests, especially at Xiengngeun site and Nawnghkio site, and (b) natural forests in transition towards mono-species plantations for

market, especially at two sites in Yunnan Province, resulting in forest degradation.

The project teams have developed and implemented a systematic approach to the regional land use change challenges, starting from baseline assessment, best practices review, participatory planning towards experimentation/demonstration of site appropriate models (agroforestry, understory cultivation, mixed-species plantation, community organizing, etc.), capacity building, monitoring/evaluation, and across-site exchange. DALaM and FRI have focused on developing site-appropriate models of agroforestry system with facilitation of community forestry user group to replace the shifting agriculture in transition, while YAF have been focused on site-appropriate models of mix-species plantations, including understory cultivation to replace mono-species plantations (of rubber and bamboo).

In addition, traditional forest and agroforestry systems, such as sacred forest and home-garden practices are promoted in the project sites. The project has established a total area of 107.49 ha for demonstration at four project sites. The project has trained 93 young researchers/master students on assessment of forest resources, and more than 400 villagers, local officials and forestry enterprise managers in sustainable forest and agroforest management. The project teams will continue to monitor the effectiveness of the rehabilitation trials and activities of the project using the criteria and indicators proposed during the third annual project workshop in Laos in Jan 2015, and synthesize the project lessons for wider application beyond MMSEA.

CONTENTS

1. BACKGROUND AND INTRODUCTION

1.1 Project context

Mountains occupy about one fifth of Earth's terrestrial surface home to 20% of the world's human population and provide humankind with multi-functional resources and services. Mountains serve as "water towers" to half of humankind in one way or the other. Mountains harbor high biological and ethno-cultural diversity. Mountain forests play a critical role in the mitigation of natural risk hazards (erosion and landslides), conservation of soil and water, and provide vital food and fodder during lean periods. Conservation and sustainable management of mountain forests are not only a necessary condition for sustainable local livelihoods, but also a key to human well-being for nearly half the world's population who live downstream. However, mountains are fragile forest ecosystems. Internal and external pressures driving land use systems towards unsustainable forms put the integrity of the fragile mountain forest ecosystems at risk in many parts of the world.

The Montane Mainland Southeast Asia (MMSEA) encompasses the northern region of Thailand, Laos and Vietnam, the Yunnan Province of China, and the Kachin and Shan States of Myanmar extending to Northeastern India and is home to some of Asia's poorest and most disadvantaged people, many of whom represent a diversity of ethnic minority groups. MMSEA contains a major section of Southeast Asia's last remaining tropical forests and harbors a diversity of endangered and endemic species of global significance. MMSEA serves as watersheds for a few large rivers in the sub-region, including the Lanchang-Mekong, the Ru-Salween, the Red River, the Yaluzangbu-Brahmaputra, the Irrawaddy, the Pearl and the Yangtze. In spite of ecological importance, MMSEA has suffered severe deforestation resulting from inappropriate land use change under internal and external pressures.

Due to rapid population growth and lack of alternative livelihoods, the over exploration of natural resources has been an approach for economic development in parts of MMSEA. The excessive deforestation and unsustainable collection of NTFPs have not only degraded the function of forest ecosystem and caused a series of social and economic problems, but also

hampered the improvement of local people's livelihood and the sustainable management of nature resources in line with safeguarding the trans-boundary ecological security in the MMSEA region. Cross-border flow and exchange of agricultural and forest products have created great demand for and extraction from natural resources. Presently, many urgent problems need to be resolved, such as ecological rehabilitation, biodiversity conservation, and poverty alleviation and so on. Some specific reasons for the proposed project to be located in MMSEA include that MMSEA is:

(1) Part of global biodiversity hotspot due to the high species diversity and richness on endemic species;
(2) Home to diversity of ethnic minority and culture with poor economic condition;
(3) Under threat of continuous loss of biodiversity, fragmentation and degradation of forest habitats and international watershed, including the Lanchang-Mekong Basin;
(4) Region where civil society efforts in nature conservation have not yet been well developed and supported.

Currently, much attention is being paid to conserve rich but fragile forest ecosystems in MMSEA region. However, most reforestation projects for rehabilitation of forest vegetation launched by governments are promoting mono-species plantations with use of exotic fast-growing tree species, and many valuable, rare and endangered native species are not used for reforestation. Meanwhile, local people's indigenous knowledge and techniques on native species are not fully appreciated by those projects.

1.2 Project goal(s) and objectives

Goal:

The goal of the project is to create new knowledge and alternative options for community-based sustainable forest rehabilitation and management for up-scaling and replication in the wider MMSEA region in order to improve upland people's livelihoods and safeguard the trans-boundary ecological security in MMSEA.

Specific Objectives:

In order to implement a demonstration of the sustainable forest rehabilitation in the border

areas among Laos, Myanmar and China, the project will have the following objectives:

1) Identify and adapt the best practice for forest rehabilitation in the target areas and around the MMSEA;

2) Experiment and demonstrate good practice for forest rehabilitation, especially use of locally preferred, rare and endangered native tree species as well as local knowledge;

3) Develop capacity in sustainable forest rehabilitation and reach out to farmers and policy makers;

4) Integrate project lessons and network with other initiatives for a regional strategy on sustainable forest rehabilitation for wider replication in MMSEA.

1.3 Project expected outputs and outcomes

Expected Outcomes:

1) Knowledge of ecological, social, cultural and economic processes associated with forest degradation and rehabilitation in pilot sites is enhanced.

Expected outputs:

a) Assessment of the threats and issues of forest degradation and biodiversity losses in selected pilot sites among China, Laos and Myanmar through the basic field inventory of natural resources status

b) Synthesis of good practices, experiences and lessons, including local knowledge learned from past forest rehabilitation and management in MMSEA

c) Sustainable forest resources management plan, including customary forest classification and management for each pilot project site in Laos, Myanmar and China/Yunnan Province through participatory process involving local communities, authorities and scientists

2) Replicable and adaptable model for community-based rehabilitation of degraded forests practices and related toolkits are developed and demonstrated at pilot sites.

Expected outputs:

a) Database of locally preferred, rare and endangered native tree species, site requirements, and techniques for preparation of seedlings and planting materials
b) Techniques for soil improvement in degraded areas for tree planting
c) Agroforestry systems, including understory cultivation
d) Toolkits to facilitate social fencing of assisted natural regeneration
e) Package for alternative rural energy
f) 10-20 ha of demonstration plots established at each pilot site

3) Capacity of different target groups including local communities and authorities, and young researchers in sustainable rehabilitation and management of degraded forests through tailored made capacity building programmes is strengthened.

Expected outputs:

a) On-job training of young generation up to 15 junior researchers and graduate students in assessment of forest degradation and rehabilitation
b) Training of farmers, community leaders, extension workers and local officials in application of sustainable forest rehabilitation models and toolkits

4) Strategies and mechanisms for up-scaling the effective practices on sustainable rehabilitation and management of degraded forests are developed and disseminated.

Expected outputs:

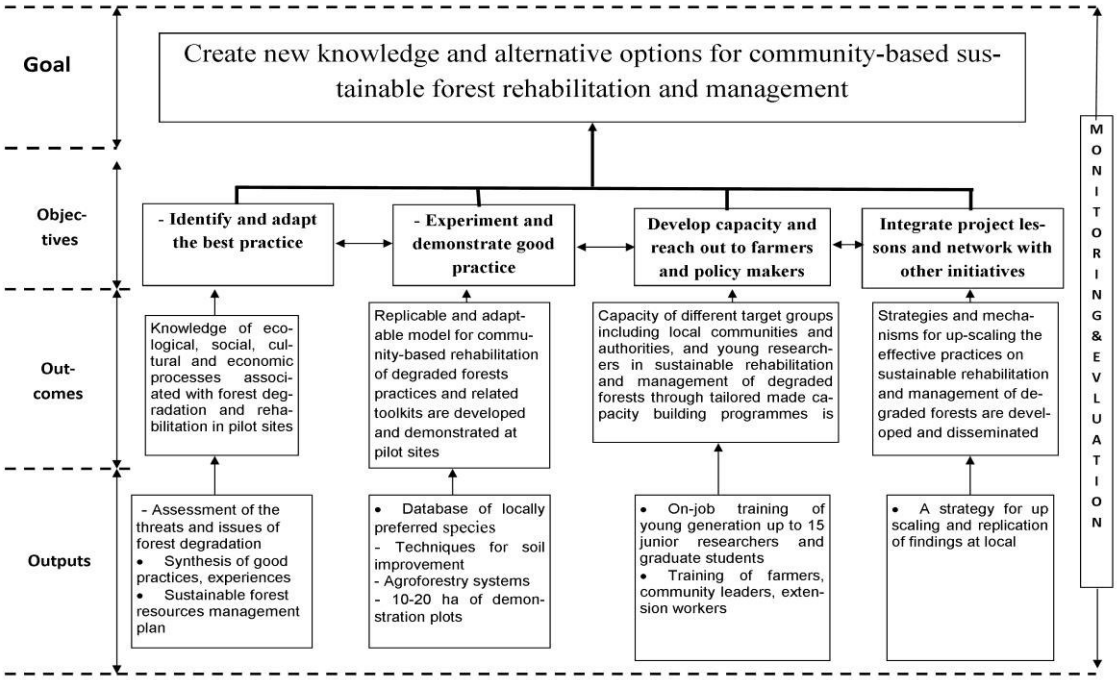
a) A strategy for up scaling and replication of findings at local and sub-regional levels
b) An information network and website on community based sustainable forest rehabilitation in the sub-region to deepen collaboration for safeguarding trans-boundary ecological security.

2. PROJECT IMPLEMENTATION

2.1 Project schedule and implementation arrangements

The project implementation was based on the following framework:

Framework for the implementation of APFNet-SFR-MMSEA



The implementation of project components and activities was on track and satisfactory. The annual project activities were scheduled as follows:

- **Year I in 2013**: development of project guidelines, on-the-job training of young researchers in project implementation, interdisciplinary assessment of forest resources and review of best practices of forest rehabilitation, participatory planning for sustainable forest development at each of four project sites, identification of locally preferred, rare and endangered native trees, and initiation of project nurseries at each of four project sites.

- **Year II in 2014**: experimentation of various models of forest rehabilitation to fit into local conditions with site-appropriate seedlings from project nurseries, demonstration of practical techniques for soil conservation and on-farm nursery of locally preferred, rare and endangered native trees to build local capacity for forest rehabilitation at each project site, and social fencing of natural regeneration.

- **Year III in 2015**: monitoring models of forest rehabilitation under experimentation, screening and demonstration of good practices, including appropriate alternative energies to continue enhancing local capacity of farmers, technicians and officials for forest rehabilitation; collaborating with local authority to enforce community rules for social fencing of natural regeneration, design and provision of training modules for training of local farmers and officials on forest rehabilitation, integration of project experience,

indigenous and scientific knowledge for wider replication for safeguarding the trans-boundary ecological security across MMSEA.

2.2 Project resources and costs

Project financial resources are supported by the APFNet grant and Counterpart Fund by the UNU, YAF, DALaM and FRI respectively. In accordance with the Annual Work Plan approved by the APFNet , the budget has been managed by the UNU under the Financial Regulations and Rules of the United Nations, United Nations Procurement Manual, and UNU Personnel Policy. UNU uses the International Public Sector Accounting Standards (IPSAS). The income cash received by the donor (APFNet) has been managed, implemented and monitored strictly in the Peoplesoft accounting system by project and by donor basis. Budget performance is audited by the authorized UN External Auditors on annual basis.

Under the overall coordination of UNU, YAF, DALaM and FRI have managed its respective project budget according to the APFNet approved annual work plan. The project implementation in four sites (2 in YAF, 1 in DALaM and 1 in FRI) has been monitored by UNU, through periodical reporting and communication.

2.3 Procurement and consultant recruitment

A detailed list of purchased assets by YAF, DALaM and FRI, respectively is listed below:

a) List of Equipment purchased by YAF for Puwen and Dehong sites

	Description	Serial No.	Date of Purchase (dd/mm/yyyy)	Original Price (local currency)	Original Price (equivalent US$)	Location
1	CANON camara	G1X	18/03/2013	4900	790.32	KUNMING
2	FOUND Deskcomputer		06/09/2013	5400	882.35	KUNMING
3	BHCNAV GPS	N410	15/08/2013	2396	391.33	KUNMING
4	Hp Printer	5200LX	15/05/2013	1325	213.83	KUNMING
5	Thinkpad Laptop	K49	15/07/2013	8000	1288.70	KUNMING
6	BHCNAV GPS	N600	15/05/2013	3440	560.28	KUNMING

7	CANON Digital Camera	6D	09/06/2013	10260	1677.00	KUNMING
8	Epson Printer	610K	13/09/2013	1200	196.17	KUNMING
9	Hp Printer	HP 1136	25/11/2014	1350	217.74	KUNMING
	Total			38271	6217.73	

b) List of Equipment purchased by DALaM for Xiengngeun

	Description	Date of Purchase	Original Price (local currency)	Original Price (equivalent US$)	Location
1	Motobike Honda Wave 100	2013		1,681	Luangprabang
2	First GPS: GARMIN eTREC Vista HCx	2013		500.00	Luangprabang
3	Digital camera + video (brand: Panasonic DMC-LX5)	2013		666,33	Vientiane
4	Second GPS: GARMIN eTREC Vista HCx	2013		500.00	Vientiane
5	Printer hp laserJet P1102	2013		200.00	Luangprabang
6	Note book DELL INSPIRON N4030	7/5/2014	5,200,000	650.00	Vientiane
7	Printer-scaner (Canon Image class MF 4550d	7/5/2014	2,800,000	350.00	Vientiane

c) List of Equipment purchased by FRI for Nawnghkio site

	Description	Serial No.	Date of Purchase	Original Price (local currency)	Original Price (equivalent US$)	Location
1	Garmin Global Positioning System (GPS)	GARMIN GPS Map 62s		361,000	419.767	CONCORDIA, Shwe Gone Plaza, Yangon
2	Cannon EOS 600D Camera Ultimate kit 3 lens	Cannon EOS 600D		879,780	1023	Royal Digital Camera Show Room,Yangon

2.4.1 Internal monitoring and evaluation

First, annual project workshops (Steering Committee and Advisory Group) were a major tool of internal monitoring and evaluation to serve as a major peer review of progress and problems, and exchange of lessons learned among four project sites as well as experts from the region. Three annual project workshops, one each took place in Kunming, China in Jan 2013, Pyinoolwin, Myanmar in Jan 2014 and Luangprabang, Lao PDR in Jan 2015.

Second, internal monitoring missions were carried out annually to ensure the project implementation on track. The Project Coordinator visited Puwen and Dehong project sites in Yunnan, China on 16-25 Jan 2013, and advised YAF to explore potential of traditional knowledge. The Project Director and Coordinator made a joint visit to Nawnghkio site in Myanmar on 5-7 July 2013, and advised FRI so that the scope of forest rehabilitation has expanded from one agroforestry model to include other forest rehabilitation models appropriate to different land uses. Project Coordinator visited the newly selected project site in Xiengngeun, Lao PDR on 8-11 July 2013 and confirmed that the site selection is in line with project requirements as well as local development priority. The Project Coordinator and the APFNet officer in charge made a joint monitoring visit to both sites in Yunnan, China on 13-17 July 2013, and advised YAF to enhance local participation as well as to select a better sub-site in Dehong. As part of internal monitoring, the Project Coordinator and the Chair of the Advisory Group participated in the external evaluations in 2014 and 2015.

In response to suggestions from internal monitoring on local participation and traditional knowledge, YAF facilitated establishment of forest user groups and development of joint agreement for forest resource management. A survey on traditional Dai homegarden was conducted, enrichment planting was done in a traditional Dai homegarden in Manfeilong village and a new homegarden was established in Lianhe village. With regard to Dehong site, YAF explored potential to build a health bamboo industry chain and promote the ex-situ conservation of precious rare bamboo species.

Third, regular communications with project site coordinators as well as APFNet officer were maintained to report ongoing progress and deal with emerging issues. YAF, DALaM and FRI had also carried out internal monitoring of progress. Director of DALAM, Heads of PAFO and DAFO of Luangprabang Province and Xiengngeun District, Professors from National university of Laos paid inspection visits to the project site. The main suggestions for improving the project demonstration site were to increase farmers' income by introducing more cash crops and integrated crop-livestock practices (especially small ruminant) livestock into the system to produce additional

income and food for food security and poverty reduction.

2.4.2 External monitoring and evaluation

- **Mid-term Evaluation (MTE)**

MTE was arranged by APFNet and carried out by Dr HU Huabin (independent evaluator) in Sept 2014. MTE made good recommendations with responses from the project teams as follows:

For management:

Township or district offices should be the major player of project implementation during scaling-up phase, while the current implementing agencies (YAF, DoALM, FRI) will act as supporting institutions or partner institutions. Therefore, greater participation of local government and community can be anticipated.

Response: the project team agrees to the recommendation and would work with local government to develop and implement the scaling-up phase:

Long-term evaluation (post project evaluation) would be necessary, unlike agricultural projects (mostly annual crops), forest rehabilitation take years for tree seedlings to grow, therefore, actual and visible impact in the locality will occur.

Response: the project team agrees to the recommendation and would incorporate it into long-term evaluation and screening of tested models for forest rehabilitation in the scaling-up phase.

For pilot sites – Puwen, Yunnan/China:

YAF team should try to establish demonstration plots for understory cultivation of landscaping plants, *Dendrobium*, in the Lianhe village, even help villagers to set up small nursery to grow seedlings for fast-growing rare and precious timber.

Response: YAF team has established demonstration plots for understory cultivation in the Lianhe village, provided training to local villagers on nursery of rare and valuable tree species. Rosewood trees were planted inside community owned rubber and tea plantations.

YAF team should consult with prefectural government offices and research institutions in the area who are also actively engaged in the promotion of environmental-friendly rubber plantation, so that suitable practices or models can be applied to those disfavored or degraded rubber plantations. YAF team could organize a study tour for villagers from Lianhe village to visit successfully established environmental-friendly rubber plantation within Xishuangbanna

Response: YAF team has collaborated with several governmental and research organizations to promote environmental-friendly rubber plantation as well as rainforest restoration activities in Xishuangbanna, China. YAF team has also invited

experts and officials to visit project sites for exchange of experience in environmental-friendly rubber plantation.

For pilot sites – Xiengngeun, Laos:
DALaM team should try to adopt some sloping agricultural practices to prevent soil erosion and retain soil fertility. e.g., broom grass or banana can be planted along the contour lines while job's tear or other annual crops can grow in between.

Response: DALaM team encouraged local farmers to experiment rotational agroforestry, starting from annual crops with short-term income, to perennials (banana and montane peanut) with medium-term income, and toward perennial gardens (fruits trees) with long-term income so as to restore economic forests on the sloping land.

DALaM team should set clear sign board for each practice and the enrichment planting in the fallow land needs to be improved or carefully designed as the currently planted seedling seems at random. DALaM team, in collaboration with DAFO, could organize an on-the-spot training activities to demonstrate tested practices for sustainable forest rehabilitation. Signs to carry project message and design should be placed in advance. If possible, try to host regional workshop organized by the project with the participation international experts and important government administrators. By this way, greater impact of this site can be achieved.

Response: DALaM team had set up appropriate sign-boards for demonstration plots ahead of the annual project workshop in Jan 2015. DALaM team in collaboration with DAFO and NAFRI hosted the annual project workshop with site visit in Jan 2015, and organized several field-based training activities for local officials and farmers.

For pilot sites – Nawnghkio, Myanmar:
FRI team should try to grow Konjac (*Amophophallus campanulatas*) in the village home gardens instead of infertile degraded forest. FRI team could soon replicate the experiences of community forests rehabilitation to more user groups within the same village or other villages nearby. Information of successful practices of the project should be disseminated from FRI to the ministry through proper ways of communications. It is quite possible that the on-going legislation pertaining community forestry of the country will take Nawnghkio site as an example.

Response, two community forest user groups have been replicated in the village. The results and activities of the project have disseminated to the Ministry through quarterly meeting of projects led by Deputy Minster.

For all pilot sites:
All pilot sites should be aware of the incoming dry season, effective measures should be applied to keep higher survival rate of seedlings just planted in the rainy season.

Response, site-appropriate measures were taken to maintain survival of seedlings. DALaM introduced a simple drip irrigation made of bamboo. FRI encouraged farmers to plant one-year old seedlings with a high rate of survival.

UNU-IAS could organize a few cross-visits for villagers, technicians and young researchers to share knowledge and exchange experiences in the region; and, the project website should be set up and running as soon as possible. All the implementing agencies should use propaganda instruments (such as TV, newspapers, interactive web platforms, etc.) properly to achieve greater impact and seeking for policy support for project replication.

Response, under limited budget, UNU-IAS and YAF was able to organize a study-tour for four sites to visit Puwen project site and Xishuangbanna Tropical Botanical Garden for exchange of experiences on 20-25 Nov 2014. YAF disseminated the project results through TV. Through FRI's regular reporting, Deputy Minister made an official visit to the Nawnghkio site, Myanmar and encouraged local communities and the FRI project team in promoting community forestry.

- **Terminal Evaluation (TE)**

TE was arranged by APFNet and carried out by Prof. Wil de Jong (independent evaluator) in Nov 2015. TE made good comments and recommendations with responses from the project teams as follows:

Project goal

A shifted project goal towards a focus on the transformation of the regions agriculture-forest landscape to increase their tree and forest components would imply developing new tree production options or agroforestry technologies.

Response, the carefully selected project sites are all agriculture-forest landscapes, involving sustainability of different land uses. Development of agroforestry technologies and new tree production have been the main strategy for rehabilitation of degraded forest land, especially at project sites in Lao PDR and Myanmar. Nevertheless, the unsustainable expansion of agriculture and single-species plantation is a priority challenge for sustainability in MMSEA. The project was focused on forest component with due attention to agriculture component of the project site agriculture-forest landscape (agroforestry and shifting agriculture) in line with the APFNet mission. The future project can further elaborate the integrated management of the agriculture-forest landscapes in the region.

Objective 4

Until the end of the project, few lessons have been learned that can be shared with other initiatives, as the majority of lessons that can be shared still need to be learned themselves.

Response, indeed, it will take time to assess effectiveness of those tested models of forest rehabilitation beyond the project duration. We agree with the TE evaluator that "they only will result in significant and real change when they can be continued for many years to come". Application of these models will also depend on natural and socio-economic conditions of potential sites. On the other hand, the project has identified the common land-use challenge of MMSEA to improve forest component with due attention to agriculture component on the agriculture-forest landscapes. The project has proposed and tested a systematic approach to forest rehabilitation from the interdisciplinary assessment of forest land use practices/traditional knowledge, towards participatory planning, experimentation/demonstration and international cooperation/cross-site networking across different economies. Moreover, some models are promising: traditional knowledge-based, tested of history, such as sacred forests/home gardens/live fences or those already tested by the project, such as conservation of understory vegetation in teak plantation in Lao PDR, and understory cultivation in Yunnan, China. The systematic approach to forest rehabilitation and some local knowledge-based models could be shared with other initiatives

Activities

Elements of the project that relate to participation, technology development and training of the project, while relevant and important can be assessed to have been inadequately thought through and implemented

Response: a) The level of community participation varies across four sites, depending on the mix of stakeholders. The level of community participation was high at project sites in Lao PDR and Myanmar as project experimentation and demonstration were carried out in the farmers' fields/the users group's land/community-own lands (sacred forests) through community organization. Forestry enterprises were involved in field activities at Dehong site, Yunnan. Social fencing activities involved close collaboration between local community and authority; b) Technology development was designed on the expertise of project teams as well as local knowledge, under a tight schedule of the project implementation. For example, identification of tree species for the project experiments with both local knowledge as well as scientific assessment was effective to start the nursery in time although a full database of useful trees with propagation techniques would require a long period of research, c) The project training was designed to meet specific needs of young members on project implementation (on-the-job training), and to introduce and explain the project concept, models and practical skills (nursery and planting of new trees, etc) to local farmers and officials. Several training manuals/pamphlets on practical skills were prepared for training activities. Indeed, a lot of efforts will be required to develop complete training courses in future.

Financial assessment

The distribution of funds over several activities appears in general well balanced. But the cost of output 1 (interdisciplinary assessment) appears too high.

Response, the interdisciplinary assessment was an important step to start the project field operation, demanding frequent travels of project teams from YAF, DALaM and FRI as well as local agencies to such remote project sites.

Potential for dissemination

The initiatives that the project implementing agencies have started under the project are well grounded and some are actually promising in that sense. But they only will result in significant and real change when they can be continued for many years to come.

Response, we agree to the comment and hope to continue the initiative in future. Nevertheless, the systematic approach to forest rehabilitation as well as some of traditional knowledge-based models could be disseminated.

Recommendations

1. The evaluation recommends that several of the Outputs that already have been completed under the project should be better documented and made available to the wider public.
2. To undertake an analysis of the economy of local agriculture and forestry activities.
3. It is to be hoped that project implementing partners can continue their collaboration in the future, and consider the reflections, conclusions and recommendations of the present Terminal Evaluations.

Response, we appreciate good comments and suggestions by the TE evaluator. Project results will be better documents and disseminated in near future. It will be important to assess the economy of local agriculture-forestry landscapes for planning the future project.

2.5 Dissemination and knowledge sharing

The project results and findings have been disseminated and shared at regional, economy and local levels.

--At regional level, the Chair of Project Advisory Group presented the project framework and progress at the Annual Meeting of the APFNet Focal Points in Kunming on 6 June 2013.

--FRI presented the project at the 1st APFNet council meeting held in Nay Pyi Taw, Myanmar in April 2015, received positive feedbacks and discussed with ITTO and Council Members on sustainability of the project after termination, regional integration of results and stabilization of shifting cultivation by replicating project activities in Myanmar. The Executive Director of APFNet remarked that FRI was demonstrating a very good model of forest rehabilitation through community

participation.
--FRI also presented the project at the 6th annual conference of Asian Social Forestry Network (ASFN) held in Inlay Lake, Myanmar in July 2015.
--Three annual project workshops, one each held in Kunming, China in Jan 2013, Pyinoolwin, Myanmar in Jan 2014 and Luangprabang, Lao PDR in Jan 2015, were organized to exchange and disseminate project progress and experiences among four project sites as well as experts from the region. Each workshop invited three regional experts (India, IGES, ITTO, Thailand, and USA) to share with the project teams on regional experience of forest rehabilitation.
--The international outreach workshop was organized by the project in Jinghong, China in Nov 2015 to summarize the project results and exchange and disseminate experiences accomplished over the three-year implementation. It was attended by project teams from YAF, DALaM, FRI, UNU, APFNet as well as from local government, experts from India and Thailand.
-- A cross-site visit among four project sites was conducted in Nov 2014.
--Semi-annual progress reporting was regularly prepared to review progress. The site reports and the consolidated report approved by APFNet were also shared among project members.
--At economy and local levels, the project progress in Puwen, Yunnan was reported by CCTV4 in May 2014, and presented to the Minister of State Forestry Administration (SFA) with positive feedback, requesting relevant agencies to provide more support to the project. The Deputy Minister of SFA visited the project site in Puwen in March 2015, and made very positive comment on the project. Both leaders of SFA all believe that the project is very good to rehabilitate degraded land together with neighboring countries and the trials in Puwen are creative and seem quite promising.
--The local authorities (PAFO, DAFO), students and professors from faculty of Agriculture, National University of Laos were organized to visit demonstration site at project site, Lao PDR in order to learn and exchange experiences on rehabilitation practices, such as agroforestry, enrichment planting, non-timber forest product planting and nursery of endangered species.
--The FRI project team presents the on-going activities and financial matters in the regular monitoring meetings led by Deputy Minister and senior officials as a platform to exchange between project implementers and high level officials, to enhance effectiveness and efficiency of project activities and to deal with the challenges in meeting project objectives. Papers and training manuals/pamphlets have been published to disseminate project results as listed in annex.

3. PROJECT PARTNERES' PERFORMANCE

3.1 Performance of Executing Agency

The project was executed jointly by the United Nations University (UNU), the Yunnan

Academy of Forestry (YAF), the Department of Agricultural Land Management (DALaM) of Lao PDR, and the Forest Research Institute (FRI) of Myanmar. The Project Steering Committee (PSC) was composed of leaders of each of three project teams in YAF, DALaM and FRI as well as the Project Director and the Project Coordinator in UNU. PSC reviewed progress, determined forward plans, and advised on the programme of cross-site activities. The Project Advisory Group (PAG), selected from in-house experts of YAF, DALaM and FRI offered technical support towards project methodologies, the integration of the project results, and the internal monitoring of the progress, advanced training and the scientific linkages with relevant initiatives in MMSEA and beyond. Both PSC and PAG met y at the annual project workshops from 2013-2015.

The project teams at UNU, YAF, DALaM and FRI made great efforts and successfully completed the project over last few years. The UNU project coordination team with advice from PSC and PAG provided overall project coordination and technical support to the project teams at YAF, DALaM and FRI, especially with regard to planning and implementation of the cross-site programme, such as organization of annual workshops, preparation of annual work plans and progress reports, internal monitoring of project sites as well as coordination with APFNet on mid-term, terminal evaluations and other activities. The YAF, DALaM and FRI project teams in collaboration with local communities and authorities were responsible for project implementation, including field assessment, experimentation/extension, capacity building and semi-annual reporting to UNU at Puwen site, and Dehong site in China; Xiengngeun site in Lao PDR, and Nawnghkio site in Myanmar, respectively.

3.2 Performance of Implementing Agency (if any), consultants (technical assistants), contractors, and suppliers

Apart from the executing agencies, the project implementation also involved the Tropical Forestry Research Institute, the Dehong Prefecture Forestry Research Institute, and the Longchuan Forestry Bureau in Yunnan, China. The project implementation was largely based on in-house expertise of executing agencies. In addition, special lectures and advice on understory cultivation, nursery of rare preferred tree species and participatory planning were provided by experts from Puer Forestry Research Institute in Yunnan, China, the Northern Agriculture and Forestry Research Institute in Lao PDR and Freelance NGO trainers in Myanmar.

Experts from Regional Center for People and Forest (RECOFTC) and Makino Botanical Garden, Japan visited the project site and shared experiences in Myanmar. A wide range of experts from Chinese Academy of Sciences, Global Parks (USA), Jawaharlal Nehru University (India), University of Forestry (Myanmar), ITTO, Chiang Mai University (Thailand) and Institute for Global Environmental Strategies (Japan) shared their experiences at the annual project workshops. Both partner implementing

agencies and experts made good contribution to supporting the project implementation as well as regional networking.

3.3 Performance of APFNet

APFNet has provided: 1) timely support and clear guidance for project planning, implementation and management, 2) timely disbursement of project grant, 3) effective communication with project executing agency and partners in proper facilitation in undertaking project activities and project dissemination, 4) external MTE and TE during the project implementation and shared swift feedbacks accordingly. It would be more appreciated if APFNet could also attend annual project workshops held in Myanmar and Lao PDR for timely exchange with project teams.

4. PROJECT PERFORMANCE

4.1 Project achievements

The outputs and outcomes achieved by the project are as follows:

- Outcome I: Knowledge of forest degradation and rehabilitation in pilot sites is enhanced
  Outputs achieved at all sites:
  1.1 Field assessment of forest resources
  1.2 Review of best practices of forest rehabilitation
  1.3 Participatory plan of forest rehabilitation

- Outcome II: Replicable and adaptable model for community-based rehabilitation of degraded forests and related toolkits are developed and demonstrated and
  Outputs:
  2.1 Database of locally preferred, rare and endangered native tree species, site requirements, and nursery techniques completed at all sites
  2.2 Techniques for soil improvement in degraded areas for tree planting demonstrated at all sites
  2.3 Agroforestry systems, including understory cultivation designed and tested at all sites
  2.4 Toolkits to facilitate social fencing of assisted natural regeneration developed at all sites
  2.5 Package for alternative rural energy demonstrated at Xiengngeun site in Lao PDR and Nawnghkio site in Myanmar

2.6 Areas of demonstration plots established: 25.74 ha at Puwen site; 29.8 ha at Dehong site; 26.65 ha at Xiengngeun site, and 25.3 ha at Nawnghkio site.

- Outcome III: Capacity of different target groups in sustainable rehabilitation and management of degraded forests is strengthened
  Output:
  3.1 Local guidelines in assessment of forest resources and participatory planning of forest rehabilitation developed for on-the-job training
  3.2 On-the-job training of 93 young researchers and master students (53 in Yunnan, China, 25 in Lao PDR; 15 in Myanmar) in assessment of forest resources and participatory planning of forest rehabilitation based on local guidelines.
  3.3 Training of more than 400 villagers, local officials and enterprise managers (180 in Yunnan, 120 in Lao PDR and 100 in Myanmar) in application of sustainable forest rehabilitation models.
- Outcome IV: Strategies and mechanisms for up-scaling the effective practices on sustainable rehabilitation and management of degraded forests are developed and disseminated
  Output:
  4.1 A strategy for up-scaling and replication of findings at local and sub-regional levels will be built on project lessons, including identification of a common challenge to deal with deforestation and forest degradation, a systematic approach to the common challenge from baseline assessment, best practices review, participatory planning towards experimentation/demonstration of site appropriate models (agroforestry, understory cultivation, mixed-species plantation, community organizing, etc), monitoring/evaluation, and inter-economy exchange.

  4.2 An information network on community based sustainable forest rehabilitation in the sub-region is established through a partnership of UNU, YAF, DALaM and FRI, based on a Memorandum of Understanding (MoU). The partnership has been extended to Jawaharlal Nehru University (JNU) in India and Chiang Mai University (CMU) in Thailand in the region as both JNU and CMU are willing to sign in MoU. The new web site is not yet set up due to the ongoing re-organization of the homepage under a merger of two former UNU institutes.

4.2 Project Impacts

The project was implemented from 2013-2015. Substantive outputs and outcomes were achieved by the project according to the project design. It will take a longer time

to assess and realize a full range of the project impacts induced by the project outputs and outcomes. Nevertheless, preliminary project impacts have been already observed at local, economy and regional levels.

At local level, the project has contributed social, economic and biophysical aspects of local livelihoods. Many farmers benefited from the project demonstration trials by learning about alternative systems of agroforestry, tree cultivation techniques and household energy. 70 % of households in Nyaung-Htuak village, Myanmar have participated in demonstration trials directly or indirectly. One of demonstration trials at Xiengngeun site, cultivation of *Thysanolaena latifolia* on the sloping lands is effective to increase farmers' income as well as to check soil erosion. As another demonstration trial at Xiengngeun site, the teak plantation with conservation of understory vegetation is very effective to reduce soil erosion, but also produce non-timber forest products for local livelihoods. The understory cultivation of *Dendrobium*, *Anoectochilus roxburghii*, and rattan as demonstration trials in Yunnan, China has expanded sources of income for local villagers and companies, especially from conservation of natural forests. The project results have also helped accelerate the converting process of pure bamboo forest to bamboo-timber mix forest in Dehong Prefecture.

At economy level, project results are making policy impacts. Jinghong City in Yunnan, China encouraged by the preliminary achievement of the project in developing the environmentally friendly rubber plantations at Puwen site, is planning a large programme to convert the rubber plantations back to "rainforests". The YAF project team is invited to provide technical assistance for the governmental programme. Local government in Dehong Prefecture has started to improve the bamboo industry by cooperation with advanced companies from outside. The project has convinced the high level policy makers that role of communities in forest rehabilitation in Myanmar. The Deputy Minister of Environmental Conservation and Forestry admired good practice of community forestry model in the Nyaung-cho project site and he had encouraged replicating such model in the whole area of Nyaung-cho Township as an alternative approach of shifting cultivation. The FRI project team has been contacted by some of local NGOs (e.g. evergreen environmental group) to observe and replicate the model.

At regional level, the project is demonstrating a good model for regional collaboration in forest management and rehabilitation. The leadership of the State Forestry Administration of China visited the Puwen project site in Yunnan, China and commended the trans-boundary collaboration of the project among China, Lao PDR and Myanmar to address a common challenge, and required relevant agencies to support the project. The project was also disseminated by CCTV4 in May 2014. Moreover, the project has extended its partnership to Thailand and India as well as exchanged with experts from other APFNet project, ITTO, IGES and Global Parks. Project experiences, including review of best practices, are relevant to the regional

efforts in forest rehabilitation on the ground.

4.3 Sustainability

The project was planned and carried out closely with local communities and authorities. The project approach is based on community participation and sustainability of demonstration models. The community forest user group at Nyaung-cho site in Myanmar has been involved in planning, implementing and monitoring of the demonstration trials. After the completion of the project, the demonstration trials will be used as a learning base for local communities and authorities to study and learn on forest rehabilitation. Some of demonstration trials, such as improvement of home gardens, conservation of sacred forests and temple forests are based on traditional knowledge/practices. Local communities will continue these traditional practices even without external support after the project completion. The self-confidence of local communities enhanced through the project participation will also encourage them to screen good models for wider replication. Several models of forest rehabilitation are tested in the YAF campuses at Puwen and Dehong sites in Yunnan and will continue to be monitored by YAF institutes. In addition the local government is becoming more and more willing to provide ecological compensation for the farmers to rehabilitate the degraded forest lands.

Nevertheless, follow-up activities would by necessary because the 3-year period of the project is too short to generate income from cash trees in the demonstration trials. For example, *Sterculia versicola* selected by FRI team with local community in Myanmar will need 5 years to be harvested after planting in the demonstration trials. It is too early to assess the sustainability of the demonstrated practices. It will also need time to verify the promising model on ecological rubber plantation at Puwen site. The FRI team and high-level policy makers are willing to continue the project to demonstrate economic/social and environmental benefits of models and to replicate in other villages. Local communities hope that they will succeed in forest rehabilitation with the help of Forest Department and good market access for cash trees in Myanmar. The project teams are all willing to continue the project and validate demonstration trials for wider application at local and regional levels.

5. CONCLUSION, LESSONS LEARNED AND RECOMMENDATIONS

5.1 Conclusion

This regional project entitled “Sustainable Forest Rehabilitation and Management for the Conservation of Trans-boundary Ecological Security in Montane Mainland Southeast Asia’ is the first demonstration project of APFNet for researchers from

different economies in MMSEA region to work together on the regional challenge for sustainable forest rehabilitation. The project activities have been fully completed, and outputs/outcomes achieved through regional sharing among participating economies, coordination and guidance by UNU and APFNet and support from higher level officials and invited international experts. Some of the demonstration models, including traditional knowledge in the project are promising with great potential for replication in spite that more time is needed to monitor the effectiveness of these models. The main project activities completed are as follows:

- Trained young researchers on-the-job for field assessment of forest resources and participatory planning of sustainable forest rehabilitation and management with local guidelines
- Conducted field assessment of forest resources, review of best practices and participatory planning of sustainable forest rehabilitation and management, including participatory agriculture and forest land use planning and zoning
- Set up nurseries to produce seedlings of locally preferred and rare native tree species
- Established demonstration trials on forest rehabilitation practices, at least 25 ha in each of four project sites
- Organized trainings for farmers on propagation of seedlings, and site-appropriate models of forest rehabilitation and field days for local authorities to learn about demonstration trials
- Produced training materials and relevant publications on forest rehabilitation practices for different users.
- Shared experiences among participating economies as well as experts from the region.

5.2 Lessons learned and recommendations

Lessons learned:

The success of the sustainable forest rehabilitation should be built on community participation as well as local knowledge, including utilization of locally preferable species. Local participation, including both local communities and authorities, is the key to the sustainability of the project. The main challenge of introducing community based forest management approach is trust building with local farmers. Local participation will also be enhanced with better communication between researchers and local communities/authorities. In some situations, forestry enterprises may be encouraged to take a risk in testing and adoption of new species and management practices so that small farmers could see real success of these enterprises and adopt new species and practices.

Recommendations for the present

(1) Monitor and assess the effectiveness of the rehabilitation trials and activities of the project using the criteria and indicators proposed during annual the project workshop

in Laos in Jan 2015.

(2) Select sustainable rehabilitation models for further improvement and extension based on the results from the assessment.

(3) Publish project findings for more awareness and support

(4) Set up the future plan to continue collaboration with local communities at project sites

Recommendations for the future studies

(1) Continue to monitor and assess the rehabilitation trials/models at project sites

(2) Identify most important degraded areas and land uses for further development

(3) Analyze and utilize local forest rehabilitation knowledge systems as a starting point to develop site appropriate models for improved practices of forest rehabilitation

(4) Replicate the successful rehabilitation models as wide as possible

(5) Strengthen local groups and community organizations for collective action at the community level for the long-term sustainability of forest rehabilitation practices

(6) Examine policy issues on incentives for forest rehabilitation, certification of forest products, and potential of agroforestry in marginal farmland

(7) Build on Phase I to develop regional guidelines for rehabilitation of degraded forest land, including regional strategy, models, criteria and indicators.

(8) Enhance the MMSEA region research network for sustainable forest rehabilitation to coordinate international joint research and demonstration.

Annexes

A. Project Implementation status
B. Financial statement(including balance sheet, source and use of Funds statement, and expenditure details) by both category and activity
C. Project audit report
D. Project outputs, such as technical reports, key project documents (workshops, field visits, technical visits, trainings etc.), publications, brochures, webpages, etc.
E. 2-3 Feature stories from the project for promotion
F. Photos, media cliffs and other materials used/available for project outreach

Annex A Implementation status (scheduled versus actual)

Project Objective/ Outputs/Activities (in line with PD/AWPs)	**Indicators** (in line with PD/AWPs)	**Baseline of activities**	**Progress made (%completion of activities and degree of output/objective achievement)**	**Appraisal time**	**Actual time**
Objective 1:	Best practices identified		100%	12/2013	12/2013
Output 1.1:	Report of assessment of present state of forest resources		100%	12/2013	12/2013
Activity 1.1	Field surveys		100%	6-10/2013	6-10/2013
Output 1.2:	Report of forest rehabilitation practices review		100%	12/2013	12/2013
Activity 1.2	Survey and literature reviews		100%	3-6/2013	3-8/2013
Output 1.3:	Report of forest rehabilitation plan		100%	12/2013	12/2013

Activity 1.3	Participatory planning		100%	7-10/2013	7-10/2013
Objective 2	Good practices experimented and demonstrated		100%	12/2015	12/2015
Output2.1	Database of locally preferred, rare and endangered native tree species		100%	12/2014	12/2014
Activity 2.1	Survey and nursery establishment		100%	9/2013-12/2014	9/2013-12/2014
Output2.2	Locally adapted techniques for soil and water management		100%	12/2015	12/2015
Activity 2.2	Experiment and demonstrate relevant techniques		100%	1/2014-12/2015	5/2013-12/2015
Output2.3	Locally adapted models of forest rehabilitation		100%	12/2015	12/2015
Activity 2.3	experiment and demonstrate various models		100%	1/2014-12/2015	5/2013-12/2015
Output2.4	Social toolkits to facilitate protection of rehabilitation		100%	12/2015	12/2015
Activity 2.4	Participatory social fencing for protection of rehabilitation		100%	1/2014-12/2015	5/2013-12/2015

Output2.5	Locally adapted package for alternative rural energy		100%	6/2015	6/2015
Activity 2.5	Experiment and demonstrate alternative practices		100%	1/2014-6/2015	1/2014-6/2015
Output 2.6	At least 25 ha of demonstration plots established at each pilot site		100%	12/2015	12/2015
Activity 2.6	Monitoring and evaluation of demonstration trials		100%	1/2014-12/2015	5/2013-12/2015
Objective 3	Capacity built and reached out to farmers and policy makers		100%	12/2015	12/2015
Output 3.1	Up to 15 junior researchers and graduate students trained		100%	12/2013	12/2013
Activity 3.1	Training courses		100%	7/2013-12/2015	7/2013-12/2015
Output 3.2	Farmers, community leaders, and local officials trained		100%	12/2015	12/2015
Activity 3.2	Field-based demonstration and training		100%	1/2014-12/2015	1/2014-12/2015
Objective 4	Integrate project lessons and network with other initiatives for a regional		80%	12/2015	12/2015

	strategy				
Output 4.1	A strategy for up-scaling of project findings at local and sub-regional levels		80%	2/2016	3/2016
Activity 4.1	Annual workshop and reporting		100%	2/2016	3/2016
Output 4.2	An information network and website on sustainable forest rehabilitation		80%	12/2015	12/2015
Activity 4.2	Networking and dissemination		100%	1/2013-12/2015	1/2013-12/2015