



THE GOVERNMENT OF THE UNION OF MYANMAR
MINISTRY OF FORESTRY
FOREST DEPARTMENT



Ex-situ and *In-situ* Conservation of Teak (*Tectona grandis* Linn. F)
to Support Sustainable Forest Management

ITTO Project PD 270/04 Rev.2 (F)



PROJECT COMPLETION REPORT

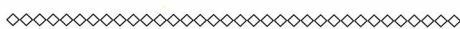
1 April 2006 – 31 March 2009

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Dr. Nyi Nyi Kyaw
National Project Manager
PD 270/04 Rev.2 (F)
Myanmar

ITTO Project PD 270/04 Rev.2 (F)

Ex-situ and In-situ Conservation of Teak (Tectona grandis Linn. F)

to Support Sustainable Forest Management



PROJECT IDENTIFICATION

TITLE : *Ex-situ and In-situ Conservation of Teak (Tectona grandis Linn. F) to Support Sustainable Forest Management*

SERIAL NUMBER : PD 270/04 Rev.2 (F)

EXECUTING AGENCY : FOREST DEPARTMENT

HOST GOVERNMENT : GOVERNMENT OF MYANMAR

STARTING DATE : 1 APRIL 2006

ACTUAL DURATION : 36 months

ACTUAL PROJECT COST : Myanmar Government Contribution
KYATS - 49,880,000 (in kind)
ITTO Contribution (USD) - 474,941.00

PROJECT SITE : Pyinmana, Paukkaung, Nattalin,
MyanAung, Saw, Kantbalu Townships.

DEVELOPMENT OBJECTIVE : To promote the production of high quality teak through its genetic improvement in order to support sustainable forest management in Myanmar

1. Background Information of the Project

The project proposal "*Ex-Situ* and *In-Situ* Conservation of Teak (*Tectona grandis* Linn. F) to Support Sustainable Forest Management" arises from the recognition of the need for sufficient supply of good quality seed for the teak plantation programme in Myanmar. Myanmar has been harvesting and exporting its quality teak all over the world from its natural forests since time immemorial. In order to support the production from the natural forests and assure sustainable forest development, the Forest Department of Myanmar is also planting approximately 80,000 acres of forest plantations annually, out of which about 35,000 acres or over 42% are teak. Nowadays, private entrepreneurs are also allowed to participate in teak planting programme. The summary is as given below:

Plantations established from 1896 to 2007

No.	Species	Area (acre)	Area (%)
1.	Teak	948,784	42.4
2.	Pyinkado	152,150	6.8
3.	Padauk	43,042	1.9
4.	Pine	53,562	2.4
5.	Others	1,040,799	46.5
	Total	2,238,337	100.0

Although the Forest Department (FD) is aware of the need for *Ex-situ* and *In-situ* conservation of its famous teak through tree improvement programme and systematic collection of quality seed for their teak plantations, seeds have been, and still are, being collected unsystematically and at *ad hoc* basis, as most of the field staffs do not have sufficient expertise in this field. Wide scale establishment of Seed Production Area (SPA) was initiated in 1996. Due to the limitation of budget and lack of training of the staffs in the Districts, the initiative was not effective although 7922.77 acres of teak plantations were converted to SPAs up till 2006. In order to maintain its market for quality teak by producing and planting with good quality seed, and assure sustainable production of valuable high quality tropical timber, there is the need to initiate a proper tree improvement programme including upgrading the Tissue Culture Laboratory at Central Forestry Development Training Centre (CFDTC) and the FD has therefore seek assistance from International Tropical Timber Organization (ITTO) to initiate this programme for teak.

1.1. Development Objective

The overall development objective of this project is to promote the production of high quality teak through its genetic improvement in order to support sustainable forest

management in Myanmar and to enhance the economy of the country through sustainable production and export of high quality teak by using good quality seed for planting.

1.2. Specific Objectives

1.2.1. To establish Seed Production Areas and initiate activities for the establishment of Seed Orchards for production of high quality seed.

1.2.2. To strengthen the Tissue Culture Laboratory and produce high quality plantlets through tissue culture and shoot cutting from hedge garden.

1.3. Outputs

1.3.1. Specific Objective I

This Specific Objective I has 4 expected outputs:

1.3.1.1. A total of 150 acres of SPA Established at Shwebo, Nay Pyi Taw, Gangaw, Pyay, Thayawady and Hinthada Districts.

Conversion of selected teak plantations to SPA and formation of Income Generation Groups (IGGs) of the local community were sub-contracted to FREDA and EcoDev groups in the first year and to EcoDev, alone in the second year.

In the first year (2007), 25 acres each of SPAs were established at Paukkaung Township, Pyay District; Nattalin Township, Thayawady District and Pyinmana Township, Nay Pyi Taw. Undergrowth clearing, thinning, fencing, construction of briefing shed and formation of IGGs of the local community and other activities that were under the sub-contracts were closely supervised by the National Project Manager (NPM), National Consultants and the project staffs. The status of the selected sites after thinning is as shown in the table below:

Status of the selected sites after thinning in the first year

Sr. No.	Location		Year established	Area	Trees felled	Trees left	Total No. of trees
	Township	Reserve					
1.	Paukkaung	South Nawin C.49	1973	25	344	658	1002
2.	Nattalin	Bawbin C. 99	1991	25	1986	1740	3726
3.	Pyinmana	Taungnyo C. 59	1966	10	88	262	350
		& Ngalaik C.78	1984	15	273	351	624



Monitoring thinning operation in SPA by NPM and National Consultant

In the second year, the remaining 3 SPAs were established at Saw Township, Gangaw District; Kantbalu Township, Shwebo District and Myan Aung Township, Hinthada District. Each SPA is 25 acres in area. As in the first year, the activities carried out by the sub-contractor were closely supervised by the NPM, National Consultant and the project staffs. The status of the selected sites after thinning is as shown in the table below:

Status of the selected sites after thinning in the second year

Sr. No.	Location		Year established	Area	Trees felled	Trees left	Total No. of trees
	Township	Reserve					
1.	Saw	Saw (1) C. 74	1983-84	25	1446	1335	2781
2.	Kantbalu	Thaw C. 192	1967-68	25	953	764	1716
3.	Myan Aung	Hmyinwa-taung C.44, 46	1981	25	597	648	1245

1.3.1.2. Provenance Trials, Hedge Gardens and a Nursery Established

Provenance Trials

According to the project document two provenance trials were established. One was 2.8 acres in area and was established at Compartment 18 of Ngalaik Reserve, Pyinmana Township and the other which was 3.2 acres was established at Compartment 91 of Yenwe Reserve, Kyauktaga Township in 2007. Randomized Complete Block Design (RCBD) was adopted in both cases. 25 trees plot with 5 replicates were used. The trial at Nagalaik Reserve consisted of 8 provenances whereas that in Yenwe Reserve consisted of 9 provenances.



NPM inspecting teak provenance trial in Pinyinana Township

Hedge Gardens

The concept of using hedge gardens in tree improvement programme is well accepted although it has not been used in practice. Many hedge gardens were established in the districts but there is no proper instruction on how it should be used and maintained.

This project itself has established 2 hedge gardens, one at the Forest Research Institute (FRI), Yezin, Pinyinana Township in 2007 and the other at Letpankon, Oaktwin Township in 2008. The one at Yezin was 0.1 acre and comprised of 131 ramets, representing 22 clones. More clones will be added so as to increase the number of clones in the clone bank. Hedge garden that was established at Letpankon, Oaktwin Township consisted of 932 ramets with 89 clones. It has an area of 2.7 acres and the grafted plantlets were planted at 9' x 9' spacing in 2008.



Hedge garden established at FRI, Yezin



Hedge garden at Letpankon, Oaktwin Township

Nursery

Two nurseries, one at FRI, Yezin and one at CFDT, Hmawbi,

were renovated for raising grafted plantlets, tissue cultured plantlets and teak seedlings for planting. Mist chambers at these two places were also renovated for raising grafted and tissue cultured plantlets in their initial stage.



Nursery at FRI, Yezin



Grafted plantlets in mist chamber

1.3.1.3. Trainings, Workshops and Study Tours Organized and Implemented

Training

Training course No. 2 of the project, which was titled "Seed Production Area Establishment, Maintenance and Seed Handling" was organized and conducted at the FRI, Yezin from 19 to 23 March 2007. Twenty participants that included one forester and two local farmers from each of the 6 project sites plus 2 from the FRI attended the training. The training included one day field trip to SPA at Pyinmana Township. The trainees also have the opportunity to discuss with the IGG in that project site.



Training No. 2 at FRI, Yezin

Study Tour

A Study tour comprising of 2 members of the IGGs and one FD staff from each of the 6 project sites, 3 staffs of the FRI, 2 staffs from the

Head Office and 3 from the University of Forestry was organized and implemented from 28 March to 29 March 2008. The group was taken to the SPA at Compartment (49), South Nawin Reserve, Paukkaung Township, Bago Division (West) to observe the activity there. They were also made to meet the members of the IGGs of Paukkaung and have discussion with them.



Study Tour group at Paukkaung

Oversea Study Tour

- (1) The National Project Manager made a study tour to the Forest Tree Breeding Centre (FTBC), Japan from 26 October to 3 November 2006.



NPM discussing with research scientists at FTBC, Japan

- (2) A group study tour on Teak Tree Breeding and Tree Improvement was conducted from 4 to 17 January 2009. The group comprised of a senior staff from the FD, the National Consultant (SPA Management/Silviculture), 3 project staffs, and 2 private entrepreneurs. They visited research institutes and places concerned with teak tree breeding and tree improvement in Indonesia, India and Thailand.



Study Tour to Tree biotechnology and tree improvement centre, Indonesia

1.3.1.4. Capacity of the Local Community in the Management of SPA Enhanced and their Livelihood Sustained and Improved

The main idea of the project is to build the capacity of community on sustainable management on teak plantation where selective healthy teak plantations are transferred to the community as SPA Development programme. This activity was sub-contracted the EcoDev, an NGO group both in the first and the second year and their activity was closely monitored by the NPM, National Consultants and the project staffs. In the first year (2007), the activity was carried out in 3 project sites, i.e. Se Oo village, Pyinmana Township, Nyaung Wun village, Paukkaung Township and San Gyi village, Nattalin Township. In the second year, the activity was carried out in the remaining 3 project sites, i.e. Hmyin-wa-taung village, Myanaung Township, Pyone village, Saw Township and Mont-baung village, Kantbalu Township.



Training on book keeping

Activities carried out were, (1) Participatory assessment and base line data collection (2) Village advocacy meeting (3) Formation of Income Generation Group (IGG) (4) Mobilizing the saving of IGG (5) Training of

IGG (6) Monitoring of Saving Financial Management (7) Opening of Saving Book (8) Withdrawing the matching fund and financial Status of IGG (9) Loan proposal planning and prioritization.



Community mobilization at Myanaung



Handing over of project support (USD 1000) by the NPM at Se Oo village

The IGG started by conducting weekly saving of their own income. The project supplemented their savings by supporting USD 1,000 to each group. The amount is used for giving loan to members for Income Generation activities with a nominal interest. The development of the IGG financial status is as shown in the table below:

Development of financial status of IGGs

Sr. No.	Location	Fund Provided	Date of Payment	Status of IGG Fund on 1.7.08	Status of IGG Fund On 20.1.09
1.	Se Oo	1,260,000	23.3.07	1,945,045	2,067,545
2.	Nyaung Wun	1,260,000	16.3.07	3,092,400	3,565,174
3.	San Gyi	1,260,000	12.1.07	2,274,450	2,923,190
4.	Hmyin-wa-taung	1,210,000	2.5.08	1,380,800	1,678,786
5.	Pyone	1,210,000	12.5.08	1,385,125	2,002,625
6.	Mont-baung	1,210,000	22.5.08	1,296,900	1,347,050

According to the suggestion given by one of the Project Steering Committee members, loan was also given for goat raising in the SPA. Two groups showed their interest and took up the activity. The status of goat raising is as shown in the table below:

Development status of goat raising

Township	Date	Amount (Ks)	No. of Goats	Remarks
Paukkaung	11.02.2008	330,000	10	
	20.01.2008	516,250	18	5 casualty
Nattalin	10.02.2008	280,000	14	
	20.01.2009	650,000	24	1 casualty



Goat raising at Paukkaung

1.3.2. Specific Objective II

1.3.2.1. Tissue Culture Laboratory Strengthened

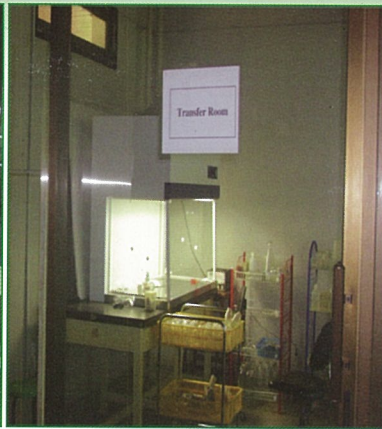
Some essential laboratory equipments and chemical for tissue culture were purchased and installed in the laboratory at the CFDTC, Hmawbi. List of the equipments and chemicals required were made in consultation with the National and International Consultants on Tissue Culture. The layout of the Laboratory was also reorganized according to the suggestion made by the International and National Consultants. Budget used in strengthening Tissue Culture Laboratory is:

(1) Purchase of equipment	USD 21,981.00
(2) Purchase of chemicals	USD 1,587.00
(3) Renovation of existing Laboratory	USD 3,869.31

Total: USD 27,437.31



Media preparation room



Transfer room



Culture room

The cost of renovation of the existing laboratory amounts to USD 3,869.31 and the total expenditure on strengthening of Tissue Culture Laboratory amount to USD 27,437.31.

1.3.2.2. High Quality Vegetatively Propagated *Plantlets* in Production from Tissue Culture and Hedge Garden

High quality vegetatively propagated plantlets were in production from tissue culture and hedge gardens. A total of 2,386 plantlets were produced from the tissue culture laboratory. Although the project was able to produce 30,830 bottled plantlets at the laboratory stage, only 2,386 plantlets survived up to the nursery stage for planting. This is mainly due to the high rate of contamination in the laboratory which is expected to be reduced when more experience is gained.

High quality vegetatively propagated plantlets were also produced through grafting, budding and shoot cuttings of the clones from the hedge gardens. Up to date, a total of 21,365 plantlets were produced by the project for its activity and also for distribution to interested private entrepreneurs who are planting teak.

1.3.2.3. Training and Seminars Organized and Convened

Training

Training course No.1 of the project which was titled "Tree Improvement, Tissue Culture Techniques and Establishment of Hedge Garden" was organized and conducted at the CFDTTC, Hmawbi. The training was conducted from 19 to 23 February 2007. Twenty participants, including Eighteen Range Officers of the Forest Department from Ayeyawady, Bago, Kachin, Kayin, Magwe, Mandalay, Sagaing, Shan and Yangon Forest Divi-

sions and two Research Assistants from the FRI, Yezin participated in the training course.



Training course No. 1, held at CFDTC, Hmawbi

Overseas Training

In consultation with the International and National Consultants on Tissue Culture, overseas training on related fields were planned and implemented.

- (1) Two trainees were sent to attend training on “Molecular and biotechnological techniques in tree improvement” at Kerala Forest Research Institute (KFRI), India from 27 February – 8 March 2008.



- (2) Another two trainees were sent to attend training on “Conventional and molecular methods of tropical tree improvement for higher productivity” at KFRI, India from 18 – 28 November, 2008.



Seminar

A one day Seminar on “Teak Seed Production Area (SPA) Management and Tree Improvement” was organized by the project at the FRI, Yezin, Nay Pyi Taw on the 20th of February 2008. The Seminar was inaugurated by H.E. Brigadier General Thein Aung, Minister for Forestry. A total of 9 papers were presented at this Seminar.



Seminar Inaugurated by H.E. Brig. General Thein Aung

1.4. The Strategy

The strategy adopted by the project to achieve its Specific Objective I was developed based on the lack of successful Tree Improvement programme in the country and to start with the simplest, cheapest and the quickest way by the establishment of SPA. At the same time, preparatory work for a more sophisticated tree improvement work, such as establishment of Provenance Trials, establishment of Clonal Seed Orchards, selection of plus trees, vegetative propagation of the clones from the selected plus trees and establishment of hedge gardens were carried out.

In order to protect the SPAs established by the project, local community were mobilized, and sensitized for management of SPA and income generation activities. Support was given by the project for their income generation activity so as to alleviate their livelihood and get better participation in the sustainable development of the SPA.

The strategy adopted for Specific Objective II was by strengthening the tissue cul-

ture laboratory and providing training for the production of improved tissue culture plantlets to support the tree improvement programme.

1.5. The Work Plan

Details of project output, activities and schedule of implementation are described in the Work Plan. It was used as a basis for formulating the Yearly Plan of Operation according to which the activities were implemented.

2. Project Context

In order to supplement its production from the natural forests, Myanmar has been establishing teak plantations for decades. In order to maintain its reputation for teak, the FD realized that production from the plantations should be as good in quality as that from the natural forests. A number of initiatives were taken by the FD to carry out tree improvement programme since 1980, but was not sustainable.

With the increased in population, illegal cutting and the need for development of the country, the natural forests are heavily cut and the production of big quality timber has decreased. Thus, the production of big quality timber from the plantation is greatly needed.

The results of this project which focused on establishment of SPA demonstration plots would enable the FD to establish more SPAs and also move on to a more advanced tree improvement programme using the results of the activities of this project. This would facilitate the FD to produce and use more improved seeds for their plantations thus, ensuring production of better quality timber for maintaining the reputation of their good quality teak.

3. Project Design and Organization

3.1. Project Design

This project was designed with the focus on involving the local community in the establishment and management of the SPA. Interested local community was mobilized and sensitized on the establishment and management of SPA and also on community development. An (IGG) was formed and project support was given to the group for their income generation activity. Eventually, the established SPAs were handed over to the IGG in usufruct basis and they were given the right to protect the SPA and also collect and sell teak seed freely. It is expected that this will ensure the sustainability of the SPA.

The project was also designed for future more sophisticated tree improvement activity. Provenance trials, plus trees selection, establishment of hedge gardens and micro and macro vegetative propagation of the species were all designed to upgrade the present

tree improvement work in the future. In order to produce more improved seedlings through micro-propagation, strengthening of the tissue culture was also included in the project.

3.2. Project Rationale

Myanmar has been establishing teak plantations systematically since 1896. The total area of plantations established within the period 1896 - 2007 is 2,238,337 acres out of which 948,784 acres or 42.4% is teak. However, supply of quality teak seeds is still lacking and a tree improvement programme is greatly needed. Most foresters in the FD agreed that a quick supply of quality seeds or quality seedlings is urgently needed for the plantation programme. The answer to this is the establishment of SPAs and collecting and using seeds from them. Other methods of obtaining quality seeds or seedlings may take time and demand high cost and expertise. This project therefore is focussed on the establishment of SPAs and at the same time preparation for a more sophisticated tree improvement programme, such as provenance trials, identification and selection of plus trees and establishment of hedge gardens.

3.3. Project Formulation

The idea of this project started since the establishment of the FRI in 1978. Two CSOs and SPAs were established by the East Pegu Yoma Project (EPP) in collaboration with FRI at that time. However, the tempo dropped with the termination of EPP. In 1996, the idea of starting tree improvement work with the establishment of SPA was again brought up, and up to 2006, a total of 7,923 acres of teak SPAs have been established. However, due to limitation in funds and lack of training of the staffs in the districts, the endeavor was not effective. The person who formulated this project was involved in this entire episode and thus has sufficient experience in formulating the project and its activities.

3.4. Project Structure

The project was implemented under the overall supervision of the Ministry of Forestry. A Project Steering Committee (PSC) was formed and the Executing Agency (EA) was the Forest Department, Ministry of Forestry. A Project Unit, comprising of National Consultants assisting the NPM in the technical aspects at all project sites. The Training and Research Programme Division (including CFDTTC), FRI and the 6 respective Forest Divisions undertook the role of project implementation.

The (PSC) was chaired by the Director General of the Planning and Statistic Department, Ministry of Forestry. This committee guided and monitored the implementation of the project. The structure of the PSC was as follows:

Director General, Planning and Statistic Department -----	Chairman
Representative from ITTO -----	Member
Representatives from the Embassy of the donor countries -----	Members
Director General, Forest Department -----	Member
Director, FRI, Forest Department -----	Member
Director, Planning and Statistics Division -----	Member
Director, Natural Forest and Plantation Division -----	Member
Director, Training & Research Development Division -----	Secretary
National Project Manager (NPM) -----	Joint-Secretary

Implementation of the project was closely evaluated and guided by the members of the PSC under the authorization given by the Chairman. As a person who has to take the overall responsibility of the project, the Director General of the Forest Department was also in close and continuous supervision and guidance to the NPM.

4. Project Implementation

4.1. Difference between Planned and Implementation

The differences between planned and implementation were:

- (1) The project site in Yangon (North) district was shifted to Thayawady district
- (2) As was instructed by the 1st PSC meeting, 2 clonal seed orchards (CSOs) that were not included in the project document, were established
- (3) National Consultant (Training, Research and Community Development) could be appointed only for 11 months out of the 24 months spelled out in the project document

a. Cost

The overall cost of the project was unchanged. There was no un-spent budget at the end of the project.

b. Schedules

The project was implemented as scheduled. Extension of the project was not needed.

c. Output Achievement

According to the project document, the project has 7 major outputs to achieve. All 7 outputs have been achieved with different magnitude. Details of the achievement are presented in part 6, The Synthesis of the Analysis.

4.2. Measures and Actions that could have Avoided these Variation

Out of the 6 project sites, the site at Yangon (North) district had to be shifted to

Thayawady district due to inaccessibility and unavailability of suitable teak plantations for conversion to SPA. Prior proper assessment of this site could have avoided this variation. Although not included in the project document, 2 CSOs were established in accordance to the guidance given at the 1st PSC meeting. As the PSC members considered this as necessary, this variation could not be avoided.

National Consultant (Training, Research and Community Development) resigned from his post to join another project. Thus, instead of 24 m/m, only 11 m/m could be utilized for this post. This variation also could not be avoided as suitable person to fill up this post was not available.

4.3. Appropriateness of the Assumption

Apart from the change in 1 project site and establishment of 2 CSOs, all assumptions pertaining to the implementation of the project was considered appropriate. All activities carried out to achieve the objectives have been implemented. Staffs of the FD at local level have been supportive and resources were made available to ensure successful implementation of the activities. National Consultants assisting the implementation of social and scientific activities have done their role effectively.

4.4. Project Sustainability

All field activities were carried out in cooperation and with the involvement of the local community. Local community also received training on SPA management and community development and support were given for their income generation activities. Moreover, the SPA was handed over to them on usufruct basis and they have the right to protect, collect and sell the teak seeds from the SPA for their benefit. This approach would certainly ensure the sustainability of the project.

4.5. Appropriateness of Project Inputs

The project inputs, both in quantity and quality are considered sufficient and satisfactory. Appropriate budgeting and timely disbursement has been identified as critical for the smooth implementation of the project. One of the important inputs contributing to the success of the project was the recruitment of qualified national consultants, technical and administrative staffs. Their skill and dedication have been useful in the project implementation.

5. Project Results

5.1. Situation Existing at Project Completion

One of the most significant achievements of the project was the successful establishment of 6 model SPAs in 6 forest districts scattered all over the country. The involve-

ment of the local community in this activity would make them see the benefit that they can reap out of collecting and selling improved teak seeds at a much higher price than those collected on ad hoc basis. Such combination can be used as a model in other areas where production SPAs have been planned to be established by the FD.

Provenance trials, CSOs, and hedge gardens that were implemented by the project and selected plus trees selected by the project can be used for future more advanced tree improvement programme of the FD.

5.2. Achievement of the Specific Objectives

The 2 Specific Objectives of the project, i.e. (1) To establish SPA and initiate activities for the establishment of Seed Orchards for production of high quality seed and (2) To strengthen the tissue culture laboratory and produce high quality clonal plantlets through tissue culture and shoot cutting from hedge garden, have been achieved with high level of success.

A total of 150 acres of SPAs have been established with local IGG formed in each of the project site. The tissue culture laboratory at CFDTTC was strengthened and provenance trials, CSOs and hedge gardens established. Moreover, 103 plus trees have been selected both for present and future tree improvement programme.

5.3. Impact of the Project Results on the Sectoral Programme, Physical and Social Environment and Target Beneficiaries

The project results would certainly have some important impact on the Sectoral programme but needs time to observe the Government policy. The project most significant impact is on the physical and social environment and the target beneficiaries. The presence of SPAs for collection of improved teak seeds for sale would have significant impacts on the local community.

5.4. Project Sustainability

The specific objectives, outputs and activities of this project were designed to address the issue of urgent availability of improved teak seed through establishment of SPAs for the plantation programme of the Forest Department and at the same time to make preparation for a more advanced tree improvement programme. Recognition of the Forest Department and acceptance by the community of the benefit of the project outputs are the two important elements for sustainability.

Sustainability is secured at the community level as the local community was involved in all the activities of establishment of SPA, and teak seed collected from the SPA would benefit them. Moreover, they have expressed their commitment to maintain the SPAs and this would provide the much needed security assurance that the SPAs would not be disturbed.

6. Synthesis of the Analysis

6.1. Specific Objective I

Logical Framework Worksheet

PROJECT ELEMENTS	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Development Objective</p> <p>To enhance the economy of the country through sustainable production and export of high quality teak by using good quality seed for planting</p>	<p>The economy of the country is enhanced through production and export of 220,000 tons high quality teak logs.</p>	<p>Statistical year book, Myanamar.</p> <p>Annual reports of the Ministry of Forestry.</p>	<p>Local community gets economic benefit through selling teak seed from SPA.</p> <p>Continued participation of the local community in protection of the SPAs.</p> <p>Forest Department will be able to produce good quality teak timber from plantations.</p>
<p>Specific Objective 1.</p> <p>To establish Seed Production Areas (SPA) and initiate activities for the establishment of Seed Orchards for production of high quality seed.</p>	<p>An increase in about 1,000 kg/year of good quality teak seeds for planting, and economic benefit to the local community.</p> <p>About 10 acres of Provenance trials established, and high quality teak plantlets in production as required for planting.</p>	<p>Forest Department statistics.</p> <p>Progress reports.</p> <p>Technical reports by FRI.</p> <p>Project terminal report.</p>	<p>Forest Department staff will get better idea on the establishment of SPA and tree improvement work.</p> <p>Good quality seed will be available in sufficient quantity for the Special Teak Plantation Programme.</p> <p>It is a good starting ground for more future sophisticated tree improvement programme.</p>

<p>Output 1.1</p> <p>A total of 150 acres of SPA established at Shwebo, Nay Pyi Taw, Gangaw, Pyay, Thayawady & Hinthada districts.</p>	<p>Three SPAs (75 acres) established by the end of year 1 and another 3 (75 acres) by the end of year 2.</p>	<p>Forest Department statistics.</p> <p>Progress reports.</p> <p>Project terminal report.</p>	<p>Good teak plantations will be available for conversion into SPA.</p> <p>Forest Department will use these SPAs as demonstration plots also.</p>
<p>Output 1.2</p> <p>Provenance trials, a hedge garden and a nursery established.</p>	<p>About 10 acres Provenance trials established by the end of year 3.</p> <p>A hedge garden containing 50 clones and a nursery established by the end of year 2.</p>	<p>Technical reports by FRI and CFDTC.</p> <p>Progress reports.</p> <p>Project terminal report.</p>	<p>Results of the provenance trials will be used for future tree improvement programme.</p> <p>More good quality vegetatively reproduced teak plantlets will be used for plantation programme.</p>
<p>Output 1.3</p> <p>Trainings, seminars, workshops and study tours organized and implemented.</p>	<p>Training on SPA establishment, maintenance and seed handling completed by the end of year 1.</p> <p>Workshops on SPA establishment and seminar on tree improvement convened in year 2 and 3 respectively.</p> <p>In-country study tours for 6 centres, and study tour abroad both for staff of FD and communities implemented in year 2 and 3.</p>	<p>Training materials.</p> <p>Workshop proceedings.</p> <p>Progress reports.</p> <p>Project terminal report.</p>	<p>Qualified instructors will be available.</p> <p>Capacity of the staffs of Forest Department and the community will be enhanced.</p> <p>Awareness on the importance of tree improvement is fully raised.</p> <p>Better participation by the local community.</p>

<p>Output 1.4 Capacity of the local community in the management of SPA enhanced and their livelihood improved</p>	<p>Community will appreciate and will be able to maintain, protect, collect, handle and distribute seed more efficiently. The livelihood of the community will be improved.</p>	<p>More and physiologically better seeds will be available. Progress reports. The livelihood of the local community improved</p>	<p>The awareness of the community on the need for quality seed and their capacity to handle seed will be enhanced. Forest Department will get more high quality teak seeds for the Special Teak Plantation Programme. The livelihood of the local community will be alleviated.</p>
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Implementation

Project Element	Indicators	Project Achievement	Schedule	Expenditure	Potential for replication	Potential for Scaling up
Specific Objective 1	To establish Seed Production Areas and initiate activities for the establishment of Seed orchards for production of high quality seed	Realised	On time	As planned	Good potential for replication	Good potential
Output 1.1	A total of 150 acres of SPA established at Shwebo, Pynmana, Gangaw, Pyay, Thawady and Hinthada districts	A total of 150 acres of 6 SPAs at 6 project sites were established.	On time	As planned	Good potential for replication	Good potential
Output 1.2	Provenance trials, hedge gardens and a nursery established	2 provenance trials, 2 hedge gardens and 2 nurseries were established	On time	As planned	Good potential for replication	Good potential
Output 1.3	Trainings, Workshops and study tours organized and implemented	Trainings, Seminar and study tours were organized and implemented	On time	As planned	Good potential for replication	Good potential
Output 1.4	Capacity of the local community in the management of SPA enhanced and their livelihood sustained and improved	6-IGGs were formed with local community. Trainings together with project support were given	On time	As planned	Good potential for replication	Good potential

Comments

This specific objective has been successfully achieved as indicated by the achievement of all indicators. A total of 150 acres of SPAs established at 6 project sites as planned.

2 provenance trials, 2 hedge gardens and 2 nurseries were established. Additionally, 2 CSOs were also established as was instructed in the 1st. PSC meeting,

6-Income generation groups were formed with the local community from the project sites. Their capacity in the management of SPA, other related subjects and community development were enhanced through training and study tours. Project supports were also given to boost up their IG activities.

6.2. Specific Objective II

Logical Framework Matrix

PROJECT ELEMENTS	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Specific Objective 2</p> <p>To strengthen the tissue culture laboratory and produce high quality clonal plantlets.</p>	<p>Vegetatively reproduced high quality teak plantlets in production for planting at the end of the project period.</p>	<p>Forest Department statistics. Progress reports. Project terminal report.</p>	<p>More Forestry staffs will be trained and gain experience in tissue culture work.</p>
<p>Output 2.1</p> <p>Tissue culture laboratory strengthened.</p>	<p>Full fledge tissue culture laboratory in operation by the end of the project.</p>	<p>Technical report by CFDTC. Progress reports. Project terminal report.</p>	<p>Continuing support from the Forest Department for this activity.</p>
<p>Output 2.2</p> <p>High quality vegetatively propagated plantlets in production from tissue culture and hedge garden.</p>	<p>Vegetatively propagated plantlets produced for planting by the end of year 3.</p>	<p>Forest Department statistics. Progress reports. Project terminal report.</p>	<p>Tissue cultured plantlets of other commercial species also produced.</p>
<p>Output 2.3</p> <p>Training and seminars organized and convened.</p>	<p>Training on tissue culture and hedge garden completed by the end of year 1. One seminar on tissue culture & hedge garden convened by the end of year 2 and another on tree breeding at the end of year 3.</p>	<p>Training materials. Seminar proceedings. Progress reports. Project terminal report.</p>	<p>Qualified instructors will be available. More Forest Department staffs will be trained in tissue culture technique and be able to participate in the activity. Awareness, on the importance of tissue culture in tree improvement programme, will be raised.</p>

Project Element	Indicators	Project Achievement	Schedule	Expenditure	Potential for replication	Potential for Scaling up
Specific Objective 2	To strengthen the Tissue Culture Laboratory and produce high quality plantlets through tissue culture and shoot cuttings from hedge garden	Realized	On time	Slightly over-used due to rise in price of equipment & chemicals	Modest potential	Modest potential
Output 2.1	Tissue Culture Laboratory strengthened	Strengthened with equipments chemical and capacity of the staff	On time	Slightly over- used due to rise in price of equipment & chemicals	Modest potential	Modest potential
Output 2.2	High quality vegetatively propagated plantlets in production from tissue culture and hedge garden	High quality vegetatively propagated plantlets in production both from tissue culture and hedge garden	On time	As planned	Good potential	Good potential
Output 2.3	Training and seminars organized and convened	1 local training, 2 overseas training and 1 seminar were organized and convened	On time	As planned	Good potential	Good potential

Comments

This objective was also achieved with great success. The tissue culture laboratory was strengthened both structurally as well as in term of equipment and chemicals. The capacity of the staff of the laboratory was also enhanced through training given abroad as well as locally by national and international consultants.

Apart from enhancing the capacity of the staff of the tissue culture laboratory, development of techniques for budding, grafting, planting shoot cuttings by the nursery staff were of great benefit. High quality vegetatively propagated plantlets are now in production and is being distributed for establishment of hedge gardens by interested private teak growers.

7. Conclusion and Recommendation

7.1. Development Lessons

The issues that were spelled out in this project document were of great significance to the *Ex-situ* and *In-situ* conservation of teak as well as to the establishment of quality teak plantations by the FD. The need for tree improvement has been debated for decades but was never put into operational consideration. This lack of interest was mainly due to the over confidence on the production of quality teak from the natural forests and lack of long sightedness and qualified human resources. Now, the production of quality teak from the natural forests is almost exhausted and it is time to supplement its production with quality plantation teak. Therefore, tree improvement programme for production of quality seedlings and plantlets for planting is inevitable.

The well established SPAs demonstration plots, provenance trials, hedge gardens and the strengthened tissue culture laboratory together with the selected 103 plus trees would be an important achievement of this project. It is envisaged that this would encourage the FD and the private entrepreneurs who are planting teak to adopt the outputs of the project in their planting programme.

7.2. Operational Lessons

The Assistant Director (AD) of Forest Research Institute (FRI) was assigned as a National Project Manager (NPM) for the project. Normally, a Director, who has many responsibilities, is appointed as NPM. The advantage of having an AD as a young NPM is that he has lesser other responsibilities of the Department than the Director. Consequently, he can concentrate better on the project and can participate more in the field operations.

Other members of the project were also young people. The involvement in the project provided them the opportunity to learn and experience implementing international standard of forest operations and research work. The success of the project may therefore be attributed to good planning, monitoring and evaluation, professional management, and good team work and enthusiasm of the project team.

7.2.1 Project Organization and Management

A project unit, comprising of National Consultants to assist the NPM was the main implementing unit. This implementing unit was guided by the PSC and the EA that was the FD. The PSC held its meeting once a year and is mainly responsible for approval of the project's annual plan of operation, budgets, annual evaluation and review of project implementation, and approve progress reports prior to submission to the ITTO and Government of Myanmar (GOM).

7.2.2 Project Documentation

Project activities were documented by MOU, Work Plan, Annual Report, Training Report, Proceedings, etc. In this project, Training Reports, Seminar Proceedings, Technical Guidelines, and Technical Papers were also documented on CD for easy reference. These documents are envisaged to be of value and helpful not only for the project personnel, but also for those who seek to know the results of the project for application in the field.

7.2.3 Monitoring and Evaluation

Bi-annual progress reports of the project that are made available to ITTO served as monitoring of the project, as they contain information on project performance for each activity and completed output. Annual monitoring and evaluation were also carried out by the PSC meeting. However, detailed monitoring and evaluation were carried out by the NPM, National Consultants and the project staffs during the frequent field visits to the project sites. This included both the field operations and community development activities that were sub-contracted to FREDa and EcoDev. Activities such as establishment of hedge gardens, provenance trials and CSOs were implemented directly by the project staffs under the close supervision of the NPM and the National Consultant. Mobilizing the district Forestry staff as part time project staff improved communication between the project staff and the township Forestry staff. This, in a way, also served as monitoring and evaluating the field activities of the project.

7.2.4 Roles and Responsibilities

Description of the roles and responsibilities of each unit within the project organization structure is critical for the successful implementation of the project. As described in the work plan, each unit namely ITTO, PSC, Project Management Team (PMT) and the 6 District Forest Offices have specific role and responsibility.

7.2.5 Controls over Plan and Implementation

Regular meeting of PSC and PMT as means of control over plan and implementation is critical. The diverse locations and type of work of the project certainly requires certain controls to avoid mistakes and difficulties. The Yearly Plan of Operation is very effective as general guidelines of control and monitoring of the budget and expenditure by external auditor also is very important.

7.2.6 Foreseen External Factors

Field activities of the project were scattered very widely over the country and encompass various climatic conditions. Great distance had to be traveled to reach the project sites and accessibility is poor in some project sites. The success of the project can be attributed to the effort and determination of the project field units and the support of the local community and the staff of the Township Forest Office.

Lack of experience in tissue culture had some effect on the ability to produce high quality plantlets to the expected extent.

7.2.7 Unforeseen External Factors

Production of high quality tissue cultured plantlets was low and was not up to the expected extent. However, this did not affect the overall target of the project as there were enough plantlets for field activities. With more experience, the rate of contamination can be reduced and more plantlets can be produced for distribution.

7.3. Recommendations for Future Projects

7.3.1 Identification

Identification of problems to be addressed is of critical importance for the success of a project. The tree-problem as described in the ITTO Manual for Formulation of Project Proposal is a very useful tool for identifying and formulating the problems. Accurate identification of problems will help to determine the activities and output to be achieved.

7.3.2 Design

Project design relates to the type of problems to be addressed. Sound scientific judgment is needed to develop appropriate project design. The availability of resources should also be put into consideration so as to ensure that the activities would be completed within a specified time and budget.

7.3.3 Implementation

Well-designed and well-planned project should bring smooth implementation of the project activities. Detection of any potential problems that may hinder the implementation of the activities of the project, through close and frequent monitoring is also very important.

7.3.4 Organization

The organization structure of the project has been very effective in ensuring that all activities were planned and implemented accordingly. The formation of executive bodies such as PSC and EA has been very useful in obtaining policy support from related Government Institutions.

7.3.5 Management

Regular meeting, consultation, field visit, reporting and publication are among the management aspects that received highest priority by the PMT.

Person responsible for the report

Name : Dr. Nyi Nyi Kyaw

Position held : National Project Manager

Date 30 June 2009

Signature :

A handwritten signature in black ink, appearing to be 'Nyi Nyi Kyaw', with a long horizontal stroke extending to the right.



PROJECT COMPLETION REPORT

1 April 2006 - 31 March 2009