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## **Ex-post Evaluation Report**

**PD 270/04 Rev.2 (F)**

**EX-SITU AND IN-SITU CONSERVATION OF TEAK**

**(TECTONA GRANDIS L.F.)**

**TO SUPPORT SUSTAINABLE FOREST MANAGEMENT**

**Prepared for ITTO**

**By**

**Dr. Yazar Minn**

**Dr. Reinhold Glauner**

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## Abbreviations

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ac	acre, 0.405 ha
CFDTC	Central Forestry Development Training Centre
dbh	Diameter breast height (tree stem diameter at 1.3m above ground)
FD	Forest Department
FRI	Forest Research Institute
ha	hectare, area 100 x 100 m
ITTA	International Tropical Timber Agreement
ITTO	International Tropical Timber Organization
MAI	Mean annual increment
MFCC	Myanmar Forest Certification Committee
MoV	Means of verification
MYK	Myanmar Kyat
PD	Project Document
PTS	Plus Tree Selection
SPA	Seed Production Area
USD	United States Dollar

## Executive summary

An ex-post evaluation was carried out of a project focusing on ex- and in-situ conservation of Teak in Myanmar. This Overall Executive Summary draws on the reports prepared following the project and on an on-site inspection seven years after project completion. A particular focus of the evaluation was to assess

1. *The overall role and contribution of the project in light of sectoral policies, development programmes, priorities and requirements to promoting the production of high quality teak through its genetic improvement in order to support sustainable forest management in Myanmar;*
2. *The current status of teak genetic resources improvement within the project's area of influence, the effectiveness of the project's implementation and its effectiveness in promoting teak genetic resources conservation and sustainable management practices of teak forest;*
3. *The contributions of the specific studies in various forestry-related disciplines prepared by the project as regards the achievement of establishing teak seed orchards for production of high quality seed,*

and to derive recommendations for future (similar) projects for ITTO and the related guidelines.

The project operated along two specific objectives, concentrating on 1) seed production areas (SPAs) and 2) the establishment of a tissue culture lab with associated hedge gardens. During a project duration of three years (April 2006 – March 2009) all planned work was implemented very successfully. Surprisingly to the very technical objectives, "local communities" were mentioned as first project beneficiaries besides the technical staff of Forest Department and Forest Research Institute. These communities however, were also regarded as (the only mentioned) risk factors.

The project produced five technical reports and a completion report. The latter summarized that "all desired project outputs were achieved, which led to concluding it as 'major success'".

The field visit revealed two major findings, i.e.

- After seven years since completion of the project, technically the project results still exist in form of research plots, laboratories, hedge gardens, and knowledge;
- Institutionally the achievements are somewhat inadequate, as they were not taken over into practical forestry (e.g. community reforestation approaches) or found their way into forest policy (the forest policy of Myanmar is currently under revision).

Moreover, the field assessment led to a number of recommendations for reviewing and revising the criteria for SPAs, plus trees, and reforestation guidelines management. The conclusions for ITTO were that similar project interventions, where communities are amongst the beneficiaries, need special attention by social forestry approaches in contrary to technical approaches. This should already be considered during the planning phase as to provide the required competencies and expertise on social forestry. Only with this expertise the project can be appropriately scaled and achieve sustainable results

Additionally, safeguards and hard indicators are required in Project plans. They need to include specific provisions and project activities, in order to ensure that results find their way into national forest policy development, and thus increase lasting impact in the land-use sector. Therefore it would be recommended to include the private sector, timber industries, and community representatives into the project steering committee.

The evaluation also revealed a number of technical recommendations for the executing and implementing agencies of the former project, as sustainability for some aspects are under risk. The proposals include the integration of project outputs into forest policies and work in closer ties with forest industries and other private sector. Additionally, it would be worthwhile to critically review and redraft some technical guidelines and manuals in the light of recent developments, such as infestation of teak trees with pests or the requirement of sawmills for shorter and bigger logs. The latter may lead to a complete review of the « plus tree concept ». This in turn is required for commercial appraisals of stands and for price development of seeds.

# 1 Introduction

ITTO is an intergovernmental organization established in 1986 to administer the provisions and operation of the International Tropical Timber Agreement (ITTA), particularly in the promotion of the conservation and sustainable management, use and trade of tropical forest resources through international cooperation, policy work and project activities. To that end ITTO proposed that one project should be the subject of an in-depth Ex-post Evaluation. The project, "Ex-Situ and In-Situ Conservation of Teak (*Tectona grandis* L. F.) to Support Sustainable Forest" [PD 270/04 Rev.2 (F)] was selected. The original project idea arose from the recognition of the need for sufficient supply of high quality seed of selected origin for the teak plantation programme in Myanmar. In order to support the production from the natural forests and to assure sustainable forest development, the Forest Department (FD) of Myanmar implemented the project between 2006 and 2009. The contributions amounted to USD 475,000 from ITTO and MKY 50 Million in-kind from the Government of Myanmar.

The project was implemented in ten townships, i.e. Mawbe, Pynmana, Paukkaung, Pyay, Nattalin, Kyauktaga, Oktwin, Myan Aung, Saw and Kantbalu townships in six divisions (Sagaing, Mandalay, Magway, Bago, Yangon, Ayeyawady). The project was intended as a preparation to a more sophisticated tree improvement programme, identification of plus trees, collection of seeds and clones for provenance trial and establishment of hedge gardens. The tissue culture laboratory was also strengthened for production of superior plantlets. The project also aimed at the participation of the local community through community development, sensitization, capacity development, workshops and study tours. It was expected that after completion of the project, large quantities of high quality seed would be available from the SPAs (seed production areas) for various plantation programmes in the country. At the same time, the local communities should also benefit (e.g. contracts, jobs providing monetary income) by collecting seeds from these SPAs and selling them back to the FD.

The SPAs were established at 6 different locations throughout the country. A total of 60.7 ha SPA area was established through conversion of selected teak plantations in Paukkaung (plantation established in originally 1973), Nattalin (plantation established in originally 1991), Saw (plantation established in originally in 1983), Myan Aung (plantation established in originally in 1983), Kanbalu (plantations established in originally 1967), and Pynmana (plantations established in originally 1966 and 1984). Conversion to SPA took place through thinnings. The provenance trials were established in Kyauktaga (1.1 ha with 9 provenances) and Pynmana (1.143 ha and 8 provenances). Additionally, two hedge gardens, located in Pynmana (at FRI 0.095 ha, 22 clones) and Oktwin (1.18 ha, 89 clones). The two nurseries that came with the project are located in Pynmana (at FRI) Mawbe (at CFDTTC). Planting stock trial was established in Pynmana, using five different types of planting stocks such as grafting, shoot cutting, seedling, tissue culture and stump. Tissue culture lab in CFDTTC, Mawbe, Yangon was upgraded during the project.

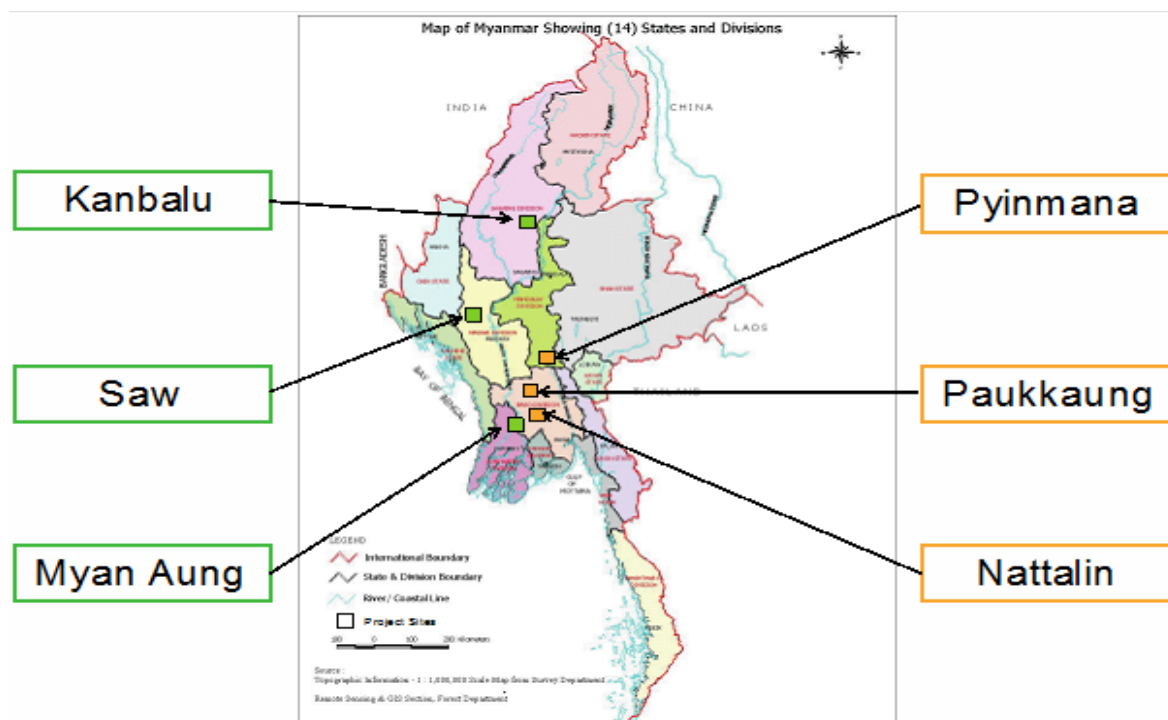


Figure 1: Project Sites

Today the FD is fully aware of the need for tree improvement and systematic collection of quality seed for the establishment of teak plantations. Despite the current temporary logging ban, Myanmar aims at maintaining its market for quality teak and downstream products. It entered into serious efforts in controlling harvesting to ensure legality of timber and commenced with plans for timber certification.

## 2 Evaluation scope, focus, and approach

The project document for the project bearing the title “Ex-situ and in-situ conservation of teak (*Tectona grandis* L.F.) to support sustainable forest management” (in the following “the project”), outlines the logical frameworks including the development objectives as follows:

- To promote the production of high quality teak through its genetic improvement in order to support sustainable forest management in Myanmar;
- To enhance the economy of the country through sustainable production and export of high quality teak by using good quality seed for planting. The project will be in support of increased timber production, particularly teak, so that internationally, trades of high quality tropical timber would be sustained and enhanced for the benefits of both producer and consumer member countries of ITTO.

The project document defines high quality teak as “dominant teak trees with good growth, long straight bole with good form, straight grain, circular in cross section, limited outing and buttressing, branching character true to form and not competing with the main axis.” To this end, the two Specific Project Objectives are as follows:

- To establish Seed Production Areas (SPA) and initiate activities for the establishment of Seed Orchards for production of high quality seed;
- To strengthen the Tissue Culture Laboratory and produce high quality plantlets through tissue culture and shoot cutting from hedge gardens.

Overall, the project should contribute to minimizing the extreme shortage of teak seed supply in the country to better meet its ambitious reforestation programme. Reforestation was mainly carried out with seeds from unspecified seed sources from “nearby” (to the planting site) forest areas.

The present ex-post evaluation of project 270/04 is carried out seven years after project completion with the following scope:

### a) Analyse and assess for the project:

1. The overall role and contribution of the project in light of sectoral policies, development programmes, priorities and requirements to promoting the production of high quality teak through its genetic improvement in order to support sustainable forest management in Myanmar.
2. The current status of teak genetic resources improvement within the project’s area of influence, the effectiveness of the project’s implementation and its effectiveness in promoting teak genetic resources conservation and sustainable management practices of teak forests.
3. The contributions of the specific studies in various forestry-related disciplines prepared by the project as regards the achievement of establishing teak seed orchards for production of high quality seed and strengthening the tissue culture laboratory to produce high quality clonal plantlets in the project’s area of influence.
4. The results and impacts of activities conducted by the project and its contribution to the overall capacity of target groups in teak genetic resources improvement.
5. The effectiveness of dissemination of project results.
6. The overall post-project situation in the project’s area of influence.
7. The unexpected effects and impacts, either harmful or beneficial, and the reasons for their occurrences.
8. The cost efficiency in the implementation of the project, including the technical, financial and managerial aspects.
9. Follow-up actions in order to enhance uptake of project results.
10. The project’s relative success or failure, including a summary of the key lessons learnt; and the identification of any issues or problems that should be taken into account in designing and implementing similar projects in the future.

### b) Provide a synthesis to:

1. Assess the overall role and meaningful contribution of the project in achieving teak genetic resources improvement in Myanmar, taking into account ITTO’s objectives and Action Plan

2. Evaluate the overall impact on and relevance of the project for the Executing Agency, the forest industry and conservation sector and local communities concerned.
3. Evaluate the overall attainment of the objectives and assess the overall effectiveness of the project.
4. Evaluate the overall appropriateness of the costs and cost structure and use of resources within the project.

c) Make recommendations on:

1. The needs for similar projects in the future.
2. The objectives of such future projects.
3. Innovative approaches/designs for projects aiming at teak genetic resources improvement in promoting SFM.
4. Appropriate target groups, e.g. countries, government, organizations, forestry sector, local communities, etc.
5. The organizational arrangements of similar projects.
6. Follow-up and evaluation practices.
7. Supplemental, alternative activities, processes, procedures, and/or follow-up programs in the field of teak genetic resources improvement and sustainable management of teak forests, if appropriate.

### 3 Project facts

#### 3.1 General

Project title:	Ex-Situ and In-Situ Conservation of Teak ( <i>Tectona grandis</i> L. F.) to Support Sustainable Forest
Project No.	PD 270/04 Rev.2 (F)
Host government:	Government of Myanmar
Executing agency:	Forest Department of Myanmar
Committee:	Reforestation and forest management
Submitted by:	Government of Myanmar
Cooperation governments:	./.
Project duration:	36 months 01 April 2006 – 31 March 2009
Financial contribution:	ITTO : USD 474,941 Government of Myanmar : MKY 9,270,800 (in kind)
Reports:	<ul style="list-style-type: none"><li>○ Proceeding on Teak Seed Production Area Management &amp; Tree Improvement</li><li>○ Report of national consultant</li><li>○ Report on training course on molecular biotechnological techniques in tree improvement at Kerala Forest Research Institute, India</li><li>○ Report on Study Tour</li><li>○ The Second Technical Report of International Consultation on Tree Improvement</li></ul>
Completion report:	Project Completion Report e (dt. 30 June 2009)
Identified core problem:	Reduction in quality seed stock in the natural teak forests



### Problem – Tree

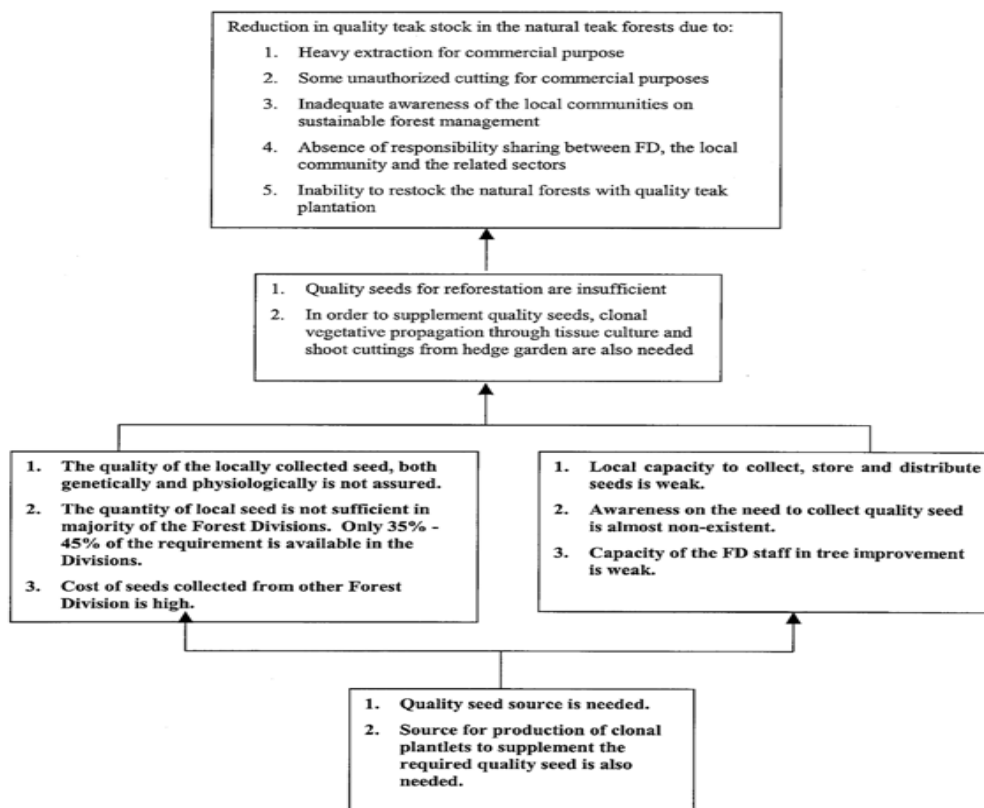


Figure 2: Problem tree of the project document

Intended situation after completion:

- 1) Teak SPAs will be established for seed collection, and demonstration for further multiplication.
- 2) Tissue culture laboratory will be strengthened and tissue cultured plantlets will be in production.
- 3) Hedge Garden, a nursery and provenance trial plots will be established for the production of quality plantlets and as a preparation for further establishment of Seed Orchard.
- 4) Capacity of the local communities will be enhanced, and their participation in the tending and protection of the SPAs will be achieved.
- 5) Capacity of the staff of the Forest Department and FRI will be enhanced especially in the fields of seed handling techniques, tree improvement and community development.

Target beneficiaries:

Local communities, FRI, CFDTTC, FD

Project risks:

Participation of communities

Completion report:

All desired project output achieved; major success

## 3.2 Logical Framework

The project operated along a development objective (Chap. 2), two specific objectives (results), and seven (4 for result 1 and 3 for result 2) outputs (complete details in Table 1 in Chap. 6.3):

Development Objective :

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

### Specific Objective 1

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

- Output 1.1:* A total of 150 acres of SPA established at Shwebo, Yamethin, Gangaw, Pyay, Yangon (North) and Hinthada districts.
- Output 1.2:* Provenance trials, hedge gardens and a nursery established.
- Output 1.3:* Trainings, workshops and study tours organized and implemented.
- Output 1.4:* Capacity of the local community in the management of SPA enhanced and their livelihood sustained and improved.

### Specific Objective 2

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

- Output 2.1:* Tissue Culture Laboratory strengthened.
- Output 2.2:* High quality vegetatively propagated plantlets in production from tissue culture and hedge garden.
- Output 2.3:* Training and seminars organized and convened.

Further detailed planning was carried out through proposed 14 activities, described in Chap.7.4. All objectives, outputs, and activities have been formulated largely in technical and physical terms with less emphasis on outreach and policy development, which at the time of project implementation was not intended.

## **4 Findings, Lessons Learned**

### **4.1 Generating the findings**

During our field trip, we visited all project sites and had interviews with three communities collecting seeds from SPAs (two formerly engaged in the project). Meetings were held with the Myanmar Forest Certification Committee (MFCC) and the timber industries. Moreover, community forestry projects were visited and discussions with community representatives were carried out. Thus, our findings are based on a large number of visual inspections and discussions with the targeted beneficiaries. We would like to group our findings according to topics, in order to cover the range of issues evaluated as outlined in Chap 3.

#### **4.1.1 Sustainability of project results**

Seven years after project completion practically all project plots (SPAs, provenance trials, conservation plots, hedge gardens) still exist and are properly maintained. One plot on a very inaccessible and untypical site, however, lacked maintenance (Pinyinmana).

However, some plots – although well maintained – do not serve its originally planned purpose any more (e.g. SPA 25AC). Due to the thinning operations, growing stock is very low, tree quality at maximum “average” and seed production is very limited. For the latter reason, the community responsible for plot management, protection, and seed collection discontinued the activities there. Instead, FD took over maintenance.

During the project phase the following plots were established:

- SPAs in Shwebo, Nay Pyi Taw, Gangaw, Pyay, Thayawady and Hinthada Districts;
- Hedge gardens at Forest Research Institute (FRI), Yezin, Pinyinmana Township (0.1 acres, 131 ramets with 22 clones) and at Letpankon, Oaktwin (2.7 acres, 932 ramets with 89 clones);
- Provenance trials in Ngalaik Reserve, Pinyinmana Township (2.8 acres, 8 provenances) and at Yenwe Reserve, Kyauk- taga Township (3.2 acres, 9 provenances);
- Nurseries at FRI, Yezin and at CFDTTC, Hmawbi.

Thus, the project achieved technically sustainable results. Most plots will be further used in future (hedge gardens, SPA, nurseries) or their objectives will be changed (provenance trials might be transformed to SPAs). Capacity building was successful after project completion and capacities are still within FD, as no major staff reshuffle took place.

## 4.1.2 Project title and indicators

We find the first part of the project title very clear, however the annexed "... to support sustainable forest management" only vaguely suggest which intentions are behind the conservation approach. Consequently, no indicator within the logical framework specifies any connection to sustainable forest management but restricts itself to seed production areas, provenance trials, study tours, and communities. The related indicators are formulated in more general terms and thus are difficult to monitor (e.g. ... livelihood improved ...). Means of verifications (MoV) are missing by simply repeating the indicator. Moreover, the development objective is only very loosely connected to gene conservation, as its indicator specifies « economy of the project is enhanced through production and export of 220,000 tons of high quality teak logs. » We appreciate the connection of conservation to economic indicators. However, based on experience of other countries, a long-term development objective should not contain a quantitative statement of round wood export. The statement should have expressed the intention to support the (local) industries with logs for downstream processing, as this creates the higher value generation « in country ». The current temporary log export ban clearly shows that the formulation of an indicators towards this end, would have been much more realistic.

## 4.1.3 Project framework

The project was formulated in very technical terms and consequently all results are worded equally focussed. A reference to forest policy development was not intended and is considered a major shortcoming today. The SPAs and gene conservation areas are not integrated into wider reforestation or SFM approaches. In practically all afforestation sites that we visited, the responsible officers could not indicate which of the afforestation sites were established from seeds from SPAs or from "seeds from forests nearby". To this end, the project produced good research results, but lacks application including impact monitoring by FD.

## 4.1.4 Project focus

We indicated earlier that both project title and indicators were technically formulated towards achieving the first part of the project, i.e. Ex-situ and in-situ conservation of teak. This resulted in a missing link to forest policy and consequently to links to sustainable forest management and community integration. The project thus produced excellent technical results. However, there are shortcomings in the application of the results in the institutional and socio-economic environment in the country.

## 4.1.5 Site selection

The establishment of SPAs, hedge gardens, etc. for gene conservation is a long-term undertaking. SPAs, once successfully established, may grow older than 60 years. Plots established on agriculture land are under permanent pressure to agricultural conversion and might lose their function over time through continuous degradation. Moreover, some plots were established on land suitable for rice cultivation and thus produce untypical results for afforestation sites of typical teak forest areas (slopes). However, not more than two to three plots will be affected.

## 4.1.6 Plot silviculture

As already mentioned all plots were silviculturally treated and are well maintained. However, we found that sometimes a clear silvicultural objective is missing. The Proceedings with the final project findings<sup>1</sup> produced two very good technical chapters on how to manage the SPAs (Title: Time for conserving Myanmar teak & Plus tree selection for tree improvement of teak). The measuring parts of these prescriptions for collecting the relevant stand data are implemented; however, subsequent analytical work is lacking. Data on tree height, diameters, etc. could be produced quickly and accurately. Information on mean or current increment, basal area however, was not available. This lack of analytical data processing leads to unfocused plot management. The selection of plus trees may serve as an example. The detailed technical prescription of tree selection is available. It is perfectly implemented in the field and all plus trees are measured annually at permanently marked measuring points (diameter at breast height, dbh). However, due to the lack of re-evaluation of the tree selection through e.g. individual tree growth, the factor "yield" is not a long-term selection criterion. During visual inspection of plus trees, the authors were of the opinion that the plus trees are perfectly shaped, however lack behind in growth compared to surrounding trees. This observation,

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<sup>1</sup> FRI, 2008: Proceeding on Teak Seed Production Area Management & Tree Improvement. FD Myanmar and ITTO.

however, needs to be confirmed by a sufficient large quantity of monitoring data. Moreover, the criterion “tree height” or “bole length” respectively needs to be carefully evaluated against today’s industry preferences. Besides the fact that hauling is done with shorter lengths (6-8 m) the industry prefers shorter stems. Clear boles of 8 m are thus not necessarily a plus tree parameter any more – all selected plus trees had 15+ m clear bole height.

Though attributes such as tree health, pests, and others are not collected they do play an increasing role in forest management of teak forests. Particular mistletoe fig infestations pose a serious problem to tree vitality in some areas and middle-aged stand may show very high mortality rates after infestation (up to ~ 60%).

#### **4.1.7 Practical application of results**

We mentioned earlier in our assessment, the lack of embedding tree improvement into a forest policy and institutional framework, some important project findings and results are not reflected in practical forest management in the country. Without repeating the said, we would like to present these findings as concise listing rather than extensive descriptions:

- In teak plantation establishment no distinction has been made between seeds/seedlings from SPAs or clonal propagation as compared to natural origins (stands “nearby”);
- Growth performance indicators (MAI) are lacking in SPAs and sites established with natural seed origins;
- Cloned or vegetatively propagated material is not systematically tested in plantation areas;
- The criteria of SPA or Plus Tree Selection are not periodically re-evaluated; and
- As some results are not yet available, e.g. from provenance trials, the anticipated scaling-up of project results has not been implemented.

#### **4.1.8 Teak tissue culture laboratory**

A major support input of the project was to strengthen the tissue culture lab of the Central Forestry Development Training Centre. This has been done through on-site training and by sending staff to Kerala, India. However, since project termination FRI has established a similar tissue culture lab. The evaluation mission acknowledges the fact that tissue culture is important. However, for a country like Myanmar, it might be necessary to revisit this issue and decide to only maintain one lab, particularly in times when resources are scarce and knowledge needs to be bundled.

#### **4.1.9 Project documentation and publications**

All project results are well documented and reports are accessible via the ITTO website. However, follow-up assessments of SPA’s have not yet been published. There are two reasons for this: a) some results (e.g. provenance trials) need a certain time span, before an assessment makes sense, and: b) the necessity for data processing and publication was not regarded as essential or necessary. Reason a): data from provenance trials have been collected, are currently being processed, and a publication is planned. Reason b) this was discussed extensively in the field, and a recommendation was given during the field trip and in this report to follow-up inventories of SPAs.

#### **4.1.10 Project impact**

By design, the project was planned to produce primarily long-term impacts, i.e. ex- and in-situ gene conservation of teak, through short-term measures. Towards this end, the indicators

- The economy of the country is enhanced through production and export of 220,000 tons high quality teak logs (development objective) ;
- An increase in about 1,000 kg/year of good quality teak seeds for planting, and economic benefit to the local community (objective 1).

are clearly formulated, however not monitored in relation to the project after completion.

As pointed out already, all short-term measures were implemented successfully. All established plots still exist and are maintained. However, long-term results will not be achieved automatically.

The real and measurable impact will only be achieved once seeds of high-quality teak trees (e.g. from SPAs) will be made mandatory by FD and consequently applied in all teak plantings. The evaluators are of the opinion that the forest policy currently drafted could provide valuable guidance towards this end. The policy

should contain clear prescription on the further extension of project related results. Government related bodies may not have the capacity yet to produce the amount of seeds or clones required for the afforestation needs of the country. Thus, policy should strongly embark on seed production through communities or public-private-partnerships with private industries. The triangle government-communities-private industries should further be strengthened, as only tight cooperation between those major stakeholders will ensure afforestation success and economic performance.

Further, the project impact on communities participating in the project or copying the design has the furthest range possible. On one hand, there are communities, who select seeds and market them successfully and in turn protect the SPA very well, even by camping there during the fire season. On the other hand, there are communities, who, due to the lack of seed production from the SPA, completely abandoned maintenance (FD took over!). Moreover, the evaluation team visited one community in Kin Mon Taung Reserved Forest, Taungdwingyi, who adopted the concept without being target community of the project. There, seed production and marketing contributes considerably to community income – the community even employed a watchman or guard for the area. However, the communities are somewhat reluctant to implement the planned silvicultural measures, as they fear reduction in income.

Moreover (see picture 17 in annex 6.5), the evaluators feel that tree quality and growth performance of this SPA is below average. A detailed assessment would be needed to confirm this.

#### **4.1.11 Project concept**

We feel that the project concept, as designed by FD and approved by ITTO has strength and weaknesses. A major strength is definitely the technical preciseness of planning and implementation of the tree improvement component. The logical framework provided good guidance through the project with all planned activities successfully implemented. The project concept for tree improvement could be transferred to other countries without major changes or adaptations.

However, the definite weakness of the design was the weak institutional tie on how the results should contribute to higher level development agendas and in particular the development objective (i.e. To promote the production of high quality teak through its genetic improvement in order to support sustainable forest management in Myanmar).

Moreover, the anticipated contribution to sustainable forest management (mentioned in the project title) was not reflected in any output or activity.

This is surprising, given the fact that FD was the executing agency, who delegated the project to FRI as implementing agency. This may have led to the isolated technical implementation with little feed back to higher levels. An intensified integration of private industries into the workshop agenda of the project may have contributed to better integration. However, one must recognize that it is a well known fact in development cooperation that projects are often implemented a little off the main agenda of the governing agency. Moreover, given the fact that the steering committee consisted of a number of directors of departments involved in afforestation, the involvement of communities and private industries at that level could have positively contributed towards better project results dissemination.

Last but not least, the community involvement was not planned appropriately. Here, the success factor is one out of five communities, who successfully continue project activities. A more careful selection of cooperating communities could have produced better results.

In short, the combination of a very technical approach to SPA establishment with “hard” indicators, the lack of institutional anchorage of the results within the forestry sector, and weak community integration with “soft” (or no) indicators is considered a major shortcoming of the project.

### **4.2 Lessons learned**

Technical-oriented projects are straightforward approaches towards advancing forestry and forest research. To this end, the project is a good example how successful good planning and dedicated implementation can be. However, combining focussed, technical aspects with soft social or policy-related aspects without equipping the latter with indicators leads to isolated project results. The social and community related components should have been supported with the same enthusiasm and intensity as the technical ones. This is also related and caused by the weak institutional anchorage. The project was administered by a strong PSC (project steering committee), consisting of

Director General of the Forest Department	Chairman;
Representative from ITTO	Member;
Deputy Director General, Planning and Statistic Department	Member;
Deputy 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 and Research Programme Division (NPM)	Secretary.

To this end, the necessary forestry knowledge and capacity was present. However, to equip the project with a stronger responsibility – which it had due to the anticipated effects for communities and for sustainable resource management – the close cooperation with policy makers, administrators and land managers could have resulted in even higher project impact on the forestry sector.

## 5 Conclusions and recommendations

### 5.1 Conclusions

The support of technical-oriented approaches is a very good way to advance forestry and build-up knowledge and capacity. Both are indispensable for managing the transition from forest exploitation to sustainable management of all forest resources for and by society and communities. However, sustainable management cannot be achieved by technical guidelines alone. The integration of all forest users and the awareness for change at political levels is equally necessary. Tree improvement and gene conservation of one very valuable tree species, i.e. *Tectona grandis*, is a long-term goal of tremendous importance, as forests are dwindling at alarming rates and reforestation programs do not keep pace with progressing land degradation.

### 5.2 Recommendations

The Project completion report mentions 13 recommendations (Annex 6.4.2) made by an earlier external project evaluation, out of which only two have fully been implemented during the follow-up phase. Three recommendations are still valid with eight partly been implemented. Particularly the longer-term recommendations are weak in implementation and still valid. We present here the old recommendations, which we feel are still valid seven years after project completion :

- Conservation of genetic sources of Myanmar teak, with large genetic variation, is important for future generations. It is also the basis for tree improvement, so in-situ conservation, not only in selected plantations but also in natural forests, should be afforded as much as possible.
- It is recommended that plus trees of outstanding phenotypes in the natural forests are selected wherever possible and propagated in clone banks, hedge gardens or CSOs.
- Existing FD personnel, including researchers and trainers, can effectively undertake the establishment of SPAs and following tree improvement steps e.g. plus tree selection, provenance trials, establishment of hedge gardens and CSOs, etc. However, FD is still in need of skilled geneticists or scientists who can first conduct clone tests to find the best genotypes from the selected plus trees and, later, for the newly established CSOs when they start to produce seeds, in order to assess the genetic gains and, by roging the CSOs, start a new generation of tree improvement process. It is suggested that promising forestry scientists are given the privilege to acquire knowledge and skill in genetics through overseas training.

As mentioned earlier, the project design was rather technical oriented. Thus, the three old recommendations embark clearly in this direction. Extension of the conservation concept to natural forests (extended in-situ conservation) and capacity building at FD and FRI levels are still required.

During the mission implementation, another set of recommendations has been drafted, which we present in the following. We would like to structure these into two groups, i.e. those to FD Myanmar and those addressing ITTO as donor and international stakeholder.

The ones to FD are specified at a high level of detail in Annex 6.4.17.4.1. These were discussed during the final presentation in Mandalay and accepted by FD. Here we would like to present an aggregated and summarized :

- Integrate tree improvement and gene conservation of teak into upcoming forest policy and give it a prominent position in future policy directions;
- Critically review all technical papers, guidelines, manuals for SPA and PTS management. When necessary review objectives of each plot and draft a management plan for each plot clearly equipping each plot with indicators to be monitored;
- Critically review and revise as necessary the production targets (here: tree dimensions) with forest industries (long and tall trees vs. short and thick trees);
- Integrate specialists, i.e. community workers, when handing over management of SPAs to communities;
- Carry out forest appraisals, i.e. commercial value assessments of SPAs for determination of seed prices. If necessary, categorize plots into classes for easier market communication;
- Develop strategy if seed marketing activities should be internationalized; and
- Critically review plantation establishment approaches and review application of clear cuts (on steep slopes, stream sides, etc.) and use of fire.

The recommendations to ITTO are summarized as follows :

- Ensure integration of results of technical projects into national forest policy during the project planning phase by integrating appropriate outputs and indicators;
- When technical-oriented projects are combined with social / community forest approaches ensure application of appropriate methods and specialists, particularly during the planning phase;
- Continue to support technical approaches in forestry, which are definitely needed to advance forestry as a science-based land management;
- Try to avoid “soft approaches” for e.g. forest communities without clearly defining measurable results and precise inputs (consultancies, trainings, etc.); and
- Ensure full stakeholder integration (timber / private industries, community representatives) during the planning phase and/or in steering committees.

## 6 Annex

### 6.1 ToR

### 6.2 Agenda

**Trip schedule of Dr. Reinhold GLAUNER in Myanmar  
From (19.7.2016) To (1.8.2016)**

No.	Date	Description	Lodging
1.	19.7.2016 Tuesday	➤ Arriving (Bangkok – Naypyitaw) (19:00 PM, BKK Air)	Night stay at Naypyitaw Dr.Yazar Minn (Liaison Officer) Accommodation (Hotel/FRI) Transportation (*FD HQ)
2.	20.7.2016 Wednesday (Morning)  (Afternoon)  (Evening)	➤ Meeting with Director General of Forest Department (FD) &Dr. Nyi Nyi Kyaw  ➤ Lunch time  ➤ Visiting to FRI ➤ Moving to Yangon	FD Meeting Hall Prepare ITTO Teak Project ppt Presenter: Dr.Thaug Naing Oo&Dr.Yazar Minn  By 4WD
3.	21.7.2016 Thursday	➤ Meeting with U Shwe Kyaw, U Bar Bar Cho, (at Myanmar Timber Certification Office)	Yangon (Gyogone Forest Office) Dr.Yazar Minn Night Stay at Yangon Forest Guest House
4.	22.7.2016 Friday	➤ Moving Yangon-Pyay-Paukhaung ➤ Visit to Central Forest Development and Training Centre ➤ Visiting to Paukhaung Teak SPA ➤ Meeting with SPA income generation	By 4WD Accompany with Dr.Y.Z.M& A.D at Pyay District Night Stay at Phyo Sithu Guest House

No.	Date	Description	Lodging
		members ➤ Visiting at Phyto Sithu teak plantations	
5.	23.7.2016 Saturday	➤ Moving Paukhaung-Oaktwin-Taungoo ➤ Checking teak plantations, SPA and Clonal Seed Orchards ➤ Presenting District Forest Management Plan and Reduced Impact Logging by FD and MTE, respectively.	Accompany with A.Ds at Pyay & Taungoo District Present by DFO of FD and Manager of MTE Night Stay at Taungoo Guest House
6.	<b>24.7.2016</b>	➤ Studying teak plantations at Taungoo - Pinyinmana-Taungdwingyi Road ➤ Studying CSO, Provenance Trial, Planting Stock Trial & research plots established in Moeswe Research Station supported by ITTO ➤ Presenting Forest Operations at Director's office of Magway Forest Department	Night Stay at Magway
7.	25.7.2016 Monday	➤ Study SPA teak plantations at Magway, Chauk, Saw, ITTO SPA at Saw ➤ Meeting with SPA income generation activities group members	By 4WD*Director, Magawe Division Night Stay at Saw Forest Guest House
8.	26.7.2016 Tuesday	➤ Studying natural forest, teak plantations at Saw-Pakokku Road ➤ Meeting with Director, Sagaing Division at Monywa	Night Stay at Monywa
9.	27.7.2016 Wednesday	➤ Moving Monywa – Kanbelu -Chatthin ➤ Checking Teak SPA in Kanbelu(ITTO) ➤ Meeting with SPA Income Generating group members	Night Stay at Monywa
10.	28.7.2016 Thursday	➤ Moving Mandalay – Sagaing ➤ Studying Wood Processing Factory at Mandalay and Sagaing ➤ Studying MTE timber depot	Night Stay at Mandalay
11.	29.7.2016 Friday	➤ Reporting & Presenting preliminary findings at Mandalay Director's office	
12.	30.7.2016	Saturday	Hotel
13.	<b>31.7.2016</b>	Sunday	Hotel
14.	1.8.2016 Monday	➤ Returning (Mandalay – Bangkok)	PG-710



### 6.3 Logical Framework (as developed at the start of the project in 2009)

Table 1: Logical framework

PROJECT ELEMENTS	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<b>Development Objective</b>			
To enhance the economy of the country through sustainable production and export of high quality teak by using good quality seed for planting.	The economy of the country is enhanced through production and export of 220,000 tons high quality teak logs.	Statistical year book, Myanmar.  Annual reports of the Ministry of Forestry.	Local community gets economic benefit through selling teak seed from SPA.  Continued participation of the local community in protection of the SPAs.  Forest Department will be able to produce good quality teak timber from plantations.
<b>Specific Objective 1</b>			
To establish Seed Production Areas (SPA) and initiate activities for the establishment of Seed Orchards for production of high quality seed.	An increase in about 1,000 kg/year of good quality teak seeds for planting, and economic benefit to the local community.  About 10 acres of Provenance trials established, and high quality teak plantlets in production as required for planting.	Forest Department statistics.  Progress reports.  Technical reports by FRI.  Project terminal report.	Forest Department staff will get better idea on the establishment of SPA and tree improvement work.  Good quality seed will be available in sufficient quantity for the Special Teak Plantation Programme.  It is a good starting ground for more future sophisticated tree improvement programme.
<b>Output 1.1</b>			
A total of 150 acres of SPA established at Shwebo, Yamethin, Gangaw, Pyay, Yangon (N) Hinthada districts.	Three SPAs ( <b>75 acres</b> ) established by the end of year 1 and another 3 ( <b>75 acres</b> ) by the end of year 2.	Forest Department statistics.  Progress reports.  Project terminal report.	Good teak plantations will be available for conversion into SPA.  Forest Department will use these SPAs as demonstration plots also.
<b>Output 1.2</b>			
Provenance trials, a hedge garden and a nursery established.	About <b>10 acres</b> Provenance trials established by the end of year 3.  A hedge garden containing 50 clones and a nursery established by the end of year 2.	Technical reports by FRI and CFDT.  Progress reports. Project terminal report.	Results of the provenance trials will be used for future tree improvement programme.  More good quality vegetatively reproduced teak plantlets will be used for plantation programme.
<b>Output 1.3</b>			
Trainings, seminars workshops and study tours organized and implemented.	Training on SPA establishment, maintenance and seed handling completed by the end of year 1.  Workshops on SPA establishment and seminar on tree improvement convened in year 2 and 3 respectively.	Training materials.  Workshop proceedings.  Progress reports.	Qualified instructors will be available.  Capacity of the staffs of Forest Department and the community will be enhanced.  Awareness on the importance of tree improvement is fully raised.

PROJECT ELEMENTS	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
	In country study tours for 6 centres, and study tour abroad both for staff of FD and communities implemented in year 2 and 3	Project terminal report.	Better participation by the local community.
<b>Output 1.4</b>			
Capacity of the local community in the management of SPA enhanced and their livelihood improved	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.	More and physiologically better seeds will be available.  Progress reports.  The livelihood of the local community improved	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.
<b>Specific Objective 2</b>			
To strengthen the tissue culture laboratory and produce high quality clonal plantlets.	Vegetatively reproduced high quality teak plantlets in production for planting at the end of the project period.	Forest Department statistics.  Progress reports.  Project terminal report.	More Forestry staff will be trained and gain experience in tissue culture work.
<b>Output 2.1</b>			
Tissue culture laboratory strengthened.	Full fledge tissue culture laboratory in operation by the end of the project.	Technical report by CFDTC. Progress reports.  Project terminal report.	Continuing support from the Forest Department for this activity.
<b>Output 2.2</b>			
High quality vegetatively propagated plantlets in production from tissue culture and hedge garden	Vegetatively propagated plantlets produced for planting by the end of year 3.	Forest Department statistics. Progress reports.  Project terminal report.	Tissue cultured plantlets of other commercial species also produced.
<b>Output 2.3</b>			
Training and seminars organized and convened	Training 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.	Training materials.  Seminar proceedings.  Progress reports.  Project terminal report.	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.

## 6.4 Activity planning

### Output 1.1

A total of 150 acres of SPA established at Shwebo, Yamethin, Gangaw, Pyay, Yangon (North) and Hinthada districts.

*Activity 1.1.1: Site will be selected in very good teak plantations of age 10 years and over. The plantation will be thinned to at least E-grade and all suppressed, fork, crooked, twisted and malformed trees will be further removed. The area will be fenced with a guardhouse constructed within the fence.*

*Activity 1.1.2: Soils in each SPA will be analysed and fertilizer will be applied where necessary.*

### Output 1.2

Provenance trials, a hedge garden and a nursery established.

*Activity 1.2.1: Zonation of provenances will be carried out base on the climograms of different parts of the country where teak occurs naturally.*

*Activity 1.2.2: Plus trees will be identified from each of the provenances and clone and seed collection from these plus trees will be organized.*

*Activity 1.2.3: Provenance trials will be established.*

*Activity 1.2.4: Soils in each plot will be analysed and recorded.*

*Activity 1.2.5: Hedge (Clonal) gardens will be established and a nursery constructed for the production of clonal cutting plantlets.*

### Output 1.3

Trainings, seminars, workshops and study tours organized and implemented.

*Activity 1.3.1: Trainings, workshops and seminars will be organized both for the staff of the Forest Department and the local community.*

*Activity 1.3.2: In-country study tours will be conducted for each of the 6 centres, while study tour abroad will also be conducted both for the staff of the Forest Department and representatives of the members of the interested local community.*

### Output 1.4

Capacity of the local community in the management of SPA enhanced and their livelihood improved

*Activity 1.4.1: Local communities from the nearby villages will be sensitized and mobilized to participate in the establishment and protection of the SPA. The SPAs will be handed over to the community in a usufruct basis after establishment. At the same time community development activities, such as income generation in the field of livestock and agriculture will also be carried out so as to alleviate their livelihood and get better participation in the sustainable development of the SPAs.*

*Activity 1.4.2: Local community from the nearby villages will participate in site selection, thinning, tending and protection activities of the SPA. Finally, seeds will be collected by the local community group and sold to the Forest Department. This will provide them income which will give them incentive to protect and look after these SPAs.*

### Output 2.1

Tissue Culture Laboratory strengthened.

*Activity 2.1.1: The existing inadequately equipped tissue culture laboratory will be strengthened through the provision of a building or rooms by the Forest Department, and the required equipment and chemicals purchased with the support from this project.*

### Output 2.2

High quality vegetatively propagated plantlets in production from tissue culture and hedge garden.

*Activity 2.2.1: Tissue culture and shoot cutting from hedge garden activities will be carried out and vegetatively propagated plantlets of selected clones will be produced.*

Output 2.3  
Training and seminars organized and convened

*Activity 2.3.1 In order to strengthen the capacity of the staffs of the Forest Department and the local community in tree improvement and particularly on hedge garden management and tissue culture technique, training and seminars on these subjects will be organized and conducted.*

### 6.4.1 Detailed, output related recommendations

This section presents the detailed review of the logical framework and associates very detailed recommendations at output levels as far as feasible. The recommendations are given in relation to improve and further sustain project results. The recommendations are derived through physical inspection of project areas and through discussions with stake holders. However, as some are very detailed and technical, only aggregated recommendations are presented in section 5.2 on page 10. All recommendations have been presented and discussed with FD during the final presentation of the consultants work on 29. July 2016.

Specific Objective 1

**To establish Seed Production Areas (SPA) and initiate activities for the establishment of Seed Orchards for production of high quality seed.**

<i>Output 1.1:</i>	A total of 150 acres of SPA established at Shwebo, Yamethin, Gangaw, Pyay, Yangon (North) and Hinthada districts.
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- Recommendations:*
- a) *Develop assessment guidelines of SPAs (country-wide) and review all 191 SPA, if they meet their objective.*
  - b) *Assessment guidelines should include data processing guidelines for calculating MAI, CAI and value appraisal. Further, pests and diseases – evtl. attributed to climatic change – should be included.*
  - c) *Develop management plan and objective for each SPA based on results.*
  - d) *Introduce scoring system for SPAs, i.e. price determinant for seeds.*
  - e) *When planting is done on commercial basis with seedlings from seeds of SPAs, separate compartments from those of seeds from natural forests.*
  - f) *Critically review seed production of remaining SPAs and compare with plantation establishment policy.*
  - g) *Develop “official” view on seed export strategy.*
  - h) *Review plantation establishment guidelines on compatibility with international standards to avoid future conflicts.*
  - i) *Avoid tree planting on agriculture land – also when it is in PF.*

<i>Output 1.2:</i>	<i>Provenance trials, hedge gardens and a nursery established.</i>
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- Recommendations:*
- a) *Develop first assessment of provenances including results from SPAs.*
  - b) *Produce plants from hedge gardens systematically for trials – also in comparison with plants from SPAs.*
  - c) *Q: The final report mentions “More clones will be added to enrich the clone bank, which will be further utilized for vegetative propagation”. Status 2008: 131 plantlets 22 clones.*
  - d) *Review plus tree selection in SPAs and include additional parameters in assessment. (Proceedings NyiNyiKyaw), such as pests and diseases.*

- e) *Develop strategy for clonal forestry to be included in forest policy.*

Output 1.3: *Trainings, workshops and study tours organized and implemented.*

Output 1.4: *Capacity of the local community in the management of SPA enhanced and their livelihood sustained and improved.*

- Recommendations:
- a) *Integrate SPA management through communities in community / social forestry policy.*
  - b) *Strictly observe quality aspects of SPA management (especially thinning). Villagers should not have the mandate to determine when and where silvicultural operations are implemented.*
  - c) *Make land and seedlings available for expansion of village-based SPAs.*
  - d) *Apply scoring system for SPA strictly.*

#### Specific Objective2

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

Output 2.1: *Tissue Culture Laboratory strengthened.*

- Recommendations:
- a) *Assess necessity for two tissue culture labs at FD (FRI and Central Forestry Development Training Centre). "Nice to have vs. need to have".*
  - b) *Develop policy on clonal forestry.*

Output 2.2: *High quality vegetatively propagated plantlets in production from tissue culture and hedge garden.*

- Recommendations:
- a) *Develop policy on clonal forestry.*

Output 2.3: *Training and seminars organized and convened.*

### **6.4.2 Review of "Recommendations by the National Consultants (March 2008)"**

This annex provides a review of the recommendations given in the project completion report. They are marked in colours as to provide a level of implementation since project completion. The ones marked in green are implemented, the ones marked in yellow are still valid but implementation is ongoing, and the ones marked in red are still valid but implementation is slow. The ranking into three categories and the rank of implementation of each recommendation has been discussed and agreed upon between the consultants and FD during the final meeting in Mandalay.

#### **Group 1 : Recommendations of completion report that have been achieved :**

- Conservation of genetic sources of Myanmar teak, with large genetic variation, is important for future generations. It is also the basis for tree improvement, so in-situ conservation, not only in selected plantations but also in natural forests, should be afforded as much as possible.
- It is recommended that plus trees of outstanding phenotypes in the natural forests are selected wherever possible and propagated in clone banks, hedge gardens or CSOs.
- Existing FD personnel, including researchers and trainers, can effectively undertake the establishment of SPAs and following tree improvement steps e.g. plus tree selection, provenance trials, establishment of hedge gardens and CSOs, etc. However, FD is still in need of skilled geneticists or scientists who can first conduct clone tests to find the best genotypes from the selected plus trees and, later, for the newly established CSOs when they start to produce seeds, in order to assess the genetic gains and, by roging the CSOs, start a new generation of tree improvement process. It is suggested that promising forestry scientists are given the privilege to acquire knowledge and skill in genetics through overseas training.

**Group 2 : Recommendations of completion report that have been partly achieved :**

- It is strongly recommended to eliminate uncontrolled harvest of seeds of poor or unknown origin. Production and use of seeds from well managed SPAs is the first, simple and very important step toward tree improvement and sustainable use of genetic resources.
- The dual purposes of SPAs are for quality seed production and in-situ conservation. Since it is difficult to find natural stands which can meet the criteria laid down in the instructions for SPA selection, it may be helpful to have special consideration for natural forests with some exceptions to the rules. Alternatively, for exceptionally good stands, it may be rewarding to consider the separate establishment of in-situ teak preservation plots. Compartment 56 of South Zamayi Reserve is a good example.
- For the exclusive purpose of quality seed production, plantation will play a dominant role in providing seed stands which will be the back bone of tree improvement in the immediate future.
- Plus trees can be selected from the natural forests, plantations or SPAs, preferably to the standards of the "Guide for selection of plus trees" formulated by the project. They are the main source to form a basis for an efficient short or long term tree improvement programme.
- As in the case of SPAs, it is easier to find more plus trees in plantations as they not only have a larger concentration of trees per unit area but also a greater proportion of phenotypically superior types due to the thinning operations in which inferior trees are removed. However, plantations, especially old ones, usually contain trees from seeds of the same or few mother trees and have little genetic variation. It is suggested not to select many plus trees from one location to avoid the accumulation of plus trees of identical clones.
- Such skilled personnel can also immediately conduct clonal tests in the old CSOs established in the early 1980s and confirm, or otherwise, once and for all the genuineness of the clones of plus trees selected in the past. This could assist or, given favourable results from the tests, even hasten the tree improvement process by revitalizing the old CSOs.
- In the absence of the aforementioned new project, it is recommended that Forest Department, particularly, present staff members of the project, continue to endeavour on the tree improvement effort in accordance with the findings and instructions prepared by the project, the application of which would definitely guarantee a certain degree of success in tree improvement and sustainable use of the teak genetic resources.

**Group 2 : Recommendations of completion report that need further work :**

- SPAs established by the project are models of limited extent and territorial units (districts and townships) are strongly encouraged to establish their own SPAs, or see that already established SPAs are brought up, to the standard that can sufficiently provide for their plantation requirements. It is also recommended that the instruction for the establishment of SPAs drafted by the project is authorized for use not only for the establishment, but also management and effective use of the SPAs
- Tree improvement programmes have been prepared and recommended for Myanmar by three different international organizations and individual experts in the past; the last one being the proposal of the International expert of the ITTO project. If it is desired to implement a systematic long-term tree breeding and improvement programme, it would be appropriate to conduct a study on the feasibility, cost-effectiveness and possible dimension of a suitable programme in conjunction with matching financial assistance that would possibly be available for the programme.
- The present project will definitely fulfil its objectives and obligations at its termination. In order to be able to implement a determined long-term tree improvement programme, it is recommended that proposal for a tree improvement project is prepared either in the form of the continuation or extension of the present project or as a new project with the same external source of financial assistance. Alternatively, it may also be in the form of a new proposal to the interested external governmental agency with whom discussion on bilateral cooperation in the related field has been established, but is still pending.

**6.5 Country Management Response to ITTO Ex-post Evaluation**

<b>Country Management Response to ITTO Ex-Post Evaluation</b>	
Project Title: <b>Ex-situ and In-situ Conservation of Teak (<i>Tectona grandis</i> L.F.) to Support Sustainable Forest Management</b> Project ID: PD 270/04 Rev.2 (F)	
<b>A) Overall Response to the Evaluation:</b>	
<i>(please insert your overall views on the evaluation report, e.g. structure, methodology and its conclusions)</i>	
<b>Evaluation Report Recommendations*</b>	<b>B) Response to recommendations</b> <i>(e.g. 'accept', 'partially accept' or 'reject' -please provide a brief explanation)</i>
Recommendation 1  Integrate tree improvement and gene conservation of teak into upcoming forest policy and give it a prominent position in future policy directions;	accept
Recommendation 2  Critically review all technical papers, guidelines, manuals for SPA and PTS management. When necessary review objectives of each plot and draft a management plan for each plot clearly equipping each plot with indicators to be monitored;	accept
Recommendation 3  Critically review and revise as necessary the production targets (here: tree dimensions) with forest industries (long and tall trees vs. short and thick trees);	accept
Recommendation 4  Integrate specialists, i.e. community workers, when handing over management of SPAs to communities;	accept
Recommendation 5  Carry out forest appraisals, i.e. commercial value assessments of SPAs for determination of seed prices. If necessary, categorize plots into classes for easier market communication;	accept
Recommendation 6  Develop strategy if seed marketing activities should be internationalized;	accept
Recommendation 7  Critically review plantation establishment approaches and review application of clear cuts (on steep slopes, stream sides, etc.) and use of fire.	accept

Evaluation Report Annex Recommendations		B) Response to recommendations (e.g. 'accept', 'partially accept' or 'reject' -please provide a brief explanation)
Recommendations related to output 1.1		
a)	Develop assessment guidelines of SPAs (country-wide) and review all 191 SPA, if they meet their objective.	accept
b)	Assessment guidelines should include data processing guidelines for calculating MAI, CAI and value appraisal. Further, pests and diseases – evtl. attributed to climatic change – should be included.	accept
c)	Develop management plan and objective for each SPA based on results.	accept
d)	Introduce scoring system for SPAs, i.e. price determinant for seeds.	accept
e)	When planting is done on commercial basis with seedlings from seeds of SPAs, separate compartments from those of seeds from natural forests.	accept
f)	Critically review seed production of remaining SPAs and compare with plantation establishment policy.	accept
g)	Develop "official" view on seed export strategy.	accept
h)	Review plantation establishment guidelines on compatibility with international standards to avoid future conflicts.	accept
i)	Avoid tree planting on agriculture land – also when it is in PF.	accept
Recommendations related to output 1.2		
a)	Develop first assessment of provenances including results from SPAs.	accept
b)	Produce plants from hedge gardens systematically for trials – also in comparison with plants from SPAs.	accept
c)	Q: The final report mentions "More clones will be added to enrich the clone bank, which will be further utilized for vegetative propagation". Status 2008: 131 plantlets 22 clones.	The numbers of clones was increased up to 89, when establishing hedge garden in Oktwin during the project.
d)	Review plus tree selection in SPAs and include additional parameters in assessment. (Proceedings Nyi Nyi Kyaw), such as pests and diseases.	Accept Infestation of Mistletoe became severe disturbance to many SPAs.
e)	Develop strategy for clonal forestry to be included in forest policy.	accept
Recommendations related to Output 1.4		
a)	Integrate SPA management through communities in community / social forestry policy.	accept
b)	Strictly observe quality aspects of SPA management (especially thinning). Villagers should not have the mandate to determine when and where silvicultural operations are implemented.	Accept
c)	Make land and seedlings available for expansion of village-based SPAs.	accept
d)	Apply scoring system for SPA strictly.	accept
Recommendations related to output 2.1 and 2.2		
a)	Assess necessity for two tissue culture labs	accept



	at FD (FRI and Central Forestry Development Training Centre). "Nice to have vs. need to have".	
b)	Develop policy on clonal forestry.	
<b>Evaluation Report Recommendations, which are not yet completed from Closing report</b>		<b>B) Response to recommendations</b> (e.g. 'accept', 'partially accept' or 'reject' -please provide a brief explanation)
	<ul style="list-style-type: none"> <li>Conservation of genetic sources of Myanmar teak, with large genetic variation, is important for future generations. It is also the basis for tree improvement, so in-situ conservation, not only in selected plantations but also in natural forests, should be afforded as much as possible.</li> </ul>	accept
	<ul style="list-style-type: none"> <li>It is recommended that plus trees of outstanding phenotypes in the natural forests are selected wherever possible and propagated in clone banks, hedge gardens or CSOs.</li> </ul>	accept
	<ul style="list-style-type: none"> <li>Existing FD personnel, including researchers and trainers, can effectively undertake the establishment of SPAs and following tree improvement steps e.g. plus tree selection, provenance trials, establishment of hedge gardens and CSOs, etc. However, FD is still in need of skilled geneticists or scientists who can first conduct clone tests to find the best genotypes from the selected plus trees and, later, for the newly established CSOs when they start to produce seeds, in order to assess the genetic gains and, by roging the CSOs, start a new generation of tree improvement process. It is suggested that promising forestry scientists are given the privilege to acquire knowledge and skill in genetics through overseas training.</li> </ul>	accept

\*Please add or delete rows as needed

Name, Title and Institution of Respondent:

Dr. Thaug Naing Oo, Director, Forest Research Institute, Nay Pyi Taw, Myanmar

20.09.2016,

Date, Signature: