The Future of Teak

What policy makers and managers need to consider



Summary Report of the Expert Group Meeting on Teak

Vienna, December 5th to 7th, 2016

A) Introduction

The report "State of the World's Forest Genetic Resources" published by FAO in 2014 lists tree species that are considered a national priority by the reporting countries for the conservation and management of forest genetic resources. Teak *(Tectona grandis)* takes the top rank in this list in more than 20 countries. Economic value (including value of timber, pulp, food, wood energy, and non-wood forest products) is one of the main reasons for nominating the species as a priority for conservation and management.

The international partners IUFRO, FAO, and TEAKNET acknowledge this priority and promote the initiation of a large-scale international research, development and cooperation program. Its goal is to strengthen the conservation and sustainable use of teak genetic resources for the benefit of teak growers, the forest industries, investors and local communities in different country contexts in Africa, Asia/Oceania and Latin America.

The following summary and policy recommendations are based on an ITTO-supported project on the evaluation of global teak resources and have been developed and formulated on the occasion of a group meeting of 13 experts[1] from 12 countries that was organised and held by IUFRO and FAO in Vienna, Austria, in December 2016.

[1] In alphabetical order: Hugh Brown, Ghana; Reinhold Glauner, Switzerland; Doreen Goh, Malaysia; Lars Graudal, Denmark; Mauricio Jerez, Venezuela; Nyunt Khaing, Myanmar; Michael Kleine, Austria; Walter Kollert, Italy; Yazar Minn, Myanmar; Olivier Monteuuis, France; James Roshetko, Indonesia (through correspondence); P.K. Thulasidas, India; Przemyslaw Jan Walotek, Brazil.

B) Summary

1. The global situation. Natural teak forests, in particular old-growth high-quality stands are declining. Likewise, the sustained production of teak logs from natural forests is decreasing due to overexploitation of existing stands, deforestation, conversion to other land uses, and growing competition for environmental services. Nevertheless, teak is one of the few emerging valuable hardwood species that has been grown increasingly in planted forests in about 70 tropical countries throughout tropical Asia, Africa, Latin America and Oceania. For most of these countries, albeit being an introduced species, teak represents a good opportunity to produce quality timber and is a major asset for the forest industry attracting large investments from the private sector. Planted teak forests according to various estimates cover between 4.35 to 6.89 million ha. They are known to exhibit a wide range of origin-related variation in growth and wood characteristics. Breeding programs continue to be developed in many countries aiming at improving timber quality of teak planted forests. Most of them, however, are established with seeds of uncertain origin and quality and more recently with clones being produced in countries such as Brazil, Costa Rica, Côte d'Ivoire, India, Indonesia, Malaysia, Tanzania or Thailand.

2. Genetic variation in teak forests and considerations for tree improvement. Provenance variation for economically and ecologically important traits has been investigated over the last 60 years and was found to be huge, but far from fully explored. Part of the genetic diversity that has been lost in natural forests may still be found in planted teak forests, many of which originate from the early introductions of the species around the world. It is therefore of fundamental importance to further investigate and characterize teak genetic variation in planted and natural populations for breeding and mass propagation. Selection and testing of planting material continues to be highly relevant as an integral part of any major planting program. Strategic plans at international, national and program level on the development and use of genetic resources ('genetic business plans') are important, whether in public-private partnerships, forestry investment schemes, or to the benefits of smallholder growers. The primary objective of such plan should be to facilitate access to good quality planting material of well documented and reliable origin.

3. Origin and global dissemination of clonal material. Teak clonal forestry has demonstrated its efficiency for establishing fast-growing industrial stands of enhanced yields, good wood quality and high commercial value. The clonal option appears to be the best way to maximize returns on investments in the shortest possible time using outstanding and site-adapted genotypes. The main risk in this context is inadequate information regarding the genetic origin of the clones that have been mass propagated and planted. The ensuing threat is an erosion of the genetic diversity in planting material deployed for large scale plantings, exposing them to greater risks of environmental impacts from climate change, pests and diseases.

4. Management of natural teak forests. Natural teak forests cover an area of ca. 29 million hectares, nearly half of which grow in Myanmar. The natural teak forest area has declined substantially in all native teak growing countries mainly due to overexploitation (legal and illegal), agricultural expansion, shifting cultivation, population pressure, and grazing. In addition, the targeted removal of the best quality teak trees (creaming) from the natural populations has most likely resulted in the genetic impoverishment of residual stands. The failure of applied teak management systems is deemed a result of complex social, political, cultural, and environmental factors. As a consequence, the survival and sustainable use of the remaining natural teak forests is highly endangered.

5. Planted teak forests for high-quality timber production. Planted teak forests need to be managed following a well-defined operational regime to achieve the desired production goals. Most important are good site selection, use of genetically improved planting material, adequate soil preparation, and the timely execution of silvicultural practices. Protection against forest fire as well as pest and disease management must be effective to avoid losses in productivity. Monitoring growth and yield dynamics is essential to facilitate adequate management responses. Sustainability (social,

environmental, economical) including the provision of environmental services (e.g. watershed protection, biodiversity conservation, carbon sequestration) must be a key concern in the management of planted teak forests. The implementation of appropriate practices at every stage of development can help to achieve this goal.

6. Teak is well-suited for smallholders. Teak-based small-scale production systems enable farmers to diversify farm production, support food security, generate income and reduce financial risks. Planted teak forests are an important alternative source of quality timber for wood industries. The potential of smallholder teak systems is hindered by limited access to good planting material, poor silvicultural management, difficult market access, and policy disincentives. These impediments must be addressed through improved market integration and policy support which will offer incentives to farmers to adopt better silviculture and agroforestry management, e.g. intercropping with suitable crops.

7. Wood production is expected to increase. About 2.0 – 2.5 million cubic meter teak roundwood is harvested annually from natural and planted forests although the annual wood increment of planted teak forests is estimated to be much higher. In the future, the production level is expected to increase, in particular from planted forests in Central and South America. In addition, India's large teak plantation estates will be expanded on unutilized marginal land to meet the country's growing domestic demand.

8. Wood quality and uses of teak. The unrivalled qualities of teak wood make it one of the tropical hardwoods most in demand for luxury markets (e.g. for yacht building), applications in the construction industry (e.g. in India) and furniture manufacturing (e.g. in Indonesia, China). The worldwide known reputation of teak was built originally upon durable high-quality timber from natural forests. Most planted teak forests however are being managed in shorter rotations. Plantation-grown teak does not have yet a high-quality image on the international market. In view of the declining supply of quality teak from natural forests, the long-term market prospects of plantation-grown teak appear promising provided that wood quality can be improved through the use of superior planting material, proper site selection and best management practices. The quality of plantation-grown teak round wood is primarily determined by log dimension (diameter and clear bole length), and the proportion of heartwood in the cross-section. In terms of mechanical and physical properties (e.g. wood density, strength, shrinkage) some evidence suggests that wood harvested from planted teak is not inferior to naturally grown teak of the same age. However, the durability of teak clearly increases with age and the proportion of heart wood, irrespective of whether it is grown in natural or planted forests. Likewise, the aesthetic qualities of teak wood are largely determined by age, colour, grain, texture and the heartwood-sapwood ratio.

9. Trade and certification. Between 2005 and 2014, the global annual trade of teak round wood was more than 1 million cubic meter on average; the imports were valued at US$ 487 million per year, which is about 3 percent of the value of the global timber trade (US$ 15.5 billion). The three major importing countries were India (74% of the total trade volume from more than 100 countries), followed by Thailand (16% of the total from about 15 countries) and China (10% of the total from about 65 countries). Teak imports to Thailand have declined considerably lately, from a peak of 6.7 million cubic meter in 2004 to only 61,000 cubic meter in 2014. China and India, on the other hand, have increased their import volumes. Indonesia exports only teak products, primarily furniture. In 2010 the Indonesian teak furniture industry exported products valued at US$ 135 billion which constitutes over 1% of the global furniture trade.
One increasingly important consideration influencing trade in plantation grown teak are forest management certification and legality issues. The timber markets of North America and Europe have responded legislatively through the Lacey Act (USA) and the European Union Timber Regulations (EUTR). Other markets will likely follow suit soon.

10. Lack of uniform international log grading rules constitutes a serious market constraint. The major challenge for teak growers is to produce internationally recognized quality wood. Despite

considerable international dialogue over many years the global teak trade is hampered by a lack of international standards and consistency in measuring and establishing volumes and qualities for teak logs, which results in widespread uncertainty and confusion around teak investments.

11. Profitability of teak investments. Investments in teak plantations growing under suitable site conditions with genetically superior planting material and good management practices yield attractive and robust financial returns. Large-scale private teak plantation developers in Ghana achieve return rates of more than 10% (IRR). This is mainly due to substantial economies of scale and cost-reducing management interventions such as intercropping with food crops by nearby farming communities which reduces maintenance costs. Additionally, most investors raise their own seedlings, which apart from giving them control over the quality of planting material, also leads to lower unit costs.

12. Long-term price trends. Teak price indices have been developed from publicly available long-term time series published in ITTO's Tropical Timber Market Reports since 1998. These indices measured in US$ per cubic meter indicate the superior status of natural teak timber as compared to plantation grown teak. In the Indian market the average cubic meter-related value of plantation grown teak is about half the value of natural teak from Myanmar. However, in recent years the market appears to have recognized a higher value for plantation grown teak, the price index of which has grown more rapidly than that of natural teak.

C) Recommendations

In view of the imminent threat of losing natural teak forests, it is imperative to organize and implement a global program for the conservation, improvement, development and sustainable use of teak resources. Such **Global Teak Support Program (GTSP)** would contribute to preserve the native teak resources still existing before they decline further. It would strengthen the understanding and knowledge of teak genetic resources, promote their sustainable use and management and contribute to develop and promote in-situ and ex-situ conservation programs through development assistance and research collaboration. Thus, GTSP would contribute to the implementation of the Global Plan of Action on Forest Genetic Resources (GPA-FGR) and assist in achieving Goal 15 of the 2030 Agenda for Sustainable Development: *Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss*; it would also support all Strategic Goals of the Aichi Biodiversity Targets of the Convention on Biological Diversity (CBD).

GTSP will have distinct tasks and program outputs, which are listed below in the form of recommendations for all relevant national and international forestry institutions and other concerned stakeholders:

1. Improve statistical database on teak forests

The available information and estimates on the development of natural and planted teak forests and the removals of teak round wood are mainly based on FAO's Teak Resources and Market Assessment 2010[2]. This database must be improved to provide more reliable information on the development of teak resources and wood removals. Teak growing countries may consider integrating teak together with other commercial tree genera into the national reporting mechanisms and/or forestry statistics including national forest inventories, in order to monitor on a regular basis the development of teak forest resources. International forestry organizations may consider organizing a remake of the 2010 survey on teak resources and markets.

[2] (http://www.fao.org/docrep/015/an537e/an537e00.pdf)

2. Strengthen international collaboration and regional networks on forest genetic resources

International collaboration and regional networks on forest genetic resources (e.g. TEAKNET, APFORGEN, SAFORGEN, LAFORGEN) should be strengthened to develop action plans for the conservation and management of teak genetic resources. Such action plans might include:

- development of geographic, operational, and reliable genetic resource databases for characterizing every teak origin and seed production stand with location maps and common descriptors;
- development of appropriate quality standards and accreditation schemes for teak planting material involving the germplasm production and delivery sector, and current schemes for control of reproductive material (e.g. the OECD scheme on forest reproductive material);
- development of user-friendly decision support tools to guide the choice of planting material for specific sites (recommendation domains), in conjunction with market information services;
- measures to ensure that these standards and tools are mainstreamed with policy makers, extension services and the private sector, including manuals, policy briefs and other capacity building and extension material;
- development of indicators that are suitable to monitor the performance of delivery pathways with regard to standards including the performance and viability of plantings;

3. Monitor genetic improvement programs and international trade in clones

Teak clone producers should be encouraged to select, identify and classify their material with a view to better monitor international trade and promote the production of a sufficient number of good quality clones of diverse genetic backgrounds that need to be reliably documented. In addition, the characteristics of clones that are traded on a global level should be subject to registration with an international authority. Tissue culture laboratories that have the capacity to produce good quality teak clones are to date only available in Asia and Latin America. It is expected that such facilities and know-how can be developed soon in other countries, in particular in Africa.

4. Improve the management of natural teak forests towards sustainability

- Strengthen forest governance and law enforcement by increasing transparency, by cooperating with local communities including other relevant stakeholders, and by mobilising funds for integrated land use planning, forest conservation, rehabilitation and restoration.
- Review and improve the existing silvicultural systems and practises, such as applying a flexible schedule of silvicultural operations in individual stand management; in addition, secure in-situ conservation stands of natural teak forests on a wide range of site conditions (e.g. climate, soils, elevation, etc.) and complement these conservation measures through the establishment of seed orchards and gene banks.
- Establish and implement performance and results-based compensation schemes (e.g. PES, REDD+) that are specifically designed to conserve and sustainably manage natural teak forests.
- Include social aspects into forest management, addressing tenure and user rights of forest communities, cost-and-benefit sharing arrangements as well as the empowerment of women, indigenous groups and minorities.

5. Support high-quality timber production in planted forests

- Review and adapt government regulations and codes-of-practise to facilitate site and stand-adapted silvicultural management.
- Support the publication in local language of teak grower's manuals, designed particularly for different target groups
- Promote capacity building and awareness campaigns for various kinds of teak growers including small-holders and for operators.

6. Support small-scale teak production systems for smallholder farmers

- National governments should encourage and support smallholders to plant teak through incentive programs, marketing support, formation of cooperatives, access to land titles or long-lease land tenure,

- Facilitate access to affordable sources of quality planting material for farmers,
- Support the formation of farmer-industry partnerships, support group marketing schemes, simplify timber trade regulations and eliminate extra-legal fees to enhance market access while reducing transaction costs,
- Regularly publish market information on teak prices and quality,
- Provide silvicultural and agroforestry management training through extension services for enhancing smallholders' technical knowledge and capacity.

7. Further investigate the impact of silvicultural management on teak wood quality
The impacts of planting material and site selection as well as management practices on the quality of plantation and farmer grown teak and its mechanical, physical and aesthetic properties should be further investigated through targeted professional research in different country contexts.

8. Improve the international marketability of teak
An international forestry or timber trade organization should take the mandate to develop and adopt an agreed set of log grading rules in collaboration with global buyers to reduce market constraints and to improve the marketability of teak wood products taking into consideration the quality and dimensions of logs from plantations as well as from natural forests. By the same token, public and private teak producers and processors are encouraged to pursue voluntary certification schemes (management and chain-of-custody certification) if they wish to meet environmental, social and economic standards of responsible forest management and gain better access to North American and European markets.

9. Provide impartial and unbiased cost-benefit analysis for potential investors
To be profitable, teak plantations require stable and predictable market conditions as well as good forest management practices with the objective to increase yields and reduce costs through suitable operational measures. In order to support the application of such management regime impartial and unbiased cost-benefit analyses on teak investments should be made available through publications, internet portals or information leaflets. TEAKNET could take a leading role in publishing such information on-line on its website.

10. Improve statistical information on teak round wood production and trade. A formalized exchange of information on the production and trade of teak would be of mutual advantage to importing and exporting countries. In this context reliable information on the dimensions, quality, origin and price of teak round wood and major wood products in internationally acknowledged measuring units should be made available on a regular basis.