

Speaker 2



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THAILAND



***“Post-5th World Teak Conference:
Adapting to future markets and
environment”***



5th World Teak Conference
Kochi, Kerala, India
17-20 September 2025

Sustainable Development of the Global Teak Sector-
Adapting to Future Markets and Environments

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Based on Summary
by Walter Kollert and P.K. Thulasidas






Grand Opening & Cultural Performances




5TH WTC, INDIA 2025



Main organizers:

-  Kerala Forest Research Institute (KFRI)
-  International Teak Information Network (TEAKNET)
-  Kerala State Council for Science, Technology & Environment, MoEFCC, ITTO, etc.

Participants

-  More than 300 participants
-  From 43 countries representing 6 continents

Organizers



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THEMATIC SESSIONS

Session I & II (combined):

- Financial Analysis, Value Addition, Markets And Legal Supply Chains

Session III:

- Recent advances in teak genetics and stand management of natural and planted teak forests

Session IV:

- Management models for smallholder teak plantations and agroforestry systems in Asia, Africa and Latin America

Session V:

- Environmental protection, biodiversity conservation and Forest Landscape Restoration

Special Session:

- Forest Stewardship Council (FSC) Session on Responsible Sourcing of Teak: EUDR and Beyond

Two panel discussions

- Global teak resources, market assessment and trade
- The role of planted teak forests in building resilient landscapes



Side Event

ITTO/BMLEH project, 'Promoting Quality Timber Production in Smallholder and Community-Based Teak and Other Valuable Species Plantations in the Tropics'



ITTO Executive Director **Sheam Satkuru** delivered Opening Remarks during the side event

Key Findings

Session I & II: Financial Analysis, Value Addition, Markets and Legal Supply Chains

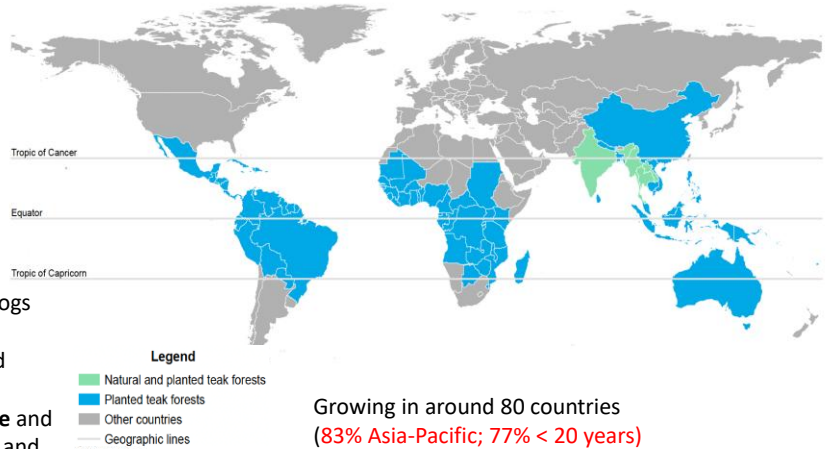
Global significance of teak

Production:

~ 2.5 million m³ (1.75 in 1990s)
 (~ 1% of tropical logs)

Imports:

- 0.9 million m³ (~ 14% of imported tropical logs)
- US\$ 340 million (~ 20% of global logs trade value)
- US\$ 286 million (~ 6% of imported tropical sawnwood)
- US\$ 1.3 billion (~ 0.5% of furniture and other wood products in Indonesia and India)

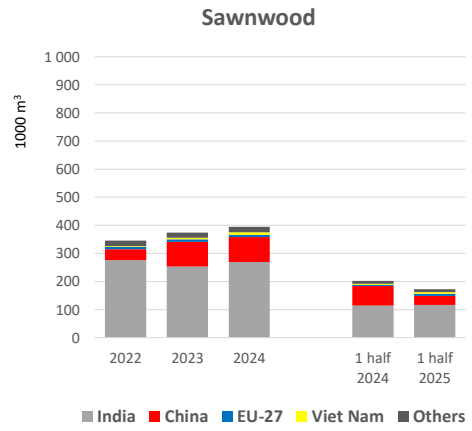
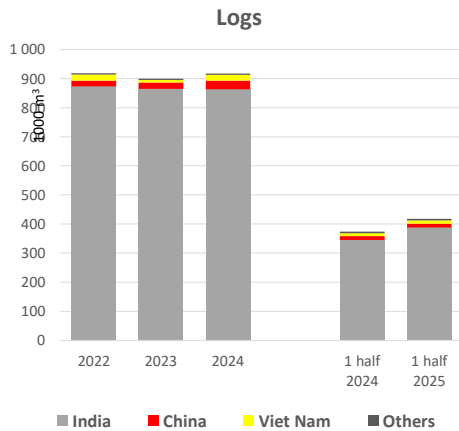


Growing in around 80 countries
 (83% Asia-Pacific; 77% < 20 years)

(Arvydas Lebedys, FAO-HQ, 2025)



Global teak trade (volume) (2022 - 1st half 2025)



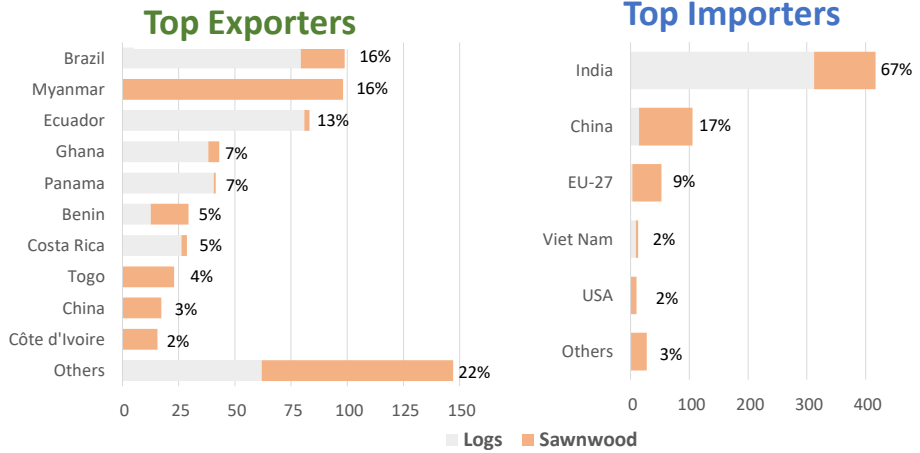
Source: National Customs data (through GTT - Global Trade Tracker)

(Arvydas Lebedys, FAO-HQ, 2025)



Major teak trading countries in terms of value in 2024

US\$ 626 million (logs & sawnwood)

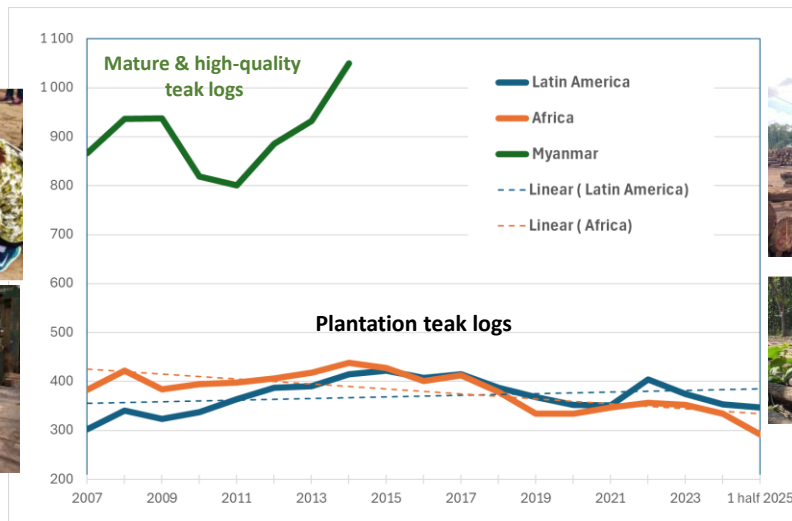


Source: National Customs data (through GTT - Global Trade Tracker)

(Arvydas Lebedys, FAO-HQ, 2025)



Unit price of teak log imports to India 2007 to 2025 (US\$/m3)



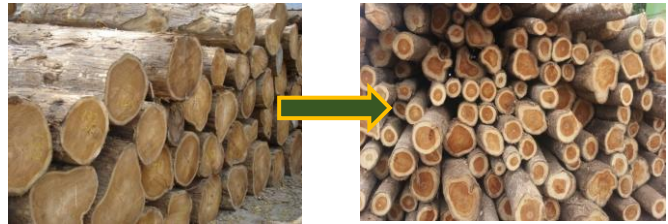
Source: Directorate General of Commercial Intelligence and Statistics, India

(Arvydas Lebedys, FAO-HQ, 2025)



Session III: Recent advances in teak genetics and stand management of natural and planted teak forests

- 🍃 Planted areas 4.3 to 6.9 mill ha
- 🍃 1.2 mill ha (1/4) owned by smallholders
- 🍃 77% of planted teak with less than 20 years rotation
- 🍃 Demand for general utility teak results in shift to short rotation, fast-grown, small-diameter logs from Africa and Latin America



Concerns over variation in growth and timber quality features, use of limited no of clones, narrow genetics

(Dorren Goh, 5th WTC 2025)

Traditional breeding (seeds, grafting, controlled pollination, SPA, CSOs)

- 🍃 Natural forests in the past replanted using seed sources ... quality questionable... mainly to enrich natural stock.
- 🍃 Plantations (e.g. India & Brazil) from seed ... insufficient quantity, unpredictable and poor germination rate... unknown/narrow genetics and quality leading to high variability.
- 🍃 Poor genetic gain and productivity loss from estab. SPAs and CSOs from lack of info

❖ Advantageous but hampered by lengthy timelines and pot. restricted genetic diversity.



(Dorren Goh, 5th WTC 2025)

High-quality planting material



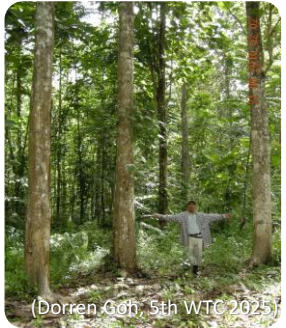
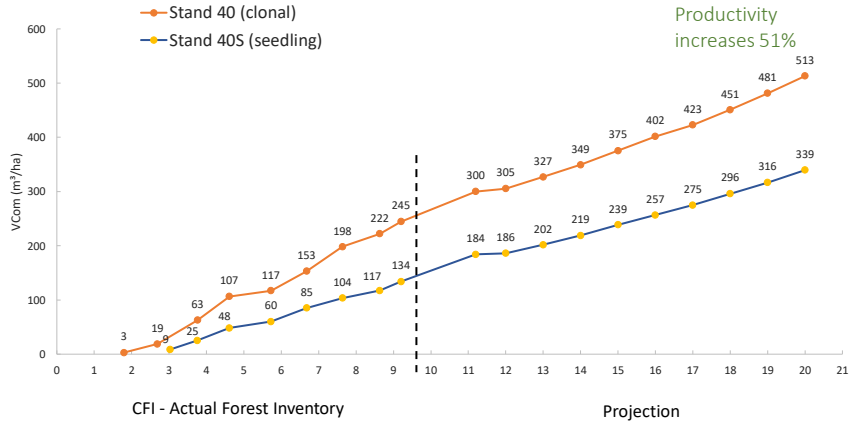
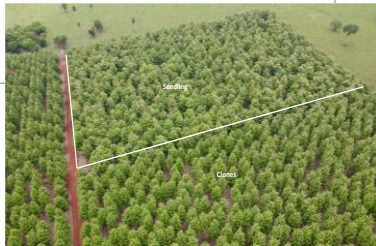
The mass production of superior-quality clonal material using **tissue culture** techniques based on the characteristics of the parent material has been proven has emerged as a superior alternative to achieving high productivity and quality.

However clonal propagation **needs genetically rich base populations** to be sustainable and to maintain resilience against **pests and diseases**. This technique can form an integral part of teak genetic improvement strategies and breeding programmes, as well as supporting the conservation of genetic resources.



Seed sources > Grafting and cutting > Tissue culture > Clonal propagation > Germplasm

- **Clonal plantations** observed over a 20-year rotation period show considerably higher yields and better timber quality than plantations established from seeds
- Average **MAI ~12 m³/ha/yr** (4.5 - 20.0 m³/ha/yr)



High-quality planting material

Cooperation. Successful tissue culture programmes require **intense collaborative efforts**, particularly from researchers with access to a wide range of germplasm and technologies, and from investors interested in achieving high productivity and rapid returns.



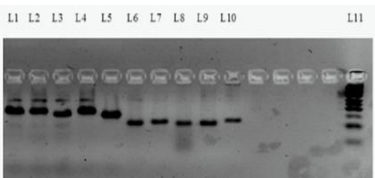
Vietnam imported high-quality tissue culture seedlings from Thailand

Instruments for monitoring the use of germplasm. The application of **molecular markers and functional genomics** is a significant utility in designing conservation and breeding programmes and may in the future contribute further to manage, monitor and control the use and deployment of teak germplasm.

Optimized DNA
Extraction



(Dorren Goh, 5th WTC 2025)



Microsatellite Marker (SSR) amplification



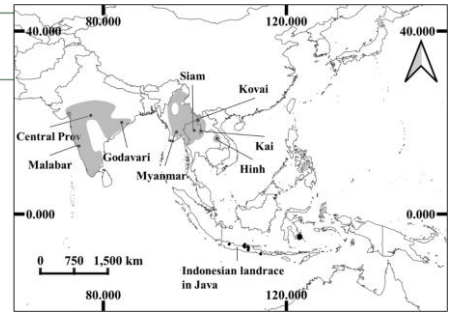
Global Dispatch of Clonal Teak plantlets for diverse applications



(Dorren Goh, 5th WTC 2025)

Genetic and technological innovation

Genetics and wood quality. There is clear evidence that geographical origin has an impact on wood quality. The **Indian teak population** was found to be more genetically diverse than populations in other regions, ensuring the potential for producing high-quality timber.



Research in Brazil has resulted in the formal registration of 19 teak cultivars, representing a significant milestone in terms of legal protection and **genetic innovation**. These cultivars are resistant to wilt disease (*Ceratocystis*) and enable better traceability.



Figura 9. Sintomas de murcha de ceratocystis, causados por Ceratocystis, encontrados na madeira de teka. manchas secas e descoloridas no sentido do rio em cortes longitudinais do lenho (A, B, C); encurvamento radial do lenho em plantas jovens (E, F); manchas de coloração circular no albúmen em plantas adultas (G, H) e manchas de madeira estratificada de plantas sadias, sem presença de mancha na madeira (I, J e K). Fonte: autoria do próprio autor.

Morphological descriptors of *Tectona grandis* based on the Ministério da Agricultura e Pecuária - Brasil

Criteria:

- Growth
- Shape
- Heartwood proportion
- + Disease resistant

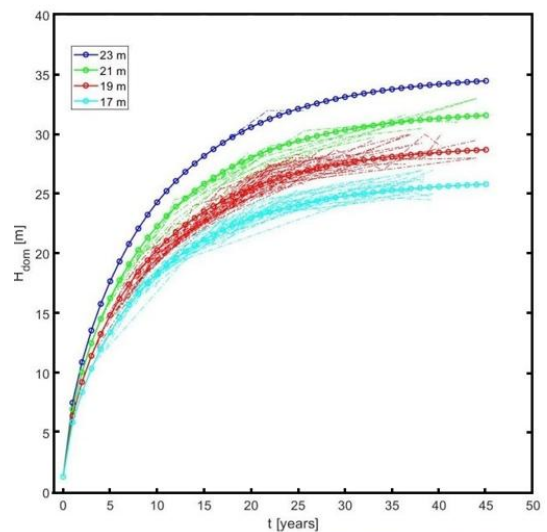
(Leonarda Grillo Neves, 5th WTC 2025)

Stand management of planted forests

Financially optimal teak plantation management was found to require low planting densities, short rotations, site index and a single thinning.

RESULTS: BEST SCENARIOS BY PRESENT VALUE (i =10%,SI =21M)										
Scen	Stand ario density (Trees ha ⁻¹)	Num thinning s	Age (yr.)	SCENARIOS		Rotation (years)	HARVEST			Present Value (USD ha ⁻¹)
				Intensity (% Basal area)	Rotation (years)		Volume (Hoppus m ³ ha ⁻¹)	Total (Hoppus m ³ ha ⁻¹)	Average dbh (cm)	
4	1111	3				17	99	160	24	1190.9
7		2				18	140	161	34	7273.7
11		2				19	146	169	35	7407.6
15		2				20	153	177	35.2	7438.1
17	625	0				17	170	170	31	494.1
22		1	7.4	0.40		18	154	172	37.5	9480.7
26		1	7,3	0,38		19	165	182	37,9	9511,3
30		1	7.4	0.39		20	173	191	38.7	9551.3
36	1600	3				17	107	167	26.6	1455.6
39		2				18	164	180	32	7031.1
43		2				19	170	188	32.5	7076.9
47		2				20	178	196	33.8	7605.4

(Mauricio Jerez-Rico, 5th WTC 2025)



Using artificial intelligence (AI) to determine stand data is a promising approach to making forest surveys and inventories more efficient and reducing costs.



Advantages of AI

- A mobile application that can be used in the plantations
- Rapid, scalable, consistent, and repeatable tree volume assessment across large areas
- Reduces reliance on intensive ground surveys
- Saves several hours per plantation block, allowing faster coverage and more frequent monitoring

(Ani A. Elias, 5th WTC 2025)

Existing method (Time \propto number of trees)	AI method (Time \perp number of trees)
30s per tree for measuring GBH and volume each 3 to 7.5 minutes per plot (6 to 15 trees per plot) for GBH 3 to 7.5 minutes for volume estimation 6 to 15 minutes in total	3s for imaging; 28s for tree detection; 1 minute for GBH estimation 1 s for volume estimation Less than 2 minutes in total

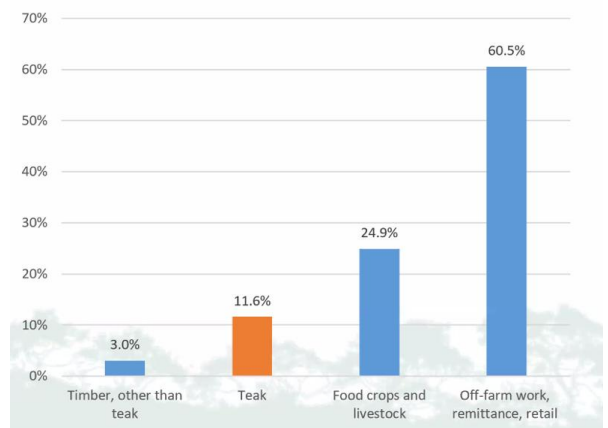
Session IV: Management models for smallholder teak plantations and agroforestry systems in Asia, Africa and Latin America

Rural livelihoods and food security.

Smallholders and farmers who own teak forests can earn an income through nursery operations, preparing land, establishing and maintaining plantations, and working in wood-based industries. Therefore, planted teak forests support rural development and sustainable livelihoods.

Teak contributes 12% but teak system contributes 40%

(Roshetko et al 2013)



Why Farmers 'Do Not Manage'?



If income is a main driver for planting, why do farmers 'not manage' their teak?

- Low quality trees - poor silviculture knowledge
- Established at dense spacing
- Lack of capital to invest in teak *
(won't borrow; banks won't lend for teak)
- Needs are short-term, timber long-term
- Inability to wait duration of a teak rotation before needing returns
- Limited access to market info/linkages
- Poor bargaining position
- High transaction costs for traders are passed on to farmers
- **Unfavourable policies & extra-legal enforcement**

Source: Roshetko, 2025

Photos: Iwan Kurniawan



Evidence from **innovative management models** for successful outgrower (**contract-farming**) schemes and **taungya** and coppicing systems shows

that technical problems pose less of a hindrance to the successful implementation of smallholder teak plantations and agroforestry than organizational and logistical challenges do.

Source: Roshetko, 2025



- Intercropping
- Silvopasture
- Home garden
- Woodlot
- Agri-boundary



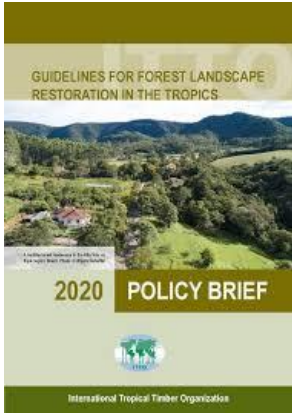
Such challenges include controversies surrounding **land tenure and governance**, the organization and logistics of **logging operations**, the absence of institutions and organizations capable of providing **qualified extension services**, and dependence on a limited market with poor access to product prices.



Session V: Environmental protection, biodiversity conservation and Forest Landscape Restoration

- **Forest landscape**
- Natural forest,
- Degraded forests
- Forest plantations, plantings of non-timber forest products,
- Agricultural production systems/agroforestry

Environmental impacts of planted forests and agro-forestry



Planted Forests

- Sustainable legal wood supply
- Degraded land improvement



TEAK Farm
Cambodia
50 years leasing

EcoForest
Panama

- Livelihood improvement
- Biodiversity & corridors
- Carbon storage & sequestration



Agroforestry (Thailand):
Inter cropping with pumpkin



Wildlife corridor
Abandoned US military camp



Teak plantations could play a major role in **sequestering carbon** and represent a viable option in Forest Landscape Restoration, in particular on degraded lands. Tapping into the **carbon credit markets** would provide additional incentives and support the global effort on climate change mitigation.

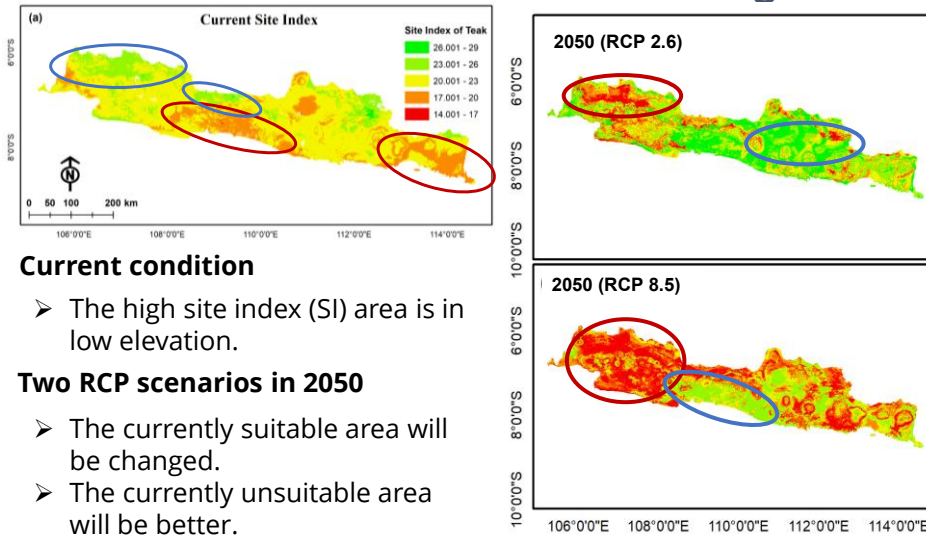


Ecological diversification in monoculture teak plantations requires management interventions on 3 levels: (1) increase the **genetic diversity** to support the adaptability of the population to the changing climate and to reduce the risk of pests and diseases, (2) support the **diversity of species** to create different sources of income and habitat for wildlife, (3) **enhance the structural diversity** of the prevailing vegetation layers.

Geospatial analysis based on ecological and social data and the implementation of participatory long-term processes involving all concerned stakeholders generate valuable results that are useful for various decisions on **land management, restoration and governance**.

(Aswathy K. Vijayan & Sutthathorn Chairuang Sri, 5th WTC 2025)

Genomic adaptation associated with present and future climate change in Java



Current condition

- The high site index (SI) area is in low elevation.

Two RCP scenarios in 2050

- The currently suitable area will be changed.
- The currently unsuitable area will be better.

Eko et al (2022) JARQ

(Naoki Tani, 5th WTC 2025)



Conference Recommendations for Action

- Support research efforts to **diversify the existing monoculture plantations** with multi-species planted forests and agroforestry production systems.
- Explore possibilities to **replace harmful fumigating agents** with eco-friendly fumigation methods for all imported wood products.
- Investigate new methods using **artificial intelligence** to record stand data in forest surveys and inventories in a cost-efficient manner.
- Support the **mass propagation of superior planting material** through the establishment of clonal plantations for higher productivity and better timber quality.
- Investigate further the institutional, organizational and logistical challenges of **smallholder growers** with the objective to facilitate teak plantation establishment and management

Conference Recommendations for Action (cont.)

-  Facilitate capacity building for local community and field workers, particularly in **teak management techniques and intercropping of teak with profitable agricultural crops**.
-  Investigate the opportunities of linking teak plantations with **carbon credit markets**.
-  Commit more resources to research and development to advance the sustainable management of planted teak forests with emphasis, in particular on the **quality of teak wood** grown in plantations to decide the **optimum harvesting cycle**.
-  Facilitate and enhance the opportunities for **TEAKNET to establish comprehensive networks** among teak producers, traders and the wood processing industry.

