

# INTERNATIONAL TROPICAL TIMBER ORGANIZATION

## ITTO

### PROJECT PROPOSAL

TITLE:	5 <sup>TH</sup> WORLD TEAK CONFERENCE: SUSTAINABLE DEVELOPMENT OF THE GLOBAL TEAK SECTOR - ADAPTING TO FUTURE MARKETS AND ENVIRONMENTS
SERIAL NUMBER:	PD 933/23 <b>Rev.1</b> (M)
COMMITTEE:	ECONOMICS, STATISTICS AND MARKETS
SUBMITTED BY:	GOVERNMENT OF INDIA
ORIGINAL LANGUAGE:	ENGLISH

#### SUMMARY:

Teak has a world-wide reputation as high-quality tropical timber. In recent years, teak has attracted the commercial interest of investors and small land holders, especially, in developing short rotation (20-30 years) teak plantations across the globe. The rapid expansion of planted teak forests, however, pose a risk of undermining the excellent reputation of naturally-grown teakwood in the global markets due to the wide discrepancy of the wood quality in plantation grown timber. The reduction of the wood quality considerably affects the log and sawn timber prices and therefore the financial viability of teak planting programmes. This is aggravated by the fact that there is no accepted international market intelligence, log grading rule and pricing mechanism in place.

On the other hand, planted teak forests, if properly managed, can produce financial benefits and offer opportunities to support the global environmental initiatives on Forest Land Restoration (FLR), carbon sequestration and livelihood enhancement of rural communities. Towards this end, teak growers at the community and government or industrial level, must ensure that the development and management of planted teak forests observe best forestry practices producing wood of the highest possible quality. This includes proper species-site matching, using good genetic planting material, employing optimal rotation cycles and appropriate silvicultural techniques.

Recent years have brought to the fore a plethora of challenges in the teak sector such as climate change induced growth constraints, erosion of the gene pool, emergence of new pests and diseases, difficulties in maintaining legal supply chains and disruptions in the markets through the COVID -19 pandemic. Though research and development has produced important results in recent years in all aspects of teak farming and markets, there exist serious gaps in knowledge management and dissemination to the stakeholders, as well as professional networking among the teak growing regions. In this context, the proposed 5<sup>th</sup> World Teak Conference to be held **during 17-20** September 2025 at Kochi, Kerala, India with the theme '**Sustainable Development of the Global Teak Sector - Adapting to Future Markets and Environments**' proposes to bring together various stakeholders on a single platform to deliberate, discuss and develop strategies for the sustainable development of the global teak sector and enable them to adapt to future markets and environments. The pre-conference program proposes to dwell in detail on the various challenges of the teak sector, initiate new research programs, develop regional networks and consolidate the gathered information as deliverable outputs during the 5<sup>th</sup> World Teak Conference.

EXECUTING AGENCIES:	KERALA FOREST RESEARCH INSTITUTE (KFRI) TEAKNET (International Teak Information Network)	
DURATION:	12 MONTHS	
PROPOSED BUDGET AND OTHER FUNDING SOURCES	SOURCE	CONTRIBUTION IN USD
	ITTO	188,238
	GOVT. OF INDIA	(in kind)
	TOTAL	<b>188,238</b>

## **Acronyms and Abbreviations**

FAO	: Food and Agricultural Organization of United Nations
ITTO	: International Tropical Timber Organization
IUFRO	: International Union of Forest Research Organization
TEAKNET	: International Teak Information Network
KFRI	: Kerala Forest Research Institute
MoEF & CC	: Ministry of Environment, Forest and Climate Change
ICFRE	: Indian Council of Forestry Research and Education
DST	: Department of Science and Technology
PSC	: Project Steering Committee
DSA	: Daily Subsistence Allowance
LOC	: Local Organizing Committee

## Table of Contents

<b>PART I: Project Context</b> .....	4
1.1 Origin .....	4
1.2 Relevance.....	5
1.2.1 Conformity with ITTO's objectives and priorities .....	6
1.2.2 Relevance to the submitting country's policies.....	6
1.3 Target area .....	7
1.3.1 Geographic location.....	7
1.3.2 Social, cultural, economic and environmental aspects .....	7
1.4 Expected outcomes at project completion.....	8
<b>PART 2: Project Rationale and Objectives</b> .....	9
2.1 Rationale.....	9
2.1.1 Institutional set-up and organizational issues.....	9
2.1.2 Stakeholder analysis .....	10
2.1.3 Problem analysis .....	11
2.1.4 Logical framework matrix.....	14
2.2 Objectives.....	15
2.2.1 Development objectives and impact indicators .....	15
2.2.2 Specific objectives and outcome indicators.....	16
<b>PART 3: Description of Project Interventions</b> .....	17
3.1 Outputs and activities .....	17
3.1.1 Outputs .....	17
3.1.2 Activities.....	17
3.2 Implementation approaches and methods .....	18
3.3 Work plan.....	19
3.4 Budget .....	21
3.4.1 Master budget schedule (USD) .....	21
3.4.2 Consolidated budget by component.....	22
3.4.3 ITTO budget by components .....	23
3.4.4 Executing agency budget by component .....	23
3.5 Assumptions, risks, sustainability .....	23
3.5.1 Assumptions and risks.....	23
3.5.2 Sustainability.....	23
<b>PART 4: Implementation Arrangements</b> .....	24
4.1 Organization structure and stakeholder involvement mechanisms .....	24
4.1.1 Executing agency and partners .....	24
4.1.2 Project management team .....	24
4.1.3 Project steering committee .....	24
4.1.4 Stakeholder involvement mechanisms .....	25
4.2 Reporting, review, monitoring and evaluation .....	25
4.3 Dissemination and mainstreaming of project learning .....	26
4.3.1 Dissemination of project results.....	26
4.3.2 Mainstreaming project learning .....	26
<b>Bibliographic Consultations</b> .....	27
<b>Annex 1</b> .....	29
<b>Annex 2</b> .....	31
<b>Annex 3</b> Recommendations of ITTO's expert panel and resulting modifications.....	37

## **PART 1: Project Context**

### **1.1 Origin**

Teak (*Tectona grandis*) is one of the most valuable tropical hardwoods of the world. Teak is ranked first in the priority species that are considered by national governments in more than 20 tropical countries for conservation of forest genetic resources and large-scale cultivation to meet increasing demand for teak timber in the global market. Natural teak forests that occur in India, Lao PDR, Myanmar and Thailand are fast dwindling in its natural habitat since 1980s and the genetic resource base is at high risk of losing its biodiversity. Teak which occurred naturally only in South Asia has grown rapidly outside its natural habitats and is presently cultivated in nearly 70 countries across the globe. At present, planted teak forests according to various estimates cover between 4.35 to 6.89 million ha and is rapidly increasing. Similarly, smallholder teak farming has also expanded contributing significantly to the global teak sector and covers approximately 19% of the total teak area in Asia and Africa, 31% in Central America and 34% in South America. This small holder teak is considered a key resource base for the teakwood industry that provides alternate income and livelihood support to the rural communities.

The World Teak Conferences organized by the international Teak Information Network (TEAKNET), India in collaboration with its partner organizations - the International Tropical Timber Organization (ITTO), Japan, the International Union of Forest Research Organizations (IUFRO), Vienna and the Food and Agricultural Organization of United Nations (FAO) - had a key role in addressing the key constraints in the teak sector, developing markets and popularizing teak across the globe. The first Teak Conference was held in San Jose, Costa Rica in 2011 with the theme "Planted teak forests: an emerging forest resource at a global level" provided an international forum for the critical analysis and evaluation of the role of planted teak forests in the sustainable development of the tropical timber sector. It also facilitated the transfer of knowledge and technology among teak growing countries and strengthened the teak networks. As such, the 1<sup>st</sup> World Teak conference provided a sound scientific base for developing teak plantations across the world. The 2<sup>nd</sup> World Teak Conference in Thailand in 2013 focussed on the theme "Sharing our Planet: Teak Model Development towards the Improvement of Mankind" and discussed successful teak models. The 3<sup>rd</sup> World Teak Conference in Ecuador in 2015 with the theme "Strengthening Global Teak Resources and Markets for Sustainable Development" discussed the economic, social, technical and environmental issues that had an impact on the production, marketing and trade of teakwood. The 4<sup>th</sup> World Teak Conference was held recently in Accra, Ghana (2022) with the theme "Global teak market: Challenges and opportunities for emerging markets and developing economies". All the previous World Teak Conferences had well thought out themes with the aim of popularizing teak, developing viable plantation models and played vital roles in addressing the emerging challenges in the teak sector. The conferences with thematic presentations, exhibitions, discussion forums and B2B meetings provided an ideal platform to a variety of stakeholders to deliberate, discuss and develop policies and strategies for the betterment of their respective fields. Further, each World Teak Conference identified the theme and set the background for the next conference.

The present project proposal is a follow up of the recommendations of the 4<sup>th</sup> World Teak Conference. The 4<sup>th</sup> World teak Conference observed that over the recent years, teak has attracted the attention of investors from both public and private sectors in the massive tree cultivation programmes. Involvement of farmers and small land holders in industrial wood supply from shorter rotations of 20-30 years is also increasingly becoming common in most of the teak growing countries. The rapid expansion of teak plantations, however, pose a risk of undermining the reputation of teak in global market place because of the wide variations in wood quality with the net effect of reducing the prices and therefore the financial viability of teak planting programmes. An integrated international market intelligence and pricing mechanism is also not available for the species. On the other hand, if properly managed, besides the economic benefits it would also offer opportunities to further the global environmental initiatives on Forest Land Restoration, carbon sequestration and livelihood enhancement of dependent communities. To achieve this, teak growers, at the community and government/ industrial levels, must ensure that these plantations are developed and managed scientifically and the wood they produce is of the highest possible quality, which will mean carefully choosing the right sites, good genetic stock, employing optimal rotation cycles and appropriate silvicultural techniques. The stakeholders in 4<sup>th</sup> World Teak Conference also pointed out that recently a plethora of new problems have emerged in the teak sector such as climate change induced growth constraints, erosion of the gene pool, emergence of new pests and diseases, legal supply chains and disruptions in the markets by way of COVID -19. Though research and development has been going on for years in all aspects of teak

farming and markets, there exists serious gaps in the knowledge dissemination to the stakeholders and networking among the teak growing regions. In this context, the 5<sup>th</sup> World Teak Conference is proposed during 17 - 20 September 2025 at Kochi, Kerala, India with the theme 'Sustainable Development of the Global Teak Sector - Adapting to Future Markets and Environments'. The conference would bring together different stakeholders on a single platform to deliberate, discuss and develop strategies for the sustainable development of the global teak sector and enable them to adapt to future markets and environments. India, being the largest market of teak timber in the world was selected to host the 5<sup>th</sup> version of the conference at the closing ceremony of the 4<sup>th</sup> World Teak Conference and would be organized by Kerala Forest Research Institute (KFRI), India and TEAKNET, India in collaboration with different National (MoEF & CC, ICFRE and DST) and International organizations (ITTO, IUFRO and FAO). The pre-conference activities propose to dwell in detail on the current challenges of the teak sector, initiate programmes, develop networks and consolidate the information as deliverable outputs during the 5<sup>th</sup> World Teak Conference.

## 1.2 Relevance

Teak is a species that was at the vanguard of globalization in the forestry sector over two centuries. The COVID - 19 pandemic related disruptions had undesired effects on the global teak sector by threatening their sustainability, disrupting trade, supply chains and the linked livelihood options. This is in addition to the existing problems such as climate change induced growth constraints, erosion of the gene pool and emergence of new pests and diseases. Though the entire teak sector has been in the doldrums during the pandemic period, the emerging new opportunities in a post COVID scenario should be harnessed for the betterment of the sector. Expansion of the plantations into new areas, enhancing conservation of the genetic base, improving efficiency of the legal and supply chains and assuring markets would boost confidence in the sector. Further, the teak sector could become more important in future due to the rapid growth in the demand for green products, especially wood for construction.

Over the past decade, several international seminars/workshops were held across Asia - Pacific to address the issues relating to teak resource management and utilisation. However, knowledge of performance and behaviour of teak in planted forests/clonal trees and agroforestry systems is still inadequate in the context of sustainable tropical forest management (SFM). Further, timber trade and SFM are the two key components of globalization and sustainable development of teak wood sector. The 5<sup>th</sup> World Teak Conference proposes to address the major challenges of 'new age eco-products' of teak that use innovative technologies for quicker production of quality timber and value addition to the products together with reducing wood waste for overcoming the limitations of small dimensional new resources and develop guidelines for adapting the sector to future markets and environments.

India, being one of the largest producers and a major importer of teak would greatly benefit from the conference both from a technical point of view and in developing sustainable markets. As such, India has a very dynamic teak production and market sector with the following emerging scenarios.

- While the State Forest Departments have initiated afforestation programmes to bring about ecological transformation, there are also efforts from private sectors to invest on growing high-value timbers like teak in India.
- The increasing trade flows in quantity and value from teak producing countries towards India
- The price trends of teak timber continue to increase in India
- The increasing scarcity of naturally grown high-quality teak wood from Myanmar and India

The above situation represents a typical case of many other tropical countries in Asia, Africa and Central and South America, where extensive teak plantation programmes have been launched recently. Besides the producer countries, many non-governmental/private organizations of user countries in Europe especially the Netherlands, France and Finland have made considerable investments in teak plantation and research programmes in South and Central America as well as African countries. They are optimistic about the good economic returns. However, there have been few efforts to discuss the constraints and propose strategies for a wide array of issues such as conserving teak genetic resources, developing legal supply chains, sharing innovations in plantation management and exploring the potentials of these plantations in the global efforts on forest land restoration. In this context, the 5<sup>th</sup> World Teak Conference proposes to bring together different stakeholders on a single platform to deliberate, discuss and develop strategies for the sustainable development of the global teak sector and enable them to adapt to future markets and environments

### 1.2.1 Conformity with ITTO's objectives and priorities

#### *Compliance with ITTA 2006 objectives*

The project is consistent with the requirements of ITTA, 2006 objectives (e), (h), (k), (l) and (s) of Article 1

- e) to promote the expansion and diversification of international trade from sustainable sources through improving the structure of international trade, taking into consideration both the long-term increase in consumption and continuity of supply, and prices which reflect the cost of sustainable forest management and which are remunerative and fair of the Members, and work toward improving market access. This is especially relevant for teak timber development through tropical plantations with the existing situation of producer member countries.
- h) to improve market information in order to achieve greater transparency of the international timber market, by collecting, compiling and disseminating trade data on teak timber.
- k) to improve marketing and distribution of teak timber and product exports from sustainably managed and legally harvested sources and which are legally traded including promoting consumer-awareness.
- l) to strengthen the capacity of members for the collection, processing and dissemination of statistics on their trade in timber and information on the sustainable management of their tropical forests.
- (s) to Identify and address relevant new and emerging issues in teak wood resources, log grading and price changes.

### 1.2.2 Relevance to the submitting country's policies

National forest policy of 1988 encourages trees outside forests for industrial needs and effective maintenance of ecological and environmental stability of the forest lands through conservation. Similarly, Agroforestry policy of 2014 encourages expansion of tree plantation in integrated manner to improve productivity, employment, income, and livelihoods of rural households, especially the small-holder farmers. Government of India has joined hands with agencies such as United States Agency for International Development (USAID) in a consortium led by Centre for International Forestry Research (CIFOR) and World Agroforestry (ICRAF) in expanding tree cover outside forests to enhance livelihoods and ecosystem services since 2022. The 5<sup>th</sup> World Teak Conference provides a good platform for developing much more inter and intra sectoral linkages in supporting such programmes.

Recent scheme of Government of India on doubling farm income can be achieved through short-rotation teak cultivation for high-quality timber in agroforestry settings. Timber production facilitates rural employment and livelihood specifically for loggers, transporters, artisans, and small-scale processing units. The 5<sup>th</sup> World Teak Conference brings together multiple stakeholders in this supply chain to discuss and sort out the constraints in furthering this initiative by the Government of India.

The current policy of India such as **Make in India** and **Aatma Nirbhar Bharat** (self-reliant India) encourages production of wood domestically and export of finished goods. India imports approximately 90,000 m<sup>3</sup> of teak wood per year from African and South American countries. At present, the price of teak products in the Indian domestic market is influenced by the availability of imported teak wood. The 5<sup>th</sup> World Teak Conference with dedicated sessions and opportunities for B2B meetings will offer viable solutions for sustained supply of teak timber to India from across the globe.

### 1.3 Target area

#### 1.3.1 Geographic location

The project has a global coverage. Technically, the project will be implemented by Kerala Forest Research Institute (KFRI) in association with TEAKNET. KFRI is located at Peechi, Thrissur, Kerala, India. TEAKNET operates from its headquarters at the Kerala Forest Research Institute (KFRI). **The conference is planned to be held at the 5-star Grand Hyatt Kochi Bolgatty at Kochi, Kerala, India. The venue is located on 26 acres of lush green land on the serene Bolgatty Island and is a waterfront urban resort overlooking the backwaters of Vembanad Lake in Kerala. The conference location has good connectivity via road, rail and flights. It is 32 kms from the Cochin International Airport.**

**The conference venue has multi-functional meeting spaces equipped with the latest audio-visual equipment and broadband Wi-Fi access. The conference would be held in the Main Ball room of Grand Hyatt with a 750 sq m of meeting and event space and would have a seating capacity of 500-600 persons. The exhibition space for private companies and scientific poster presentations is planned in adjacent ballrooms measuring 750 sq m each. A board room with a seating capacity of 30 (round tables) will be kept aside for Business to Business (B2B) meetings and small group meetings. The selected venue also offers a spacious foyer for arranging food and refreshments for the participants. The main office for managing the conference and serving the needs of the participants will be located adjacent to the main hall.**

#### 1.3.2 Social, cultural, economic and environmental aspects

##### Social aspects

The project is relevant to almost all tropical teak producer countries and there are indications that commercial teak plantations can be designed for local benefits involving teak grower, processor and trading communities. The proposed teak conference would be an ideal platform for the different stakeholders to interact and develop strategies to address sustainable teak production and expanding market opportunities.

##### Cultural aspects

In the older times, teak trees were found in abundance in moist deciduous forest tracts of Asia-Pacific. During the era of colonization, natural teak resources were greatly depleted due to overexploitation. However, teak planting activity in the public sector has been on the increase afterwards not only in Asian countries but also in other parts of the world. The importance of teak in family farming, forest conservation and management along with its prominent position in the global timber market and trade have resulted in the remarkable expansion of teak plantations in about 70 tropical countries throughout tropical Asia, Africa, Latin America and Oceania. The proposed teak conference would be an ideal platform for the stakeholders from different cultural settings to share ideas and explore future opportunities.

##### Economic aspects

The economic benefits cannot be quantified from the project although qualitatively it is expected to enhance the contributions to the tropical timber economy by way of promoting networking and showcasing the potential of teak in future markets and changing environments. It would provide an opportunity to assess the teak resources and emerging market scenarios in different parts of the world and facilitate business-to-business contacts.

##### Environmental aspects

The project is envisaged in the backdrop of the UN decade of Eco-restoration and would bring forth strategies for integrating the expanding teak plantations and small holder teak sector in the global efforts. **Specific sessions will be devoted for promoting environmental aspects of teak plantations.**

#### **1.4. Expected outcomes at project completion**

The project is expected to produce the following outputs:

- ✓ Clear understanding of national policies and programmes of the teak producing countries and particularly in promoting the trade from further processing and marketing of teak products
- ✓ Addressing emerging scenarios with respect to climate change induced growth constraints, erosion of the gene pool, new pests and diseases and opportunities in a post COVID scenario.
- ✓ Identification of the lead institutes in relevant areas of research and training as well as networking to cater to the needs of the international stakeholders
- ✓ Establishment of working relationships with necessary commitments among the participating stakeholders for developing focussed strategies for specific groups.

The information generated through the 5<sup>th</sup> World Teak Conference will be of immense use to the policy makers, traders and researchers.



## **PART 2: Project Rationale and Objectives**

### **2.1 Rationale**

Teak has world-wide reputation as a high-quality tropical timber. Over the recent years, teak has attracted the attention of investors from both public and private sectors in the massive tree cultivation programmes. While the global teak plantations are estimated to exceed 5.4 million ha, 94% is located in tropical Asia. Involvement of farmers and small land holders in industrial wood supply from shorter rotations of 20-30 years is increasingly becoming common in most of the teak growing countries including India. The rapid expansion of teak plantations, however, poses a risk of undermining the reputation of teak in global market place because of wide variations in wood quality with the net effect of reducing the prices and therefore the financial viability of teak planting programmes. To avoid this, teak growers, at the community and government/ industrial levels, must ensure that the wood they produce is of the highest possible quality, which will mean carefully choosing the right sites, good genetic stock, employing optimal rotation cycles and appropriate silvicultural techniques. Although, teak is grown widely over the globe, precise information on its production or extent is lacking. Similar is the case with several other features of the teak wood resources. An integrated international market intelligence and pricing mechanism are also not available for the species. The traders depend many often on advertisements by private agencies on the availability of teak wood and the prices. Lack of knowledge about teak wood resources, availability of timber for sale and local prices across the local and international markets, leads to economic losses to the producers and traders. Though research and development has been going on for years in all aspects of teak farming and markets, there exists serious gaps in the knowledge dissemination to the stakeholders. Apart from this, recent years have also brought to the fore a plethora of problems in the teak sector such as climate change induced growth constraints, erosion of the gene pool, emergence of new pests and diseases and disruptions in the markets by way of COVID -19. In this context, the present 5<sup>th</sup> World Teak Conference in India during 17-20 September 2025 with the theme 'Sustainable Development of the Global Teak Sector - Adapting to Future Markets and Environments' proposes to bring together different stakeholders on a single platform to deliberate, discuss and develop strategies for the sustainable development of the global teak sector and enable them to adapt to future markets and environment. The pre-conference activities propose to dwell in detail on the current challenges of the teak sector, initiate programmes, develop networks and consolidate the information as deliverable outputs during the 5<sup>th</sup> World Teak Conference. The conference proposes to bring together different stakeholders on a single platform to deliberate, discuss and develop strategies for the sustainable development of the global teak sector and enable them to adapt to future markets and environments. India, being the largest market of teak timber in the world was selected to host the 5<sup>th</sup> version of the conference at the closing ceremony of the 4<sup>th</sup> World Teak Conference and would be organized by Kerala Forest Research Institute (KFRI), India and TEAKNET, India in collaboration with different National and International organizations.

#### **2.1.1 Institutional set-up and organizational issues**

The Kerala Forest Research Institute shares the country's mandate to work towards sustainable forest management including plantations and trees outside forests. Teak has been a priority species for the Institute and has produced considerable research outputs and organized several conferences, seminars and workshops on teak over the past five decades. The Institute has also produced several documents in the form of research reports, manuscripts and CDs on several aspects of this species. KFRI hosts the Teak Museum at its Nilambur Sub Centre, a unique museum dedicated for a single species. The Institute is well equipped with experienced manpower and infrastructure. TEAKNET, the International Teak Information Network has its headquarters at KFRI. KFRI and TEAKNET have organized international teak events before, e.g., the international workshop on the Production and Marketing of Teakwood: Future Scenarios, 23-25 Nov. 2009. The detailed list of International events organized by these organizations is given in Annex 1.

This project is planned to be executed jointly by KFRI and TEAKNET in collaboration with National (MoEF & CC, ICFRE and DST) and International Organizations (ITTO, FAO and IUFRO) and designed in such a way that the outputs will be beneficial to all stakeholders especially the growers, traders, researchers and policy makers.

## 2.1.2 Stakeholder analysis

Before a formal stakeholder analysis is presented, certain descriptions are made here of the beneficiaries and the technical aspects involved.

### Target beneficiaries

Target beneficiaries include teak growers, traders, researchers, international organizations and policy makers. The teak growers include both public sector and private growers.

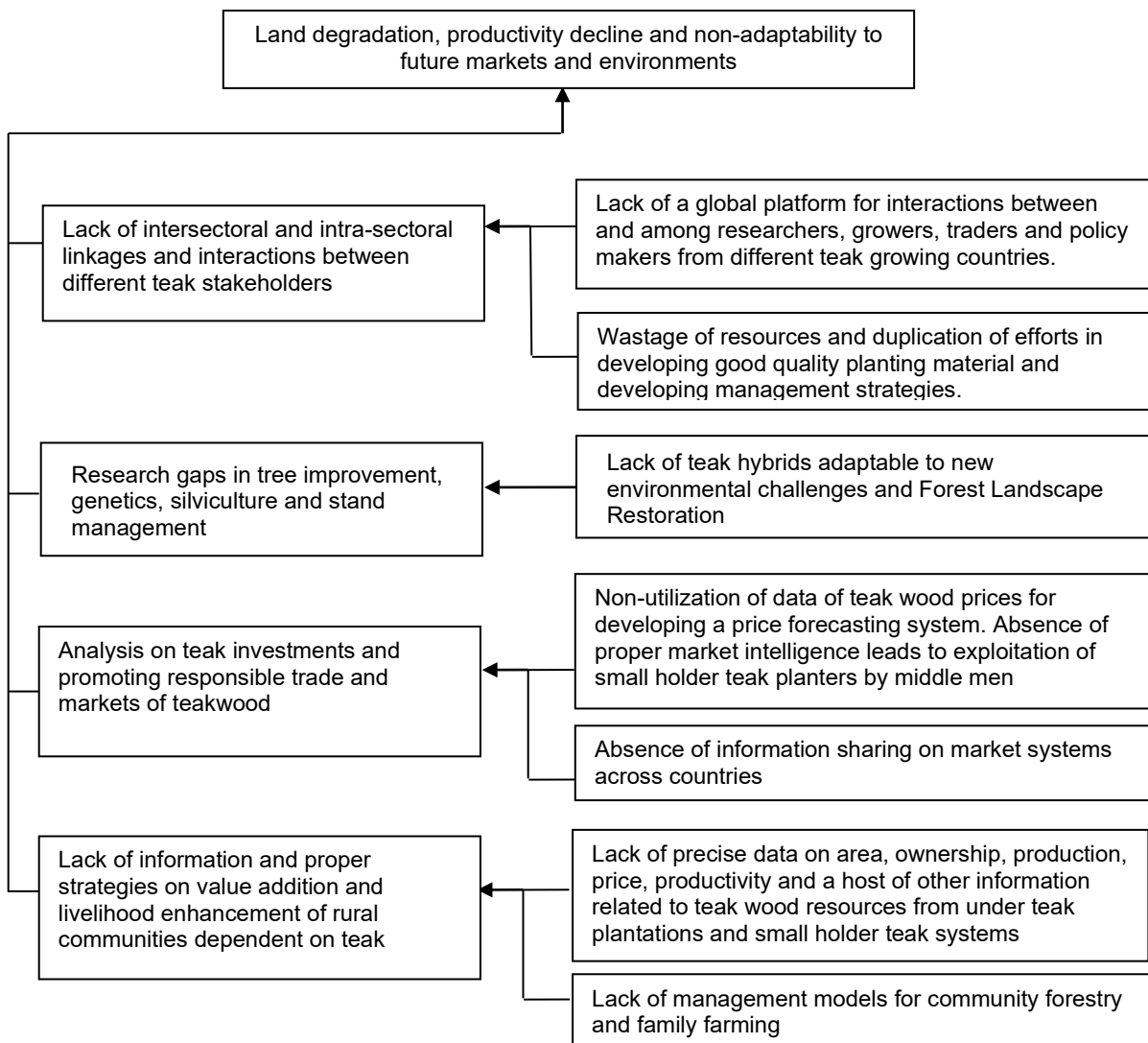
A formal stakeholder analysis as per the ITTO specifications is depicted in the following.

Stakeholder group	Characteristics	Problems, needs, interests	Potentials	Involvement in the project
<b>Primary stakeholders</b>				
International institutions like FAO, IUFRO and ITTO	Agencies actively involved in assessment of the status of forests and promotion of sustainable management of these forests.	Need country wise information on teak wood resources and dependent communities	Responsible of monitoring the status of forests, providing assistance to countries	Technical support in the conduct of the World Teak Conference
Traders	Derive income by trading teak wood	Networking, Need information on availability of timbers and prices and lack of information on new opportunities and markets	Can facilitate marketing of teak wood	Target beneficiaries of market information and trade potentials
<b>Secondary stakeholders</b>				
Research institutions	Have research missions	Need financial support and facilities for effective research	Capable of generating new and useful information through data analysis	KFRI involved in project implementation
Policy makers	Part of the government bodies of different countries	Need information on new strategies and advanced management prospects, long term demand for teak wood	Responsible for making policies; have control on legal and financial aspects of growing and trading teak	Target beneficiaries of research output
State Forest Departments/ Corporations	Grow and sell teak in large scale, responsible for policy regarding teak cultivation	Need advice in cultivation practices, concerned about sustainable management of forests	Great impact on production and marketing	Benefited by better market intelligence
<b>Tertiary stakeholders</b>				
Teak growers	Derive income by growing teak trees in homesteads	Need advice in cultivation practices, affected by government policies, interested in quick income	Can contribute to production substantially	Target beneficiaries of information dissemination
Teak wood product consumers	Users of teak wood products	High price of teak wood	Sustained markets	Benefited by affordable prices in the long run

TEAKNET	Involved in networking, information dissemination, opinion forming regarding all aspects of production and marketing of teak wood	Lack financial support for networking activities	Information dissemination	Involved in project implementation
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### 2.1.3 Problem analysis

**Problem tree for key problem: Challenges in sustainable forest management, erratic and unpredictable price trends and the lack of a communication platform for inter-sectoral and intra-sectoral interactions among concerned stakeholders and supporting policy decision-making are key problems for the globally expanding teak sector. The below figure presents a problem tree that displays the logical sequence of the identified major challenges.**



**The above identified key problems can be grouped into 4 major spheres of action:**

#### **1. Lack of information and proper strategies on value addition and livelihood enhancement in the teak sector**

**The lack of information and proper strategies for value addition and livelihood enhancement in the teak sector can indeed pose challenges for stakeholders, including farmers, processors, and policymakers. Teak is a valuable timber species known for its durability and aesthetic qualities. Enhancing value addition and livelihoods in the teak sector requires a multi-faceted approach that considers various aspects such as sustainable cultivation, processing techniques, market access.**

and community engagement. Assessing modern and efficient processing techniques to maximize the value of teak products like better drying methods, advanced sawmilling, innovative wood treatment processes etc. would help to assess needs and develop customized training modules for local artisans and woodworkers in different teak growing regions. The 5<sup>th</sup> World Teak Conference proposes a dedicated thematic session on this aspect, which would give an opportunity to look into the end use of teak wood resources under plantations and small holder teak systems and develop management models for community forestry and family farming. This session would help to address and evolve strategies for value addition, markets and legal supply chains for teak in tune with the changing global scenarios.

## **2. Promoting investments and responsible legal trade and markets of teakwood**

Investing in teak plantations and promoting responsible legal trade and markets of teakwood requires a holistic approach that considers environmental, social, and economic aspects. By promoting sustainability, transparency, and ethical practices, the teakwood sector can contribute to the well-being of communities, conservation of forests, and the growth of a thriving market that values high-quality, responsibly sourced teakwood products. A dedicated session in the 5<sup>th</sup> World Teak Conference would assess the benefit – cost analysis of teak investments and certification of teak products across the globe and would help develop documents to be used by policy makers to facilitate enabling environments for investments and responsible trade and markets of teakwood.

## **3. Identifying research gaps in tree improvement, genetics, silviculture and stand management**

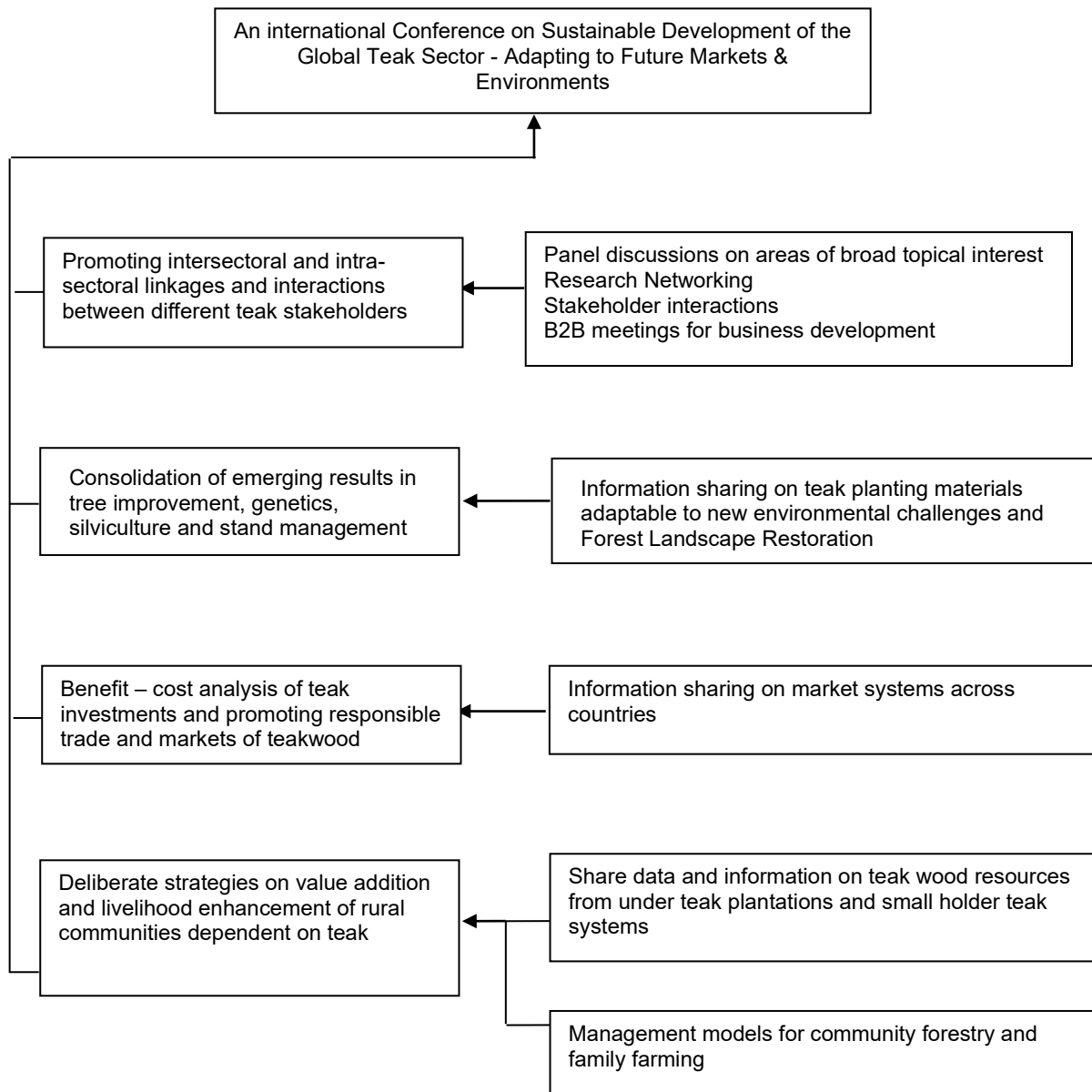
Research in teak tree improvement, silviculture, and stand management is critical for sustainable forestry practices, biodiversity conservation, and enhancing timber production. While significant progress has been made in these areas, there are still several research gaps that need attention. Tree Improvement and Genetics needs to look beyond the conventional techniques to adapt the plants to new environments and infuse climate resilience using advanced tools in genomic selection. Also, research on the genetic diversity and efforts to conserve the same is important to guide conservation efforts and maintain healthy and resilient populations of tree species. Evaluating silvicultural practices that induces maximum productivity in short rotation plantations, exploring approaches to enhance carbon sequestration, mitigate climate change impacts, and contribute to overall landscape resilience would also be crucial in the coming decades.

At present, teak plantations are mainly viewed from a production perspective, while assessing the multiple ecosystem services provided by these systems such as water regulation, carbon storage, biodiversity conservation, and cultural values would bring forth more value and meaning to decisions promoting teak systems across the globe. Further, emerging threats due to new pest and diseases and invasive alien species needs timely interventions and knowledge sharing. Exploring the use of remote sensing technologies and data analytics for real-time monitoring of forest stands would cut costs and enable timely interventions and adaptive management in large plantations. However, addressing these research gaps require collaborative efforts among researchers, practitioners, policymakers, and local communities and the 5<sup>th</sup> World Teak Conference would provide an ideal platform for sharing and discussing these emerging issues in the teak sector. Advancing knowledge in tree improvement, genetics, silviculture, and stand management would contribute to a more sustainable and resilient teak system that would assure higher productivity, provide essential services and benefit current and future generations.

## **4. Establishing effective platforms for both inter-sectoral and intra-sectoral interactions**

Collaboration and information exchange among different stakeholders between different sectors and within the teak sector, is essential for sustainable development. However, the absence of effective platforms for such interactions hinders the sharing of knowledge, best practices, and innovations. Inter-sectoral collaboration with related industries can lead to synergies and new business opportunities. Meanwhile, intra-sectoral interactions among various stakeholders (farmers, researchers, policymakers, traders) can improve coordination and help address common challenges. The 5<sup>th</sup> World Teak Conference as that of the previous Teak Conferences would have special plenary sessions and small group meeting to promote such linkages.

**Solution tree for key problem:** An International conference with representatives from government institutions, the private sector, universities, research institutes, international and non-governmental organizations to share knowledge and experience and to exchange ideas on the multiple economic, social and environmental benefits that teak resources can provide. The deliberations would help sustainable development of the global Teak sector and enable them to adapt to future markets and environments. The below figure displays the respective solution tree to the identified key problems and major fields of action.



## 2.1.4 Logical framework matrix

Strategy of intervention	Measurable indicators	Means of verification	Key assumptions
<p><b><u>Development Objective</u></b></p> <p><b><u>Enhancing the Resilience and Sustainability of the Global Teak Sector through Innovations in Cultivation, Forest Management, and Market Strategies</u></b></p>	<p><b><u>Long term effects such as adoption of the strategies and improvements in forest management, processing and trade of teak wood products, capacity enhancements and livelihood improvement of teak dependent communities and strengthened teak networks</u></b></p>	<p><b><u>Stakeholder surveys and feedbacks, specific case studies and global collaborations in research, capacity building and teak business.</u></b></p>	<p><b><u>Willingness and effective participation of the teak stakeholders</u></b></p>
<p><b><u>Specific Objective</u></b></p> <p>Bring a wide spectrum of teak stakeholders on a single platform to deliberate, discuss and develop strategies to enable the sector to adapt to emerging and future markets/ environments.</p>	<p>Immediate effects such as</p> <ol style="list-style-type: none"> <li>1. Attendees</li> <li>2. Participant engagement</li> <li>3. Feedback</li> <li>4. Publications</li> <li>5. National and International collaborations</li> <li>6. Networking</li> <li>7. Knowledge dissemination</li> </ol>	<ol style="list-style-type: none"> <li>1. Attendee analysis</li> <li>2. Online and offline surveys</li> <li>3. Collaborations – Research and Business</li> <li>4. Citations and references of the conference publications</li> </ol>	<p>Willingness and effective participation of the teak stakeholders from different sectors</p>
<p><b><u>Outputs</u></b></p> <p>Output 1 Thematic papers on subthemes of the main themes of 5<sup>th</sup> World Teak Conference</p> <ul style="list-style-type: none"> <li>- Value addition and their markets</li> <li>- Cost-benefit analysis on short rotation teak investments in different teak growing regions</li> <li>- Recent advances in teak genetics, stand management and legal supply chains</li> <li>- Management models for small holder teak plantations in Asia, Africa and Latin America</li> </ul>	<p>Thematic papers (5 Nos.)</p>	<p>Thematic papers</p>	<p>Active participation of the resource persons</p>

<p>- Environmental protection, biodiversity conservation and Forest Landscape Restoration</p> <p>Output 2 Webinars on subthemes of the major themes of 5<sup>th</sup> World Teak Conference</p> <p>Output 3 Proceedings of the World Teak Conference</p> <p><b><u>Output 4</u></b> <b><u>Cross-Sectoral Collaboration to support the formation of public-private partnerships</u></b></p>	<p>Webinars (5 Nos.)</p> <p>Proceedings</p> <p><b><u>Number of Inter-Sectoral Partnerships due to the conference and related activities</u></b></p> <p><b><u>Joint Policy advocacy</u></b></p> <p><b><u>Technology and Innovation Transfer during the conference</u></b></p>	<p>Webinars</p> <p>Proceedings</p> <p><b><u>Networking events</u></b></p> <p><b><u>Exhibition</u></b></p> <p><b><u>Documents / MoUs of Collaborative Activities</u></b></p> <p><b><u>Joint policy document</u></b></p>	<p>Willingness and effective participation of the teak stakeholders from different sectors</p> <p>Willingness and effective participation of the teak stakeholders from different sectors</p> <p><b><u>Willingness and effective participation of the teak stakeholders from different sectors</u></b></p>
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## 2.2 Objectives

### 2.2.1 Development objectives and impact indicators

#### **Enhancing the Resilience and Sustainability of the Global Teak Sector through Innovations in Cultivation, Management, and Market Strategies**

The long-term impact indicators are:

1. Adoption of the strategies and improvements in cultivation, processing and trade of teak as assessed by stakeholder surveys and feedbacks
2. Capacity enhancements of teak stakeholders in site specific management of teak plantations and livelihood enhancement of teak dependent communities as indicated by specific case studies
3. Strengthened teak networks as indicated by global collaborations in research, capacity building and teak business.

### 2.2.2 Specific objectives and outcome indicators

The specific objective of the proposed World Teak Conference is to bring a wide spectrum of teak stakeholders on a single platform to deliberate, discuss and develop strategies to enable the sector to adapt to emerging and future markets/ environments.

#### The outcome of the World Teak Conference would be measured using the following indicators

1. **Attendance:** The number of attendees, representing countries and the spectrum of teak stakeholders (eg: traders, policy makers, researchers, students, farmers, artisans etc.) would be an important indicator in assessing the success of the conference. The higher the number of attendees across all these sectors vis – a – vis the previous teak conferences, the greater the impact of the conference.
2. **Participant engagement:** The level of engagement of the attendees would be another important indicator of the success of the conference. This would be measured by the number of questions asked during sessions, the level of discussion during workshops, and the amount of interaction on social media platforms.
3. **Feedback:** Feedback from attendees would be another valuable indicator of the success of the World Teak Conference. This would be measured through online and offline surveys.
4. **Publications:** The number of publications that result from the conference, such as conference proceedings, journal articles, or book chapters, would be an indicator to measure the impact of the conference.
5. **Knowledge dissemination:** The extent to which the knowledge presented at the conference is disseminated to the wider community would be an important indicator of the impact of the conference. This would be measured through social media metrics, downloads of conference materials, citations and other mechanisms.
6. **National and International collaborations:** The collaborations from different organizations in the conduct of the conference would indicate the level of interest and support for the conference.
7. **Networking:** The opportunities for networking among attendees would be an important indicator of the success of a scientific conference. This would be measured by way of post conference collaborations in research, trade and business.



## PART 3: Description of Project Interventions

### 3.1. Outputs and activities

#### 3.1.1 Outputs

Output 1: Thematic papers on subthemes of the main themes of the 5<sup>th</sup> World Teak Conference

Output 2: Webinars on subthemes of the main themes of the 5<sup>th</sup> World Teak Conference

Output 3: Proceedings of the 5<sup>th</sup> World Teak Conference

#### **Output 4: Cross-Sectoral Collaborations to support the formation of public-private partnerships**

#### 3.1.2 Activities

<u>Output 1</u>	<b>Thematic papers on subthemes of the main themes of the 5<sup>th</sup> World Teak Conference</b>
Activity 1.1	Identify and enlist key resource persons in major teak growing regions (Asia, Africa and South America) to act as lead resource persons for the region
Activity 1.2	Collate data and preparation of the thematic papers
Activity 1.3	Edit and publish the thematic paper in a systematic format and release the publications during 5 <sup>th</sup> World Teak Conference
<u>Output 2</u>	<b>Webinars on subthemes of the main themes of the 5<sup>th</sup> World Teak Conference</b>
Activity 2.1	Identify and enlist key resource persons to collate data and deliver the Webinar
Activity 2.2	Publicize the event through TEAKNET and KFRI websites
Activity 2.3	Conduct the Webinars
<u>Output 3</u>	<b>Proceedings of the 5<sup>th</sup> World Teak Conference</b>
Activity 3.1	Undertake the preconference activities like Information dissemination through electronic media for wide publicity
Activity 3.2	Develop a dedicated Conference Website
Activity 3.3	Develop and finalize the programme schedule
Activity 3.4	Invite, screen and finalize abstracts for technical sessions.
Activity 3.5	Finalize the list of resource persons and participants
Activity 3.6	Conduct the World Teak Conference
Activity 3.7	Develop, edit and finalize the 5 <sup>th</sup> World Teak Conference proceedings
<b>Output 4</b>	<b><u>Cross-Sectoral Collaborations to support the formation of public-private partnerships</u></b>
<b><u>Activity 4.1</u></b>	<b><u>Exhibition to facilitate the presentations of public institutions and private companies to the conference participants</u></b>

<b><u>Activity 4.2</u></b>	<b><u>Organize thematic round-table business meetings with participation of private companies from different countries and continents to facilitate new business contacts</u></b>
<b><u>Activity 4.3</u></b>	<b><u>Initiate the signing of Memoranda of Understanding to formalize new business contacts among private companies</u></b>
<b><u>Activity 4.4</u></b>	<b><u>Recruit new institutional and individual members for TEAKNET</u></b>

### 3.2 Implementation approaches and methods

**Kerala Forest Research Institute (KFRI) and TEAKNET, operating from its headquarters in Thrissur, Kerala, India, will carry out the project collaboratively with the support of international organizations (ITTO, IUFRO and FAO).**

**In spite of the fact that the world was just recovering from the impact of the COVID pandemic and restrictions were still in place in some countries, 302 delegates from 28 countries have attended the 4<sup>th</sup> World Teak Conference (WTC) in Accra, Ghana in 2022. All previous teak conferences had attendances in excess of 350 from more than 30 countries. Participation in the previous WTCs included representatives from government organizations, teak growers, traders, plantation managers, private businesses, academic institutes, research organizations, international organizations, NGOs, and students. As such, this conference offers a forum for stakeholder interactions, development of initiatives, and exchange of novel ideas on teak, a premium tropical hardwood that is extensively grown worldwide.**

**Based on the previous WTCs, the 5<sup>th</sup> World Teak Conference is expected to host more than 400 participants and the sessions / themes of the 5<sup>th</sup> World Teak Conference are as follows,**

- **Value addition, market and legal supply chains**
- **Cost-benefit analysis on short rotation teak investments in different teak growing regions**
- **Recent advances in teak genetics and stand management**
- **Socio- economic aspects and management models for small holder teak plantations in Asia, Africa and Latin America**
- **Environmental protection, biodiversity conservation and Forest Landscape Restoration**

**The Business-to-Business (B2B) sessions will enable traders and developers to adopt effective networking and trading strategies for the export and import of teak goods.**

### 3.3 Work plan

Project Elements	Responsible Party	Year 1			
		1	2	3	4
Activity 1.1 Identify and enlist key resource persons in major teak growing regions (Asia, Africa and South America) to act as lead resource persons for the region	TEAKNET				
Activity 1.2 Collate data and preparation of the thematic papers	Resource persons				
Activity 1.3 Edit and publish the thematic paper in a systematic format and release the publications during 5 <sup>th</sup> World Teak Conference	TEAKNET				
Activity 2.1 Identify and enlist key resource persons to collate data and deliver the Webinar	TEAKNET				
Activity 2.2 Publicize the event through TEAKNET and KFRI websites	TEAKNET				
Activity 2.3 Conduct the Webinars	TEAKNET				
Activity 3.1 Undertake the preconference activities like Information dissemination through electronic media for wide publicity	TEAKNET				
Activity 3.2 Develop a dedicated Conference Website	TEAKNET				
Activity 3.3 Develop and finalize the programme schedule	TEAKNET and KFRI				
Activity 3.4 Invite, screen and finalize abstracts for technical sessions	TEAKNET and KFRI				
Activity 3.5 Finalize the list of resource persons and participants	TEAKNET and KFRI				
Activity 3.6 Conduct the World Teak Conference	TEAKNET and KFRI				
Activity 3.7 Develop, edit and finalize the 5 <sup>th</sup> World Teak Conference proceedings	TEAKNET				
<b><u>Activity 4.1</u></b> <b><u>Exhibition to facilitate the presentations of public institutions and private companies to the conference participants</u></b>	<b><u>TEAKNET</u></b>				
<b><u>Activity 4.2</u></b> <b><u>Organize thematic round-table business meetings with participation of private companies from different countries and continents to facilitate new business contacts</u></b>	<b><u>TEAKNET</u></b>				

<b><u>Activity 4.3</u></b> <u>Initiate the signing of Memoranda of Understanding to formalize new business contacts among private companies</u>	<u>TEAKNET</u>				
<b><u>Activity 4.4</u></b> <u>Recruit new institutional and individual members for TEAKNET</u>	<u>TEAKNET</u>				

### 3.4 Budget

#### 3.4.1 Master budget schedule (USD)

Sl.no	Description	Type	Cost	Year	Total	Agency
<i>Activity 1: Thematic papers on subthemes of the main themes of the 5<sup>th</sup> World Teak Conference</i>						
A1.1	Project Assistant	Personnel	600/month	1,800	1,800	TEAKNET
A1.2	Project Associate	Personnel	750/month	4,500	4,500	
A1.3	<b><u>International Consultant- Responsible for forming an international scientific committee considering the five conference thematic areas. In charge of reviewing, editing and publishing the abstract and will be responsible for helping KFRI/ TEAKNET in coordinating the activities with international organisations</u></b>	Personnel	1200/month	3,600	3,600	
<i>Activity 2: Webinars on subthemes of the main themes of the 5<sup>th</sup> World Teak Conference</i>						
A2.1	Project Assistant	Personnel	600/month	1,800	1,800	KFRI
A2.2& 2.3	Resource Persons	Personnel	350/webinar	1,400	1,400	
<i>Activity 3: 5<sup>th</sup> World Teak Conference</i>						
A3.1	Web designing and maintenance	Personnel	5000/year	5,000	5,000	TEAKNET
A3.2	Project Assistant	Personnel	600/month	3,600	3,600	
A3.3	Administrator	Personnel	1000/month	3,000	3,000	TEAKNET/ KFRI
A3.4	<b><u>National Consultant – Coordinating the activities with concerned national level ministries and line departments. Facilitating the successful execution of the 5<sup>th</sup> World Teak Conference.</u></b>	Personnel	1000/month	3,000	3,000	
A3.5	Project Assistant	Personnel	600/month	3,600	3,600	
A3.6 & A4.1 to A4.4	Project Coordinator	Personnel	1500/month	18,000	18,000	
	Contribution to the costs of Conference venue	Conference	10000/day	30,000	30,000	
	Contribution to the costs of Food and refreshments	Conference	7500/day	22,500	22,500	
	Exhibition and hall arrangements	Conference	4000/day	12,000	12,000	
	Miscellaneous support (Field trip, etc.)	Conference	2500/trip	2,500	2,500	
<i>Duty travel and Miscellaneous</i>						
1.	Local Travel	Travel cost	250/month	3,000	3,000	KFRI
2.	<b><u>Invited Keynote Speakers and Resource Persons Travel Costs (10 Nos.). Expected number of the participants for the conference is approx. 400</u></b>	<b><u>Travel Cost</u></b>	<b><u>650/ person</u></b>	6,500	6,500	
3.	<b><u>Daily Subsistence Allowance including local transportation, food and lodging (USD 100 x 5 days x 10 persons)</u></b>	<b><u>DSA</u></b>	<b><u>500/person</u></b>	5,000	5,000	
4.	Capital Equipment (Laptop)	Capital Items	1500/item	1,500	1,500	
5.	Miscellaneous Consumables	Consumables	1200/year	1,200	1,200	

6.	Office supplies	Consumables	1000/year	1,000	1,000	
7.	Information, media, publication	Publicity	1200/year	1,200	1,200	
8.	Annual Audit	Audit	8000/year	8,000	8,000	
9.	Executing agency management cost (10% of the project budget)	KFRI	10% of Project	14,370	14,370	
<i>Project Monitoring &amp; Administration</i>						
1.	ITTO Monitoring and Review		10000	10,000	10,000	
1.	ITTO Programme Support Cost (12% of total cost)		20168	20,168	20,168	ITTO
	<b>Grand total</b>				<b>188,238</b>	

### 3.4.2 Consolidated budget by component

Description	Year 1	Total	Agency
1 Project Coordinator	18,000	18,000	TEAKNET
1 National Consultant for <b><u>planning and facilitating the entire Conference</u></b>	3,000	3,000	TEAKNET
1 International Consultant <b><u>for overall scientific process and coordination with international organisations. Additionally delivering a webinar on a specific topic depending on his expertise.</u></b>	3,600	3,600	TEAKNET/ KFRI
1 Administrator <b><u>in charge of all meetings, Abstract invitations and follow-ups, as well as keeping an accurate book of records.</u></b>	3,000	3,000	TEAKNET/ KFRI
1 Project Associates to <b><u>develop, coordinate and oversee the activities involved in executing the Conference, as well as in charge of data collection and facilitating the preparation of thematic papers.</u></b>	4,500	<b>4,500</b>	TEAKNET/ KFRI
4 Project Assistants <b><u>to identify and enlist key resource persons in major teak growing regions to deliver the Webinar. Assist the Project Associate to organise the Conference</u></b>	10,800	10,800	TEAKNET/ KFRI
4 Resource Persons <b><u>for conducting the webinars on the major thematic areas of the World Teak Conference</u></b>	1,400	1,400	TEAKNET/ KFRI
1 Web Designer <b><u>to develop a dedicated website for the conference</u></b>	5,000	5,000	TEAKNET/ KFRI
Contribution to the cost of Conference venue	30,000	30,000	TEAKNET /KFRI
Contribution to the cost of food and refreshments	22,500	22,500	TEAKNET /KFRI
Contribution to the cost of Exhibition and hall arrangements	12,000	12,000	TEAKNET /KFRI
Miscellaneous support (Field trip, etc.)	2,500	2,500	TEAKNET/ KFRI
Duty Travel (National & International)	9,500	9,500	KFRI
Daily Subsistence Allowance (DSA)	5,000	5,000	KFRI
Capital Equipment (Laptop)	1,500	1,500	TEAKNET
Miscellaneous consumables	1,200	1,200	KFRI
Office supplies	1,000	1,000	KFRI
Information, media, publication	1,200	1,200	KFRI
Annual Audit	8,000	8,000	KFRI
Executing agency management cost (10% of the budget)	14,370	<b>14,370</b>	KFRI
ITTO Monitoring and Review	10,000	10,000	ITTO
ITTO Programme Support Cost (12% of total cost)	20,168	20,168	ITTO
<b>Grand total</b>	<b>188,238</b>	<b>188,238</b>	

### 3.4.3 ITTO budget by components

Budget Component	Annual disbursements	Total	Year 1
10. Project Personnel		49,300	49,300
20. Sub-contract		67,000	67,000
30. Duty Travel		14,500	14,500
40. Capital / Equipments		1,500	1,500
50. Consumables		2,200	2,200
60. Miscellaneous		9,200	9,200
70. Executing Agency Management Cost (10%)		14,370	14,370
Subtotal 1		<b>158,070</b>	<b>158,070</b>
80. ITTO Monitoring, Evaluation and Administration Costs 81. Monitoring and Review costs 82. Evaluation cost		10,000	30,168
83. Programme Support Cost (12%)		20,168	
<b>ITTO TOTAL</b>		<b>188,238</b>	<b>188,238</b>

### 3.4.4 Executing agency budget by component

Budget Component	Annual disbursements	Total	Year 1
Salary of scientific personnel		49,300	49,300
Logistic support		27,400	27,400
Local facility		67,000	67,000
Executing Agency Management Cost		14,370	14,370
ITTO Monitoring, Evaluation and Administration Costs		30,168	30,168
<b>Total</b>		<b>188,238</b>	<b>188,238</b>

## 3.5 Assumptions, risks, sustainability

### 3.5.1 Assumptions and risks

The risk involved in the project is on the requirement of active and effective participation of the resource persons/researchers, and private/community sectors due to unplanned global disruptions (eg: COVID 19 in 2020).

### 3.5.2 Sustainability

The future operation and maintenance will have the following essential components:

- a) TEAKNET would follow up the recommendations of the 5<sup>th</sup> World Teak Conference in collaboration with relevant agencies, surveys and case studies
- d) The follow up activities from time to time will be transferred to the stakeholders on a continued basis through TEAKNET and KFRI websites and online platforms.

## PART 4: Implementation Arrangements

### 4.1 Organization structure and stakeholder involvement mechanisms

#### 4.1.1 Executing agency and partners

Kerala Forest Research Institute along with TEAKNET will perform the executing part.

#### 4.1.2 Project management team

The project will be implemented in India by, Kerala Forest Research Institute (KFRI) under the overall supervision of the Government of Kerala, India.

**A representative from the Indian Ministry of Environment and Forest will serve as the conference's chair. The local organiser is Kerala Forest Research Institute and the following Committee is constituted for the planning, organization and implementation of the World Teak Conference in 2025.**

<b><u>Conference Chair</u></b>	<b><u>:</u></b>	<b><u>Ministry of Environment, Forest and Climate Change, Govt. of India</u></b>
<b><u>Conference Co-Chair</u></b>	<b><u>:</u></b>	<b><u>Director, KFRI</u></b>
<b><u>Local Organizing Committee Chair</u></b>	<b><u>:</u></b>	<b><u>Representative, Govt. of Kerala</u></b>
<b><u>Local Organizing Committee Co- Chair</u></b>	<b><u>:</u></b>	<b><u>TEAKNET Coordinator</u></b>
<b><u>Finance Controller</u></b>	<b><u>:</u></b>	<b><u>Registrar, KFRI</u></b>
<b><u>Scientific Organising Committee Chair</u></b>	<b><u>:</u></b>	<b><u>Chairman, TEAKNET</u></b>
<b><u>Scientific Organising Committee Co-Chair</u></b>	<b><u>:</u></b>	<b><u>Steering committee member, TEAKNET</u></b>

**To organize the Conference, KFRI will form a Local Organising Committee headed by conference chair and co-chair for the registration, finance, publication, marketing and local arrangements. These committee convenors would be responsible for the coordination, management, implementation and monitoring of activities of the respective committees under supervision of the project coordinator.**

#### 4.1.3 Project steering committee

A Project Steering Committee (PSC) will be formed under the supervision of Director, KFRI for coordination of the project with the following structure:

Director, KFRI .....	Chairperson
Registrar, KFRI .....	Member
ITTO Representative .....	Member
FAO Representative.....	Member
IUFRO Representative .....	Member
TEAKNET Coordinator .....	Convener

Implementation of the project will be closely evaluated and guided by the Members of the PSC under the authorization given by the Chairperson.



#### 4.1.4 Stakeholder involvement mechanism

A major objective of the conference is facilitating interaction among stakeholders and also information dissemination will be implemented through TEAKNET currently hosted by KFRI.



#### 4.2 Reporting, Review, Monitoring and Evaluation

##### Project Progress Reports

Quarterly progress reports of the project will be made available to ITTO. The reports will conform to the standard format established in the *ITTO Manual for Project Formulation (1999)*. These reports will contain information on project performance for each activity and, if possible, completed outputs.

##### Project Completion Reports

The project completion report will be submitted to ITTO within 3 months of the completion of the project. The Executing Agency will undertake this responsibility in compliance with the Project Agreement and *ITTO Manual for Project Monitoring Review and Evaluation*.

##### Project Technical Reports

Project technical reports will be submitted to ITTO whenever technical results are available or within 3 months of the completion of the project. The reports will be prepared in conformity with the *ITTO Manual for Project Monitoring Review and Evaluation*.

##### Monitoring, Review and Steering Committee's Visit

The project will be subjected to monitoring by ITTO Monitoring Committee according to ITTO's guidelines. Monitoring visits by ITTO representatives may be fixed by the ITTO in consultation with the Executing Agency.

### **4.3 Dissemination and mainstreaming of project learning**

#### **4.3.1 Dissemination of project results**

The primary form of dissemination of project results will be through the project report which will be circulated to the major user agencies like National Forest Departments after submission and approval of the ITTO. Efforts will be made to publish the selected abstracts in reputed journals after collecting full articles from the authors. Publication of the World Teak Conference and allied activities through TEAKNET Bulletin, website and social media accounts will be the next mode of information dissemination. All the important events and proceedings of the workshops will be published in the TEAKNET website ([www.teaknet.org](http://www.teaknet.org)) which is accessible to all growers, traders and researchers internationally.

#### **4.3.2 Mainstreaming project learning**

The World Teak Conference and related activities would provide an excellent platform for deliberation, discussion, and solution-finding in the global teak sector. As a result, the project would help to achieve its goal of transforming the global teak sector from a suboptimal to a dynamic and sustainable entity. The project completion report will be submitted to ITTO within three months of the project's completion. The Executing Agency will undertake this responsibility in compliance with the Project Agreement and *ITTO Manual for Project Monitoring Review and Evaluation*. Publication of the project report and dissemination of Conference highlights and thematic papers through websites and newsletters.

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### Kerala Forest Research Institute (KFRI) Research Reports/Publications

1. Bhat K. M. and Indira, E.P. 1997. Effects of faster growth on timber quality of teak. KFRI Res. Report 137, 61p.
2. Bhat K. M. 2000 Investigations into heartwood formation in intensively managed teak plantations. KFRI Research Report No. 181.
3. Bhat K. M, Chacko, K. C and Balagopal M. 2001. Evaluation of high input management on growth and timber production in teak. KFRI Res. Report 200.
4. Bhat K. M, Nair K. K. N; Bhat K. V; Muralidharan E. M and Sharma J. K (eds). 2005. Quality Timber Products of Teak from Sustainable Forest Management. Kerala Forest Research Institute, India and International Tropical Timber Organisation, Japan, 670p.
5. Chand Basha, S., Mohanan, C. and Sankar, S. (eds) 1997. TEAK- Proceedings of Teak
6. Symposium, Trivandrum, Kerala, Kerala Forest Department & KFRI.
7. Mammen Chundamannil. 1996. Teak plantations in Nilambur; an economics review plantation in Kerala, KFRI Research Report 144.
8. Sarojam N. 2003. World bibliography on teak.

9. Bhat K. M., Priya P. B and Rugmini, P. 2001. Characterisation of juvenile wood in teak. *Wood Science and Technology* 34: 517-532
10. Bhat K. M and E.J. Maria Florence. 2003. Natural decay resistance of juvenile teak wood grown in high input plantation. *Holzforschung* 57(5):453-455.
11. Bhat K. M and Priya P. B. 2004. Influence of provenance variation on wood properties of teak from the Western Ghat region in India. *IAWA Journal* 25(3):273-282
12. Bhat K. M and Hwan Ok Ma. 2004. Teak growers unite. *Tropical Forest Update -ITTO Newsletter* 14 (1): 3-5. Yokohama, Japan.
13. Bhat K. M., Thulasidas P. K., Maria Florence E. J and Jayaraman K. 2005. Wood durability of home garden teak against brown and white rot fungi. *TREES; Structure and Functions* 19:654-660.
14. Bhat K. M. 2005. Wood and non-wood product chains of planted forests and the regional development in the tropics. *International Forestry Review* 7(5):105.
15. Bhat K. M., Thulasidas P.K., Maria Florence E. J. 2005. Timber quality of teak grown outside forests. *International Forestry Review* 7(5):121.
16. Krishnankutty, C.N. 1997. Demand, supply and price of teak wood in Kerala. Ph. D. thesis, Calicut University, 206p.
17. Thulasidas P. K., Bhat K. M. and Okuyama T. 2006. Colour variation of home garden teak wood grown in wet and dry localities of Kerala, India. *J. Tropical Forest Science* 18(1): 51-54
18. Thulasidas P. K., and Bhat, K. M. 2007. Chemical extractive compounds determining the brown-rot decay resistance of teak wood. *Holz. als Roh Werkstoff*. 65: 121-124

## Annexes

### Annex 1: Profile of the Executing Agency

#### The Kerala Forest Research Institute

KFRI was established in 1975 as an autonomous institution under the umbrella of the Science, Technology and Environment Committee (STEC) of the State. KFRI has come a long way since its establishment and secured a unique place among the leading forestry research organizations in tropical forestry. On 24 February 2003, KFRI came under the Kerala State Council for Science, Technology and Environment, a registered society under Travancore-Cochin Literary, Scientific and Charitable Societies Registration Act 1955 along with other five autonomous R & D Centres in the State.

KFRI's vision is, as a Centre of Excellence in Tropical Forestry, to provide the scientific backbone for effective conservation of forest ecosystem and sustainable utilisation of natural resources for ensuring benefits to the society at large. The main objective of the Institute is to undertake research in all aspects of forestry, wildlife management and wood science and technology. Specifically, KFRI aims at

- Providing technical support to facilitate scientific management and utilisation of forests for social benefits,
- Contributing to our understanding of the natural processes and patterns in the functioning of the forest ecosystem and their interrelationships with the quality of the environment.
- Providing information and advice to wood-using industries and general public on forest related subjects

The physical facilities of KFRI are spread around three campuses with the headquarters at Peechi and a Subcentre at Nilambur and a Field Research Centre at Velupadam. The Institute has well equipped laboratories to carry out modern research in tropical forestry to cater to the needs of various stakeholders.

#### Personnel

- |                                     |  |
|-------------------------------------|--|
| 1. Scientists with Ph.D.            | 31 (Junior Scientist to Chief Scientist)             |
| 2. Administrative staff             | 51 (Office attendant, Office assistant to registrar) |
| 3. Technical staff with B.Sc./M.Sc. | 06 (Electrical and Engineering officers)             |
| 4. Project staff with B.Sc./M.Sc.   | 91 (Project Fellows and Project Assistants)          |

#### **TEAKNET (International Teak Information Network)**

Teak is being grown in plantations in more than 70 countries across the globe although its natural occurrence is limited to India, Laos Myanmar and Thailand. In order to promote the interactions and share wealth of information among the stakeholders of teak wood sector, the idea of forming a teak network was conceived in 1991 and established TEAKNET for the Asia Pacific Region in Myanmar in 1995. As decided in the Regional Teak Workshop in Kerala, India 2007, the Secretariat of TEAKNET has been relocated in Kerala Forest Research Institute (KFRI). Since its inception at KFRI in 2008, the TEAKNET Secretariat has expanded its network from the Asia-Pacific to the International Teak Information Network. TEAKNET Secretariat is committed to enhance the capacity of international stakeholders particularly teak growers, forest resource managers, processors, traders, researchers and policy makers in responding effectively to the changing social, economic and environmental needs. This will cater to the needs of international stakeholders through web-based dissemination of information and new research findings in addition to bi-monthly e-newsletters.

#### *Overview of TEAKNET Events across the years*

Listed below are some of the successful international conferences/ side events organized by TEAKNET in the past. TEAKNET was involved in conducting the world teak conferences since 2011 and the past four World Teak Conferences were held in Asia, Latin America and Africa; the first in Costa Rica (2011); followed by Bangkok (2013), Ecuador (2015) and Ghana (2022). More than 300 delegates from 36 countries attended these conferences, representing national and regional Government representatives, teak cultivators and traders, plantation managers, private enterprises, universities, research institutes, international organizations, non-governmental organizations and so on.

Sl. No.	Year	Title
1.	2003	International Conference on “ <i>Quality timber products of teak from sustainable forest management</i> ”, 2-5 December 2003, KFRI, Peechi, India under the auspices of ITTO, Govt. of India & IUFRO.
2.	2007	Regional Workshop <i>Processing and marketing of teak wood products of planted forests</i> , Peechi, India 25-28 September 2007
3.	2009	International Workshop <i>Production and marketing of teak wood Future scenarios</i> , Peechi, India, 23-25 November 2009
4.	2011	First World Teak Conference: <i>Planted Teak Forests – a Globally Emerging Forest Resource</i> San José, Costa Rica, 31 Oct – 2 Nov 2011
5.	2011	International Training Programme <i>Innovations in the Management of Planted Teak Forests</i> , Kerala Forest Research Institute, Peechi, India, 31 August- 3 September 2011
6.	2013	Second World Teak Conference: <i>Sharing our Planet: Teak Model Development towards the Improvement of Mankind</i> 25-30 March 2013, Bangkok, Thailand
7.	2014	Project Formulation Workshop on <i>Sustainable Management and Genetic Conservation of Teak Resources</i> , 26-27 May 2014, Bangkok, Thailand
8.	2015	Third World Teak Conference: <i>Strengthening Global Teak Resources and Markets for Sustainable Development</i> , 11-15 May 2015, Guayaquil, Ecuador
9.	2016	TEAKNET Partner Event: <i>Global Significance of Teak- Present and Future</i> in Asia-Pacific Forestry Week, 22-26 February 2016, Pampanga, Philippines
10.	2017	TEAKNET Partner Event <i>Teak Resources for a Sustainable Future</i> in the IUFRO All Division 5 (Forest Products) Conference, 12-16 June 2017, Vancouver
11.	2018	TEAKNET Partner Event <i>Mainstreaming High Quality Timber Production from Planted Teak Forests and Efforts for Conservation of Teak Genetic Resources</i> , 23-27 October 2018, Beijing, China
12.	2019	TEAKNET Partner Event <i>Towards Sustainable Development of the Global Teak Sector in a Changing World</i> in the XXV IUFRO World Congress 29 September-05 October 2019, Curitiba, Brazil
13.	2022	TEAKNET Side Event <i>New Opportunities for Teak Sector in the Post-COVID Scenario</i> at World Forestry Congress at Seoul, Republic of Korea, 2-6 May 2022
14.	2022	4 <sup>th</sup> World Teak Conference <i>Global Teak Market Challenges and Opportunities for Emerging Markets and Developing Economies</i> at Accra, Ghana, 5 to 8 September 2022

#### Personnel

1.	Scientists with Ph.D.	01
2.	Administrative staff	01 (Coordinator PR & Communications)

## ANNEX 2

### Key personnel involved in the project

Role	Investigator	Duties/ Responsibilities
Project Coordinator	Dr. S Sandeep	Overall coordination, develop collaborations and conduct the conference
Associate Investigators	Dr. R Jayaraj Dr. Suma Arundev Dr. V Anitha	Assist coordinator in the conduct of the 5 <sup>th</sup> World Teak Conference and coordinate the preconference activities

### Curriculum vitae of the key personnel involved in the project

#### 1. Brief Biodata of Dr. S Sandeep

Name : Dr. S Sandeep  
 Position : Principal Scientist & TEAKNET Coordinator, KSCSTE – Kerala Forest Research Institute, Peechi - 680653, Kerala, India  
 Date of Birth : 25 May 1980  
 Sex (M/F) : Male  
 Institution : KSCSTE - Kerala Forest Research Institute  
 Peechi, Thrissur-680 653, Kerala

#### **Educational Qualifications:**

No.	Degree	Period of Study	University/Institute	Subject
1	Ph.D	2005 - 2010	Indian Agricultural Research Institute, New Delhi	Soil Science and Agricultural Chemistry
2	Post-Graduation	2003 - 2005	Indian Agricultural Research Institute, New Delhi	Soil Science and Agricultural Chemistry
3	B.Sc Agriculture	1997 - 2001	Kerala Agricultural University, Thrissur, Kerala	Agriculture

#### **Details of the Ongoing Relevant Research Projects**

No.	Title of Project	Amount (INR.)	Funding Agency
<b>Principal Investigator Projects</b>			
1	Scoping Study to Develop People-Inclusive Livelihood-Based Governance Strategy for the Long-Term Conservation of Mangrove Forests of Kerala	164 Lakhs (2021 - 2023)	Rebuild Kerala Development Programme, Govt. of Kerala
2	Developing organo-lime nanocomposites on graphene microstructures extracted from humic acids	32 Lakhs (2022-2024)	Dept. of Biotechnology, Government of India
3	Monitoring Eco-Restored sites at Chembikunnu in Wadakkanchery Range	30 Lakhs (2022-2025)	Kerala Forest Department, Govt. of Kerala

#### **Details of International/ National Conferences organized**

No.	Programme	Funding Agency
1	Regional Technical Workshop on Tree Volume and Biomass Allometric Equations in South Asia (2014)	FAO
2	National Seminar on Issues, challenges and strategies in sustaining soil health (2015)	Dept. of Science and Technology, Govt. of India and KFRRI

3	TEAKNET Side Event on New opportunities for Teak sector in the post COVID-19 Scenario alongside XV World Forestry Congress at Coex, Seoul, Republic of South Korea (2022)	ITTO and IUFRO
4	4 <sup>th</sup> World Teak Conference at Accra, Ghana	Forestry Commission – Ghana, ITTO, IUFRO, FAO and Private Sponsors

### **Recent relevant research articles**

1. P. Krishnapriya, P. Bijith and **S. Sandeep**. 2023. Physicochemical characteristics of shrimp ponds on mangrove ecosystems in Kannur District of Kerala, India. *Wetlands Ecology and Management*. <https://doi.org/10.1007/s11273-023-09916-5>
2. T. Ramesh., N.S.Bolan., M.B. Kirkham., H. Wijesekara., K.M. Manjaiah., C.S. Rao., **S. Sandeep**., J. Rinklebe., Y.S. Ok., B.U.Choudhury., H. Wang., C.Tang., X. Wang., Z. Song., O.W.Freeman. 2019. Soil organic carbon dynamics: Impact of land use changes and management practices: A review. *Advances in Agronomy*. <https://doi.org/10.1016/bs.agron.2019.02.001>
3. **S. Sandeep**, J. M. Ninu and K. A. Sreejith. 2019. Mineralogical transformations under fire in the montane grassland systems of the southern Western Ghats, India. *Current Science*, 116 (6), 966 - 971.
4. M.R. Mayadevi., P.K. Sushama and **S. Sandeep**. 2017. Effects of *in-situ* bioconversion of farm residues on growth and quality of banana cv. Nendran in laterite soils of Kerala. *Journal of Experimental Biology and Agricultural Sciences*, 5(3), 341 – 350.
5. **S. Sandeep**, K.M. Manajaiah, M.R. Mayadevi and A.K.Singh. 2016. Monitoring temperature sensitivity of soil organic carbon decomposition in maize – wheat cropping systems of semi arid India. *Environmental Monitoring and Assessment* 188:451. DOI 10.1007/s10661-016-5455-4.
6. **S. Sandeep**, K.M. Manajaiah, Sharmistha Pal and A.K.Singh. 2016. Soil carbon fractions under maize–wheat system: effect of tillage and nutrient management. *Environmental Monitoring and Assessment*. 188:14. DOI 10.1007/s10661-015-4995-3.
7. **S. Sandeep** and K.M. Manjaiah. 2016. Impact of tillage and nutrient management practices on soil aggregate carbon pools of rice-wheat cropping systems in semiarid India. *Indian Journal of Geomarine Sciences*. 45(2), 207 -214.
8. **S. Sandeep**, M. Sivaram, K.K. Sreejesh and T.P. Thomas. 2015. Evaluating Generic Pantropical Allometric Models for the Estimation of Above Ground Biomass in the Teak Plantations of Southern Western Ghats, India. *Journal of Tropical Forestry and Environment*. 5 (1): 1-8.
9. **Sandeep, S.** and Sujatha, M. P. 2014. Mineralogy of kaolin clays in different forest ecosystems of southern Western Ghats, India. *Current Science*, 107 (5): 875 - 882.
10. **S. Sandeep** and K.M. Manjaiah. 2014. Thermal stability of organic carbon in soil aggregates of maize wheat system in semi arid India. *Journal of Soil Science and Plant Nutrition*, 14 (3), 625-639.

### **Book chapters**

1. **Sandeep Sasidharan** and Sankaran Kavileveetil. 2022. Perspective Chapter: Forest Degradation under Global Climate Change. Intech Open.
2. **Sandeep Sasidharan** and Yasodha Ramasamy. 2021. Teak: The King of Timbers. In: Yasodha Ramasamy., Esteban Galeano., Thwe Thwe Win (eds) *The Teak Genome*. Springer - Nature, Singapore.
3. **Sandeep Sasidharan**. 2021. Teak Plantations and Wood Production. In: Yasodha Ramasamy., Esteban Galeano., Thwe Thwe Win (eds) *The Teak Genome*. Springer - Nature, Singapore
4. Manjaiah K.M., **Sandeep S.**, Ramesh T., Mayadevi M.R. 2017. Soil Organic Carbon Stocks Under Different Agroforestry Systems of North-Eastern Regions of India. In: Dagar J., Tewari V. (eds) *Agroforestry*. Springer - Nature, Singapore
5. M. Sivaram and **S. Sandeep**. 2016. Error Propagation in the Estimation of Greenhouse Gas Emissions due to Forestry Sector. In: *Statistics and Informatics in Agricultural Research*, IASRI, New Delhi. pp. 24 - 33.
6. P. Sureshkumar and **S. Sandeep**. 2016. Secondary Nutrients in Soils and their Management. In: *Soil Science: An Introduction*, Indian Society of Soil Science, New Delhi. pp 601 - 622.



7. Sujatha M. P., Bhindhu, P.S., **Sandeep, S.**, Suresh Kumar, P., Kavitha, C. and Remya, E.B. 2013. Soil fertility: Thrissur district. In Soil fertility Assessment and Information management for enhancing crop productivity in Kerala. Kerala State Planning Board.

## **2. Brief Biodata of Dr, R Jayaraj**

Name : Dr. R. Jayaraj  
 Position : Principal Scientist & Scientist-In-charge  
 Centre for analytical Instrumentation-Kerala (CAIK),  
 KSCSTE - Kerala Forest Research Institute, Peechi - 680653, Kerala, India  
 Date of Birth : 01 March 1977  
 Sex (M/F) : Male  
 Institution : KSCSTE - Kerala Forest Research Institute  
 Peechi, Thrissur-680 653, Kerala

### ***Educational Qualifications:***

Sl.No.	Degree	Period of Study	University/Institute	Subject
1	Ph.D	2003- 2007	Jiwaji University, Gwalior	Biochemistry
2	M.Sc	1997 - 1999	Madras University, Tamil Nadu	Biochemistry
3	B.Sc	1994 - 1997	Madras University, Tamil Nadu	Biochemistry

### ***Details of the Ongoing Relevant Research Projects***

No.	Title of Project	Amount (Durn.)	Funding Agency
<b>Principal Investigator Projects</b>			
1	Microplastics and phthalate esters in Urban water bodies – Occurrence, distribution and seasonal variation in selected urban areas of Kerala	27.92 Lakhs	Plan Grants, Govt. of Kerala
2	Synthesis, characterization and analysis of activated spherical carbon derived from lignocellulosic biomass	29.117	Plan Grants, Govt. of Kerala
3	Developing organo-lime nanocomposites on graphene microstructures extracted from humic acids	32 Lakhs (2022-2024)	DBT, Government of India

### ***Recent relevant research articles***

- Suma Arun Dev, Remya Unnikrishnan, R. Jayaraj, P. Sujanalal, V. Anitha (2021) Quantification of adulteration in traded ayurvedic raw drugs employing machine learning approaches with DNA barcode database. 3 Biotech (2021) 11:463, <https://doi.org/10.1007/s13205-021-03001-5>.
- Remya Unnikrishnan, Sumod M, R Jayaraj, P Sujanalal, Suma Dev (2020) The efficacy of machine learning algorithm for raw drug authentication in *Coscinium fenestratum* employing a DNA barcode database *Physiol Mol Biol Plants*, <https://doi.org/10.1007/s12298-021-00965-9>
- Unnimaya Raveendran, Ganga KA., S Viswanath, VB Sreekumar and R Jayaraj (2020) Nutritional evaluation of different bamboo species in Kerala as a sustainable food source. *Journal of Non-Timber Forest Products* 27(1), pp.22-26, 2020.
- Alina Paul and R Jayaraj (2020) Pesticidal properties of *Anamirta cocculus*, *Cardiospermum halicacabum*, *Cocculus laurifolius* and *Strychnos nux-vomica* against *Spodoptera litura* (Lepidoptera: Noctuidae)". *Indian Journal of Natural Products and Resources*, Vol. 11(4), December 2020, pp 295-306.
- Remya Unnikrishnan, Suma Arun Dev, R. Jayaraj (2020) Pitfalls and promises of raw drug identification techniques in the ayurvedic industry: an overview. 3 Biotech (2020) 10:497.
- Ravindran Jayaraj, Pankajshan Megha, Puthur Sreedev (2016) Organochloride pesticides, their toxic effects on living organisms and their fate in the environment. *Interdiscip Toxicol.* 2016 Dec; 9(3-4): 90–100.

7. R Jayaraj, N Sasidharan, Beenu Tom, Muhammad Anaz K (2016). Comparative phytochemical profiling and quantification of mangiferin content in species of Salacia from southern Western Ghats of India. *Journal of Biologically Active Products from Nature* (6 (3) 209 - 222)
8. Pillai TG, Jayaraj R (2015) *Colletotrichum gloeosporioides*: A True Endophyte of the Endangered Tree, *Cynometra travancorica* in the Western Ghats. *J Plant Pathol Microb* 6:267. doi: 10.4172/2157-7471.1000267
9. Pillai G, Jayaraj R (2015) Identification of Endophytic Fungi/opportunistic Pathogen from the Perennial Herb of Amaranthaceae Family. *J Plant Physiol Pathol* 3:1. doi:10.4172/2329-955X.1000140
10. Kunnumakkara AB, Sung B, Jayaraj Ravindran, Diagaradjane P, Deorukhkar A, Dey S, Koca C, Tong Z, Gelovani JG, Guha S, Krishnan S, Aggarwal BB. (2012) Zylamend suppresses growth and sensitizes human pancreatic tumors to gemcitabine in an orthotopic mouse model through modulation of multiple targets. *Int J Cancer*. 2012 Aug 1;131(3): E292-303. doi: 10.1002/ijc.26442. Epub 2011 Nov 9. PubMed PMID: 21935918; PubMed Central PMCID: PMC3288649.

### **3. Brief Biodata of Dr. Suma Arundev**

Name : Dr. Suma Arun Dev  
 Position : Principal Scientist & Head, Forest Genetics & Biotechnology  
 Division, Kerala Forest Research Institute, Peechi  
 680653, Kerala, India  
 Date of Birth : 13 May 1971  
 Sex (M/F) : Female  
 SC/ST : No  
 Institution : KSCSTE - Kerala Forest Research Institute  
 Peechi, Thrissur-680 653, Kerala

#### ***Educational Qualifications:***

No.	University/Institute	Dates	Field of Study	Degree
1.	Center for Ecological Sciences, Indian Institute of Science, Bangalore	2005-2008	Molecular Ecology	Post-Doctoral
2.	Cochin University of Science and Technology (CUSAT), Cochin, Kerala, India	1998-2003	Molecular Population Genetics	Doctorate in Philosophy (Environmental Biotechnology)
3.	Department of Botany, University of Kerala, Kariavattom, Trivandrum, Kerala, India	1994-1995	Genetics & Plant Breeding	Master of Philosophy
4.	Department of Botany, University of Kerala, Kariavattom, Trivandrum, Kerala, India	1991-1993	Genetics & Plant Breeding	Master of Sciences (Genetics & Plant Breeding)

#### ***Details of the Ongoing Relevant Research Projects***

No.	Title of Project	Amount Durn.)	Funding Agency
<b>Principal Investigator Projects</b>			
1	Conservation, Improvement, Management and Promotion of Sandalwood ( <i>Santalum album</i> Linn.) cultivation in India (AICRP-3)	47.40 Lakhs (2020-2025)	CAMPA-ICFRE, GOI (Multi-institutionary) (All India Co-ordinated Research Project –AICRP)
2	Genome wide and geospatial approaches for enhancing the adaptive potential of threatened rattan resources in India	104 Lakhs (2019-2023)	DBT, Government of India (Multi-Institutionary),

3	Assessment of adaptive genetic diversity in teak and sandalwood to guide conservation and genetic improvement efforts'	48 Lakhs (2019-2023)	DBT, Government of India (Multi-institutionary),
4	Establishment of a Center for DNA barcoding and Timber Forensics	26 Lakhs 2023-2025	Kerala Forest Development Fund (KFDF), Govt. of Kerala

### **Recent relevant Research articles (2020-2023)**

1. Sarath P, Dev SA, Sreekumar VB & Dasgupta M. (2022) Anthropogenic threats and habitat degradation challenge the conservation of palm genetic resources – an appraisal of current status, threats and look-ahead strategies. *Biodiversity and Conservation*. <https://doi.org/10.1007/s10531-022-02512-8> (IF - 4.296)
2. Sanil M.S, Swathi Balakrishnan, Sreekumar V.B., Suma Arun Dev (2022) Dipterocarps used India as a raft from Gondwana to Eurasia. *Taxon* <https://doi.org/10.1002/tax.12794> (IF- 2.8)
3. Eswaran M, Thangaraj K, Aliyar B, Dev SA, Balakrishnan S, Dasgupta M (2022) Development of a sensitive and single step PCR based assay for the detection of sandal spike phytoplasma. *Current Science* 122 (12): 1454-1459 (IF 1.13)
4. Sijimol K, Sreekumar VB, Suma Arun Dev (2022) Genetic diversity and structure of *Ochlandra travancorica* populations from Kerala part of the Western Ghats. *Journal of Bamboo and Rattan* 21 (1): 08-21.
5. Suma Arun Dev, Remya Unnikrishnan, Jayaraj R, Sujanapal P, Anitha V (2021) Quantification of adulteration in traded ayurvedic rawdrugs employing machine learning approaches with DNA barcode database. *3 Biotech* 11: 463 <https://doi.org/10.1007/s13205-021-03001-5> (IF -2.406)
6. Balakrishnan S, Dev SA, Sakthi AR, Vikashini B, Bhasker R, Magesh BS, Ramasamy R (2021) Gene-ecological zonation and population genetic structure of *Tectona grandis* L.f. in India revealed by genome-wide SSR markers. *Tree Genetics and Genomes* 17: 33. <https://doi.org/10.1007/s11295-021-01514-x> (IF -2.2197)
7. Dasguptha M, Dev SA, Parveen AM, Sarath P, Sreekumar VB (2021) Draft genome of *Korthalsia laciniosa* (Griff.) Mart., a climbing rattan elucidated its phylogenetic position. *Genomics* 113: 2010-2022. (IF -5.736)
8. Aparna Chakkamadathil Rajeev, Nishi Sahu, Kumar Arvind, Maushumi Deori, Tony Grace, Suma Arun Dev, Vijay Pal Yadav and Ilora Ghosh (2021) Exploring prevalence of potential pathogens and fecal indicators in geographically distinct river systems through comparative metagenomics. *Environmental Pollution* 282 (Article No.117003) <https://doi.org/10.1016/j.envpol.2021.117003> (IF 8.071)
9. Remya Unnikrishnan, Sumod M, Jayaraj R, Sujanapal P, Suma Arun Dev (2021) The efficacy of machine learning algorithm for raw drug authentication in *Coscinium fenestratum* (Gaertn.) Colebr. employing a DNA barcode database. *Physiol Mol Biol Plants* <https://doi.org/10.1007/s12298-021-00965-9> (IF -2.391)
10. Anoja Kurien, Suma Arun Dev, Sreekumar VB and Muralidharan EM (2020) The low copy nuclear region RPB2, as a novel DNA barcode region for species identification in the rattan genus *Calamus*. *Physiology and Molecular Biology of Plants*. <https://doi.org/10.1007/s12298-020-00864-5> (IF -2.391)
11. Unnikrishnan, R., Dev, S. A., & Jayaraj, R (2020) Pitfalls and promises of raw drug identification techniques in the ayurvedic industry: an overview. *3 Biotech*, 10(11). doi:10.1007/s13205-020-02482-0 (IF 2.391)
12. Sijimol, K., Suma Arun Dev and Sreekumar, V.B. (2020) DNA barcoding supports existence of morphospecies complex in endemic bamboo genus *Ochlandra Thwaites* of the Western Ghats, India. *Journal of Genetics* 99: 68. <https://doi.org/10.1007/s12041-020-01227-5> (IF 1.166)
13. Suma Arun Dev, Sijmol K, Prathibha PS, Sreekumar VB and Muralidharan EM (2020) DNA barcoding as a valuable molecular tool for the certification of planting materials in bamboo. *3 Biotech (Springer)* 10: 59 <https://doi.org/10.1007/s13205-019-2018-8> (IF 2.391)

#### **4. Brief Biodata of Dr. V Anitha**

Name : Dr. V Anitha  
Position : Senior Principal Scientist & Research Coordinator, Programme coordinator, Forestry & Human Dimensions Programme Division Head, Forest Economics Department, Kerala Forest Research Institute, Peechi 680653, Kerala, India  
Sex (M/F) : Female  
Institution : KSCSTE - Kerala Forest Research Institute  
Peechi, Thrissur-680 653, Kerala

#### ***Educational Qualifications:***

Name of Institution (City/Country)	Dates	Field of Study	Grade/Marks
Forest Research Institute, Deemed University, Dehra Dun, India	1997	Forestry	Ph.D.
Government College for Women, University of Kerala, Trivandrum, India	1993	Economics	Master of Arts (M.A.)
Govt. Training College, University of Kerala, Thiruvananthapuram, India	1991	Social Sciences	Bachelors of Education (B.E.)

#### ***Details of the Ongoing relevant Research Projects***

No.	Title of Project	Amount (INR)	Funding Agency
1	Demand and supply of teak resources in Kerala (Principal Investigator)	29.12 Lakhs (2023-2025)	Kerala Forest Department, Govt. of Kerala, India
2	Establishment of a center for DNA barcoding and timber forensics (Co-Principal Investigator)	26 Lakhs (2023-2025)	Kerala Forest Department, Govt. of Kerala, India

#### ***Technical Reports***

1. **Anitha V.**, Sandeep S. 2017. Wood Balance Study in Kerala. 2014-15. KFRI Report Research Report Number 574.P 49
2. Jayaraman, K; **Anitha V.** 2010. Forestry sector analysis for the state of Kerala. KFRI Report Number 345. 87p
3. Jayaraman, K; **Anitha, V**; Sivaram, M. 2008. Forestry sector analysis for the state of Kerala. KFRI Report Number 317. 65p

**Annex 3: Recommendations of ITTO's expert panel and resulting modifications**

<b><u>In Section 1.3.1</u></b>	<b><u>A comprehensive information of the conference location and facility is included.</u></b>	<b><u>Page No: 07</u></b>
<b><u>In Section 2.1.3</u></b>	<b><u>Included elaborate discussions based on the existing problem tree</u></b>	<b><u>Page No: 11</u></b>
<b><u>In Section 2.1.4 and Section 2.2.1</u></b>	<b><u>Redefined the development objective as suggested</u></b>	<b><u>Page No: 14 &amp; 15</u></b>
<b><u>In Section 2.1.4 and Section 3.1.1</u></b>	<b><u>One more output added in section 2.1.4 and 3.1.1 so as to match the number of causes and output .</u></b>	<b><u>Page No: 14 &amp; 17</u></b>
<b><u>In Section 3.2</u></b>	<b><u>Summarized the previous WTC participation, projected the anticipated number of participants for the 5<sup>th</sup> WTC conference. Specified the Conference Themes and Sessions</u></b>	<b><u>Page No: 18</u></b>
<b><u>In Section 3.4.1</u></b>	<b><u>Duties and responsibilities for consultants added in section 3.4.1. The number of invited keynote speakers and resource persons increased from 5 to 10. The travel cost of USD 650/ person may vary according to the departure country of the invited persons but the total amount will be limited to USD 6500. Recalculated the DSA to USD 100 for 5 days, taking into account local travel, food and lodging.</u></b>  <b><u>More than 400 attendees are anticipated for the conference based on the previous WTCs. Apart from the fully supported invited keynote speakers and resource persons, the budget also makes provisions to meet partial conference expenses for 75 participants in the budget section A3.6. Hence, the budget includes funds to assist a total of 85 attendees (10 fully funded invited keynote speakers/ resource persons + 75 partially funded attendees) to attend the Conference.</u></b>	<b><u>Page No: 21</u></b>
<b><u>In Section 3.4.2</u></b>	<b><u>Given attribute to each budget category</u></b>	<b><u>Page No: 22</u></b>
<b><u>In Section 4.1.2</u></b>	<b><u>Provided information on the project management team with their roles in section 4.1.2</u></b>	<b><u>Page No: 24</u></b>
<b><u>Annex</u></b>	<b><u>Included an Annex that shows the responses to the specific recommendations and respective modifications in tabular form</u></b>	<b><u>Page No: 37</u></b>