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# 4th International Congress on Planted Forests

Beijing, China, 23-27 October, 2018

## Planted Forests – A Solution for Green Development

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**Title:****A-01 Mainstreaming high-quality timber production from planted teak forests and efforts for conservation of teak genetic resources****Organizers:**

Name	Country	Organization	Email
PK Thulasidas	INDIA	International Teak Network information (TEAKNET)	coordinator@teaknet.org
PK Thulasidas	INDIA	Co-organised by International Union of Forest Research Organisations (IUFRO) Teakwood Working Party (Div 5.06.02)	thulasidas@kfri.org
Kenichi Shono	THAILAND	Supported by FAO Regional office for Asia Pacific (FAO RAP)	kenichi.shono@fao.org

**Time slot:**

1.5 hours

**Format:**

Oral presentations, Panel discussion

**Session description:**

The report “State of the World’s Forest Genetic Resources” published by FAO in 2014 lists tree species that are considered national priorities by the reporting countries for the conservation and management of forest genetic resources. Teak (*Tectona grandis* L.f.) takes the top rank in this list in more than 20 countries. Given the importance of teak for forest conservation and management and its prominent position in the global timber market and trade has resulted in remarkable expansion of teak plantations in about 70 tropical countries with the objective of producing and supplying large volume of superior-quality teak timber in the shortest possible time. At the same time, high-yielding forest plantations must be integrated into the wide context of forest landscapes and thus contribute to its restoration as well as the achievement of the global development agenda, particularly SDG 15. While at the same time, the natural teak forest area has declined substantially in all native teak growing countries and the genetic resource base is at high risk of losing its biodiversity.

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The Global Teak Study published by IUFRO in 2017 highlighted the importance of addressing these key issues related to genetic resources conservation, sustainable management, economics, production, markets and trade and the report also provides policy recommendations and guidance for future work in promoting sustainable management of natural and planted teak forests in the tropics. TEAKNET in association with IUFRO and FAO is in the process of launching a global teak support programme (GTSP) with the financial assistance of ITTO, first in the Mekong countries of Asia Pacific region, and later extending it to Africa and Latin America. Teak investments, when undertaken under the right climatic and edaphic conditions, using genetically superior planting material, have shown to yield attractive and robust return rates of more than 10% IRR, provided that good management and appropriate silvicultural practices are applied. The major economic challenge for teak growers is to produce quality wood that is acceptable in international markets. One increasingly important consideration influencing trade in plantation teak involves environmental certification and legality issues. Governments, buyers and retailers, mainly in western countries have embraced the principles of certification. In the future, public and private teak producers and processors will increasingly pursue voluntary certification schemes (forest management and chain-of-custody certification) to meet environmental, social and economic standards of responsible forest management and gain better access to high-price in timber markets. The specific objective of the session is to address: (1) Present options of high-quality timber production in planted forests as a component of forest landscape restoration; (2) Strengthen the understanding and knowledge of teak genetic resources, promote their sustainable use and management; (3) Review and improve the existing silvicultural systems and practices for better stand management on teak wood quality; (4) Review the international marketability of teak, among others.

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**Title:**

**A-02 Intra and inter tree-species variations to consider in planted forest:  
selection of the appropriate genetic material to plant under a changing climate**

**Organizers:**

Name	Country	Organization	Email
Christophe Orazio	France	EFI	Christophe.orazio@efi.int
Thomas Paul	New-Zealand	SCION	Thomas.Paul@scionresearch.com
Elisabeth Pötzelsberger	Austria	BOKU	elisabeth.poetzelsberger@boku.ac.at
Antonio Coreira	Portugal	ISA	ahcorreia@isa.ulisboa.pt
Nick MCCarthy	Ireland	WIT	NMCCARTHY@wit.ie

**Time slot:**

2 hours

**Format:**

Oral presentations, Debates, Dialogues

**Session description:**

Plantation forests allow the selection of tree species at the establishment phase to respond or target specific objectives e.g. profitable timber and pulp supply. Increasingly selection of plantation trees is also guided by objectives such as to increase the resilience of newly planted forests against threats and negative impacts emerging under a changing environment. –Traditionally forest manager referred to their experience based on past plantations and their learning from their successes or failures to establish new stands with particular species. In a context of global change, such historic knowledge might have reduced validity and possible better ways to gain knowledge of site - climate matching for plantation trees is needed. This extends beyond the establishment phase over the full rotation of plantations and the stand making it more challenging due to the longer rotations of some plantation species. Due to the longer timeframes the anticipation of and resilience towards risks (at least partly) associated with climate change, such as new pests and pathogens, as well as the changing climate itself on the physiological processes will be crucial. As foresters

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are becoming more and more aware of this issue, there is a need to develop decision support tools and improve knowledge of the real adaptive capacity of the recommended planting material for plantations. There are many ongoing initiatives all over the world ranging from knowledge compilation from existing stands and trials designing and deploying experimental infrastructures to monitor and anticipate climate change impacts on plantations and organising relevant information in an appropriate way to facilitate decisions on tree planting material for forest managers and regional authorities in charge of tree species choices regulations: (1) First results from REINFFORCE network of arboreta analysis, an estimate of the potential of adaptation of genetic material for plantations. Antonio Coreira, Christophe Orazio, Hernan Serrano. (2) The ESPERENCE approach in France, Céline Perrier, Olivier Picard. (3) Initiatives to support tree species/provenance selection in a climate change context. Brigitte Musch, Eric Paillassa, Hernan Serrano, Nick McCarthy, Christophe Orazio. (4) NEXT COST Action, an overview of the potential of exotic species under climate change in EUROPE, Elisabeth Potzelsberger, JC Bastien, Joana Vicente, Martin Gossner.

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**Title:****A-03 Forest genetics and genomics: the opportunities and challenges of climate change mitigation****Organizers:**

Name	Country	Organization	Email
Heidi Dungey	New Zealand	Scion	heidi.dungey@scionresearch.com
Simeon Smaill	New Zealand	Scion	simeon.smaill@scionresearch.com
Jianming Xue	New Zealand	Scion	jianming.xue@scionresearch.com

**Time slot:**

2 hours

**Format:**

Oral presentations

**Session description:**

Climate change is one of the most important global issues, one of the 17 UN Sustainable Development goals. Global climate change will expose forest trees to new challenges and will alter the short- and long-term selection pressures on trees. Drought and the incidence and intensity of pest and disease outbreaks are predicted to increase. These factors have the potential to radically alter our ecosystems as well as our global supply chains of fibre and wood from planted forests. In order for the UN goals to be achieved, science responses are also needed, including genetics, genomics and understanding the fundamental science of how trees grow and respond to biotic and abiotic risks. We propose a session that presents the tools that are available for risk management. New technologies are key to providing solutions that can be implemented rapidly and China is leading the world in many of these areas. From China, the latest genome sequencing, genotyping technologies available and how these can be implemented will be presented, with experience in model plants, conifers vs angiosperms. Challenges of adapting the technologies will be addressed for tree species with long genomes, high copy numbers and polyploidy. Breeding programmes have traditionally selected genotypes that were stable across environments. Climate change is likely to push this selection into new climate paradigms where selections no longer remain resilient, and outside the previous limits of tree breeding. Dr Simeon Smaill and Dr Heidi Dungey will present on breeding strategy responses that might be taken to mitigate this. Dr Jianming Xue will also present a hot-off-the press analysis

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of clonal and genomic differences in C13, breeding strategy responses and pro-active responses that can be undertaken to mitigate the effects that climate change will have on the economy and on the population. We will include and invited speaker (we hope to invite Harry Wu) from the planted forest experience in Europe, from the Ume? Plant Science Centre (UPSC). The challenges of managing a complex breeding population of a native tree species and their plans to include genomics.

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**Title:****A-04 Managing carbon and nutrient cycling for enhanced forest productivity and resilience under intensification of planted forest management and future climate scenarios****Organizers:**

Name	Country	Organization	Email
Peter Clinton	New Zealand	Scion	peter.clinton@scionresearch.com
Jianming Xue	New Zealand	Scion	jianming.xue@scionresearch.com
Osbert Sun	China	Beijing Forestry University	sunjianx@bjfu.edu.cn
Shirong Liu	China	Chinese Academy of Forestry	liusr@caf.ac.cn

**Time slot:**

2 hours

**Format:**

Oral presentations

**Session description:**

Food and fibre security, environmental degradation and climate change are grand challenges facing humankind. Sustainable management of planted forests to meet the growing global needs and for a greener future is increasingly important to address these challenges. The productivity of planted forests is limited by nutrient availability, which will be more complex with climate change and intensification of planted forest management. To understand the impact on productivity, biodiversity, sustainability and associated ecosystem services, detailed understanding and deion of the current biotic and abiotic controls on ecosystem soil C and nutrient fluxes are needed. To better understand nutrient availability - the quantity of nutrients available for uptake by trees, we must understand carbon and nutrient cycling. It is only when we consider how carbon and nutrient cycles through an entire forest ecosystem that we can judge the impact of forest management operations on long-term productivity under

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intensification and future climate scenarios. Information on biophysical soil properties, nutrient cycling, forest nutrition and resource use efficiency all have some meaning in terms of productivity, but none should be considered in isolation. Nutrient cycling is essential for maintaining nutrient supply to forest plants and for enhancing forest productivity. Nutrient cycling is also strongly linked to greenhouse gas emissions and thus the global climate change. Nutrient cycling and availability, forest nutrition and resource use can be severely affected by anthropogenic and natural disturbance regimes caused by intensification of planted forest management and climate changes. This session will provide a platform to examine and discuss recent research progress on carbon and nutrient cycling in relation to forest nutrition, resource use efficiency and productivity in planted forest ecosystems and how interactions among them are affected by intensification of planted forest management operations and climate change. It is the intent of this session to examine with particular reference to (1) biotic and abiotic characteristics of nutrient-limited stands under intensification of planted forest management and climate change, (2) the control of nutrient availability and its relationship to carbon and nutrient cycles in an entire forest ecosystem, (3) specific challenges facing forest managers, such as restoring carbon and nutrient levels after harvesting of several rotations, and (4) sustainable forest management options for maintaining long-term soil and forest productivity.

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**Title:**

**A-05 Tree Genetics and Breeding-genomics, functional genomics and GM trees**

**Organizers:**

Name	Country	Organization	Email
Li Quanzi	China	State Key Laboratory of Tree Genetics and Breeding, CAF	liqz@caf.ac.cn

**Time slot:**

1 hours

**Format:**

Oral presentations

**Session description:**

Genetic modified trees (Down and over expression, activation tagging, CRISPR in poplar, spruce); field trial of GM trees; Promoter functions in trees.

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**Title:****B-01 Functional Evaluation and Sustainable Management of the Three-North Afforestation Program****Organizers:**

Name	Country	Organization	Email
Jiaojun ZHU	China	Institute of Applied Ecology, CAS	

**Time slot:**

1.5 hours

**Format:**

Oral presentations

**Session description:**

Protective forests have been constructed worldwide to prevent damages from natural disasters, to protect infrastructures, to promote regional economic and environmental well-being and to maintain regional ecological balance. China has the largest amount of protective forests, largely due to contribution from the Three-North Afforestation Program (TNAP; the Green Great Wall) initiated in 1978. This session brings together scientists, practitioners and policy-makers working in science of protective forest from all over the world to evaluate and promote sustainable management of TNAP.

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**Title:****B-02 Management of degraded coniferous planted forests to increase the provision of ecosystem services****Organizers:**

Name	Country	Organization	Email
Isabella De Meo	Italy	CREA	isabella.demeo@crea.gov.it
Alessandro Paletto	Italy	CREA	alessandro.paletto@crea.gov.it
Maurizio Marchi	Italy	CREA	maurizio.marchi@crea.gov.it
Alessandra Lagomarsino	Italy	CREA	alessandra.lagomarsino@crea.gov.it

**Time slot:**

1.5 hours

**Format:**

Oral presentations

**Session description:**

Ecosystem services (ES) are known as the direct and indirect benefits of ecosystems to human well-being. Maintaining and balancing the ES supplied by forests requires thorough assessment and evaluation at different spatial and temporal scales. Moreover forest management choices and strategies are able to influence forest structures by means of silvicultural treatments (forest system; rotation age and thinning regime) and affect ES provision. According the Millennium Ecosystem Assessment (MEA), four groups of ES can be defined: (1) provisioning services (timber, bioenergy, water and food production); (2) regulating services (carbon sequestration, water regulation, natural hazards protection); (3) cultural services (social, historical and spiritual values); (4) supporting services (plant production, nutrient cycling). Many studies highlighted the key contribution to timber and bioenergy production of planted forests but also their ES provisioning at a global scale has been recently stressed. In the framework of planted coniferous forests are characterized by a low biodiversity level, mechanical and ecological instability and susceptibility to biotic and abiotic diseases which can contribute to a general status of forests' degradation. As a consequence, the ecosystem functionality can be compromised and the provision of ecosystem services reduced. In these contexts, ecological restoration of planted coniferous forests is a key point to improve the ecosystem services delivery. Restoration strategies and guidelines can be defined by forest managers through decision-making processes and the involvement of stakeholders and local communities.

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**Title:**

**B-03 Geospatial technology applications in plantation management activities**

**Organizers:**

Name	Country	Organization	Email
Pang Yong	China	Institute of Forest Resource Information Techniques, Chinese Academy of Forestry	pangy@ifrit.ac.cn
Marusák Robert	Czech	Czech University of Life Sciences Prague	marusak@fld.czu.cz

**Time slot:**

1.5 hours

**Format:**

Oral presentations

**Session description:**

As a renewable resource, the quantity and quality of plantation can be improved through management activities. In many countries, plantations are underlying increasing management to provide more forest products and ecosystem services. Meanwhile, natural forests are also enduring many disturbances from human society. These forest management activities include site evaluation, regeneration, tender, logging etc. To manage forest sustainably, these management activities need to have good plan and followed monitoring dynamically. With the developments of remote sensing, GIS, and spatial statistics, geospatial technologies are getting more and more applications in forest management activities. High spatial resolution remote sensing data are providing sub-meter data which can detect individual crown. Lidar technology can characterize forest elements vertical change like pruning and under-tending. Long time series remote sensing data are providing forest regeneration and disturbances. Cross-scale applications are getting booming through data integration of ground measurement, airborne transects, and satellite observation. We encourage scientists of different disciplines to contribute innovative methods or operational practices that can be applied in plantation management activities.

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**Title:**

**B-04 New Generation Plantations for Natural Climate Solutions**

**Organizers:**

Name	Country	Organization	Email
Luis Neves Silva	Portugal	New Generation Plantations platform	lnsilva@wwfint.org
Peter Freer-Smith	UK	University of California	pfreersmith@ucdavis.edu
Palle Madsen	Denmark	University of Copenhagen	pam@ign.ku.dk
Bronson Griscom	USA	The Nature Conservancy	bgriscom@tnc.org

**Time slot:**

1.5 hours

**Format:**

Dialogues

**Session description:**

Forests provide a wide variety of ecosystem services and international conventions and national policies for climate change mitigation and biodiversity conservation recommend forest protection and restoration. A recent estimate suggests that natural climate solutions such as conservation, restoration and improved land management actions across global forests, wetlands, grasslands and agricultural lands can provide over a third of the cost-effective climate mitigation needed between now and 2030 to achieve the goals of the Paris Agreement. Improved forest management offers large and cost-effective mitigation opportunities, many of which could be implemented rapidly without changes in land use or tenure. While some activities can be implemented without reducing wood yield, other activities would result in reduced near-term yields. This shortfall can be met by implementing new commercial plantations and has the largest low-cost mitigation potential. Recognizing the potential of well-managed forest plantations, the New Generation Plantations (NGP) platform was launched in 2007. NGP encourages well-managed planted forests in the right places to foster the economic and ecological platform in the landscape for conservation and facilitation of biodiversity and meet human needs. The approach

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aims to address all the aspects of supporting a sustainable development of society to create realistic and long-term viable solutions for both people and biodiversity. This session discusses the case for forest production, restoration and mitigation/adaptation to limit climate and other environmental risks and to improve the resilience of landscapes. NGP has demonstrated a concept that works. Planted forests make up only around 7% of forest cover worldwide, but supply a third of the total global production of industrial roundwood. The data on changes of ecosystem services indicate that over and above roundwood production, plantations which are managed in line with the NGP can be part of the solution to the global challenges of climate mitigation, conservation of biodiversity and natural capital, and poverty alleviation. In a variety of countries and contexts, participants have shown that it's possible to produce timber efficiently and profitably while maintaining ecosystems and contributing to socio-economic development. And that doing so can open up new opportunities to create shared value for communities, restore degraded and deforested land, and contribute to climate change mitigation and adaptation. The organisers will promote a dialogue session about, how can a new generation of plantations provide a natural climate solution, and identify future lines of research.

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**Title:****B-05 Managing planted forests for enhancing ecosystem services****Organizers:**

Name	Country	Organization	Email
Shirong Liu	China	Chinese Academy of Forestry	liusr@caf.ac.cn
Zhen Yu	China	Chinese Academy of Forestry; Iowa State University	zyu@iastate.edu

**Time slot:**

2 hours

**Format:**

Oral presentations

**Session description:**

Global forest plantation area (187 million ha in 2000) accounts for 5% of forest cover with an annual planting rate estimated at 4.5 Mha/yr. Such rapid expansion of forest plantations is expected to provide a variety of ecosystem services. Nonetheless, global climate change, which has been recognized to pose increasing water stress on forests, could undermine the expected benefits from plantations. Areas now marginally suitable for forestation may soon become unsuitable. Moreover under extreme conditions, climatic or/and hydrological stresses may exceed ecosystem tipping point and trigger forest dieback. Additionally, inappropriately planned or implemented forest plantation programs may lead to inefficient and high-cost forestry practices, as well as to a potential risks and threats to the regional environment due to adverse impacts on water resources. The potential vulnerability of planted forests to both climate change and water availability has received a growing concern. Previous and ongoing forest plantation projects provided essential experiences and implications for optimizing planted forests managements in pursuing ecosystem services enhancement. For example, mono-cultural plantations may lead to low ecosystem resilience and high tree mortality due to environmental stresses, while fast-growing trees are usually highly water-demanding species and, consequently, may reduce water yield in certain regions. Nonetheless, how planted forests and natural forests differed in providing ecosystem services is still unclear across scales. Moreover, should government devote most efforts on forest area expansion or emphasize on optimized management strategies for forest productivity and quality enhancement? These interesting

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questions are in pressing needs to be discussed, which will be beneficial for assessing and managing ongoing and planned forest landscape restoration projects, such as the ambitious target of 350 million ha of reforestation associated with the New York Declaration of Forests. Therefore, we propose this session to address topics related to ecosystem services from forests at different scales, including carbon sequestration, water consumption, water use efficiency, ecosystem resilience, and trade-off between different ecosystem services. Specifically, the session will highlight studies from the following aspects: (1) differences in ecosystem services provided by plantations and native forests; (2) optimized managements for enhancing ecosystem services; (3) climate change impacts on forest ecosystems; (4) ecosystem resilience to climate extremes; (5) close-to-nature forest management

#### 1) Proposed Session

**Format** This session will consist of presentation and poster sub-sessions. The presentation sub-section will take 2 hours for having 6 speakers. Each presenter will provide oral presentation for 15 minutes and another 5 minutes for Q&A. Poster sub-session will also be offered to provide opportunity for professional networking and results discussion of studies from all participants.

#### 2) Potential Session Speakers invited

The session organizer, Dr. Zhen Yu, will give a presentation entitled “Natural forests exhibit higher carbon sequestration and lower water consumption than plantation forests in China”. The organizers will also invited experts from other institutions internationally to discuss forest ecosystem services in the conference. We are soliciting 2-4 potential speakers from China, Japan, Australia, Germany, New Zealand, France, USA, and Canada. The potential list includes Dr. Pengsen Sun and Dr. Hui Wang from Chinese Academy of Forestry; Dr. Junwei Luan from International Center for Bamboo and Rattan; Dr. Yuichi Yamaura from Hokkaido University, Japan; Dr. Richard Harper from Murdoch University, Australia; Dr. Heinrich Spiecker from University of Freiburg, Germany; Dr. Ge Sun from Southern Research Station, USDA Forest Service, USA; Dr. Dan Binkley from Northern Arizona University, USA; Dr. Thomas Fox from Virginia Tech University, USA; Dr. Adam Wei from University of British Columbia, Canada; Dr. Antonio del Campo from Universitat Politècnica de Valencia, Spain; Dr. Hervé Jactel from French National Institute for Agricultural Research, French; and Dr. Eckehard Brockerhoff from New Zealand Forest Research Institute, New Zealand.

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**Title:****B-06 Planted forests management and carbon sequestration: biogeochemical processes and silvicultural practices****Organizers:**

Name	Country	Organization	Email
Wang, Hui	China	Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry	wanghui@caf.ac.cn
Andreas Schindlbacher	Austria	Federal Research and Training Centre for Forests, Natural Hazards and Landscape, Vienna, Austria	andreas.schindlbacher@bfw.gv.at
Ming, Angang	China	Experimental Center of Tropical Forestry, Chinese Academy of Forestry	mingangang0111@163.com

**Time slot:**

2 hours

**Format:**

Oral presentations

**Session description:**

As an important component of global forest resources, planted forests are playing an increasingly crucial role in timber production, environmental improvement, landscape rehabilitation and climate change mitigation. Planted forests are facing challenges regarding stand structure and quality, productivity and ecological functions. There is a need to develop an appropriate strategy and practice approach for achieving multi-purpose management solutions fostering carbon sequestration, biodiversity conservation, eco-environment improvement, in response to the new demands for building a beautiful world and contributing to the international strategic goals of ecological restoration and climate change mitigation. There is much evidence now pointing to higher carbon sequestration potential in trees and soil by improved plantation management. We encourage novel contributions from combined studies of biogeochemical processes and silvicultural practices through manipulative field and laboratory experiments or long-term field observations encompassing plant and soil aspects.

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**Title:****B-07 Developing integrated risk management in planted forest to enhance resilience****Organizers:**

Name	Country	Organization	Email
Christophe Orazio	FRANCE	EFI	christophe.orazio@efi.int
Hervé Jactel	France	INRA	herve.jactel@efi.int

**Time slot:**

2 hours

**Format:**

Oral presentations, Dialogues

**Session description:**

Global change is a threat for all forest in the world. The two main drivers are the global warming speed, affecting the functioning of the whole forest ecosystem, and the constant increase of world trade generating more and more opportunities of introduction of pest and diseases to forest areas. As planted forests are often made of monospecific large areas, there is a need of a holistic management of risk. The integrated risk management in forests is defined as the combination of the following different parameters at various scales: prevention and control, silvicultural practices related to risk, ecological and economic constraints, the management of multiple hazards and the role of institutions and legal rules that influence risk management. This session is offering an opportunity to compile initiatives at strategic level and tactical level from the policy making to the stand management. It will end with a discussion on the best initiatives and key risk management to implement in a context of planted forest.

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**Title:**

**B-08 Planted Forests Resources Monitoring**

**Organizers:**

Name	Country	Organization	Email
Chen Erxue	China	Chinese Academy of Forestry	chenrx@ifrit.ac.cn

**Time slot:**

2 hours

**Format:**

**Session description:**

With the development of the economy, areas of forest plantations have expanded enormously in recent years all over the world. The rapid expansion of forest plantations may have substantial impacts on biodiversity, terrestrial carbon cycle, hydrology and climate. Although China was well known as the country with largest coverage of forest plantation in the world, the monitoring of planted forests has the problems such as low efficiency, low accuracy and extensive management. Our capacity to better managing plated forest resources is still constrained by lack of accurate and updated data on spatial distribution, area, and dynamics of forest plantations. However, the new generation technologies in the fields such as remote sensing, internet of things, big data and visualization is now providing opportunities and challenges for developing innovative technology system for planted forest resources monitoring. Multi-platform (Ground based, Air plane including UAV and Satellite) remote sensing plays an important role in mapping spatial distribution and temporal dynamics of forest plantations in different scales from single tree to forest; Internet of things is very suitable for real-time monitoring tree/forest growth and its environment information; Virtual reality (VR) technique can be used to visually present the extracted forest information through the techniques mentioned before, and even can be used to assistant us to design optimal forest cultivate plans, which can be developed by applying newly developed big data mining and artificial intelligence (AI) techniques. Based on the above-mentioned challenges and opportunities, the goal of this technique session is to facilitate communication between experts in the field of planted forest resources monitoring, cultivation and management using advanced information techniques.

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**Title:****B-09 Increasing resilience in planted forests to climate change impacts****Organizers:**

Name	Country	Organization	Email
Somidh Saha	Germany	Karlsruhe Institute of Technology, University of Freiburg	somidh.saha@kit.edu
Zhongqian Cheng	China	Chinese Academy of Forestry	zhongqian@caf.ac.cn

**Time slot:**

1.5 hours

**Format:**

Oral presentations

**Session description:**

The planted forests are a significant source of raw material (i.e., timber, pulp, fuelwood, etc.) in many countries around the world. Also, planted forests provide multiple other ecosystem services to human society. However, planted forests are often vulnerable to climate change impacts due to poor ecological resilience. In recent years, some studies have shown that increasing species and structural diversity in planted forests could enhance the resilience of such forests to climate change impacts such as droughts, floods, storms, etc. Nonetheless, most of those studies were carried out in temperate forests regions in Europe and North America. The research on subtropical and tropical forests is relatively low in this field. Moreover, studies on the social and economic resilience of planted forests are still inadequate. In this session, we are inviting abstracts on research studies carried out in planted forests on all type of ecosystems on increasing resilience in short-, mid- or in long-term. Studies on social and economic resilience are also welcomed. We will try to publish selected abstracts in a special issue of a peer-reviewed journal.

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**Title:****B-10 Forest microbiome: seeing the microbes for the trees****Organizers:**

Name	Country	Organization	Email
Steve A Wakelin	New Zealand	Scion	steve.a.wakelin@scionresearch.com
Simeon Smaill	New Zealand	Scion	simeon.smaill@scionresearch.com
Shenglei Fu	China	Chinese Academy of Sciences	sfu@scbg.ac.cn
Weijun Shen	China	Chinese Academy of Sciences	shenweij@scbg.ac.cn

**Time slot:**

1.5 hours

**Format:**

Oral presentations

**Session description:**

Interactions among trees, their environment, soils, and rich biotic communities deeply influence tree health, forest productivity, and the myriad of ecosystems forests support. Complex networks of microorganisms have a profound role establishing and regulating these interactions, and are increasingly recognised as being essential to effective functioning of forest ecosystems. With growing world population, and the transition to bio-based economies, demands on forests to provide more food and fibre will greatly increase. Within this same window, however, forests will face increasing pressure from alterations to historic climatic patterns, land use change and intensification, and increased dispersion of pests and diseases. As forest owners look for opportunities to sustainably manage forest production, systems-based solutions driven by an understanding and managing the reciprocal interactions among the forest microbiome and connected elements – trees, soil, & environment – are beginning to be explored. The forest microbiome is already fundamental to the success of planted forests. Soil microbes help process complex organic matter into forms readily available for uptake, while beneficial mycorrhizal fungi enhance the ability of trees to acquire those resources. Other microbes can directly influence tree performance by producing hormones and other molecules that alter the biochemical processes within the tree, stimulating greater growth and resistance to stress. Conversely, studies of the forest microbiome also offer a window into the activity and population dynamics of

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key pathogens, providing new avenues for the early detection of harmful activity. Beyond the detection of these relationships, examinations of the forest microbiome have also been able to identify various forest and site management treatments that can alter both the population, and activity, of microbial species that influence tree growth. These include the intensity of organic matter removal at harvest, soil cultivation during site preparation, fertiliser use, incidental effects from fungicide use on beneficial species and weed control treatments. This work has already identified a number of cases in which the apparent short term benefits of a treatment intended to enhance forest productivity have produced no gains by the end of the forest rotation due to relatively small, but long lasting, disruptions to the services provided by the forest microbiome. This integrated approach to assessing forest management and the activity of the forest microbiome also provides new opportunities to utilise the activity of the forest microbiome more effectively, promoting the incidence of beneficial behaviour. Reliable stimulation of beneficial activity may reduce the need for chemical interventions within planted forests, providing management options that are both more economically and environmentally viable. Given the rapid development of tools to characterise the microbiome from both phylogenetic and functional perspectives, and the increasing body of work detailing the importance of the microbiome to sustainable forest production and the delivery of ecosystem services, this session will aim to capture the state-of-art scientific knowledge, concepts and thinking, and also identify gaps and priorities for forest-microbiome research.

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**Title:****B-11 Planted forests and their role on water quality and quantity dynamics across the landscape****Organizers:**

Name	Country	Organization	Email
Dean Meason	New Zealand	Scion	dean.meason@scionresearch.com
Brenda Baillie	New Zealand	Scion	brenda.baillie@scionresearch.com
Xiaohua (Adam) Wei	Canada	University of Alberta	adam.wei@ubc.ca
Mingfang Zhang	China	University of Electronic Science and Technology of China	mingfangzhang@uestc.edu.cn

**Time slot:**

1.5 hours

**Format:**

Oral presentations

**Session description:**

Clean fresh water is essential for terrestrial and aquatic life and access to safe and clean drinking water and sanitation has been declared a human right by the United Nations (UN). However, the world faces increasing pressure on its freshwater resources particularly with the intensification of agricultural and urban activities and forecasted impacts of climate change. Forested catchments, both indigenous and planted, have a strong influence on water quality and water quantity. Forests play an important role in flow regimes and are known world-wide for producing high quality sustainable sources of clean water for drinking purpose, along with a wide range of other uses. Forest ecosystems and hydrological processes are intricately linked and forests play a key role in stabilising and protecting soils from erosion. Consequently, forests protect many dams from siltation, mitigate pollution impacts on waterways and groundwater, and are cost-effective in reducing the need for expensive water treatment processes to remove sediment, chemical, pharmaceutical and microbial contaminants. In addition, both soil and water are essential drivers of forest health and growth. The demands on water resources are increasing with the growth of the world's population, a growing demand for a higher standard of living and the

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intensification of agricultural activities to meet world food and fibre demands. These pressures will be exacerbated in many regions by climate change which is predicted to alter global precipitation and temperature regimes with subsequent impacts on the frequency and magnitude of extreme rainfall events and droughts and associated increases in hydrological extremes. Water users downstream from forests increasingly see forests and forestry as a competitor for their “rightful” share of water. This could lead to conflict of water use by different rural and urban users across the landscape, and this may intensify with large scale afforestation for land stabilisation, carbon sequestration, and timber and fibre production. Although the science in forest hydrology has developed over the last century, current research has identified knowledge gaps and emerging issues on the dynamics of water quality and quantity within forests and across the landscape. To address these concerns, the IUFRO Task Force on Forests, Soil, and Water has identified a set of objectives aimed at improving current knowledge and understanding on forests, soil and water interactions within the wider landscape, and the future impact of human use and climate change on these resources, to better inform policy development, forest management practices, and the development of mitigation and adaptive strategies. This session would provide the opportunity for participants to present the latest research addressing these challenges, forest management approaches, adaptive strategies, and technologies that address the future role of planted forests in maintaining/increasing global resilience to increasing uncertainty of freshwater resource quality and availability associated with the demands of increasing population growth and climate change.

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**Title:****B-12 The strategy and new technology for controlling pests and diseases in planted forests****Organizers:**

Name	Country	Organization	Email
Xing-Yao Zhang	China	Research Institute of Forestry New Technology, Chinese Academy of Forestry	xyzhang@caf.ac.cn

**Time slot:**

2 hours

**Format:**

Oral presentations

**Session description:**

Forest health is necessary for planted forests for green development. While, pests and diseases are the main factors threatening forest health. So, it is very important to strengthen the prevention and control of pests and diseases in planted forests. In this session, the theme will introduce the status of development and the characteristics of the pests and diseases in planted forests about biological invasion, periodic catastrophe of indigenous species and sub-health. Meanwhile, some control methods for the pests and diseases will also be involved. Based on the development of contemporary ecology, biotechnology and high-tech monitoring technology, the session will discuss strategy and new technology for the prevention and control of pests and diseases in planted forests for forest health. This proposed session will cover the conference theme “Planted Forests – A Solution for Green Development”.

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**Title:****B-13 Impacts of climate change and air pollution on forest ecosystems: Impacts, adaptation and management options****Organizers:**

Name	Country	Organization	Email
Enzai Du	China	Beijing Normal University; IUFRO Unit 7.01.03	enzaidu@bnu.edu.cn
Guangyu Wang	Canada	Faculty of Forestry, University of British Columbia	

**Time slot:**

1.5 hours

**Format:**

Oral presentations

**Session description:**

Climate change (e.g., global warming, drought and CO<sub>2</sub> enrichment) and air pollution (e.g., acid rain, nitrogen deposition, and increase in surface ozone) are altering global forest structure and function in 21st Century. Many of these factors are at levels not previously observed in human history for many parts of the world. In current context, it is important to understand the impacts of climate change and air pollution on forest ecosystems and their feedbacks. This will help to improve ecological sustainability of both natural and planted forests, and to better guide management options. This session will open to speakers who are working on climate change and air pollution and their integrated ecological impacts through different monitoring, modeling, experimentation efforts. Our session provides opportunities for knowledge exchange and discussion on current challenges and future research directions for sustainable management of forest ecosystems.

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**Title:****B-14 Certifying Planted Forests to Promote Their Sustainable Management****Organizers:**

Name	Country	Organization	Email
Lu Wenming	China	Chinese Academy of Forestry (CAF)	luwenmingcaf@126.com
Wang Wei	China	China Forest Certification Council (CFCC)	wangwei@forestry.gov.cn
Ben Gunneberg	Switzerland	Programme of the Endorsement of Forest Certification (PEFC)	ben.gunneberg@pefc.org

**Time slot:**

2 hours

**Format:**

Oral presentations

**Session description:**

Independent third-party forest certification emerged in the 1990s as a tool for assessing and communicating the environmental and social performance of forest management operations. Today, forest certification is mainstream, supported worldwide by major producers and buyers, and elements of certification are directly or indirectly required in a number of national forestry or government/public procurement policies. After 25 years development, forest certification has become a very effective market based instrument for promoting sustainable forest management. This session will focus on the presentations and discussions on promoting sustainable management of planted forests through market based instrument of independent third party certification, which covers both for sustainable management of planed forests as well as tracing and trading on certified timber and timber products from certified planted forests. 5 expected presentations will analyze the role of certification in promoting sustainable management of planted forests, expending their processing and marketing, and improving livelihood of local communities, as well as challenges and opportunities for its future development, followed by questions and answers and then discussions.

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**Title:****B-15 China Plantation forests for sustainable development****Organizers:**

Name	Country	Organization	Email
Pengyu Li	China	WWF China	pyli@wwfchina.org

**Time slot:**

2 hours

**Format:**

Oral presentations

**Session description:**

WWF works closely with public and private sectors in plantation forests across China, explore the best management practices, provide technical support and training opportunities to local forests entities, improve their overall management capacities and promote sustainable forest management. The summit offers a window for all to understand the current challenges of Chinese planted forests, and exhausts some methods WWF adopted to overcome those hurdles. Guest speakers from forests administrations, industrial leaders and local forests farms are here today to share us with their insightful experiences and create ripple effects among plantation managers.

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**Title:**

**B-16 WOODNAT project: enhancing the walnut (*Juglans* sp.) planted forests for timber production**

**Organizers:**

Name	Country	Organization	Email
Jesús Fernández-Moya	Spain	Bosques Naturales SA	jesusfernandez@bsquesnaturales.com

**Time slot:**

2 hours

**Format:**

Oral presentations, Panel discussion

**Session description:**

*Walnut planted forests oriented for timber production*

Walnut trees are species of the genus *Juglans* sp. L., traditionally characterized by their highly valued nuts and timber. The main walnut species are Persian walnut (*Juglans regia* L.), also known as European, English or Common walnut, and American or Black walnuts (*J. nigra* L., *J. major* (Torr.) A. Heller, *J. hindsii* (Jeps.) Jeps. ex R.E. Sm.) and different hybrids between them have been developed specifically for timber production by hybridation between Persian and American species, mainly: Mj-209xRa y Ng-23xRa.

Walnut timber has been traditionally highly appreciated and mainly used for furniture, flooring and paneling. It generally has two main uses: wood veneer and sawn wood. However, some other uses have been explored to obtain the maximum profit from either small trees or big trees with irregular shapes: carefully designed small objects (art, fashion, kitchen and decoration) and slabs tables.

Taking into consideration this high market interest, many planted forests oriented for timber production have been established during the last decades with Hybrid or with Persian Walnut in Europe, which are usually intensively managed and allow managers to sustain relatively high growth rates. Similarly, many planted forests have been established with Black Walnut in North America (and some of them in Europe), even though there are many natural forests dominated by this species in the region. These relatively new forest plantations oriented for timber production are established usually intensively managed and allow managers to sustain relatively high growth rates. These walnut planted forests have been established in different cultivation systems,

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from pure plantations with a plantation density of around 333 trees/ha to agro to agro-silvo-pastoral systems with a wide range of designs.

Regarding the experience from these plantations, it has been showed that selecting the right plant source is one of the main issues once one has decided to establish a new walnut plantation in a site. Even though plenty of options could be available depending on the budget and dimensions, the plant quality and the genetic potential should be considered a key investment when establishing a commercial planted forest. This importance has caused that much effort has been dedicated over the last decades for achieving in-vitro propagation of clonal walnut plants.

#### *The WOODNAT project*

Taking these 3 main issues into account (silviculture, timber market/industry and plant quality/genetics) WOODNAT is a R+D+I project financed by the European Union H2020 which aims at providing for the first time an integral approach to walnut hardwood supply chain from nurseries to close-to-market wood products. Although many projects and tools have been developed in the past to promote a sustainable management of hardwood plantations, most of them have failed due to lack of a global approach. WOODNAT consortium gathers 9 players representing the whole walnut hardwood value chain across Southern Europe willing to collaborate to generate added value: Bosques Naturales, S.A. (BN hereafter), the promoter of the WOODNAT project is a Spanish SME with 20 years' experience in the forestry sector. By putting together representatives of every tier in the chain, we will beat the atomization among landowners and discover new profitability paths to all of us

Hence, the scope of the WOODNAT project is to add value to wood production and enable close-to-market outputs, developing a series of cutting edge technologies in relation to forestry measures starting from seedling/replanting, through to harvesting. Within this framework, the WOODNAT is working for the designing of improved tools for sustainable forest management decisions and operations in primary production systems, enhancing the marketing of the derived products (both timber and non-timber products) and ensuring the providing of the essential ecosystem services such as carbon sequestration, biodiversity conservation, water regulation, soil and nutrient regulation, and recreation.

The WOODNAT project started in October 2016, with a temporal scope of 3 years. Hence, organizing a session within the 4th International Congress on Planted Forests in October 2018, integrated within the WOODNAT project is a perfect timing for sharing with all the other possible professionals interested in walnut all the advances we have had in the current 2 years of the project and it still give us the possibility to include more activities in the 1 year period before the end of the project.

#### *The proposal of the session*

We propose a session focused on walnut (*Juglans* sp.) planted forests, to share the advances during the last years in the nursery production (and genetics), the silviculture (including agroforestry) and the timber processing and marketing of walnut.

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We propose a session where some of the advances of the WOODNAT project can be shared but where also we will encourage the participation of other professionals (researchers and/or private companies) working with these species (different walnut species). Indeed, the participation of people working with walnut in non-European regions (e.g. North America and Asia, among others) might be an excellent opportunity to share common experiences and analyze them. Hence, we propose some presentations in a preliminary status and, if the session is approved, we will contact other possible professionals in order to enrich the discussion.

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**Title:****B-17 Forest plantation productivity in relation to stand structure and environmental conditions****Organizers:**

Name	Country	Organization	Email
Xiao Wenfa	China	Chinese Academy of Forestry	xiaowenf@caf.ac.cn
Li Maihe	Swiss	WSL, Swiss	maihe.li@wsl.ch

**Time slot:**

5 hours

**Format:**

Oral presentations, Panel discussion

**Session description:**

The symposium focuses on understanding forest plantation productivity in relation to stand structure and environmental conditions. Except provide wood resources, plantations play an important role in C sequestration by accumulating C through photosynthetic assimilation and the subsequent storage in the form of biomass. However, due to various management methods and plantation types with different environmental conditions, how to improve the forest plantation productivity to meet and balance both demands listed above is a key issue for policy makers and researchers worldwide, especially under global warming background. Considering the most common managements (thinning, harvesting, replantation, fertilization, etc.), forest structure and environmental factors (soil carbon, water content, litter, etc.) are inevitable changed, hence, the interaction of plantation productivity between stand structure and environmental factors will be discussed in this session, which will allow us to better understand underlying mechanisms in the formation of plantation productivity with changing environment factors, and to reduce the uncertainty in our predictions of planation dynamics in this century under global change.

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**Title:****B-18 Design and management of mixed-species planted forests for the provision of multiple ecosystem services****Organizers:**

Name	Country	Organization	Email
Herv éJactel	France	INRA	
Christophe Orazio	France	European Forest institute	

**Time slot:**

2 hours

**Format:**

Oral presentations, dialogue

**Session description:**

Humanity has never been so much in demand for wood biomass, for multiple uses such as climate change mitigation through carbon sequestration, wood material and products for construction and packaging, wood energy for heating and cooking. In the same time, it is important to alleviate the pressure on natural forests where harvesting can threaten biodiversity hotspots. There is thus an urgent need for more planted forests.

However, the vast majority of planted forests are tree monocultures. And yet, increasing empirical and modelling evidence demonstrates that pure forest stands are both less productive and more susceptible to biotic and abiotic disturbances than mixed-species forests.

While mixed-species planted forests are conceptually relevant, forest managers are still reluctant to plant tree mixtures, due to technical constraints and economic uncertainties. The objective of the section will be thus to gather the available information from tree diversity experiments and forest trials and propose avenues for the design and management of mixed-species planted forests providing multiple ecosystem services. A particular focus will be made on the composition (identity of tree species to be associated) and structure (density and spatial pattern of associated species) of multifunctional mixed-species plantations.

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**Title:****B-19 Challenges of oak regeneration in crowded world****Organizers:**

Name	Country	Organization	Email
Somidh Saha	Germany	Karlsruhe Institute of Technology, Germany (Deputy Coordinator of the IUFRO Working Group 1.01.06 “Ecology and Silviculture of Oak”)	somidh.saha@kit.edu
Zhongqian Cheng	China	Research Institute of Forest Policy and Information, Chinese Academy of Forestry (CAF), Beijing, China	zhongqian@caf.ac.cn

**Time slot:**

1.5 hours

**Format:**

Oral presentations

**Session description:**

Hundreds of oak species can be found globally. Oaks grow in huge parts of northern hemisphere in the Americas, Europe, Asia and North Africa. They can be found as solitary trees on barren dry hill slopes or in dense lush green mixed forests with laurels on the tropical hills. The traditional use of oaks for timber, firewood, substrate in mushroom culture, and fodder in livestock production in many parts of world make it one of the most sought after species in commercial forestry. Oak trees and oak dominated forests also support high level of biodiversity and other ecosystem services. However, many oak species are difficult to naturally regenerate due to multiple reasons such as: competition from other species, poor germination of acorns, slow growth rate, low tolerance to shade, anthropogenic disturbances, diseases, browsing etc. At the same time, ongoing climate change is threatening oak species and forests in many regions of the world. In subtropical and tropical regions, vast areas of oak forests were degraded and often converted to agriculture or monoculture of other tree species. In recent years, there is a renewed interests among foresters and private forest owners to increase the proportion of oaks in the forests under more close-to-nature and mixed forests management. Nevertheless, challenges in regeneration remained the main impediment of oak forest restoration. In this session, we invite all types of work that deals with oak regeneration in the field of tree improvement, silviculture, ecology, growth modelling, forest management, forest pathology etc. We will try to publish a special issue in a peer-reviewed forestry journal from this session if we get sufficient contributions.

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**Title:****B-20 Sustainable forest management planning of China's forest****Organizers:**

Name	Country	Organization	Email
Shuirong Wu	China	Chinese academy of forestry	shuirongwu@126.com
Heinrich Spiecker, Lars Sprengel	Germany	Albert-Ludwigs-Universität Freiburg	instww@uni-freiburg.de
Min Liu	China	Forestry economic development research center of National Forestry and Grassland Administration (NFGA)	

**Time slot:**

2 hours

**Format:**

Oral presentations

**Session description:**

The ecological, economic and social benefits of forestry are of high importance on the political agenda of the Chinese government. However, many of the Chinese forests are of low vitality and low productivity, and the quality of the wood is often poor. The average net annual increment of Chinese forests is only 3.6 m<sup>3</sup> ha<sup>-1</sup> with average diameter of 13.6 cm. And this has also to do with the young age of many forests and generally cut before they are 40 years old in China as well as difficult site conditions. It has been widely accepted that it is mainly a consequence of lack of proper forest management and the lack of application of suitable management schemes. Especially, long-term oriented forest management concepts as well as large scale management planning tools are still missing.

On the other hand China's fast growing economy requires additional resources. Until 2020, China's forest area is planned to increase by another 40 million ha from the 2005 level according to the national targets in response to climate change (NDRC, 2009). China also aims to increase forest stock volume by around 4.5 billion cubic meters by 2030 on the 2005 level as described in China's intended nationally determined contributions (INDC) for the new post-2020 agreement (NDRC,2015). In order to achieve these aims a better understanding of forest growth and new planning tools are needed which allow for a better anticipation of long-term forest development and for choosing and implementing best management practice. The objectives of this

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session are to 1) Present the development of the growth models; 2) Present China's long-term forest management planning; 3) Review the silviculture practices of increasing forest health and productivity especially in respect to valuable timber, to carbon sequestration, to biodiversity, etc.

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**Title:****B-21 Sustainable forest management to enhance the resilience of forests to climate change in China****Organizers:**

Name	Country	Organization	Email
Chen Jinghua	China	GEF project on SFM, World Bank Loan Project Management Center, NFGA	
Fu Rong	China	FAO Beijing Representative Office	
Wu Shuirong	China	Research Institute of Forestry Policy and Information, CAF	shuirongwu@126.com

**Time slot:**

2 hours

**Format:**

Oral presentations, dialogue

**Session description:**

China's advances in the forestry sector are still a story of "quantity over quality". While the efforts to halt forest loss and degradation through reforestation and afforestation initiatives have been highly ambitious and steadily increasing in intensity and scope over the course of the last two decades, significant opportunities for improvements regarding the quality of forest management remain. The practices being employed in the context of ongoing forest expansion initiatives usually do not fully conform to international standards for sustainable forest management (SFM). Monoculture, even age stands continue to cover millions of acres in China, representing forest structures that are not only vulnerable against pest and diseases as well as climatic shocks, but also yield much lower environmental benefits in terms of fostering biodiversity and mitigating climate change. Especially the comparatively low carbon stocks and sequestration ability in large parts of China's forest areas is a big challenge.

The scope of ongoing and planned forest activities across the country calls for urgent and immediate action. Forest structures feature a pronounced lock-in effect with management decisions made today determining the forests' environmental benefits for decades to come. The negative environmental effects of unsustainable approaches will increase when employed during a period of ambitious forest expansion. On the other hand, the current dynamic offers a unique window of opportunity: alleviating the level of quality of forest management at this point in time can make an enormous positive impact as it will change practices employed in a large area of forest. The potential

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leverage effect of GEF activities is therefore particularly high at this point in time. This GEF projects aims to seize this opportunity to the fullest and to enable local communities in four Chinese provinces to effectively employ incentive-based sustainable forest management (SFM) practices in reforestation and forest restoration activities, enhancing carbon storage and sequestration as well as biodiversity conservation. In order to achieve this objective, the project will utilize four ongoing developments that can be directly related to SFM and serve as starting point to successfully and sustainably mainstream SFM practices into China's forestry sector:

- Decentralization of forest management structures;
- Emergence of a strong forest certification mechanism;
- Creation of a comprehensive forest inventory and carbon monitoring system;
- Establishment of a national carbon market.

The combination of these four trends, all strongly backed by political interest and government commitment, creates a promising window of opportunity for project activities to create a high amount of Global Environmental Benefits with relatively small incremental investments.

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**Title:****B-22 Eucalypt plantation management in China (Non-final draft)****Organizers:**

Name	Country	Organization	Email
Prof. Chen Shaoxiong	China	China Eucalypt Research Centre, Chinese Academy of Forestry	Sxchen01@163.com
Ms Zheng Jiaqi	China	China Eucalypt Research Centre, Chinese Academy of Forestry	cerczjq@163.com

**Time slot:**

2 hours

**Format:**

Oral presentations

**Session description:**

The area of eucalypt plantations in China currently exceeds 4.5 M ha, and this country has the third largest area of such plantations after India and Brazil. China's eucalypt industry now comprises a complex, multifaceted industry including seedling propagation, fertilizer production and supply, plantation silviculture, harvesting and transport, wood processing for products including lumber, pulp and paper, and wood-based panels, as well as bioenergy production and various forest byproducts and non-wood forest products. The combined value of output of this whole industry reached 300 billion CNY by 2015. Since 2015, China's eucalypt plantations produced about 30 million m<sup>3</sup> of wood annually, accounting for about 27% of the country's total annual domestic timber output. These plantations thereby make a substantial contribution to safeguarding the security of China's wood supply.

This session will focus on the following aspects: analysis of factors contributing to the rapid development of China's eucalypt industry, risks and management of pathogens on plantation eucalypts, genetic diversity in breeding populations of the most important commercial plantation eucalypt in China, progress and current status of eucalypt genomic research, the MaxEnt model for predicting potentially suitable geographic areas for key eucalypt species, and nutrient cycles and nutrient utilization efficiencies in across different age eucalypt plantations.

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**Title:**

**B-23 Multifunctional plantation management**

**Organizers:**

Name	Country	Organization	Email
Prof. Yanhui Wang	China	Chinese Academy of Forestry	wangyh@caf.ac.cn
Dr. Kai Schwaezel	Germany	United Nations University Institute for Integrated Management of Material Fluxes and of Resources (UNU-FLORES)	

**Time slot:**

2 hours

**Format:**

Oral presentations, Panel discussion

**Session description:**

The optimal use of plantations through integrated management of numerous forest services is the fundamental mission of modern forestry in responding to increasing demands on forest resources due to rapid economic development, population growth, rising living standards, and environmental change. Improving the multifunctionality of planted forests, besides the forest area increased through afforestation, plays an increasingly important role in meeting these fast growing demands on the various forest services. A precondition for the multifunctional plantation management is to understand, quantify and balance the often complex related or even competitive individual services/functions of plantation, and the spatio-temporal varied relations between the service supply from plantations and the service demand from society. The concept of multifunctional plantation management is still a long way from being realized and put into practice. To meet this huge challenge, the forestry scientists and forest managers from China and other countries have worked in different environments and obtained obvious achievements in the field of multifunctional plantation management. This session aims to present and exchange the latest achievements in the techniques, case studies, and evaluations of multifunctional plantation management.

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**Title:**

**B-24 Bioenergy from planted forests**

**Organizers:**

Name	Country	Organization	Email
Dr. Stelian Alexandru Borz	Romania	Transilvania University of Braşov	<a href="mailto:stelian.borz@unitbv.ro">stelian.borz@unitbv.ro</a>
Dr. Nike Krajnc	Slovenia	Slovenian Forest Institute	<a href="mailto:nike.krajnc@gozdis.si">nike.krajnc@gozdis.si</a>

**Time slot:**

2 hours

**Format:**

Oral presentations

**Session description:**

The availability of natural forest ecosystems to provide all the typical range of functions, products and services, and to meet the future demands has decreased due to high rates of deforestation that occurred in the twentieth century and which have raised concerns about their use for bioenergy. In this context, planted forests are playing an increasingly important role as a source of bioenergy, with the proportion of planted forests dedicated to bioenergy being likely to increase because of second-generation lignocellulosic biofuels and of political and strategic targets fixed in many parts of the world. Moreover, they could also serve feedstock markets for solid wood fuel applications, increasing that way their flexibility, but, at the same time, will constrain efforts to pursue sustainability. To this end, planted forests have strategic significance in terms of both energy security and environmental sustainability.

Bioenergy production spans a wide range of systems, including those made by man. In order to pursue the sustainability of those systems, it is essential to understand the fundamental principles that underlie their behavior and to develop concepts, methods and tools that support their design, implementation, operation and improvement to attain bio-physical effectiveness, economic efficiency, compatibility with humans, environmental soundness, and institutional acceptance. The objective of the session on Bioenergy from Planted Forests (BPF) is to extend our knowledge and understanding on how the planted forests can sustainably supply the energy markets in the future. This includes all the systems associated with bioenergy production from

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planted forests starting with operational management such as the establishment and harvesting efficiency assessment and ending with policy and strategy development. Presentations on topics covering operational performance, mechanization, ergonomics, life cycle assessment, environmental impact, policy instruments, strategy development, management, economics, optimization, sustainability and innovations in the specific supply chain and good practice examples, ranging from small scale to fully commercial applications are welcome.

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**Title:**

**B-25 Bark beetle ecology and the management strategy in planted forests**

**Organizers:**

Name	Country	Organization	Email
Zhen Zhang	China	Research Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry	zhangzhen@caf.ac.cn

**Time slot:**

2 Hour

**Format:**

Oral presentations

**Session description:**

Bark beetles are important threat to planted forests. To understand the ecology of bark beetles, such as relationship and ectosymbioses among host trees, bark beetles and fungi, adaption of forests to pests and environment, is crucial for effective management of the bark beetle complex symbioses. In this session, the theme will introduce the status and the understanding of the bark beetle and their fungal symbionts in planted forests. It will be also discussed how to manage plated forests in a ecologically rational ways to help our forests in the long term to strengthen their resistance to bark beetles so as to strength forest health.

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**Title:**

**C-01 Sustainable Intensification - can we increase forest production without adverse impacts on the environment and society and under a rapidly changing climate**

**Organizers:**

Name	Country	Organization	Email
Tim Payn	New Zealand	Toi Ohomai Institute of Technology and Scion	tim.payn@scionresearch.com
Luis Neves Silva	Portugal	WWF International	lnsilva@wwfint.org
Various	Various	IUFRO Task Force 'Sustainable planted forests for a greener future'	tim.payn@scionresearch.com

**Time slot:**

1.5 hours

**Format:**

Oral presentations, Panel discussion

**Session description:**

Population Growth, Climate Change and Food Security are massive challenges facing the planet. It is likely that the world's population will reach 9 billion by 2050, the planet will be subject to at least another degree temperature rise by then and increased frequency and intensity of extreme weather events. In a number of areas (biodiversity, nitrogen and phosphorus flows) we have reached or exceeded Rockstrom's Planetary Boundaries and are using resources at a far greater rate than is sustainable. If we are to meet the challenges we will need to provide more resources for the expanding population and also adapt to the changing climate. Many global research programmes are focusing on food security and the concept of 'sustainable intensification' – increasing production while minimizing risks from environmental degradation. However very few (if any) global programmes are focusing on fibre security, though there is some focusing regionally on sustainable intensification in forestry which is an important component. It is projected (WWF 2012) that the world will need 300% more fibre by 2050. This will be unable to be sustainably sourced from natural forests. These are under ongoing threat from agricultural [and some forestry] encroachment with significant adverse effects on biodiversity and many other key attributes such as environmental integrity, or carbon stocks. Planted forests give us a significant

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opportunity to boost fibre supply. However while the GFRA2015 report showed that while in the last 25 years the area of planted forests has increased rapidly, the rate increase in area is slowing (Payn et al 2015 ). This suggests the world may reach a maximum planted forest area. If this is the case then we will need to look at how best we make use of the area to supply the projected increased need for fibre – sustainable intensification is one approach. Therefore this session will focus on the role planted forests can play in ensuring fibre security with a particular emphasis on sustainable intensification – ‘Can we increase forest production without adverse impacts on the environment and society and under a rapidly changing climate’. We invite papers on the following topics: (1) Potential productivity gains from intensification; (2) Environmental effects of intensification; (3) Social effects of intensification; (3) Cultural effects of intensification; (4) Climate challenges for intensification; (5) Evaluation of intensification from a systems perspective. Papers with a global perspective that include local case studies are preferred. We propose a series of short oral presentations [not a lot of time] plus poster papers. The session will: (1) produce a short synthesis paper based on the papers presented that will be published through the IUFRO Planted Forests Taskforce. (2) Encourage presenters to publish their papers in appropriate scientific journals. If there is enough interest a special issue of a journal may be developed.

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**Title:****C-02 Understanding plantation wood properties for value-added end products****Organizers:**

Name	Country	Organization	Email
Jianxiong Lyu	China	National Key R&D Program of China (2017YFD0600200)	jianxiong@caf.ac.cn
Jianxiong Lyu	China	Chinese Research Institute of Wood Industry	jianxiong@caf.ac.cn
Yafang Yin	China	IUFRO D5.06 Properties and Utilization of Plantation Wood	yafang@caf.ac.cn
Yafang Yin	China	International Association of Wood Anatomists (IAWA)	yafang@caf.ac.cn

**Time slot:**

2 hours

**Format:**

Oral presentations, Panel discussion

**Session description:**

To better understand the properties for plantation forests to provide wood materials for use in value-added products, there is a need to assess how relevant wood properties are impacted by growth characteristics, and how end products are impacted by wood properties. Application of updated and cost-effective evaluation techniques to plantation grown materials is an important step in understanding and learning how to improve the quality of plantation grown material and to identify optimal use by the forest products industry. This session is related to the congress theme “Wood, fiber and non-wood forest products”. The goal is to present most recent developments in assessment of plantation forest resources for wood quality. Specifically, this session will focus on: (1) Wood anatomical properties of forest plantations; (2) Wood physics properties of forest plantations; (3) Wood chemical properties of forest plantations; and (4) Establishment and development of referenced library of plantation wood properties for resource management and wood utilization.

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**Title:****C-03 Value-added application of planted forest: wood properties, modification and processing****Organizers:**

Name	Country	Organization	Email
Changtong Mei	China	Nanjing Forestry University	mei@njfu.edu.cn

**Time slot:**

2 hours

**Format:****Session description:**

The application of planted forest can reduce or eliminate the need to exploit natural forest for wood production. In comparison to natural forest, the quality of wood from planted forest is commonly lower, leading to the necessity of improving wood properties and producing value-added products. This session covers the work relating to the value-added application of wood harvested from planted forest. Subjects are wood anatomy, wood physics, wood chemistry, wood modification and processing technologies. Areas such as wood formation, structural and chemical composition of wood, the interrelationship between wood composition and their properties are included. Topics related to wood processing, e.g., machining, gluing, finishing, the conversion of wood into pulp and bio-refinery products are involved. The innovated techniques of producing artificially made products are welcomed, including wood-based panels, wood plastic composites and other wood based materials. Advanced technologies relating to wood application in construction fields are also covered.

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**Title:****C-04 Sustainable Management of Planted Forests for Value-Added Bio products****Organizers:**

Name	Country	Organization	Email
Jingxin Wang	U.S.	Division of Forestry and Natural Resources, West Virginia University	Jingxin.Wang@mail.wvu.edu
Shirong Liu	China	Chinese Academy of Forestry; International Center for Bamboo and Rattan, China	liusr@caf.ac.cn
Benhua Fei	China	International Center for Bamboo and Rattan, China	fbh@caf.ac.cn
Jianchun Jiang	China	Institute of Chemical Industry of Forest Products, Chinese Academy of Forestry, China	jiangjc@icifp.cn

**Time slot:**

2 hours

**Format:**

Oral presentations, Panel discussion

**Session description:**

Planted forests provide a large amount of renewable resources for value-added bioproducts or chemicals. Biomass from planted forests and other sources is the fourth largest source of energy in the world after coal, petroleum, and natural gas, providing about 14% of the world's primary energy consumption. In the U.S., for example, biomass-energy has supplies over 3% of the total energy consumption, which has surpassed hydropower and ranked as the largest domestic source of renewable energy for the nation. The biomass resource base is composed of a wide variety of forest and agricultural resources, industrial processing residues, and municipal solid and urban wood residues. Woody biomass is being increasingly used to make a wide range of renewable bioproducts, including industrial chemicals, pharmaceuticals, textiles, renewable materials, personal care products and other manufactured goods. Using biomass in these ways has the potential to generate higher value returns. Most of the forestlands, especially those held publicly, are generally less intensively managed as forests are expected to provide multiple-use benefits including wildlife habitat, recreation, and ecological and environmental services. Nonetheless, high potential of woody biomass production is still expected from forest plantations due to its existing large area (global forest plantation area at 187 million

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ha in 2000). For the U.S. alone, the amount of forestland-derived biomass that can be sustainably produced is approximately 368 million dry tons annually — more than 2.5 times the current consumption in the nation. However, how to best manage forest plantations for sustainable value-added bioproducts remains a great topic for further discussion worldwide. Therefore, we propose this session to address a few major issues related to biomass feedstock development, conversion, utilization and commercialization of bioproducts. Specifically, this proposed session will address the following objectives: 1) Sustainable management and value chains of planted forests, 2) Logistics and processing, 3) Value-added energy and bioproducts from planted forests 4) Utilization of biomass as a feedstock for bioenergy and bioproducts 5) Socio-economic and environmental impacts of biomass utilization 6) Policies, regulations, strategies and sustainability of utilization biomass and planted forests 7) Advanced manufacturing technologies of bioproducts and chemicals from biomass and planted forests

5 Proposed Session Format This session will consist of two parts using presentation/panel discussion format. It will take 2 hours for having 6-8 speakers. In the first part, each will be asked to present for 10 minutes of his/her studies. While in the second part, all the speakers will be invited to the panel for further discussion and interactions between speakers and audience. Poster exhibition will also be offered to research results from participants who either are willing to present posters or could not present orally.

6 Potential Session Speakers We intend to bring together internationally recognized experts to discuss biomass feedstock development and utilization of planted forests and other sources in the conference, including professionals in academia, government agencies, and industries. We are soliciting 2-4 potential speakers from China and other Asian countries like Japan, and Republic of Korea, with commitments from International Center for Bamboo and Rattan (ICBR), Drs. Benhua Fei, Zhijia Liu and Zhiqiang Li; Chinese Academe of Forestry, Dr. Shirong Liu, Dr. Jianchun Jiang, and Dr. Junming Xu; International Network for Bamboo and Rattan (INBAR). We are also targeting to solicit 2-4 speakers from North America and Europe, including potential speakers from USDA Forest Products Laboratory, Dr. Richard Bergman; West Virginia University, Dr. Richard Thomas and Dr. Jingxin Wang; State University of New York, Dr. Tim Volk; Washington State University, Dr. Michael Wolcott; University of Tennessee, Dr. Tim Rials; University of Gottingen in Germany, Dr. Dirk Jaeger; Dr. Raffaele Spinelli, Italian National Research Council; Swedish University of Agricultural Sciences, Dr. Ola Lindroos.

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**Title:****C-05 Chemical Processing and Utilization of Plantation Woody Products — New Concept: Green Process and Value-added Products****Organizers:**

Name	Country	Organization	Email
Wang Siquan	USA	University of Tennessee	swang@utk.edu
Fang Guigan	China	Institute of Chemical Industry of Forestry Products, CAF	fangguigan@icifp.cn

**Time slot:**

2 hours

**Format:**

Oral presentations

**Session description:**

The global plantation area is 264.62 million hectares, That of China has reached more than 69.33 million hectares, ranked the first in the world, these secretion, bark, foliage, nuts and related extracts and other non-woody resources, from plantation forest, rich reserves, there are very huge potential market values from those resources. At the same time, the surplus 160 million tons of woody residues are produced per year, but their utilization ratio is of less than 50%. Some common problems are visible, such as value-added less products and pollution discharge from their production processes, which seriously restrict the sustainable development of forestry. It is of great practical significance to enhance the efficiency and diversification of plantation residues and non-wood forest products to promote the green sustainable development of forestry industry. In the aspect of improving the utilization ratio of residual resources from plantations, the preparation of edible fungi culture matrix and production of functional feed additives from these resources are very important paths for their utilization ratio increment. In the fabrication of high value-added products, functional materials, from lignin and cellulose separated from these residues, is an effective means, not only to improve value-addition, but also the main entry point for green development and Low-carbon economy. The application of lignin, cellulose and their diversities performance control techniques are the weak links during high value utilization. In the environmental pollution control during large-scale utilization of residue fibrous resources, the production of pulp and charcoal or carbon material can realize the large-scale utilization of surplus resources, with modern clean processes. Therefore, the resource utilization of plantation residues is an important way to realize the

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low-carbon, efficient and circular development of modern forestry. Non-woody forest products have attracted many attentions recently, because it can meet human health and nutritional needs, develop local economy and increase farmers ' income. China is the world's largest country for collection of Non-wood forest products, the development and utilization of non-wood forest products has a long history. The resources of Non-wood forest products are renewable, and the orderly exploitation and utilization will not have negative effects on the recovery and reuse of resources, and the economic benefits produced will be sustainable. The development and utilization of Non-wood forest products are emphasized to produce edible, medicinal, industrial and other types of products, which have been benefitting our socio-economic growth and public life and health demands. But there are still some problems, such as lower utilization rate of resources, less varieties of refined or deep-processed products and lower economic value addition. Preparation of bio-polymer materials and biomass plate chemicals from Non-wood forest products resources, such as resin, woody oil, plant polyphenols, plant polysaccharides. Deep processing of these resources to develop new value-added products will not only help to improve the resource utilization rate, but also to promote farmer's incomes and beautiful rural construction.

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**Title:****C-06 Chemical Utilization of Non-wood Forest Products****Organizers:**

Name	Country	Organization	Email
Shang Shibin	China	Institute of Chemical Industry of Forestry Products, CAF	shangsb@163.com
Wang Fei	China	Nanjing Forestry University	hgwf@njfu.edu.cn

**Time slot:**

2 hours

**Format:**

Oral presentations

**Session description:**

At present, the area of plantation forest in China is 69.33 million hectares, ranking first in the world. Its exudates, bark, branches and leaves, drupe and related extracts and other non-wood resources are abundant, and the potential market value is huge. Non-wood forest products have attracted much attention in recent years, mainly because they can meet human health and nutritional needs, develop local economy and increase farmers' income. China is the largest non-wood forest product collecting country in the world. The development and utilization of non-wood forest products has a long history. The non-wood forest product resources are renewable, and the orderly development and utilization will not adversely affect the recovery and reuse of resources, and the economic benefits produced by them are sustainable. There are a wide variety of non-wood forest products developed and used in China, including all types of products such as edible, medicinal and industrial use. The economic development and public life have a large demand for non-wood forest products. Over the years, China has taken "collection and sale" as the main way to develop and utilize non-wood forest products, which were sold directly in the way of raw materials, and the economic benefit is poor. Chemical utilization of non-wood forest products is to use chemical methods for non-wood forest products such as tree extracts and secretions, including pine oleoresin, woody oil, plant polyphenols, plant polysaccharides, forest source activities and other forest products to prepare bio-based polymers and biomass chemicals. The deep processing and chemical utilization of these resources to develop new products and increase the added value of the products will not only help to improve the resource utilization rate, the intensive processing technology and the product development ability of the important resources, but also to promote the wealth of farmers and the construction of beautiful countryside.

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**Title:****C-07 Wood science and technology****Organizers:**

Name	Country	Organization	Email
Mihai Ispas	România	Transilvania University of Braşov, România	
Marius Cătălin Barbu	Austria	Salzburg University of Applied Sciences	
Salim Hiziroglu	USA	Oklahoma State University	

**Time slot:****Format:**

Oral presentations

**Session description:**

With an area of over 290Mha and a share of over 7.25% of the total area of the world's forests, planted forests play not only an important protection role but also an economic one, equally important.

Thus, even if the area of planted forests with protective role has passed 66Mha, the area of planted forests with production role is over 3 times higher (over 204Mha), of which over 175Mha are planted forests for industrial end use (FAO 2005).

Given these figures and a very rough estimate of yield from planted forests (5m<sup>3</sup>/ha/year) bring a paradigm shift: just app. 7% of the world's forests (the planted forests) can potentially produce two-thirds of global industrial roundwood (Evans 2009). It is worth mentioning that almost half of all planted forests for production are reported as managed for saw-log or veneer-log production, followed at relatively large distance by the area planted for pulpwood / fiber (approximately 20% of the total).

All these show that planted forests contribute massively to industrial wood and fibre supply, but also that the impact of the planted forests may be as great on environmental protection as in economic and social benefit terms.

An important aspect related to the planted forests is that only a small range of species is used for production in all forestal regions. Thus, of the several thousand tree species in the world, only about 30 have been widely planted. And of these, with two exceptions (Teak and Chinese fir), most are from just four genera: *Acacia*, *Eucalyptus*, *Pinus* and *Populus* (Evans 2009).

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Another important issue that must be considered by planners, researchers and technologists is the impact on markets of large volumes of certain species and size classes, which have been widely planted for productive purposes during the last decades.

In this context, it will be necessary, for example, to develop technologies of utilizing large quantities of small-dimension logs from only few species and also to find ways to use certain species for purposes that they have not been used up to now.

The objective of the session “wood science and technology” under the theme "wood, fiber and non-wood forest products" is to present some of the latest researches on wood science and wood processing technology which respond to the challenges of the new paradigm: namely that the wood as raw material originates mainly and will increasingly come from planted forests. It is meant to cover a diverse range of subjects of interest for the wood domain, in terms of valorization of wood from planted forests, such as: wood structure and properties, wood drying and heat treatments, wood-based materials, wood processing and surface quality, wood preservation, chemical modification, gluing and coating, wood for furniture and construction.

All oral presentations in this session are invited to be written into full manuscript for submission to the Special Issue on Sustainable Forest Management in the journal Sustainability ([http://www.mdpi.com/journal/sustainability/special\\_issues/sus\\_forest](http://www.mdpi.com/journal/sustainability/special_issues/sus_forest)).

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**Title:****C-08 Life cycle impacts of renewable forest-based products in developing circular bioeconomy****Organizers:**

Name	Country	Organization	Email
Pekka Leskinen	Finland	European Forest Institute	
Xiaoqian Chen	China	European Forest Institute	
Hongmei Gu	United States	USDA Forest Service,	
Wang Zhen	China	Beijing Forestry University	

**Time slot:**

2 hours

**Format:****Session description:**

Circular Bioeconomy provides new economic development model to replace fossil based materials and products with renewable alternatives in order to contribute to the Sustainable Development Goals (SDGs) and climate change mitigation. Forests are the biggest land based renewable resources. Nowadays new products like cross laminated timber (CLT) in building sector, and novel use of wood fibers in bio-based plastics, textiles and chemicals provide enormous market potentials for forest-biomass based products in developing circular bioeconomy. Internationally approved Life cycle assessment (LCA) is a tool to evaluate the environmental impacts of products and services over their full life cycle from cradle to grave or cradle to cradle. The LCA-based evaluation is crucial for countries to develop their green, circular and low carbon strategies in manufactures, recycling, and resources managements, in order to avoid outsourcing emissions to other products, sectors, or life cycle stages. This session focuses on how various products from traditional to novel forest-biomass based products would contribute to the circular bioeconomy development to assist climate change mitigation and world economic impacts.

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**Title:****D-01 Policies for improved contributions of planted forests to economies, societies and the environment****Organizers:**

Name	Country	Organization	Email
Rod Keenan	Australia	University of Melbourne	rkeenan@unimelb.edu.au
Wen Yali	China	Beijing Forestry University	wenyali2003@163.com
Thu Ba Huynh	Australia	University of Melbourne	thubahuynh@gmail.com

**Time slot:**

2 hours

**Format:**

Oral presentations, Panel discussion

**Session description:**

Planted forests are expanding in the Asia Pacific region to meet timber supply, economic development, poverty alleviation and landscape restoration goals. However, there has been a mixed history with expansion of forest plantations in this region. Some countries have successfully implemented large scale plantation programs that have been widely supported by the community and are providing substantial economic and social benefits. In others, plantation programs have been controversial, implementation has been slow and there have been limited benefits for local people or the wider economy; there have often been significant concerns about environmental impacts. In light of this concern, researchers have been active across the region in exploring new approaches to plantation development. This session will bring together policy researchers and experts from several countries in the region to discuss current problems and best-practice approaches to plantation development that serves the needs of industry, communities, smallholders and the environment. This will include speakers and panelists from Australia, Vietnam, Lao PDR, China and Indonesia, including from industry and NGOs. The panel will consider policy issues such as: land tenure and allocation processes; regulation and enforcement; finance, incentives and education programs for smallholder plantations; support for domestic processing and value-adding to plantation timber; and approaches for integrating environmental values and benefits. The panel session will build on activities and experiences from the research project 'Improving policies for forest plantations to balance smallholder, industry and environmental needs in Laos and Vietnam' being supported by the

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Australian Centre for International Agricultural Research. Participants in the session will be better informed of current policy needs and research activity in supporting wider benefits from forest plantations.

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**Title:****D-02 The Role of Sustainable Intensification in Restoration and Provision of Forest-Products – Connecting the Dialogue****Organizers:**

Name	Country	Organization	Email
Luis Neves	Portugal	New Generation Plantations	Insilva@wwfint.org
Natalia Canova	Brasil	Brazilian Tree Industry - Ib á	natalia.canova@iba.org
Luis Carlos Estraviz	Brasil	IUFRO- Plantations Task Force	lcer@usp.br

**Time slot:**

2 hours

**Format:**

Panel discussion

**Session description:**

Sustainable intensification is a concept that emerged from the debate about the world food and agriculture price and productivity crisis of 2008, which prompted a significant response from the scientific community on what solutions to avoid future supply-demand challenges might look like (Royal Society, 2009, Godfray et al., 2010). The concept of SI considered the increase of crop production in the face of the impacts of climate change and the growing scarcity of water and land, whilst sustaining the environment, preserving natural resources and supporting livelihoods of farmers and rural populations. From the start, the debate on SI has been centered on the application of scientific and technological innovation to crop productivity. Whilst the term has its origins in agriculture, the forestry community was quick to realize the relevance of the concept of SI to the multiple challenges it faces: The Forests Dialogue, the New Generation Plantations Platform and the IUFRO have all established interconnected dialogues on the topic. Indeed, the emerging debate on sustainable intensification in forestry can be seen as a coalescing force for converging parallel but hitherto uncoordinated dialogue. Engaging society, producers, and the global market is essential to address many of the raised questions that regard the practical implementation of SI. This side event aims to discuss how science, industry and civil society can bond on a more cohesive dialogue to discuss the ways technological innovation can be harnessed to provide solutions for challenges such as

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restoration, biodiversity and ecosystem services, and the capacity to increase production and mitigate climate change.

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**Title:**

**D-03 Green Belt Road**

**Organizers:**

Name	Country	Organization	Email
Luis Neves Siva	Portugal	New Generation Plantations	lnsilva@wwfint.org
Wu Shuirong	China	Chinese Academy of Forestry	shuirongwu@126.com
Wenbin Huang	China	WWF China	WBHuang@wwfchina.org

**Time slot:**

1.5 hours

**Format:**

Dialogues

**Session description:**

China's One Belt, One Road (OBOR) initiative, perhaps the most ambitious infrastructure and development programme ever, aims to pour some US\$900 billion of investment into infrastructure linking China with the rest of the world. From roads and railways stretching from South East Asia to Europe, to ports linking the South China Sea with East Africa and the Middle East, to new energy infrastructure across Central Asia, it's a plan that's going to change the planet. While President Xi Jinping has stressed that OBOR will be green and sustainable, infrastructure development on such a scale is bound to have environmental impacts. Equally, there's a risk that inward investment doesn't necessarily benefit the people living nearby, who are often those in greatest need. These are issues that New Generation Plantations has grappled with, and demonstrated solutions for. Smart land-use planning at the landscape scale can integrate mosaics of productive areas (like plantations) with conservation, while maintaining ecosystem integrity, protecting areas of high conservation value, restoring degraded land and increasing resilience. And doing so in a way that involves all stakeholders can create shared value for businesses, society and the environment. This session wants to highlight the opportunity to roll out these solutions on a scale that can make a significant difference to the natural environment, the climate, socio-economic development and the supply of renewable raw materials. The "Three Norths Forest Shelterbelt Programme" – also known as the Great Green Wall – is the biggest tree-planting project in the world, expected to cover 350,000km<sup>2</sup> along a length of 4,500km, by 2050. Currently, the government invests ¥2 billion (US\$300 million) into the programme each year. While poplar has been the species of choice

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for much of China’s Great Green Wall, more attention has been turning recently towards local species – notably yellowhorn (*Xanthoceras sorbifolium*) and tree peony (*Paeonia suffruticosa*). FuturaGene, a subsidiary of NGP participant company Suzano, has developed a yellowhorn nursery, capable of producing millions of seedlings, with cloned cultivars, giving farmers a higher-yielding tree. Well-managed plantations provide economic returns as well as environmental and social value. But realising this opportunity will require serious investment. NGP is keen to make this case to responsible investors, toward developing “Green Belt Road Bonds”.

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**Title:****D-04 Barriers and opportunities to realising the full value of planted forests contribution to ‘Sustainable Wood for a Sustainable World’****Organizers:**

Name	Country	Organization	Email
Benjamin Caldwell		Food and Agriculture Organization of the United Nations	
Luis Neves Silva	Portugal	New Generation Plantations	lnsilva@wwfint.org
Tim Payn	New Zealand	Scion	tim.payn@scionresearch.com

**Time slot:**

1 hour

**Format:**

Oral presentations

**Session description:**

Sustainable Wood for a Sustainable World (SW4SW) is an initiative to harness contributions from forests to the SDGs. It stems from a perceived need to build a broad coalition to remove constraints for the development of sustainable wood value chains, working on their backward and forward linkages, which can make them improve livelihoods, contribute to climate change mitigation and adaptation and provide for an inclusive development model consistent with the absorptive capacity of the planet, including through bioeconomy.

Sustainable wood value chains are critical in mitigate climate change, by carbon storage in standing forests and in harvested wood products. Climate mitigation potential of highly productive planted forests that provide large quantities of wood and woody biomass is much larger than just using forest ecosystems as carbon storage. This potential only reaches its peak once these resources are efficiently utilized. Its substitution effect of fossil-based raw materials and products, especially the contribution to mitigation in the energy and construction sectors is of particular relevance. Upcoming technologies such as biorefineries illustrate examples of intelligent uses of wood and woody biomass, along with more well-known uses such as wood buildings. Together, such uses of wood may make an important contribution to the negative emissions needed to meet global climate goals.

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The session will: - produce a paper based on the session, contributing to provide scientific background to the advocacy work on restore wood's positive public image, promote the principles of sustainable wood value chains from planted forests; - be followed up by the international Dialogue, Tree Plantations in the Landscape, in New Zealand, on production and consumption of sustainable wood in consistency with the SDGs and climate change needs; - stimulate IUFRO Planted Forest Task Force contribution and alignment with the Sustainable Wood for a Sustainable World initiative, being an active academy partner;

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**Title:****D-05 Ecosystem services frameworks for enhancing the management of planted forests****Organizers:**

Name	Country	Organization	Email
Dr. Richard T. Yao	New Zealand	Scion	richard.yao@scionresearch.com
Dr. Lu Wenming	China	Chinese Academy of Forestry	luwenmingcaf@126.com
Dr. Robert Deal	USA	USDA Forest Service	rdeal@fs.fed.us

**Time slot:**

2 hours

**Format:**

Oral presentations

**Session description:**

Planted forests are becoming increasingly important to the economy, environment and society. Global timber supply is increasingly being sourced from sustainably managed planted forests. These sustainable forests provide landowners with income from the sale of timber in domestic and export markets. In addition, they also improve water quality for downstream users and sequester carbon for climate regulation. They also provide important habitats for threatened flora and fauna species and critical habitats for improving biodiversity. A requirement for forest product certification standards is that planted (production) forests should have a minimum conservation area to contribute to biodiversity conservation. Planted forests, especially those situated near urban centres, provide valuable recreational services such as mountain biking, walking, horse riding and motorbiking. However, environmental and social values provided by planted forests remain easily ignored in policy and investment decisions because they are perceived to have limited market value. The ecosystem services approach has emerged as a way of framing and describing the comprehensive set of benefits that people receive from nature. Several ecosystem services frameworks and tools have been developed to enable the accounting of forests' multiple values, goods and services. These frameworks and tools enable monetization, quantification and/or qualitative deion of non-market ecosystem services to allow their representation in policy, investments and development of new markets. Some tools also enabled the bundling of both market and non-market ecosystem services values to create new and

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emerging markets for these services. Some assessment approaches allow the demonstration of the broader benefits of planted forests that helped in renewing product certification as well as facilitate sustainable forest management and develop policies for their implementation. The objective of the session on Forest Ecosystem Services (FES) is to present some of the tools and frameworks that have been applied to assess FES, how the results helped to inform policy, investment and developing markets, and what were the challenges and opportunities encountered along the journey. The application of such frameworks may vary across different scales such as planted forest estate, community, town, state or provincial, regional or national or international scales. All oral presentations in this session are invited to be written into full manus for submission to the Special Issue on Sustainable Forest Management in the journal Sustainability

([http://www.mdpi.com/journal/sustainability/special\\_issues/sus\\_forest](http://www.mdpi.com/journal/sustainability/special_issues/sus_forest)).

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**Title:****D-06 Urban forestry as tool to Contribution of biodiversity protection:  
Experience of West Africa Sahel, Niger****Organizers:**

Name	Country	Organization	Email
WASCAL	Ghana	WASCAL	moussa.s@edu.wascal.org

**Time slot:**

1 hour

**Format:**

Oral presentations

**Session description:**

Urbanization in the Sahel is constantly competing with and greatly impacting the woody flora in major cities. Urbanization can replace the species mix, leading to changes in plant community composition; however, there are limited studies that assess these attributes in Sahelian cities. This study assessed the woody species diversity and stand structure of urban forests in Niamey and Maradi. Woody species were inventoried in 363 plots (measuring 50 m x 50 m each) located across six land use and land cover types. Dendrometric variables of woody plants were measured. A total of 4977 individual tree species belonging to 139 woody species (of 41 families) was found in the two cities. A hundred and twelve species belonging to 88 genera with 37 families were inventoried in Niamey while Maradi had 111 species belonging to 37 genera with 34 families. The overall diversity index shows that the urban forest in two cities is rich in species ( $H' = 2.48 \pm 0.56$  bits;  $2.30 \pm 0.87$  bits). The residential urban forests in both cities had the highest Shannon indices. The most dominant families were Fabaceae 24.46 % (34 species) followed by Combretaceae 7.75 % (8 species) and Verbenaceae 7.75 % (8 species). About 52.52 % were exotic while 47.48 % were native. Neem tree was the most abundant woody species in both cities, accounting for 45.85 % of the total number of woody plants encountered.

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**Title:****D-07 Eucalyptus Tree Farming as Emergent Practice and its Impact on Environment, Land use and Livelihood in Gurage Zone, Ethiopia****Organizers:**

Name	Country	Organization	Email
Center for Environmental Science, Addis Ababa University.	Ethiopia	AAU	teshome.soromessa@aau.edu.et

**Time slot:**

1 hour

**Format:**

Oral presentations

**Session description:**

There are high and increasing demands for wood for industrial uses and fuel needs, and others especially in developing countries of the tropics with their increasing populations. To cope with increasing demand for wood situation, people often opt to planting fast growing, highly utilizable, exotic tree species. Such popularity may be justified by more than eighty countries that have shown interest in eucalyptus and have planted more than four million hectares worldwide outside the natural range of Australia, S E. Asia, and the Pacific. Given the urgency of food security in the country, plantations with exotic trees underscore the importance of integrating trees into more intensive tree crop production systems wherever the environment is conducive. Population pressure in the Ethiopian highlands has led to a change in land use/ land cover. Establishment of wood lots and plantations with exotic tree species (such as Eucalyptus) has long been advocated as a strategy for relieving pressure on indigenous forests and wood lands in the Ethiopian highlands. Traditional agroforestry practices in Ethiopia involve planting of trees in various spatial patterns to meet wood, fuel wood and fodder requirements. In recent years, however, single rows of Eucalypts globules trees planted along crop field borders have become a dominant feature of the central highland landscape. Thus, preservation of indigenous woodland and biodiversity may be achieved when substitutes for indigenous forest products for fuel wood are available. The study area, Gurage Zone has thirteen weredas. For the purpose the study four weredas will be selected based on the tremendous expansion of eucalyptus tree farming. To get primary data about the study

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systematic purposive sampling method will be employed. Three hundred eighty three households from sample weredas will be selected. These households will be representatives of eucalyptus tree farming activities since eucalyptus growing and land holding system are more or less similar in the zone. Thus, after selecting households with eucalyptus tree farms from the list of each Wereda's PAs (peasant administrations), closed and open ended questionnaires will be distributed to every 10th households. The main reason for selecting this sampling method is to avoid the inclusion of non-eucalyptus tree farmers and to keep the validity of the representative samples. Key Words: Eucalyptus tree expansion, Ecological impact of eucalyptus tree, Gurage Zone, Livelihood impact of Eucalyptus, Land use competition, Land use/land cover change

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**Title:**

**D-08 Intensifying Forest Management in China**

**Organizers:**

Name	Country	Organization	Email
Runsheng Yin	USA	FPE Editor/MSU	<a href="mailto:yinr@msu.edu">yinr@msu.edu</a>

**Time slot:**

1.5 hours

**Format:**

Oral presentations, Panel discussion

**Session description:**

Competition for forestland in China has intensified, but the forestland has been poorly managed, leading to low stand quality, growth rate, and ecosystem functionality. An overarching question has been how to manage the country's forestland more efficiently. The objective of this session is to address this question by assessing China's forestry development strategy, policy, and practice against the potential of its forests and the goal of its society. A crucial pathway is to implement a classified management strategy, whereby a small portion of suitable forestland is dedicated to intensive plantations for producing timber/fiber, while a selective but large part of the other commercial forests will be more effectively managed to provide ecosystem services as well as to produce timber. To implement this strategy successfully, China must transform its forestry organizational and governance systems.

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**Title:****D-09 An introduction to the Forest Policy & Economics Special Issue on China's Forest Reforms****Organizers:**

Name	Country	Organization	Email
Runsheng Yin	USA	FPE Editor/MSU	<a href="mailto:yinr@msu.edu">yinr@msu.edu</a>
Can Liu	China	FDERC/NFGA	<a href="mailto:sfa1sfa1sfa1@163.com">sfa1sfa1sfa1@163.com</a>

**Time slot:**

2 hours

**Format:**

Oral presentations, Panel discussion

**Session description:**

FPE has been editing/publishing a Special Issue (SI) on China's forest reforms. These reforms, like those for other sectors of China's economy, have been gradual shifts away from centrally approved collective/state management and toward greater market orientation. The reforms have been pragmatic, expanding in their comprehension as success was demonstrated and as the authorities approved. Their success has been phenomenal. This session will release the SI and highlight/discuss its papers, which examine the history and progression of these reforms, their contribution to China, and to our broader global understanding of successful forest policy and management.

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**Title:**

**D-10 Assessing the Effectiveness and Impact of China's Ecosystem Restoration Programs**

**Organizers:**

Name	Country	Organization	Email
Baodong Cheng	China	BFU	<a href="mailto:baodongcheng@163.com">baodongcheng@163.com</a>
Runsheng Yin	USA	FPE Editor/MSU	<a href="mailto:yinr@msu.edu">yinr@msu.edu</a>

**Time slot:**

2 hours

**Format:**

Oral presentations, Panel discussion

**Session description:**

China has been undertaking major restoration programs since the late 1990s, including the Sloping Land Conversion Program (SLCP) and the Natural Forest Protection Program (NFPP). These programs have been expected to substantially mitigate the regional ecological degradation and rural poverty and to significantly contribute to the global cause of sustainable development. What are their induced socioeconomic and environmental impacts and how to improve their governance? This session is proposed to address those two questions. The session will feature 4 individual presentations of 25 minute each and a 20-minute wrap-up discussion.

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**Title:****D-11 Collective Forestry Reform, Non-Timber Forest Economy, and Rural Development****Organizers:**

Name	Country	Organization	Email
Dr. Yali Wen	China	Beijing Forestry Univ.	Wenyali2003@163.com
Dr. Lan Gao	China	Southern China Ag. Univ.	
Dr. Runsheng Yin	USA	Michigan State Univ.	<a href="mailto:yinr@msu.edu">yinr@msu.edu</a>

**Time slot:**

2 hours

**Format:**

Oral presentations, Panel discussion

**Session description:**

Reforming forest tenure and enhancing forest governance has attracted broad attention for addressing such major issues as reducing deforestation and forest degradation, promoting forest restoration and management, and improving forest ecosystem quality and productivity. All of these can have significant impacts on community livelihoods, climate change, and sustainable development. However, large knowledge gaps and policy challenges exist in the efforts of implementing forest tenure/governance reforms. This session will report what has been done and address what remains to be done, based on China's recent experience.

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**Title:**

**D-12 A landscape approach to planted forests**

**Organizers:**

Name	Country	Organization	Email
<b>Vincent GITZ</b>	<b>Indonesia</b>	<b>CIFOR/Forests, Trees and Agroforestry program of the CGIAR</b>	<b>v.gitz@cgiar.org</b>

**Time slot:**

2 hours

**Format:**

Oral presentations

**Session description:**

The CGIAR programme on FTA has characterized landscape approaches in the following way: “As it relates to agriculture, forestry and other land uses, and to the livelihoods they sustain, the landscape approach transcends traditional management and governance boundaries, seeking to provide tools and concepts to identify, understand and address a complex set of environmental, social and political challenges, and to enable evidence-based and inclusive prioritization, decision-making and implementation” (FTA, 2017).

The session will consider how this concept of landscape approach can be applied to planted forests, how it can support the analysis of the potential contributions they can make to ecosystem products and services and human well-being, and how such an analysis can inform and orient decision making, from the design of policies, measures and incentives, to implementation at local level, involving various categories of actors.

Presentations from researchers of the FTA program, its partners and other organizations will show how the landscape approach can be applied to planted forests, how it enables to better take into account local specific issues, including water management, biodiversity conservation, land restoration, social issues and concerns of local populations. They will provide further analysis on how it can facilitate prioritization of issues, strengthen synergies and manage trade offs, illustrated by specific cases. Examples of policies, measures and incentives will be provided, from a range of countries with ambitious planted forest policies.

The presentations will be followed by a session of questions and answers.

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The session will result in the publication of a paper.

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