



**Interconnecting Forests,
Science and People**

**125th Anniversary
Congress 2017**

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Contact

No# Title	10 Innovations in forest operations for better serving evolving societal needs
Main Organizer	Dirk Jaeger University of Freiburg, Freiburg/Germany <i>dirk.jaeger@foresteng.uni-freiburg.de</i>
Co-Organizer(s)	Udo H. Sauter, Forest Research Organisation of Baden Wuerttemberg
Session description	<p>Politics increasingly introduces initiatives fostering transition towards a bio economy aiming at societies preferably utilizing renewable natural resources while achieving economic growth efficiently and sustainably. This move has consequences for forest management for meeting growing demands for sustainably produced timber on the one side while maintaining or even enhancing ecosystem services for a growing urbanized society, e.g. space for recreation, culture etc. on the other side. Furthermore, forest management and especially forest operations are challenged by ecological and, in particular, climate changes resulting amongst others in difficult technical operating conditions (e.g., missing frost periods for low impact off-road operation of harvesting machinery in forests of the northern hemisphere).</p> <p>New technologies and transformed production processes in forest operations offer solutions for minimizing trade-offs between the different demands while supporting the sustainable supply of timber and non-timber products. This means within the forest-wood production chain not only technical advancement of machine design for reducing environmental impacts, increasing productivity, safety and user comfort but also innovative planning and monitoring tools including airborne and terrestrial laser scanning, drone surveillance are needed together with innovative logistics for machine and truck scheduling including backhaul improvement. Furthermore, intelligent process steering mechanisms together with new business models are needed as suggested by the concepts of "Industry 4.0" which allow not only adaptation of running processes but also process integration for enhanced process quality at reduced process costs.</p> <p>The overall goal of this session is to introduce innovative solution strategies at a global level for tackling major future challenges of forest operations and discussing potential impacts with stakeholders of the production chain and interested attendees.</p>

No# Title	31 Quality Assessments along the wood supply chain for optimal use of the forest resource
Main Organizer	Franka Brüchert FVA Baden-Württemberg, Freiburg/Germany <i>franka.bruechert@forst.bwl.de</i>
Co-Organizer(s)	Alexis, Achim, Laval University Quebec, Canada – (WG 5.01.04) Dave, Auty, Northern Arizona University, USA – (WG 5.01.04) Paul, McLean, Forestry Commission, Forest Research Agency, UK – (WG 5.01.04) Gert, Anderson, Skogforsk, Sweden – (WG 3.02.04)
Session description	<p>The present forest resource is limited in some parts of the world and a shortage of wood and woody biomass is identified as an obstacle for the developing bio-economy worldwide. Supply chain optimization is important for the environmental and economical production of wood based forest products. A key requirement for this optimization is that the available and future forest resources must be assigned to their best and most appropriate uses as early as possible in the forestry wood chain. The development of modern methods in remote sensing, stem form assessments and non-destructive testing of the wood can help facilitate such decision making at all stages along the wood-supply chain: pre harvest, in the forest, at road side and at the mill. Integrating the information gathered at all stages along the chain still presents some challenges.</p> <p>This session seeks to promote discussion around the development and implementation of non-destructive tools and remote sensing for early characterization of the forest resource prior to primary processing. It will include topics such as new technological and modeling approaches to characterize the resource, new concepts for data management and integration throughout the supply chain and decision making based on tree and wood properties throughout the supply chain.</p>

No# Title	78 Forest Operation and Ergonomics: Challenge and Solutions.
Main Organizer	Seca Gandaseca Universiti Putra Malaysia, Serdang/Malaysia <i>seca@upm.edu.my</i>
Co-Organizer(s)	IUFRO RG 3.07 Forest Operation in the Tropic IUFRO RG 3.03 Forest Ergonomics CIFOR
Session description	<p>Session Topic: Forest Operations and Ergonomics: Challenges and Solutions.</p> <p>This session will address the challenges and solutions on forest operation and ergonomics related to the current global issues such as forest degradation and climate change is one of the current world agenda. In this session, the sharing knowledge among professional/ researchers from several countries as well as the current issues will be discussed in this session. Facing the further situation under climate change, it is very important to modified the existing forest operation and ergonomics system or to adopt new forest operation and ergonomics system which can be adapted with the current situation and environment. Hopefully, some finding solutions from this session will contribute significantly in seeking and addressing challenges and finding suitable solutions, especially from the sight of forest operation and ergonomics.</p>

No# Title	107 Collaborative logistics and planning in the forest sector
Main Organizer	Sophie D'Amours University Laval, Quebec/Canada <i>Sophie.Damours@outlook.com</i>
Co-Organizer(s)	Luc Lebel, University Laval Mikael Ronnqvist, University Laval
Session description	Collaborative approaches are raising interests as they provide ways to increase efficiencies by capturing network economies and group-based decision making. By accepting joint planning and execution parties are providing the whole network with extra opportunities. Although a number of research projects has showcase the potential of these emerging approaches, very few have been implemented. This session aims to better understand what limits the implementation of collaborative logistics and planning in the forest sector and propose new research directions. Co-harvesting, co-procurement, co-distribution are examples of collaborative opportunities to be considered.

No# Title	114 Transforming low grade logs and residues into higher value products through improved supply chain management
Main Organizer	Nathaniel Anderson U.S. Forest Service, Missoula, MT/USA <i>nathanielmanderson@fs.fed.us</i>
Co-Organizer(s)	Woodam Chung, Oregon State University, Dimitris Athanassiadis, Forest Technology Swedish University of Agricultural Sciences
Session description	<p>Supply chains for low grade products, such as biomass, fuelwood and pulpwood, are often closely tied to supply chains for high grade sawlogs and veneer, which tend to have higher market value. However, foresters are often faced with unforeseen events and conditions that result in much higher outputs of low grade products than are typically generated by silvicultural treatments for normal establishment, tending, and harvest operations. Insects, disease, poor site conditions, fire, drought, severe weather, invasive species, and previous high grading can negatively impact the growth and survival in otherwise well managed stands. These agents can negatively impact timber properties and grade through checking, insect damage, poor form, decay, and staining, and can also increase the relative densities of undesirable and underutilized species. This session will highlight innovative research and development in supply chain logistics, marketing and utilization that seek to increase the value of low grade products, including those from salvage harvests, sanitation cuttings, fuel reduction thinnings, and forest restoration treatments. A variety of studies from around the world will focus on ways to increase productivity, reduce costs, and increase product value on such operations through inventive logistics, new processing techniques, novel equipment, creative marketing of stained wood and non-traditional species, and decision tools for analysis, planning and management. Emphasis will be on improving the financial viability of silvicultural treatments implemented to meet ecological and economic objectives, especially on marginal, difficult, and degraded sites.</p>

No# Title	117 Sustainable forest operations for forest and landscape restoration
Main Organizer	<p>Rene Zamora-Cristales World Resources Insitute, Washington/USA <i>rene.zamora@wri.org</i></p>
Co-Organizer(s)	<p>John Stanturf, United States Forest Service Southern Research Station. Cesar Sabogal, Forest Management Forestry Policy and Resources Division (FOA) Forestry Department, FAO of the United Nations Guillermo Navarro, Policy and Forest Economics, Center for Tropical Agricultural Research and Education (CATIE), Costa Rica Kazuhiro Aruga, Utsunomiya University Faculty of Agriculture, Forestry Section, Japan Marco Contreras, Forest Management, Department of Forestry, University of Kentucky, USA Maria Franco Chuaire, World Resources Institute, USA Woodam Chung, College of Forestry, Oregon State University. Roger Villalobos, Forest and Landscape Management, Center for Tropical Agricultural Research and Education (CATIE) Bastiaan Louman, Forestry, Center for Tropical Agricultural Research and Education (CATIE) Walter Vergara, World Resources Institute, USA</p>
Session description	<p>Forest and landscape restoration (FLR) represents an opportunity to reverse the land degradation process that affects many regions in the world and also help to mitigate carbon emissions from agriculture activities and prevent unsustainable land use changes, e.g. from forestry to agriculture. FLR activities aim to restore land functionality to increase social wellbeing while improving environmental conditions and generating financial and economic benefits. Strategies may include but not limited to agroforestry, tree plantations, silvopasture systems or silvicultural management of degraded and secondary forests. Global aspirations to restore 150 million hectares by 2020 (Bonn Challenge) and 350 million hectares by 2030 (UNFF New York Declaration) are now supported by several countries in the world (i.e. Initiative 20x20 in Latin America and AFR100 in Africa) and have generated a great momentum among the national governments, private impact investors and non-government organizations. Given that there are issues of scale (hundreds of millions of hectares), well designed and adapted forest operations (e.g. site preparation, tree planting, silviculture, harvesting, etc.) will be key to the successful and cost-effective implementation of restoration projects on the ground. Innovative forest operations will be needed to overcome the challenges posed by a range of diverse landscapes and contexts. Additionally adapted harvesting methods will also be needed to gather the products of the restoration activities. Forest operations will need to evolve and adapt from a less monoculture-type operation to more diverse, non-traditional practices that will improve techniques for site preparation, tending and planting, to harvesting and transportation. In this session we will be looking to answer how are FLR operations different from traditional forest operations and what knowledge need to arise from that difference. Also this session will be an excellent opportunity to link climate change mitigation strategies with efficient and innovative forest operations that will increasingly become part of the solution to achieve the global commitments and improve landscapes resilience.</p>

No# Title	121 Reforestation challenges: planting material, ecophysiology, biodiversity, climate change mitigation and adaptation, and disaster risk reduction
Main Organizer	<p>Vladan Ivetić University of Belgrade - Faculty of Forestry, Belgrade/Serbia <i>vladan.ivetich@sfb.bg.ac.rs</i></p>
Co-Organizer(s)	
Session description	<p>There are five million hectares of new forests planted each year, according to Global Forest Resources Assessment (FAO 2015). How successful are we in planting these new forests? What are challenges that practitioners meet today in planting forests? What are challenges that forests established today will face in decades to come? There is a myriad of research results and a body of knowledge large enough to understand principles behind the field performance of planted forests. The environment is dynamic and inputs and outputs continually change, so there is a constant need for new research ranging from the global to microsite scale, and from the ecosystem and species to the population and genotype scale.</p>

No# Title	125 Planning methods in ensuring a continued license to practice
Main Organizer	Bruce Talbot Norwegian Institute of Bioeconomy Research, Aas/Norway <i>bta@nibio.no</i>
Co-Organizer(s)	
Session description	<p>Site damage in connection with timber harvesting appears to be an ever increasing problem despite decades of efforts in avoiding these through technical development. A warming climate means shorter periods with frozen soils and longer wetter periods in many forest areas. A recent report based on over 400 ha of harvesting sites in Sweden showed that over 80% of moderate to severe wheel rutting damage took place in areas accurately predicted as being highly predisposed to damage by simple terrain modelling. This implies that up to 80% of site damage is potentially avoidable if systems can be developed to operationalize the information in the tactical planning of forest machines. However, damage avoidance often comes at a cost that must be borne by forest owners or contractors. This session will highlight the utility of Operations Research methods in providing solutions that take account of both the commercial and the environmental benefits and dis-benefits in scheduling forest machines in the best possible way. Selected presentations will demonstrate innovative modelling methods that monetize environmental damage in a trade-off with meeting supply contracts for different products. The aim of this session is not-only to demonstrate that production and environmental regard are not mutually exclusive, but that they in fact need to be closely integrated in maximizing the contribution of timber production to the bio-economy.</p>

No# Title	151 History, Findings, and Future Directions of Forest Landowner Research
Main Organizer	Brett Butler U.S. Forest Service, Amherst, MA/USA <i>bbutler01@fs.fed.us</i>
Co-Organizer(s)	Christoph Hartebrodt, Forest Research Institute of Baden-Württemberg
Session description	<p>The fate of the forests lies largely in the hands of those who own it and consequently forest owners are critical component of “Interconnecting Forests, Science and People.” Operating within political, social, economic, and biophysical constraints, forest owners are the ones who decide if and how forests will be managed and what will be produced. Private owners dominate many forested landscape across much of the world. According to the FAO’s 2015 Global Forest Resources Assessment, private forest owners control nearly 70 million hectares of forestland around the globe and account for well over 50% of the forestland in many countries in Europe and North and South America. The largest areas of private forestland are in the USA, Brazil, China, Colombia, Papua New Guinea, Australia, Canada, Sweden, Mexico, Finland, and Japan. Within this category of private forest owners, family forest owners, also known as nonindustrial private forest owners, are dominant. Surveys are the most common research tool used for understanding the attitudes, behaviors, and demographics of family forest owners. Most landowner surveys are focused on narrow topics for owners in limited geographic areas, but a handful of projects have been established that look at forest owners across broad areas and for extended periods of times, such as the U.S. Forest Service’s National Woodland Owner Survey, the “accountancy networks” of Germany and Austria, and the periodic landowner surveys in Finland, Sweden, and Japan. This session will provide an opportunity for discussing the history, synthesizing the current state, and charting a path forward for forestland owner research.</p>

No# Title	154 Sustainable and Constructive Strategy of Ergonomic Research in Forestry
Main Organizer	Yozo Yamada Ehime University, Matsuyama/Japan <i>yamada.yozo.fj@ehime-u.ac.jp</i>
Co-Organizer(s)	Witold, Grzywinski, Poznan University, Poland Efi, Yuliati Yovi, Bogor University, Indonesia
Session description	The future role of ergonomic research increases its importance under current global forest and forestry conditions. The need of forest ergonomic solutions is obviously visible in the topics of: work accidents, physical or psychological burdens, machine operation techniques, occupational health, forestry labor, aging, training and education, decision making, management sense, social roles, care for environment, and so on. In contrary, numbers of the ergonomic researchers in forestry have decreased. This problem could be triggered by the fact that forest ergonomic education has been implemented insufficiently. Only few universities or colleges that majoring in forest and forestry provide lecture (and laboratory) discussing forest ergonomics. In this mid-term meeting, we will mainly discuss to how to foster future ergonomic researchers, and propose publishing a world standard forest ergonomic textbook for world forest ergonomic education. Secondly, we will discuss strategy to reduce working accidents from forest and forestry operations as a world critical problem.

No# Title	168 Sustainable forest operations – A foundation of the green economy
Main Organizer	Enrico Marchi University of Florence, Firenze/Italy <i>enrico.marchi@unifi.it</i>
Co-Organizer(s)	Woodam Chung, Department of Forest Engineering, Resources and Management, Oregon State University, Corvallis, OR, USA
Session description	The IUFRO Task Force on Climate Change and Forest Health has recently provided an opportunity for forest operations scientists around the globe to examine the concept and approaches of sustainable forest operations (SFO). The essential elements of SFO have been identified as environment, human factors, economics, quality and society. Holistic views and approaches are required to measure and ensure the performance on each element for the sustainability of forest operations. The objectives of this session are to 1) review the concept of sustainable forest operations as a foundation of the green economy, 2) understand dynamic linkages among the essential elements, and 3) provide examples of quantitative approaches to assessing performance of forest operations sustainability. This session will provide an important dialog platform that will stimulate interdisciplinary collaborations to discover effective and sustainable ways of managing forests and practicing forestry.

No# Title	169 New comminution technologies and logistics to improve the quality of forest energy feedstock
Main Organizer	Han-Sup Han Humboldt State University, Arcata/USA <i>humboldtkimchi@gmail.com</i>
Co-Organizer(s)	Raffaele Spinelli, Trees and Timber Institute of the National Research Council, Italy Jae-Heun Oh, National Institute of Forest Science, South Korea Hans Hartmann, Competence Centre for Renewable Feedstock, Germany Rolf Björheden, Skogforsk, Sweden Pere Navarro, Forest Sciences Centre of Catalonia, Spain
Session description	<p>Feedstock quality is an increasingly important issue in forest biomass operations, because new biomass conversion technologies operate within narrow fuel specifications. That especially is true for new gasification plants, which require dry particles with a 4-5 cm length. Opposing requirements characterize the new technologies for conversion of wood biomass into jet fuel, which need particles shorter than a 1 cm on a consistent basis. All biomass conversion technologies require low moisture content and minimum or no contamination with bark and dirt. Chippers and grinders are commonly used to prepare feedstock for bioenergy. However, innovative technologies and tools have recently been developed to keep up with the demands for particular feedstock specifications. Some examples of new comminution technologies include micro-chippers that produce chips smaller than 6-mm in length, knife edge bits that produce clean and chunky wood chips, various pocket designs in a drum chipper, and sawdust machines that convert logs directly into sawdust-sized materials. In addition, technical advances in the feedstock comminution processes directly affect the cost of feedstock supply and transportation logistics. We propose a technical session to 1) introduce methods and standards for forest biomass quality assessment; 2) new comminution technologies to produce feedstocks that meet specifications for different biomass conversion methods; 3) share technically and financially successful examples of adapting innovative comminution technologies and logistics, and 4) provide a forum to review the current technologies to produce quality feedstocks and discuss future topics and issues of comminution technology development.</p>

No# Title	201 Sustaining the emerging bioeconomy - Innovations in forest harvesting & transportation
Main Organizer	Jean-Francois Gingras FPInnovations, Pointe-Claire/Canada <i>jean-francois.gingras@fpinnovations.ca</i>
Co-Organizer(s)	Division 3.01 Harvesting & Transportation Engineering Akay, Abdullah Emin, Bursa Technical University, Faculty of Forestry, Department of Forest Engineering, Division 3.01 Acuna, Mauricio, Forest Industries Research Centre (ML16) University of the Sunshine Coast, 3.01 Chung, Woodam, Oregon State University, College of Forestry, Department of Forest Engineering, Resources and Management
Session description	<p>The emerging bioeconomy around the world depends on a reliable and sustainable forest fiber supply chain. As in all other industrial fields, technology progresses more and more rapidly including in the forest sector. The examples abound and include enhanced forest inventory data obtained through satellite imagery and tools such as LiDAR, automated process controls in modern machines, advanced GPS navigation and telemetry/telematics solutions, remotely-operated systems, drones for operational reconnaissance, monitoring and planning, winch-assisted machines for steep slopes, sensors, function automation, RFID log tagging, autonomous trucks and augmented reality in machine cabs: Innovations in timber harvesting, processing and transportation systems have literally transformed forest operations in recent years. Modern forest equipment offers a safe and comfortable environment that enhances the quality of life for forest workers compared with traditional systems. Machines today consume much less energy, produce minimal disturbance on the environment and advanced engine technology leads to very low air and noise pollution. It is important for the research community to hear about technological advances in the various phases of operation to accelerate the implementation of these value-adding technologies.</p> <p>This session will offer a great forum for all IUFRO members interested to learn about the latest technological innovations in the field of forest harvesting, planning, process control and transportation.</p>

No# Title	202 Eco-friendly harvesting operations in mountainous terrains
Main Organizer	Raffaele Cavalli University of Padova, Legnaro/Italy <i>raffaele.cavalli@unipd.it</i>
Co-Organizer(s)	
Session description	<p>Forest operations in mountainous terrain need to apply production systems which are adapted to specific local conditions and existing infrastructure, while minimising negative externalities to the environment and society, such as soil, water, greenhouse gas emissions, visual impacts, wildlife, and other ecosystem services. A variety of harvesting operations have been developed for steep terrains around the world ranging from extracting timber by sliding to cable or aerial systems. This session is aimed to create a forum for research scientists, students and practitioners from around the world to review the state-of-knowledge about harvesting in mountainous terrain and shape emerging concepts which could be suitable for solving location-specific problems of world's mountain forest areas.</p> <p>Eco-friendly approaches for interventions in mountainous forest areas represent a key issue that requires a deep understanding of the relationship between products, management practices and site susceptibility. Both negative and positive impacts of management options have to be considered as guidelines to sustainably harvest timber resources in mountainous forests. This is of particular importance because of the critical roles such forests play in biodiversity conservation and watershed hydrology. Considering climate change and the future energy constraints, changing paradigms must be envisaged to promote energy efficient systems for carrying out forest operations in steep terrain.</p>

No# Title	209 Safety and Healthy in Forestry
Main Organizer	Kenan Melemez Bartın University, Bartın/Turkey <i>kmelemez@hotmail.com</i>
Co-Organizer(s)	Habip Eroglu, Karadeniz Technical University Abdullah E. Akay, Bursa Tecncal University
Session description	<p>Around the world, there are often discouraging trends of rising accident rates and a high incidence of occupational diseases and of early retirement among forestry workers. Forestry in general (the establishment and regeneration of forests, silvicultural work and forest protection, timber harvesting and transportation) and logging in particular continue to be among the most dangerous occupations. Accidents are normally caused by poor organization and supervision, inadequate tools and equipment, poor planning, and lack of skills and competence among workers, supervisors and managers. Mechanisation in timber harvesting has led to increased productivity, but also job losses and radical change in working methods. While mechanization often reduces the danger and stress of forestry work, it may cause psychological and musculoskeletal problems of a different kind. Satisfactory safety and health levels are achieved when a number of closely related principles have been applied at national, enterprise and worksite levels. Forestry enterprises vary considerably in terms of size, scope, economic stability and culture. To improve workers' health and ensure that they can work longer and live healthier, the interconnected issues of occupational safety and workers' health are best managed in a comprehensive and integrated manner. This section consists of occupational safety, occupational diseases, ergonomics, workplace design etc. in forestry activities. It aims to protect workers from hazards in forestry work and to prevent or reduce the incidence of occupational illness or injury.</p>

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