

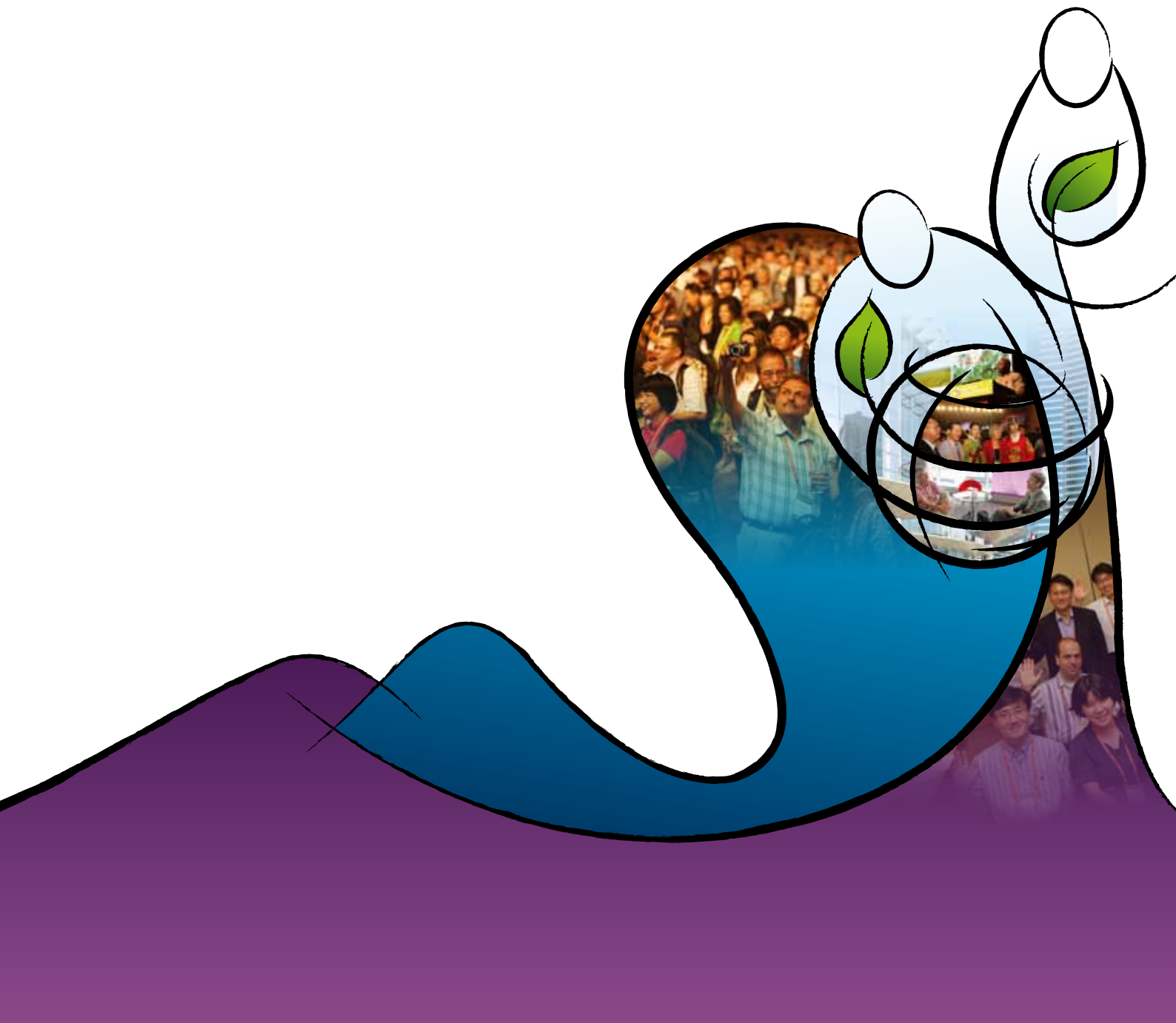


# CONGRESS REPORT

## XXIII IUFRO WORLD CONGRESS

Forests for the Future: Sustaining Society and the Environment

23-28 August 2010, COEX, Seoul, Korea  
[www.iufro2010.com](http://www.iufro2010.com)





# XXIII IUFRO WORLD CONGRESS REPORT

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# Preface

The XXIII IUFRO World Congress was held in Seoul, Korea from 23 to 28 August 2010. Approximately 2,800 forest scientists from 93 countries participated in the Congress to present about 2,000 papers and discuss on various topics relating to forests for the future. The Congress in Seoul ranked first among all previous congresses in terms of the number of participants and abstracts presented in the history of IUFRO.

The Congress consisted of official events and social events, scientific program, IUFRO meetings, trade and exhibition as well as tours. The Opening Ceremony was graced by the presence of President Lee, Myung-bak of the Republic of Korea on 23 August that culminated the official events at the Congress. About 2,400 participants attended the ceremony where the IUFRO flag was hoisted followed by the opening address by IUFRO President Don Koo Lee, the congratulatory remarks by FAO Director Eduardo Rojas-Briales, and the congratulatory message delivered by UNFF Director Jan McAlpine on behalf of UN Secretary General Ban, Ki-moon and a welcoming remarks by President Lee, Myung-bak. The Congress was honored to have a head of state attending the Opening Ceremony for the first time in the history of IUFRO. The Tree Planting Ceremony, as part of the IUFRO World Congress tradition, was held on 22 August in Seoul Forest which is a new urban park in Seoul to build an IUFRO Garden. In celebration of the Congress, an offspring tree of Jeong-i-pum pine and descendant trees of Geumgang pine (*Pinus densiflora* for. *erecta*) were planted and a monument was unveiled in the Garden.

The scientific program was divided into Plenary Sessions, Sub-plenary Sessions and Technical Sessions. The one-hour Plenary Sessions were held in the plenary hall at 11:00 everyday (except Thursday for the In-Congress Tours) in which keynote presentations were delivered to the audience by world-renowned experts. Particularly, Korean poet KO Un, invited by the host country, delivered a keynote speech entitled “An Act of Grace from the Forest: How is Absolution Possible?” which was acclaimed by many

participants. The Sub-plenary Sessions were organized by selecting 15 subjects of current interests from the Technical Sessions under nine themes set by the Congress Scientific Committee (CSC). Three Sub-Plenary Sessions were convened daily in sub-plenary halls where speakers presented altogether 61 papers. A total of 2,062 papers (oral: 916; poster: 1,146) were presented in 150 Technical Sessions. The submitted abstracts were published in a special edition of the *International Forestry Review (IFR)* and distributed to all participants.

The Scientist Assistance Program (SAP) provided financial assistance for 174 forest scientists from 55 developing countries. In addition, Seoul National University financially supported 78 participants. In total, 252 participants from developing countries benefitted from this year’s program, which is the most massive support among the IUFRO World Congresses. One week before the Congress, Pre-Congress Training Workshops were held and was attended by 69 invited forestry scientists from 28 countries. The workshops were comprised of four courses: forests and climate change, forest-water interactions, traditional forest knowledge and, forests and human health.

Participants joined the In-Congress Tours on 26 August. There were 1,355 participants who had selected one of the eight courses offered for a hands-on experience of Korea’s exemplary reforestation and traditional Korean culture. After the Congress, 163 persons joined one of the eight courses prepared for the Post-Congress Tours. Those who chose a tour in Korea learned about nature and culture of Korea while those who selected a tour outside Korea traveled to China, Japan or Mongolia.

During the Congress, a Trade & Exhibition was held to show the future directions in the development of forest science and forestry. Eighty-two exhibitors from 13 countries engaged in the exhibition, scoring 13,139 visitors. Besides, participants also shared a broad range of up-to-date information regarding forest science and

policies at the 41 Side Events.

A daily report of the XXIII IUFRO World Congress, *IUFRO World Congress Bulletin* which was published by the International Institute for Sustainable Development (IISD), provided updates on the status of the Congress via printed newsletters as well as online. Major and selected news was also detailed on *The Congress Daily* for the participants during the Congress period. Five keynote speakers were invited to the press conference, which brought attention of the media to the Congress.

Numerous amenities increased the level of satisfaction of the participants during the Congress. In tandem with Korea's global reputation as an Internet powerhouse, the Congress venue provided Internet access to participants in several places. In the Speaker's Room, all speakers could review their presentations and transmit their presentations to the screen in their session rooms directly. Each session room was equipped with the RFID-based recognition

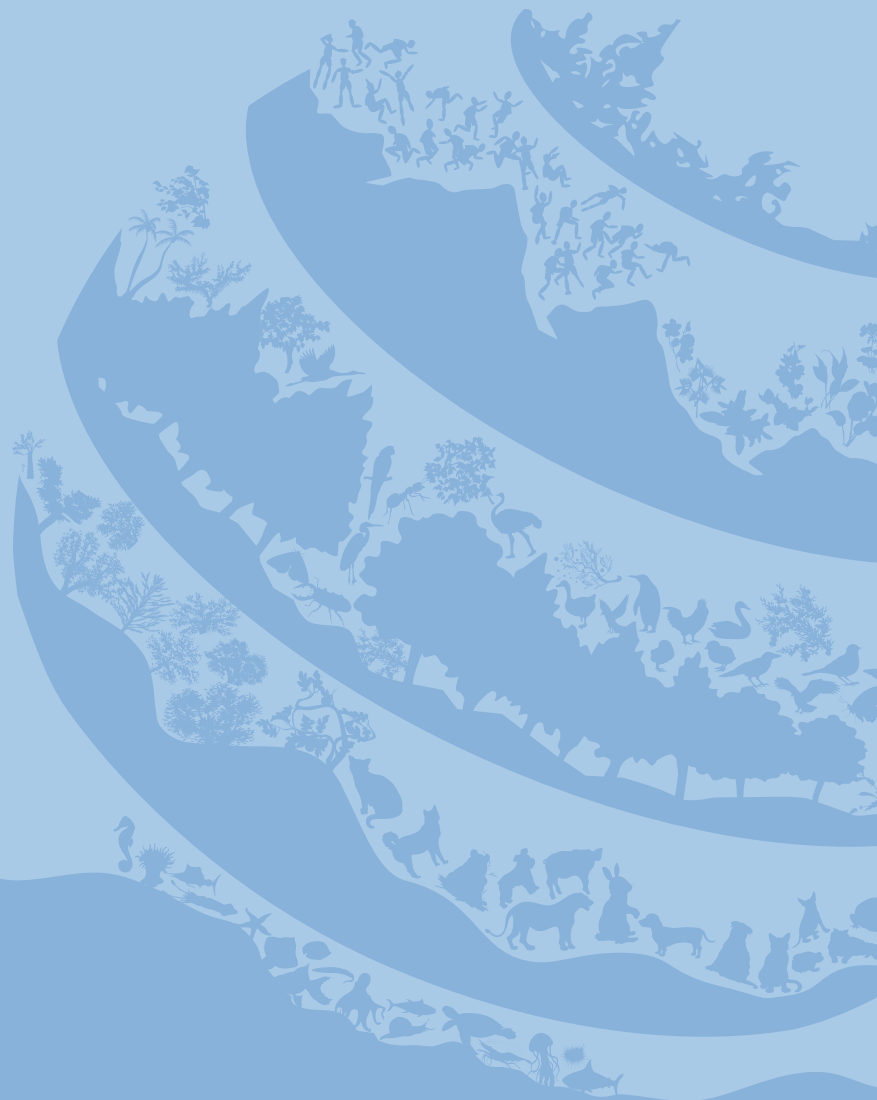
system, which was used to monitor the number of participants by session.

Many participants admired all through the XXIII IUFRO World Congress. Some past IUFRO Presidents who have attended many IUFRO Congresses did not hesitate to admit this Congress as the best they had ever attended, which cheered the Congress Organizing Committee (COC) most. The COC acknowledges all the Congress organizers who have endeavored to make this Congress a big success. The COC also pays tribute to the staff of INTERCOM Convention Services Inc., the Professional Convention Organizer (PCO), for their splendid job.

IUFRO President Don Koo Lee handed over the IUFRO flag to a representative from the United States, the next host country. We look forward to the XXIV IUFRO World Congress to be held in Salt Lake City contributing to the tradition of IUFRO by making another great success.



# Executive Summary



XXIII IUFRO  
WORLD CONGRESS REPORT

# Executive Summary

## Official Events

### • Opening Ceremony on 23 August 2010

About 2,500 participants crowded Hall D2 at COEX for the Opening Ceremony. All the participants received an admittance sticker for the entrance starting at eight in the morning as President of the Republic of Korea Lee, Myung-bak was scheduled to attend the Ceremony to give a welcome speech. The COC had informed the participants beforehand to bring their passports for admittance into the Ceremony. The participants went through the security check and entered the hall without delay attributed to careful planning prior to the Ceremony.

The official event ahead of the Opening Ceremony lasted from 09:40 to 10:00, which consisted of a cultural performance on “Soomukhwadaego (percussion performance harmonizing with Korea wash painting)” and video clips on green growth. The Opening Ceremony began officially at 10:00 when the moderator, Lee, Jin-min, announced the arrival of the VIPs. The audience was presented with the opening address by IUFRO President Don Koo Lee, the congratulatory remarks by FAO Director Eduardo Rojas-Briales, and the congratulatory message delivered by UNFF Director Jan McAlpine on behalf of UN Secretary General Ban, Ki-moon. Some renowned forest scientists were awarded the Scientific Achievement Award on the stage. Lee, Myung-bak, President of the Rep. of Korea gave a welcoming speech followed by a

performance by some children. After the Ceremony, another cultural performance “Lotus in the Morning (royal dance)” was put on stage. Simultaneous interpretation service (Korean to English) was provided during the Ceremony.

IUFRO President Lee, in his opening address, declared the opening of the XXIII IUFRO World Congress. He stressed on the roles of forests and forestry sectors in challenging global issues including climate change, Millennium Development Goals and Reducing Emissions from Deforestation and Degradation (REDD) through strong partnership and collaboration within the IUFRO network. He concluded by emphasizing the importance of sustainable equity, growth and development in the realization that “Forest is our life, our hope and our future” thus looking forward to continuous support to IUFRO.

Eduardo Rojas-Briales, Assistant Director General of the Food and Agriculture Organization, referred forests as “major variable in managing climate change” in his congratulatory address while cautioning that forestry was at a crossroads amid declining revenue and increasing demands.

Ban, Ki-moon, Secretary General of the United Nations, greeted the XXIII World Congress in his congratulatory remarks which was delivered by Jan McAlpine, Executive Secretary of United Nations Forum on Forests. He stressed on the crucial role of forest in sustainable development. He appreciated IUFRO for providing global network of







knowledge, opportunities and assistance to institutions which will eventually bring about local, regional and international changes. He announced that the United Nations has declared 2011 the International Year of Forests to further raise awareness and promote global action to reduce deforestation, prevent forest degradation and decrease poverty in forest-dependent communities, and to promote sustainable forest management, and encourage all IUFRO members to commemorate year 2011.

President Lee, Myung-bak in his welcoming speech emphasized the importance of forests as origin of life and blood of people. He talked about Green Growth presented by the Korean government as a national vision to balance between development and conservation of forests and the solution for combating desertification. He also introduced the concept of carbon offset aimed at reducing greenhouse gas emissions. He proposed for sustainable development through abstention from excessive greed and by building a “planet-conscious system” where human and nature co-exist harmoniously. As an action plan, President Lee briefed some policies including the establishment of Asia Forest Cooperative Organization and Global Green Growth Institute led by the Korean government to strengthen international cooperation for green growth.



Children from six countries appeared on the stage after all the speeches were delivered. The children held up cards displaying the Congress title, “Forests for the Future: Sustaining Society and the Environment” and showcased the message that children are the future to the huge audience.

#### • Closing Ceremony on 28 August 2010

The week-long XXIII IUFRO World Congress closed on 28 August 2010. An estimated 1,500 participants shared the pain and pleasure watching the closing of the splendid Congress in Seoul. They admired the efforts of the host country, the host organization and the COC. In particular, volunteers in green T-shirts had impressed the participants with their excellent support and conscientiousness. Overall, the Seoul Congress went smoothly in the upscale convention center. Indeed, many senior participants praised it was the best among the IUFRO Congresses that they had ever attended.

The Closing Ceremony consisted of the thank-you remarks by the COC Chair; the announcement of the Best Poster Award; the presentation on the International Council Meeting; the introduction of the IUFRO Honorary Members; the declaration of the Seoul Resolution; the introduction of new IUFRO President and Board Members; IUFRO President-elect’s remarks; IUFRO flag delivery and the announcement of the next host country; and closing remarks by the IUFRO President.

The video clips that remind fond memories of the 2010 IUFRO Congress led the audience to the Closing Ceremony, followed by a popera performance by Professor Lee, Tae-won. Each moment filmed during the six-day IUFRO Congress was literally momentous. Vivid were the moments when the head of state attended the Congress for the first time in the history of IUFRO, poet KO Un’s keynote speech acclaimed by the audience with a standing ovation, the In-Congress Tours, the Technical Sessions and the Tree Planting Ceremony.

Park, Jung-Hwan as the COC Chair gave the thank-you remarks in which he paid tribute to the substantial



support by the Korean government and other sponsors. He also expressed sincere gratitude to all the committed staff including the PCO members, the volunteers, the exhibitors and the ministries as well as the COC members. In his remarks, Park cited the numbers, saying 2,734 forest scientists from 92 countries joined the Congress this year. The Congress was the largest IUFRO World Congress on all fronts: 2,062 presentations in total with 916 oral presentations and 1,146 poster presentations.

Su See Lee, Chair of the IUFRO Honors and Awards Committee, announced the Best Poster Award winners. Seven posters were selected from the seven Divisions except three among the posters presented during the Congress.

IUFRO President Don Koo Lee reported the results of the International Council Meeting to the Congress. He reported that two IUFRO meetings on 24 and 27 August had adopted the IUFRO Strategy 2010-2014 detailing two goals, research and institutional. The six thematic areas include Forests for People; Climate Change and Forestry; Bio-Energy; Forest Biodiversity Conservation; Forests and Water Interactions; and Forest Resources for the Future. He also announced the 2010 Congress Resolution, new IUFRO Honorary Members accepted, the newly elected IUFRO President, two Vice Presidents, nine Division Coordinators and five new President Nominees. He also reported that Salt Lake City, Utah, USA had been designated as the venue for the XXIV IUFRO World Congress in 2014.

IUFRO President Don Koo Lee invited the two newly-elected IUFRO Honorary Members to the podium: Risto Seppala (Finland) and Eric Teissier du Cros (France), the 24th IUFRO President and Vice President from 2001 to

2005, respectively.

Chair of the CSC, John Parrotta, declared the Seoul Resolution consisting of six thematic areas of forest scientific research and international collaboration under the title, "Forests for the Future: Sustaining Society and the Environment." The Resolution urged IUFRO member institutions and external stakeholders to renew their strong commitment to global interdisciplinary collaboration as well as global forest research recognizing the importance of forest science in emerging global challenges.

IUFRO President Lee introduced the new IUFRO President and Board Members who will take office between 2010 and 2014: IUFRO President Niels Elers Koch (Denmark), IUFRO Vice Presidents Mike Wingfield (South Africa) and Su See Lee (Malaysia). The Heads of the nine Divisions were also announced: Björn Hanell (Sweden), Yousry El-Kassaby (Canada), Hans Heinemann (Switzerland), Margarida Tome (Portugual), Andrew Wong (Malaysia), Tuija Sievänen (Finland), Andrew Liebhold (USA), Jean-Michel Carnus (France), and Daniela Kleinschmit (Sweden/Germany). Meanwhile, José Campos (Costa Rica), Ben Chikamai (Kenya), Elena Kulikova (Russia), Shirong Liu (China) and Ulrike Pröbstl (Austria) also joined the Board as President Nominees.

Standing before the audience at the capacity of IUFRO President in the IUFRO World Congress, President-elect Niels Elers Koch complimented on immediate past IUFRO President Don Koo Lee for his excellent leadership of the past five years. As the incoming IUFRO President, he pledged to contribute to a better and more peaceful world by extending opportunities for global forest scientists. Koch cited active partnership and collaboration





as one of IUFRO's strengths saying the strong IUFRO team would perform important tasks altogether under the IUFRO Strategy 2010–2014, which reflects the new, clear and ambitious mission of IUFRO for forest scientists and decision-makers. He expressed his commitment to promote networking focusing on the six thematic areas. He mentioned the importance of thinking outside the forest box as forest science is highly cross-sectoral, and the resulting collaboration as an effective platform for global network and in tackling shared challenges. He reached out to IUFRO members for their support in achieving his goals as IUFRO President, particularly in close cooperation and partnerships with FAO, CIFOR, IFSA and others. He concluded his remarks by vowing to do his utmost in strengthening global forest network.

The IUFRO flag hoisted on the screen of the Plenary Hall faded out, signaling the closing of the XXIII IUFRO World Congress. Salt Lake City in the United States was announced as the host of the XXIV IUFRO World Congress. Deputy Secretary of USDA Forest Service, Ann Bartuska received the flag on behalf of the United States. She briefly introduced Salt Lake City, United States as the next host of the IUFRO World Congress. She described American diversity in culture, music, people, landscapes



(from boreal to tropical, urban to rural) and land ownership. Bringing up the challenges such as bark beetle issues and forest fire, she expressed her high expectations on the 2014 XXIV IUFRO World Congress. Bartuska introduced Salt Lake City as the former host city of the Winter Olympic Games, rich in winter sports as well as summer sports and abundant in sports facilities and its unique setting. She emphasized that the In and Post-Congress Tours will serve as an opportunity for participants to experience diverse landscapes of the city, saying the official Convention Center has been already arranging many things for the prospective participants with enormous enthusiasm.

In the Closing Ceremony remarks, IUFRO President Don Koo Lee praised the XXIII IUFRO World Congress for inspiring researchers, scholars and decision-makers, saying the Congress was full of commitment to forests for the future through open discussions on knowledge and experiences regarding the current forest issues. He cited the speech by President Lee, Myung-bak where a strong message was sent to the audience on addressing serious environmental challenges related to forests which requires low-carbon green growth technologies by Korea and other countries. He also said that forests sustain the environment and generate environmental, economic and social benefits. Therefore, it is fundamental in meeting the Millennium Development Goals (MDGs). However, deforestation is increasing worldwide at an alarming rate. Immediate

actions are needed to sustain the environment and avoid anthropogenic deleterious effects. He called upon all stakeholders to extend forest knowledge and experiences while requesting governments to review related policies. He also urged his IUFRO colleagues to continuously protect the environment and forests. In closing, he extended his appreciation to all involved in the Congress. Special thanks were given to the COC Chair Park, Jung-Hwan and the CSC Chair John Parrotta.

#### • Tree Planting Ceremony on 22 August 2010

Traditionally, the IUFRO World Congress Tree Planting Ceremony is held on the eve of the Congress Opening Ceremony. Some 200 Congress participants including the IUFRO President and officials of the city of Seoul gathered at Seoul Forest on Sunday 22 August for the Tree Planting Ceremony moderated by COC Chair Park, Jung-Hwan. The Director General of the Korea Forest Research Institute (KFRI) Choi, Wan-Yong delivered the opening remarks, followed by congratulatory remarks by the IUFRO President and welcome speech by Seoul Vice Mayor, Kwon, Yong-kyu. Subsequently, the trees were planted and a monument was unveiled to commemorate the XXIII IUFRO World Congress in Seoul. In closing, the Rainbow Children's Choir staged their performance.

The Director General of KFRI, Choi, in his opening speech elaborated the meaning of the commemorative trees and wished the week-long IUFRO Congress in Seoul a great success. IUFRO President Lee looked forward to the resounding success of the IUFRO World Congress by reminding the audience of the significance of Seoul Forest built by the citizens in the same context



of Korea's reforestation success. Kwon, Yong-Kyu, Vice Mayor of Seoul Metropolitan government, welcomed the participants and the XXIII IUFRO World Congress in Seoul. He explained the implications of Seoul Forest to people and wished a big success of the Congress.

The IUFRO President, distinguished guests and the children were then invited to the Ceremony to plant eight pine trees: one offspring tree of Jeong-i-pum pine and seven Geumgang pine trees. Then, the participants unveiled the monument of the XXIII IUFRO World Congress in the IUFRO garden. Deeply touched by the songs of the Rainbow Choir, the audience gave a big applause to the children for another round of their performance. The Ceremony ended successfully.

One seven-year-old tree that was planted in the Ceremony is the offspring from the crossing of Geumgang pine and Jeong-i-pum pine, the only Korean pine designated as a natural monument. The seven Geumgang pine trees at the age of nine were transplanted from Wooljin, Gangwon Province. The Congress organizers could not establish the IUFRO garden in Seoul Forest without the special consideration by the Seoul Metropolitan Government who aspired to support the success of the IUFRO Congress.



## Social Events

### • Welcome Reception

Over 2,000 participants attended the welcome reception running from 6:30 p.m. to 9 p.m. in Hall D1. The Welcome Reception commenced with a dynamic music performance by Gil-No-Ri. Playing Korean traditional musical instruments, the traditional music troupe marched through the hall, where Congress participants were standing together. The troupe featured a more vibrant and exciting music and dance performance on stage.

Choi, Wan-Yong, Director General of the KFRI, the Host Organization, welcomed Congress participants and guests with open arms. Chang, Tae-Pyong, Minister for Food, Agriculture, Forestry and Fisheries, delivered a congratulatory address.

The reception offered participants excellent opportunities for networking as well as a wide range of food and refreshing beverages. Indeed, delegates caught up with old forestry pals and made new friends, while enjoying the performance and dinner. Meanwhile, during the reception, delegates were presented a unique chance to wear Hanbok,



the traditional Korean costume, as well as taking a picture with models in traditional Korean costume. A little bit of jazz made the reception night atmosphere even cozier, helping delegates shake off their jet lag and break the ice.

### • Farewell Gala Dinner

The Farewell Gala Dinner following the Closing Ceremony offered delegates a platform to celebrate IUFRO's accomplishments, and to bid farewell to old and new friends. The dinner was hosted by the Minister of Korea Forest Service, Chung, Kwang-Soo. Beef steak or vegetarian meal (for vegetarian delegates) was served. A special dinner for delegates observing Ramadan was served at 7:10 p.m. Participants also enjoyed the Lucky Draw event, which was held over the dinner. Lucky draw prizes included porcelain crafts, a wooden silverware set, silk pencil cases and a netbook computer.

The popular non-verbal performance of "Nanta," formerly appeared on Broadway, entertained the assembled delegates. Integrating unique Korean traditional drumbeats in a western performance style, Nanta storms into a huge kitchen where four capricious cooks were preparing a wedding banquet. While cooking, they turn all kinds of kitchen items into the best of percussion instruments. The



Farewell Gala Dinner concluded with a performance by the Little Angels children's performing arts group. Korea's pride, Little Angels, delighted delegates with choral music, traditional Korean puppet dance and other traditional performances.

### • President's Dinner

The President's Dinner was hosted by IUFRO President Don Koo Lee in Conference Room 300 at 19:00 on 25 August. The dinner followed Director's Forum and President's Discussion. The speakers and panelists at the Forum and the Discussion were invited to the dinner. The President also invited the former IUFRO Presidents and resources persons of IUFRO to the dinner to celebrate this memorable IUFRO World Congress during his presidential term.



### • President's Reception for International Council

The IUFRO President Reception was held for the International Council (IC) members in ASEM Hall Room 201 at 18:30 on 27 August after their meeting. Not so many members could make it to the reception because the Division Business Meetings were held at the same time. Some 40 members participated in the reception including the IC members, IUFRO Board members, the IUFRO Secretariat members, the COC members and the IUFRO President Office members. In the reception led by IUFRO Executive Director Peter Mayer, IUFRO President Lee delivered the



opening remarks and hailed the successful conclusion of the IC meeting on the agenda including the selection of the incoming board members, the executive members and the next IUFRO World Congress host, Salt Lake City in the United States. The representatives from Canada and Japan thanked the IUFRO Congress Organizing Committee and the IUFRO Secretariat for having come to the conclusion in the IC meeting, proposing a toast for the continuing prosperity of IUFRO.

### • Incoming & Outgoing Board Members' Luncheon

The incoming and outgoing IUFRO Board members were invited to luncheon in the Auditorium VIP Room at noon on 28 August, where about 50 members joined including the executives and the Enlarged Board members. IUFRO President Don Koo Lee paid tribute to IUFRO Executive Director Peter Mayer's contribution to IUFRO delivering a souvenir. Mayer was going to take office as Head of the Austrian Federal Research and Training Centre for Forests, Natural Hazards and Landscape. IUFRO President Lee also gave the Distinguished Service Awards to IUFRO COC Chair Park, Jung-Hwan and CSC Chair John Parrotta



for their outstanding commitment to the success of the XXIII IUFRO World Congress. All the IUFRO Board members who served between 2006 and 2010 received the souvenirs as a token of gratitude for their efforts from IUFRO President Lee.

## Scientific Programs

The title for the XXIII IUFRO World Congress, “Forests for the Future: Sustaining Society and the Environment,” provided the basis for the program format and contents. The Congress Scientific Committee (CSC) developed nine Congress themes reflecting the concept of the Congress title as follows:

- Forests and Climate Change;
- Biodiversity Conservation and Sustainable Use of Forest Resources;
- Forest Environmental Services;
- Asia’s Forests for the Future;
- Forest Products and Production Processes for a Greener Future;
- Emerging Technologies in the Forest Sector;
- Frontiers in Forest and Tree Health;
- Forests, Communities and Cultures; and
- Forests, Human Health and Environmental Security.

The CSC invited technical session proposals that address one or more of the Congress themes from all IUFRO members who would share an interest in the future of forests and the Congress themes. Session proposals from non-IUFRO members were also accepted but preference was given to those that were prepared jointly with IUFRO divisional units and Task Forces. Altogether 150 proposals were submitted. Session proposals were reviewed and evaluated by the CSC with primary consideration given to their scientific quality, topical significance, and relevance to the Congress themes. Ten session proposals originally accepted for technical sessions were chosen by the CSC for inclusion in the sub-plenary session program. Finally, a total of 150 technical sessions were included in the program, which included 6 sessions which were organized after the review of submitted abstracts on topics other than

those covered by sessions that were approved through the earlier review process.

Session organizers were responsible for communicating and coordinating with those who would be presenting papers or posters during their session and moderating sessions (or assigning session moderators).

The scientific program was composed of five plenary sessions, 15 sub-plenary sessions, 150 technical sessions and three poster sessions with 58 A-type posters, 181 B-type posters and 907 C-type posters. Altogether 916 papers were orally presented in the 150 technical sessions. The delegates’ interest in attending the scientific program is illustrated in the Figure 1. All the abstracts of the papers presented during the Plenary, Sub-plenary and Technical Sessions were published in Congress Proceedings prior to the Congress as a special volume of the *International Forestry Review* vol. 12 (5)

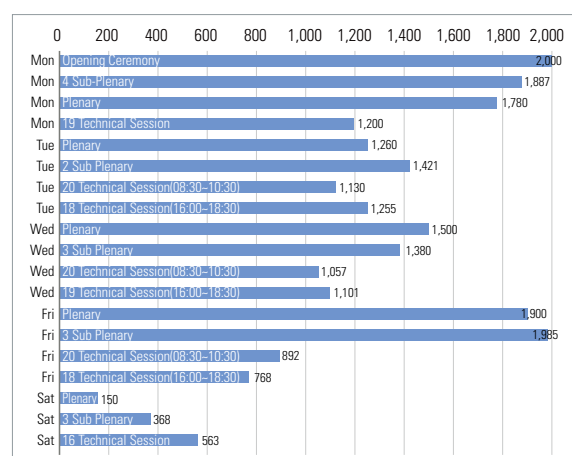


Fig.1 The number of delegates participating in the scientific congress activities.

### • Plenary Sessions

The Congress title, “Forests for the Future: Sustaining Society and the Environment,” was elaborated in five selected keynote presentations which were given each morning, except Thursday, throughout the Congress period. The internationally renowned experts highlighted new visions on forests for the future. On average, there were 1,318 delegates participating in each plenary session.



Table 1. Program of Plenary Sessions

Date	Title	Speaker
23 August (Mon)	An act of grace from the forest: how is absolution possible?	KO Un
24 August (Tue)	Forests, climate change, and communities: making progress up the learning curve	Frances Seymour
25 August (Wed)	Integrating scales and sectors to foster sustainable livelihoods, and landscapes and forests	Jose Joaquín Campos Arce
27 August (Fri)	The potential role of communities in sustainable forest resources	Elinor Ostrom
28 August (Sat)	The disastrous trajectory of the rain forests: research imperatives	Peter Shaw Ashton

The first keynote speaker, KO Un, Poet and a Chair Professor of Dankook University of Korea delivered his speech on 23 August after the opening ceremony with title of “An Act of Grace from the Forest: How is Absolution Possible?” This plenary session was moderated by Park, Jung-Hwan, Chair of COC. The following is the summary of his speech: “Art is long; life is short,” still resonates today. The pun, “Art is short; life is frustratingly long,” is not yet persuasive. Instead, we often talk about “Forest is short; desert is long,” which may be interpreted as the forest is getting much smaller while the desert is getting far wider on the continents. That is a reflection on the essence of the historic phrase related to forest destruction in the past thousands of years. Too often, intentionally or not, we have neglected the fact that the splendor of civilization enhanced human welfare and linear progress are the other side of anthropogenic crimes that destroyed the forest. Under the

circumstances, let me look back on the past and present of the forest on the planet. The forest is a means of overcoming the fears of survival caused by God and maintaining human being’s life today. Now I would like to look ahead of our future that covers the spirit, reality and fate of the forests in the far future facing us.

Frances Seymour, Director General of CIFOR, delivered her keynote address on “Forests, climate change, and communities: making progress up the learning curve” during the plenary session on 24 August. This session was moderated by Niels E. Koch, Vice-President of IUFRO. The following is the summary of her speech: Reducing deforestation and forest degradation, and enhancing carbon stocks (REDD+) is a critical component of the emerging global climate protection regime. Forests also have a key role in ecosystem-based climate adaptation strategies. Recognition of these essential contributions of forests to human security in the context of climate change has attracted political attention and financed forest management efforts. However, ensuring that these efforts benefit rural communities, especially poor households, women, and indigenous peoples, remains a challenge. REDD+ and adaptation initiatives are being superimposed on existing forest governance institutions that are often systematically biased against the interests of rural resource users and forest stewards. Research on forest tenure, community forestry, integrated conservation and development, and forest law enforcement all suggest lessons for REDD+ and forest-related adaptation interventions. Forest researchers are attempting to assess the effects of climate-driven policies and practices on communities faced with highly varied and rapidly changing landscape. Preliminary findings are beginning to emerge and highlight the institutional deficits likely to constrain success. Unless such initiatives are able



to shape rather than be shaped by, the political economy of forests at global, national and local levels as well as the opportunity to improve the lot of forest communities will be lost.

José Joaquín Campos Arce, Director General of CATIE, delivered his keynote address entitled “Integrating scales and sectors to foster sustainable livelihoods, landscapes and forests” during the plenary session on 25 August. This plenary session was moderated by John Parrotta, Chair of CSC. The following is the summary of his speech: Forestry research must more effectively address the complex challenges and uncertainties we face today. Under this scenario, social and ecological resilience should be aimed for development of agendas, and good science is essential for enhancement of the community capitals on which that resilience depends. Integrated actions at the stand, farm, landscape, national and international levels are needed. Interdisciplinary research and policymaking based on multi-scale system approaches, development of multiple value chains and internalization of spatially determined externalities in the landscapes have much to offer to both sound rural development and environmental conservation. Integrated models combine different production systems (agriculture and forestry) and the provision of ecosystem services; the integration of disciplines; knowledge and learning generated by research; education and horizontal cooperation with multiple partners; and innovations from genetics, technologies, landscapes and policies. Experiences include improving the well-being of poor rural families through perennial crops (such as coffee and cacao) in agroforestry systems, providing ecosystem services by managing woody perennials in degraded pasturelands, maintaining and restoring large-scale hydrological and ecological processes through effective local governance and co-management structures, helping rural people benefit from their environmental and social responsibility in forestry and agricultural value chains, effective payment for ecosystem services, constructing biodiversity-friendly landscapes through locally led biological corridors and leveraging collective action via multiple-use forestry, local leadership and forest landscape management. These approaches bring new questions requiring innovative professional education and continued research.



Elinor Ostrom from Indian University, USA, delivered her keynote address entitled “The potential role of communities in sustaining forest resources” during the plenary session on 27 August. This plenary session was moderated by John Innes, Vice-President of IUFRO. The following is the summary of her speech: A team of researchers associated with the International Forestry Resources and Institutions (IFRI) research program have been conducting research since the early 1990’s on forest and social conditions in a large number of communities in Bolivia, Colombia, Guatemala, Indiana, Kenya, Mexico, Nepal, Tanzania, Thailand, Uganda, and the United States. Our samples from over 200 sites included government-owned, privately-owned, community forests, and co-managed forests. Second and third visits have been made to many of these forests. No specific ownership arrangement is consistently related to better conditions. Rather, we have found that when local users do have some rights to long-term harvesting of at least some products from a forest, they are more likely to invest in monitoring the activities going on in the forest. And, most important – locally monitoring makes a very substantial difference in the likelihood that a forest is regenerating (or at least not degrading). Thus, future policies should not focus on formal ownership as the most important factor affects forest sustainability but rather how to insure the participation of local users in developing plans for the forest and gaining their involvement.

Peter Shaw Ashton, Emeritus Professor at the Harvard University, USA, delivered his keynote address entitled “The disastrous trajectory of the rain forests: research imperatives” during the plenary session on 28 August. This plenary session was moderated by Su-See LEE, Chair of Honor and Award Committee of IUFRO. The following is the summary of his speech: The continuing loss of tropical

evergreen lowland forests worldwide annually contributes to nearly 20% of elevated atmospheric carbon. That could be remedied by reforestation of agriculturally marginal lands, provided that the carbon is semi-permanently sequestered in wood products. It is the extraordinary biodiversity of these forest ecosystems which is unique and cannot be recreated. Sadly, the richest forest is valued for other uses, and is therefore the most threatened. Does this matter? Rain forest biodiversity is usually upheld as a source of novel pharmaceuticals but, far more important but rarely reasoned, is their vital importance for future crop protection, especially of tree plantations. Current research is revealing that tropical forest tree species diversity is maintained by a balance of species' population numbers sustained by the dispersal distances of host-specific pests and pathogens, thereby providing space for other tree species, differing ecologically solely in being susceptible to different pests and pathogens, to co-exist in stable mixture. There are two solutions: Conservation of the gene sequences which imbue wild crop relatives with resistance, that they may be available for genetic engineers; or a revolution in tree crop design, based on what is being learned by research in surviving rain forests. It is not too late to conserve, and the costs are not prohibitive. Who are the beneficiaries, and who should pay? Solutions will require vision, goodwill and solidarity among policymakers that is as yet not in evidence.

#### • Sub-plenary Sessions

Three Sub-plenary Sessions related to one or more of the Congress themes were conducted concurrently daily. On average, there were 470 delegates attending each sub-plenary session. The most popular session was “New

Frontiers of forest economics.” In total, 58 papers were presented in the Sub-plenary Sessions. The number of participants and papers presented in the sessions are shown in Table 2.

Table 2. Number of participants and papers presented by Sub-plenary Session

Date	Session	No. of Participants	No. of Papers
23 August (Mon)	Sub-plenary 05	200	Panel Discussion
	Sub-plenary 08	1,260	6
	Sub-plenary 12	377	6
	Sub-plenary 15	50	Panel Discussion
24 August (Tue)	Sub-plenary 02	1,224	6
	Sub-plenary 13	197	4
25 August (Wed)	Sub-plenary 03	100	6
	Sub-plenary 10	170	Panel Discussion
	Sub-plenary 11	1,110	8
27 August (Fri)	Sub-plenary 06	1,800	4
	Sub-plenary 07	135	3
	Sub-plenary 09	50	6
28 August (Sat)	Sub-plenary 01	120	Panel Discussion
	Sub-plenary 04	108	4
	Sub-plenary 14	140	5

#### • Technical Sessions

The Technical Sessions were jointly organized by the CSC and session organizers. Authors were requested to submit abstracts under one of the nine Congress themes, selecting the appropriate technical session within each theme. All abstracts were required to be submitted online via the Congress website (<http://www.iufro2010.com>), reviewed and evaluated online by the appropriate session coordinator and members of the CSC. Primary selection criteria were 1) scientific quality, 2) topical significance, 3) relevance to





the Congress themes, and 4) the relevance to the specific objectives of the technical and/or poster session. The XXIII IUFRO World Congress was the first Congress in which abstract submission, evaluation and acceptance were all performed online.

In total, 3,147 abstracts were submitted. Of these, 189 were rejected as unsuitable or because they had been submitted to more than one session, and 39 were voluntarily withdrawn. Another 799 were eliminated when the authors failed to register for the Congress by the required deadline. Of the papers that remained, 916 were accepted as oral presentations, 1,146 as posters and 58 for Sub-Plenary Sessions. All abstracts accepted were published in the *International Forestry Review* [Vol 12(5) 2010] and a copy of this volume was included in the Congress Registration Package. A companion Congress CD was also provided to each delegate at the Congress.

The number of technical sessions and papers by theme are given in Table 3, while the five most popular sessions in each Theme are shown in Table 4. The session on “Climate Change in the boreal forest zone: impacts and interactions” of the theme of Forests and Climate Change attracted the largest number of participants in the Congress. The



number of papers by region is indicated in Table 5. The largest number of papers was presented by Asian delegates, followed by European, North American and African delegates.

Table 3. Number of Technical Sessions and papers presented by Theme

Theme	No. of Sessions	No. of Papers
A. Forest and Climate Change	17	115
B. Biodiversity Conservation and Sustainable Use of Forest Resources	28	163
C. Forest Environmental Services	16	97
D. Asia's Forests for the Future	17	99
E. Forest Products and Production Processes for a Greener Future	10	70
F. Emerging Technologies in the Forest Sector	11	70
G. Frontiers in Forest and Tree Health	20	123
H. Forests, Communities and Cultures	23	139
I. Forests, Human Health and Environmental Security	8	40

Table 4. Most popular Technical Sessions in each of the Theme

Theme	Technical Session	No. of Participants
A	A-01 Climate change in the boreal forest zone: impacts and interactions	130
	A-02 (1) Biodiversity and climate change: direct and indirect linkages in adaptation and mitigation	124
	A-05 Plantation forestry under marginal conditions: water use and water use efficiency in a changing climate	105
	A-07 Is climate change leading to global increases in drought-induced forest die-off?	100
	A-02 (2) Biodiversity and climate change: direct and indirect linkages in adaptation and mitigation	97
B	B-21 Assessing the effects of forest management on biodiversity over large landscapes: tools, trends and implications for conservation	101
	B-20 Analysing the “translation” of global discourses on forest governance to regional, national and local levels	89
	B-14 Multiple-use management and sustained use of tropical production forests	80

Table 4. – Continued

Theme	Technical Session		No. of Participants
B	B-15	Silvicultural systems for tropical forests: challenges and progress	80
	B-19	Statistical methods in biodiversity assessment and biodiversity responses to silviculture	70
C	C-06	Forest carbon credit markets and the forest sector	70
	C-07	To what extent can payments for forest environmental services be pro-poor?	63
	C-01 (2)	Stand structure: a key issue in managing forests for timber, wildlife, water, and NTFP resources	62
	C-08	Culture, economics, and sustainable forest management	60
	C-02	Integrating forest products with environmental services	58
D	D-06 (1)	Challenges and issues of forest management and utilization in Asian countries	121
	D-06 (2)	Challenges and issues of forest management and utilization in Asian countries	97
	D-12 (2)	Forest restoration and economic valuation for poverty reduction and environmental conservation in Southeast Asia	76
	D-12 (1)	Forest restoration and economic valuation for poverty reduction and environmental conservation in Southeast Asia	73
	D-13	Biology and ecological functions of forested peatlands	70
E	E-05	Sustainability impact assessment of the forest-based sector	84
	E-03	Utilization of forest biomass as raw materials for green biofuels and chemicals	80
	E-08	Surface processing and treatment technologies for wood and wood based materials to enhance durability and performance	75
	E-02	Value chain optimization in the forestry industry context	67
	E-07	Sensing wood properties and allocation of round wood with respect to product requirements	67
F	F-09	Forest biomass utilization for bio-energy: technology, economics and environment	98
	F-08	Innovation in the forest sector – maximizing the sector's competitiveness	82

Table 4. – Continued

Theme	Technical Session		No. of Participants
F	F-06	Remote sensing in carbon balance evaluation and monitoring	80
	F-07 (2)	Forest monitoring and inventories by means of LIDAR, photogrammetry and HR satellite data	80
	F-02	Contemporary frontiers in forest inventory and assessment using successive remotely sensed data	72
G	G-18	Diseases and insects in pines threatening global forest health in the 21st century	103
	G-03 (1)	Effect of multiple ecosystem stressors on tree and forest ecosystem health	85
	G-12	Oak decline in the world	78
	G-06	Alien invasive pathogens: threats to forest ecosystem integrity and services	62
	G-02	New insights into roles of ophiostomatoid fungi in bark beetle-fungus symbioses	60
H	H-07	International developments in the administration of publicly-funded forest research: challenges and opportunities.	95
	H-11 (2)	Improving forestry education: innovative views of students and teaching staff	87
	H-12 (2)	Cultural values and sustainable forest management: strategies and actions	80
	H-09	Future of forests-responding to global changes	76
	H-01	Income from smallholder forestry-can it be a driver of poverty alleviation?	71
I	I-02 (2)	Health benefits of forests	56
	I-01	Healthy urban forests: healthy people	52
	I-02 (1)	Health benefits of forests	49
	I-05	Non-timber forest resources and human welfare	47
	I-04(1)	Knowledge systems, societal participation and sustainable forestry for human wellbeing	34

Table 5. Number of papers presented by region

Continent	No. of Papers
Asia	330
Europe	264
North America	168
Africa	65
Oceania	38
South America	32
The Middle East	19

## • Poster Presentations

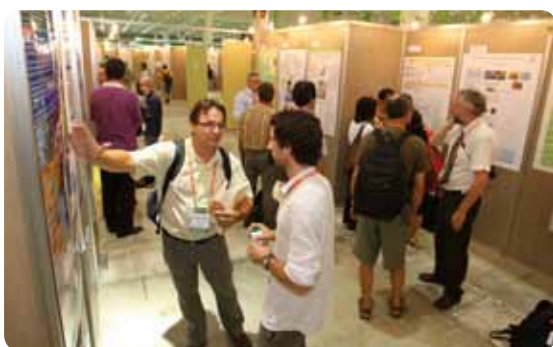
The XXIII IUFRO World Congress saw the introduction of two interactive poster sessions (type A and type B) including a general poster session:

**Poster Session Type A (In-Session Poster Presentations):** Some technical sessions (B-02, B-06/B-07, B-08, B-19, B-27, D-07, E-02, F-01, G-03, G-17, I-01, I-04 and I-06) included formal poster presentations during their technical sessions. Poster presenters in these sessions were requested to prepare a second copy of their poster(s) for this purpose; otherwise presenters were asked to move their posters from the main poster exhibition hall before their technical sessions, and return their posters to the exhibition hall after their technical session.

**Poster Session Type B (Mini Sessions):** Some other Technical Sessions (A-02, A-07, A-08, A-09, B-09, B-12, B-17, B-21, C-02, C-05, C-10, C-14, D-08, E-05, E-07, F-03, F-09, G-01, G-12G-16, G-19, H-01 and H-05), formal poster presentations took place in the main poster exhibition hall between 12:15 and 13:15 hours on either 24 August or 25 August. These sessions were led by the respective session moderators.

**Poster Session Type C:** Posters in all other Technical Sessions were included in general poster sessions which were held in the main poster exhibition hall. The general poster sessions had formal poster viewing period between 12:00 and 13:30 on 24 August and 25 August.

The number of posters presented according to respective themes is shown in Table 6. A total of 1,146 (54%) of the



accepted posters were set up in the main poster exhibition hall. All the poster stands were numbered and zoned by Themes and Technical Sessions.

Table 6. Number of posters presented by Theme

Theme	No. Papers
A. Forest and Climate Change	152
B. Biodiversity Conservation and Sustainable Use of Forest Resources	187
C. Forest Environmental Services	93
D. Asia's Forests for the Future	147
E. Forest Products and Production Processes for a Greener Future	183
F. Emerging Technologies in the Forest Sector	106
G. Frontiers in Forest and Tree Health	140
H. Forests, Communities and Cultures	85
I. Forests, Human Health and Environmental Security	53

Table 7. Number of posters presented by region

Continent	Presentations
Asia	817
Europe	147
North America	77
Africa	39
Oceania	5
South America	34
The Middle East	27

## • Speakers' Room

The speakers' room was the facility room for speakers at the Congress. Its main functions were to assist the speakers to finalize and preview their presentations before storing



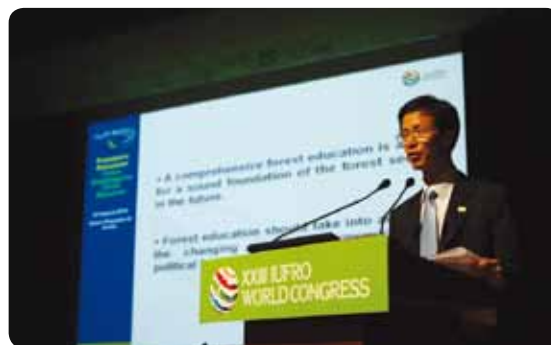
their presentation files in a network server. All presentation files stored in the network server were accessible from the laptop in each session room where the presentations were held. A total of 16 PCs were made available to the speakers for this purpose and 6 technicians assisted with the technical preparation of presentations. All speakers were requested to visit the Speaker's Room and submit presentation files at least four hours before their sessions begin.

## IUFRO administrative and special meetings

### • President's Discussion

#### “Future Challenges for Forest Education”

On the occasion of the XXIII IUFRO World Congress in Seoul, Republic of Korea, the President of the International Union of Forest Research Organizations (IUFRO), Don Koo Lee, invited a panel of distinguished persons representing the scientific community, forestry students, business and industry, NGOs, and international forest policy to offer their views on how forest education can be made more effective and attractive in the future. The President's Discussion took place on 25 August from 15:30 to 17:00 hours. It was chaired by Don Koo Lee and moderated by Peter Mayer. The panel speakers included Hosny El-Lakany (University of British Columbia), Yoon Soo Kim (Chonnam National University), Emmanuel Ze Meka (International Tropical Timber Organization), Florent Kaiser (International Forestry Students' Association), Hideki Nose (Sumitomo Forestry Co. Ltd.), and Gerald



Steindlegger (WWF International).

### 1. Welcome and opening

Lee welcomed the participants to the President's Discussion and highlighted its theme “Future Challenges for Forest Education.” He stated that a comprehensive forest education is a key for a sound foundation of the forest sector in the future and should take into account changing societal, economic and political framework conditions. He pointed out two main goals of the session, namely to (i) discuss future challenges and identify elements for an attractive and effective forest education in the future, and (ii) discuss the role of IUFRO and concrete activities in the frame of IUFRO. He informed the participants about the structure of the session, i.e. presentations followed by a discussion.

### 2. Presentations

#### Vision for Forest Education 2015

Hosny El-Lakany (Adjunct Professor at the University of British Columbia, Chair of the International Partnership for Forestry Education) presented his vision for forest education 2015. He noted with concern the declining enrolment in forestry schools and stated that due to incorrect perceptions by forest educators about the professional requirements, there was a risk that forestry graduates lose touch with the forest. He pointed out that forest management requires interdisciplinary approaches, based on solid science, that balance economic, environmental and social demands. He noted that universities have to undergo fundamental changes if they are to retain their relevance in the future. Towards this end, El-Lakany identified six steps for change:



(1) Restructure the curricula, beginning with graduate programs and proceeding to undergraduate programs; (2) Consider abolishing permanent departments and create problem-focused, multidisciplinary programs; (3) Increase collaboration among institutions, nationally and internationally, and emphasize international aspects of forestry; (4) Transform current dissertation systems so that students do not write original papers but develop analytic treatments in e-formats; (5) Expand the range of professional options for graduates and prepare students for jobs that may be different from which they are being trained for; and (6) Re-visit the current tenure system and replace it with time-bound contracts for educators which can be terminated or renewed. El-Lakany concluded his presentation by providing information about the International Partnership for Forestry Education.

#### Should Foresters be Educated at Universities or at Technical Colleges?

Yoon Soo Kim (Chonnam National University, Republic of Korea) pointed out a general shift in interests of students away from the liberal arts towards “practical arts” since the 1970s. Furthermore, students have become more intelligent consumers not only in the “supermarket of information” but also in picking the majors. In many OECD countries, a four-year university education in forestry does no longer guarantee better jobs and higher income. While 4-year university-level education usually combines teaching and research and aims at producing leaders in various fields of forest sciences, a 3-year technical college level education focuses on teaching for jobs in forestry industries and concentrates on specific disciplines and main fields of practice. Kim noted a significant decline in the number

of university-level graduates in forestry worldwide. Although a slight increase in graduates can be observed in Asia, this increase does not compensate for the massive decline globally. He stated that this decline reflects a failure to adequately respond to rapidly changing social, economic and political environments which has resulted in a decrease in job opportunities at the professional level and an over-production of graduate students in OECD countries. Therefore, there was a need to assess strengths, weaknesses, opportunities and threats in forest education in the universities in comparison with other disciplines. Kim also suggested increasing the collaboration of universities in OECD countries with tropical countries, as well as strengthening technical education in countries with rain forests.

#### International Forest-related Agreements

##### – What Students Should Learn

Emmanuel Ze Meka (Executive Director, International Tropical Timber Organization) provided an overview of international forest-related agreements. He stated that international cooperation on forest issues had been motivated by a growing concern over deforestation and forest degradation in the 1960s and the accelerating deterioration of the human environment and natural resources and its consequences for economic and social development. Currently, there are more than 40 forest-related international and regional agreements, of which only the United Nations Forum on Forests and the International Tropical Timber Agreement focus exclusively on forests. Other agreements treat forests in a wider context of environmental protection and conservation. Ze Meka noted that the increasing fragmentation and lack of coordination among forest-related international agreements limits their effectiveness and efficiency in tackling global forest problems. Although significant progress has been made in various fields, notably in operationalizing sustainable forest management through criteria and indicators and forest certification, the world’s total forest area continues to decline, biodiversity continues to be lost at an unprecedented rate, and there continues to be rampant illegal harvesting and trade. Therefore, Ze Meka called for increasing awareness through forest education about

the need for improved international cooperation and concerted efforts to resolve problems confronting the world's forests.

#### What Students Would Like to Learn about Forests

Florent Kaiser (President, International Forestry Students' Association) stated that by entering education, students often enter a process of formation to become a “professional” and are taught to conform to the “real world”. However, in many cases this reality defers from the students' earlier visions and ideals. He stated that what students actually need to learn is not how to adapt to the professional world, but how to implement their visions into our proper lives and into their later work. To achieve this, students need to go out in the forest and actually experience what they are learning in formal lectures. Therefore, they should be given more opportunities to evaluate the applicability of obtained knowledge, e.g. by including more short-term and long-term projects in university curricula. Furthermore, against the background of global change and given the difference of forest conditions in various parts of the world, exchange among students, teaching institutions and teaching methods should be promoted. Kaiser also called for promoting non-formal learning methods and the acquirement of “soft” skills, such as communication, organization, and leadership. He stated that by providing a platform for sharing ideas, knowledge and experiences, the International Forestry Students' Association makes an important contribution to meeting the challenges of forest education and to turning students' visions into reality.

#### What Business and Industry Expects from Forest Education

Hideki Nose (Director of Sumitomo Forestry Co. Ltd., Japan) stated that the corporate activities of Sumitomo Forestry have resulted in an accumulated know-how about forest management and the requirements for forest education. Against this background, he observed a tendency towards specialized knowledge and a lack of comprehensive judgement by forest graduates of broader forest issues such as biodiversity and economics.

Nose stressed the importance of a humanistic attitude, environmental responsibility and life-long learning for achieving a sustainable society. He also emphasized the importance of field experience and noted that the utilization of advanced technology is of key relevance for achieving a comprehensive and sustainable forest management. Nose concluded his statement with an old Japanese proverb stating that “only by looking at a tree, you cannot know the forest.”

#### Needs for Forest Education – An Environmental NGO Perspective

Gerald Steindlegger (Policy Director Forest & Carbon, WWF International) stated that in order to retain its relevance, modern forest education has to serve the maintenance and enhancement of the diverse values of forests, such as carbon, water, biodiversity and recreation, and has to demonstrate that it serves people. Towards this end, he provided 10 recommendations on how to improve forest education: (1) Strengthen the science-policy interface in order to be able to provide policy solutions for decision makers; (2) Provide a good understanding of the role of forests and forest management in addressing global challenges; (3) Educate cross-sectoral approaches and provide tools for managing forests in the broader landscape context; (4) Reach out to other sectors that impact forests such as agriculture, mining or infrastructure; (5) Constantly adapt and build on, but leave old paradigms; (6) Recognize that long-term economic sustainability depends on ecological sustainability; (7) Contribute to fair benefit sharing and address imbalances in nature resource consumption between North and South; (8)





Promote innovative, multicultural thinking and provide students with communication and negotiation skills; (9) Acknowledge the great knowledge of local communities and indigenous peoples; and (10) Include more expert from outside the forest sector.

### 3. Discussion

In the discussion, it was stated that significant changes can be observed in forest education. Traditionally aimed at preparing students for occupations in forest management, forest education nowadays requires a more comprehensive consideration of people and forests beyond forest management and has to prepare students for a much broader range of occupations. This not only requires the continuous updating of contents, but also the development of generic skills (such as communication skills) and methodological competences that enable graduates to tackle novel, complex problems. Examples of universities which have successfully reformed their curricula were provided in the discussion. It was stated that these “best practices” should be communicated and replicated. Furthermore, it was pointed out that new approaches to forest education, including e-Learning and Open Education Resources have emerged that should be utilized also in forest education. Against the background of a decreasing number of forest graduates, the International Year of Forests 2011 would provide a unique opportunity to raise awareness about forests and their contribution to a sustainable development of society.

In closing the meeting, Don Koo Lee thanked the speakers and the participants for their contributions. He noted that fundamental changes are required in order to retain the relevance of forest education in the future. Towards this end, a wide range of issues had been highlighted that are crucial for meeting future challenges of forest education. He noted that the President's Discussion had also provided important guidance for the work of IUFRO on forest education in the future.

### • IUFRO Business Sessions

The IUFRO Business Sessions were jointly or individually organized by the IUFRO Research Groups, Working Parties and Task Forces. These sessions were intended for administrative and business issues of the respective IUFRO units, not for discussion on substantive research issues. There were altogether 37 Business Sessions (see Table 8).

Table 8. IUFRO business sessions

Date	Subject	Organizer
23 August (Mon)	Temperate and boreal silviculture/Ecology and silviculture of beech	John Stanturf Palle Madsen
	Forest products marketing and business management	Richard Vlosky
	Ecology and silviculture of Norway spruce	Jens Peter Skovsgaard
	Sawing, milling and machining	Kohji Murata
	Technology transfer/ Extension	Jurij Begus
	Impacts of air pollution and climate change on forest ecosystems	Andrzej Bytnerowicz
	Urban forestry	Cecil Konijnendijk
	Silviculture and management of threatened and endangered tree species	Margaret Devall
	Ecological economics	David Bengston
	Sustainable management and genetic resources in Meliaceae	Sheila Ward
	Entomology	Andrew Liebhold
	Division 5 - Forest Products	Dave Cown
	24 August (Tue)	Landscape Ecology
Multipurpose inventories		Naoto Matsumura
Forest biodiversity		Jean-Michel Carnus
Bamboo and rattan		Jinhe Fu
Informatics, modelling and statistics		Biing T. Guan
Small-scale forestry		John Herbohn
Traditional forest knowledge		John Parrotta
Wood quality		Pekka Saranpaa
Pathology		Gaston Laflamme
Gender and forestry		Merete Furuberg
Composite and reconstituted products	C.M. Barbu	
Tree ring analysis	Margaret Devall	

Table 8. – Continued

Date	Subject	Organizer
24 August (Tue)	Sustainable utilization of forest products	Jamie Barbour
	Physiology of vegetative reproduction	Olivier Monteuis
27 August (Fri)	Wood Protection	Pascal Kemden
	Wildlife conservation and management	V.B. Mathur
	Forest recreation, landscape and nature conservation	Frank S. Jensen (U. Probstl)
	Forest operations ecology	Berg Staffan
	Urban and Periurban Forestry (UPF)	Michelle Gauthier (FAO)
	Ecology and silviculture of ash and maple species	Jens Peter Skovsgaard
	Harvesting and transportation engineering	Loren Kellogg
	Natural disasters	Gernot Fiebiger
	Forest ecosystem functions	Thomas Spies
	Non wood forest products	Jim Chamberlain
28 August (Sat)	Ecology of alien invasives	Ravinder K. Kohli



## • IUFRO division meetings

The IUFRO Division meetings were held from 18:30 to 20:30 hours on 27 August.

Division
Division 1: Silviculture
Division 2: Physiology and Genetics
Division 3: Forest Operations Engineering and Management
Division 4: Forest Assessment, Modelling and Management
Division 5: Forest Products
Division 6: Social, Aspects of Forests and Forestry
Division 7: Forest Health
Division 8: Forest Environment
Division 9: Forest Policy and Economics



## • Making the most of the Congress

The first session of the Congress took place at Room 401 of COEX on 22 August. The session, moderated by Michael Kleine, was aimed at providing first-timer delegates with guidance on how to make the most of the scientific sessions of the Congress, the time in between sessions and other Congress events. Participants were also familiarised with the facilities available at the COEX Congress Centre and “best practices” in exchanging information, making contacts with fellow researchers, building partnership for research projects through involvement in IUFRO activities. Over 150 participants joined this one-hour session.

Welcome address speeches were delivered by John Innes, IUFRO Vice-President Policy and Park, Jung-Hwan, Chair of the Congress Organizing Committee. Then



John Parrotta, Chair of the CSC, gave a presentation on the scientific program of the Congress. Lee, Seok-Woo, a member of the COC, introduced the facilities available at COEX. A brief guide on “best practices” for Congress participants was presented by Michael Kleine, IUFRO-SPDC Coordinator. Before the session was closed by Niels Elers Koch, IUFRO Vice-President Science, all speakers answered questions from the audience.

## Side Events

The COC invited online application for Side Events on a first-come first-serve basis room booking. Attendance at meetings was limited only to registered delegates attending the XXIII IUFRO World Congress. A meeting room with basic equipment including an LCD projector, a screen and three microphones were provided for free. A total of 41 meetings were held in the evenings on Tuesday 24 August and Wednesday 25 August on the sidelines of the official Congress program (Table 9). The meetings were organized by various forest and forestry-related agencies including IUFRO units.



Table 9. Side Events

Date	Subject	Organization	Country
	Interactive arena for researchers and decision makers with an interest in forest futures	Swedish Univ. of Agric. Sci.	Sweden
	The 50th Anniversary of the Founding of Korean Forest Society	The Korean Forest Society	Korea
	Impact of voluntary certification on forest management: Research findings, needs and coalitions	Forest Stewardship Council (FSC)	Germany
	“Looking beyond to shape the future” - Scandinavian Journal of Forest Research celebrates 25 years in the service of forest science arranged jointly by Scandinavian Journal of Forest Research, Nordic Forest Research Co-operation Committee (SNS) and Taylor	SNS-Nordic Forest Research Cooperation Committee	Sweden
	Forest carbon market development	Seoul National University	Korea
	ASEAN-Korea Environmental Cooperation Project (AKECOP) meeting	AKECOP	Korea
	Asia pacific forest genetic resources	Asia Pacific Association of Forestry Research Institutions	Malaysia
	Biodiversity conservation and sustainable use of forest resource	Beijing Forestry University	China
	Networking of forest genetic resources evaluation & conservation	ICFRE, Dehradun	India
24 August (Tue)	IFSA students' charity evening	International Forestry Students Association	Germany
	Institutionalizing effective pro-poor forest landscape management	IUCN	Switzerland
	Forest culture conference and cultural performance (Working Party 6.07.03 Forest Culture and Cultural Forestry)	Working Party 6.07.03 Forest Culture and Cultural Forestry	Korea
	Steering committee meeting of the IUFRO Task Force on Forests and Human Health	Finnish Forest Research Institute	Finland
	NGO's reforestation campaign in Korea	Northeast Asian Forest Forum	Korea
	Low-carbon economy and sustainable wood industry	Chinese Academy of Forestry	China
	Three-dimension forest structure parameters estimation using remote sensing techniques	Chinese Academy of Forestry	China
	Urbanization and urban forest development	Chinese Academy of Forestry	China
	Forestry researches for global environment	Forestry and Forest Products Research Institute	Japan
	Preparation of the state of the world's forest genetic resources report	FAO	Italy
	Forest conflict in Asia: burning issues and potential solutions	RECOFTC - The Center for People and Forests	Thailand
	Tree improvement and cultivation of fast growing tropical tree plantations	Chinese Academy of Forestry	China

Table 9. – Continued

Date	Subject	Organization	Country
	Forest management and carbon sequestration	Chinese Academy of Forestry	China
	Seoul national university-global green cooperation	Seoul National University	Korea
	Integrated ecosystem management for the drylands' future	Chinese Academy of Forestry	China
	ITTO Children Environmental Education Programme (CEEP) on tropical forests	ITTO (International Tropical Timber Organization)	Japan
	Strengthening forest conservation, communities and markets: FSC's global strategy	Forest Stewardship Council (FSC)	Germany
	Introduction to forest therapy project in Korea	Chungbuk National University	Korea
	Forest Law Enforcement, Governance and Trade (FLEGT): opportunities and challenges	Chinese Academy of Forestry	China
	Networking of forest genetic resources evaluation & conservation	ICFRE, Dehradun	India
	Agroforestry policy	World Agro forestry Centre	Kenya
	Marrying REDD and forest biodiversity conservation with indigenous people's cultural beliefs in the climate change era	University of Guyana	Guyana
25 august (wed)	Global forests: the role in integrated land management	International Institute for Applied Systems Analysis	Austria
	Tweets for forest research – opportunity and problems of using social media in forest science	IUFRO	Finland
	Guidelines for in situ conservation of genetic resources	Bioversity International	Italy
	Discussion about PhD students workshops: interest, scope and usefulness.	International Forestry Students Association	France
	Outdooring of policy brief and full scientific report on making Africa forests fit for climate change	Forestry Research Network of sub-Saharan Africa (FORNESSA)	Ghana
	Forest and carbon: positive feedback to climate change or opportunities for climate mitigation?	Korea Forest Research Institute	Korea
	Collective forest tenure reform in China - experiences and challenges	Renmin University of China	China
	Green growth, forest and forestry in Asia region	Korea Green Promotion Agency	Korea
	International Boreal Forest Research Organization	USDA Forest Service (retired emeritus scientist)	United States
	Comparative analysis of forest policies on climate change	Seoul National University	Korea



## Pre-Congress Training Workshops

### • Workshops

IUFRO's Special Programme for Developing Countries (IUFRO-SPDC) in cooperation with the Korea Forest Research Institute organised a pre-congress training event at the Forest Human Resources Development Institute of the Korea Forest Service in Namyangju City (near Seoul) from 16 to 21 August. The training event offered four topical workshops on current issues of global and regional importance and included (I) forests and climate change; (II) traditional forest knowledge; (III) forests and water interactions; and (IV) forests and human health. These topical workshops were complemented by two additional training modules, one on science-policy interfacing and one on information management.

### The Workshop Programme

#### Workshop I: Forests and Climate Change

Climate change is, perhaps, the greatest threat that world society is facing now and in the future. Although there is still a significant level of uncertainty on how strong these changes are going to be, there is undoubtedly a common agreement that human activities, mainly through the use of fossil fuels and deforestation, are major forces driving these processes at a global scale. The workshop offered participants the opportunity to acquire a better understanding of the role that ecosystem services may have within adaptation strategies in the tropics, and of its implications for forest research planning and implementation. The participants enhanced their ability and skills in applying state-of-the-art methods and addressing climate change from the perspective of adaptation of forests and people to the impacts of global climate change conditions.

During the workshop sessions climate change issues raging from observed impacts of climate change on forests and their services to society, particularly in tropical and subtropical regions; ecosystem services and adaptation strategies to climate change; vulnerability



concepts and methods; and community-based risk screening modelling tools were discussed. Various case studies on model application and implications for research and on-the-ground forest management were further deliberated in groups.

### Workshop II: Traditional Forest Knowledge

The workshop offered participants an overview of traditional forest knowledge and related research work, focusing on the definition of traditional forest knowledge; a comparison of traditional forest knowledge and scientific knowledge systems; contributions of traditional forest knowledge to understand forest systems and sustainability; and measures available to prevent further erosion of traditional forest knowledge. The workshop addressed traditional forest knowledge from various perspectives departing from the question: Are we discussing Traditional Forest Knowledge or Indigenous Forest Wisdom?

The class discussed the meaning of traditional forest knowledge and ways to combine many systems of knowledge in decision-making. Henry Lewis' video, 'The First of Spring,' revealed the uses aboriginal people used to have for fire in the boreal forests of Canada. Because most participants had assumed fire to be bad for forests, they were surprised by the contributions of properly timed fire to protection of villages, promotion of forage for valuable animals, and promotion of valuable plants such as those producing berries. The participants also discussed various interpretations of shifting cultivation in relation to forest management and the implications of traditional knowledge for international agreements such as the Convention of Biological Diversity and the UN Declaration on Rights of Indigenous Peoples.



One of the main goals of the workshop was to encourage participants to respect traditional forest knowledge and to learn how to include holders of such knowledge in management decision-making and in research projects. For this reason, the workshop utilized collaborative learning strategies. Participants worked in groups on tasks that addressed other main topics while using the participants' prior knowledge. The instructor ceded control to them, in order to show that a scientist did not have to be the main focus of attention for learning to occur. The week began with students filling out a questionnaire to provide a baseline for their knowledge of the subject; when they filled out the same questionnaire on the final day, the results revealed significant learning had occurred.

### Workshop III: Forests and Water

Forests and water are closely interlinked and equally important for the world's sustainable development. Understanding their interaction is a basic requirement for sustainable forestry and forest management, especially in regions where water is short. In recent years, more attention has been given to the debate about water-related influences on forest ecosystems and forest management, particularly on issues of flood and water yield. Improving insight and latest knowledge of these issues among scientists and practitioners is therefore important and helpful for future forestry development.

The workshop offered participants access to latest knowledge on issues of forest-water interactions, the scientific base and applications through process-based models. More specifically, the workshop addressed water-related issues in forestry including basic forest-water-interaction related processes and measurements;



important influencing factors and their measurements; current knowledge about forest hydrological functions; the management of forest hydrological impact; and eco-hydrological models and their application. Various case studies on model applications and on-the-ground measures to protect water resources and or enhance water yield in drylands complemented the programme. Overall, the training workshop was successful in that the participants enhanced their ability and skills in applying state-of-the-art forest eco-hydrological knowledge in modern forest-related research and educational activities.

#### Workshop IV: Forests and Human Health

Emerging infectious diseases are considered to be among today's major challenges to global health, human development as well as science. The role of and potential effects on forests and implications for forest resource management are significant. Forest land use changes and practices, particularly when unregulated and unplanned, frequently lead to an increase of zoonotic and vector-borne diseases and related decrease in biodiversity. Additionally several socio-economic changes will have various affects, including for example changes in energy use, in human behaviour, in political landscape and crises. These aspects need to be taken into account when decisions on forest land use and forest resource planning and management are made. In the workshop, participants were first introduced to the complex relationship of forests and human health ranging from issues related to mental and physical well-being, pharmaceuticals and nutraceuticals; forest food and herbs; and to zoonotic diseases, respiratory problems and toxic substances. These aspects were discussed in detail through an informative review of cases dealing with global environmental health and biodiversity. As a

response to these challenges, the Forest-Human Health Impact Assessment (F-HIA) was introduced as a tool for assessing health concerns in forest related projects and sustainable management. This tool highlights the health risk factors that are closely associated with potential impacts from changes in the environment. Based on the knowledge of this method, workshop participants were engaged in a F-HIA simulation activity where they applied its principles based on a self-defined scenario. After careful review and thorough discussions, recommendations were made as to whether the proposed changes in scenario can be acceptable or need to be amended in order to include various forms of precautions contributing to avoiding negative impacts on human health.

#### Training Modules

In addition to the topical workshops, the pre-congress training event also included one-day skills training sessions in science-policy interfacing and information management.

#### Training Module I: Working effectively at the Interface of Forest Science and Forest Policy

The need for sound scientific information in the development of public environmental and forest-related policies at the local, national and international levels has grown significantly in recent years. Although it is commonly accepted that scientific information is indispensable for policy and management, linking substantive knowledge and authoritative political decision making is a chronically difficult task. In order to facilitate the work at the science-policy interface the training provided concepts and methods to researchers on how to plan, conduct, and organise research activities so that the results can more quickly



and easily be transformed into usable information for problem-solving and policy-making. Towards this end the participants were introduced to some basic aspects and principles important for effective science-policy interfacing, discussed scientific input at the international, national and local levels and also worked in groups on specific case studies to designed improved systems of interactions between the forest scientists and end-users of research such as politicians, land managers, advocacy organisations and local communities.

### Training Module II: Forest Information Management

Managing large amounts of data and information constitutes an important component of forest research and development activities. Towards this end, modern information and communication technologies support efficient collection, processing, and dissemination of information. In order to make full use of such technologies, forest scientists must be familiar with the methods, systems, and tools available today. This training module therefore aimed at introducing participants to the challenges of managing and sharing information with audiences located all over the world. Topics covered included an overview of Internet based information delivery; the Global Forest Information Service (GFIS); fundamentals of project management with workgroup assignments and reports; practical options for creating dynamic methods of syndicating information through RSS with specific information on becoming a GFIS Information provider; as well as successful methods of adopting these principles by IUFRO partners such as FORNESSA and APAFRI. All topics were supported by hands-on exercises whereby each participant was provided an own PC workplace for the duration of the one-day training.

### Participants

Out of a total of 160 scientists from developing countries who have applied, 69 have been approved for participation in the pre-congress training workshops (41% women; 59% men).

The following 28 countries of Africa, Asia, and Latin America were represented in the training workshops:

Argentina (1 participant); Bangladesh (4); Brazil (1); Benin (2); Cameroon (1); Chile (1); China (7); Costa Rica (1); Ethiopia (2); Ghana (3); India (13); Indonesia (8); Iran (2); Lao PDR (1); Republic of Korea (4); Kyrgyzstan (1); Mongolia (1); Mozambique (1); Nepal (2); Nicaragua (1); Nigeria (2); Peru (1); Philippines (2); Sri Lanka (1); Thailand (2); Venezuela (2); Uganda (1); Zambia (1).

### Contributors and donors

In total, 22 trainers and resource persons as well as 3 support staff from 10 different countries contributed to the training, representing the following 10 IUFRO Members institutions and partners:

- Asia Pacific Association of Forestry Research Institutions (APAFRI), Malaysia;
- Chinese Academy of Forestry (CAF), China;
- Finnish Forest Research Institute (Metla), Finland;
- Food and Agriculture Organization of the United Nations (FAO);
- Forestry Research Institute of Ghana (FORIG), Ghana;
- Forestry Research Network of Sub-Saharan Africa (FORNESSA), Ghana;
- Korea Forest Research Institute, Republic of Korea;
- Tropical Agricultural Research and Higher Education Center (CATIE), Costa Rica;
- University of British Columbia, BC, Canada; and
- US Forest Service, United States of America.

The in-kind support included the provision of the training venue and local logistics by the Korea Forest Service, and assistance in the preparation and implementation of the training event by the Korea Forest Research Institute. The other partners contributed time for the preparation of workshop material, provision of expertise and trainers, and implementation of the workshops. IUFRO gratefully acknowledges the contributions and assistance provided by the donors for this training event.

Generous funding for the IUFRO-SPDC Pre-Congress Training Workshops was provided by the Korea Forest Research Institute, the Ministry of Foreign Affairs of Finland, the US Forest Service, the Austrian Ministry of Agriculture, Forestry, Environment and Water

Management, and the Food and Agriculture Organization of the United Nations.

## Scientist Assistance Program

The Scientist Assistance Program (SAP) is designed to offer delegates from developing countries financial assistance to participate in the XXIII IUFRO World Congress. The Selection Committee gave preference to young scientists who had a good recent record of scientific achievement, were active members of IUFRO units, and contributed to the Congress by presenting a paper/poster or making a critical input to its organization. Female scientists received special consideration for this support.

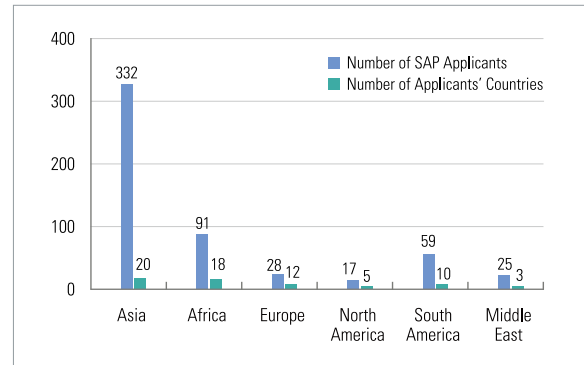
Priority candidates for support were identified using the following criteria:

- Paper/Poster: Applicants without accepted papers or posters were automatically rejected;
- Age: Applicants were automatically rejected if they were above 57 years of age or if they were above 45 years of age and had been funded by IUFRO to attend previous IUFRO Congresses;
- Involvement of IUFRO activities (e.g. office holder, active in a IUFRO unit, employed with a IUFRO Member Organization);
- Scientific achievement since the year 2005 (i.e. journal papers published, conference papers or other publications); and
- Gender: In providing support, special attention was given to gender balance.

SAP awardees received financial assistance to fund travel expenses, accommodation, per diem and complimentary registration to attend the Congress. The application deadline for the SAP ended on 31 December 2009. A total of 552 applications were received from 68 countries, of which a total of 142 delegates from 40 countries were offered full funding (travel expenses, accommodation, per diem and complimentary registration) and 32 delegates from 15 countries offered partial funding (accommodation, per diem and complimentary registration) to attend the XXIII IUFRO World Congress in Seoul (Figure 2 and Table 10).

Full funding was given to delegates from low and lower middle income countries and partial funding to delegates from upper middle income countries (Figure 3). Forty four percentage of SAP awardees were women.

(A)



(B)

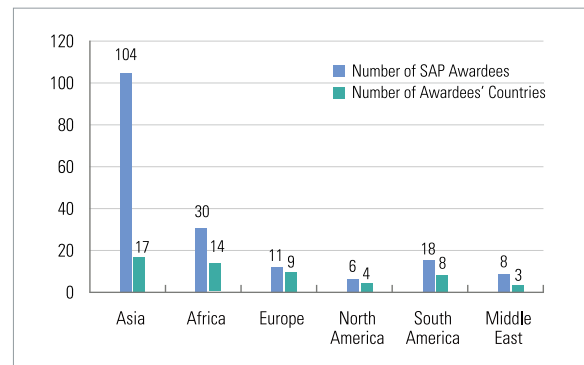
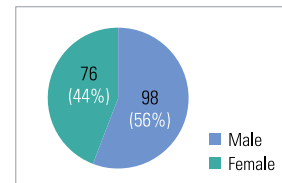
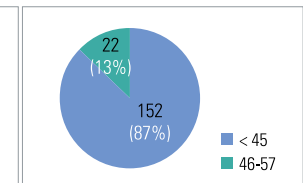


Fig. 2. Number of SAP applicants and applicants' countries (A), and SAP awardees and awardees' countries (B) by region.

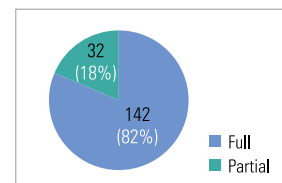
(A)



(B)



(C)



(D)

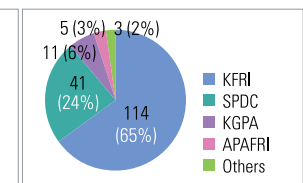


Fig. 3. Number of SAP awardees by gender (A), age (B) and type of support (C), and their sponsors (D).

[KFRI: Korea Forest Research Institute, SPDC: IUFRO Special Programme for Developing Countries, KGPA: Korea Green Promotion Agency, APAFRI: Asia Pacific Association of Forestry Research Institutions]



Table 10. Number of SAP awardees by country.

Country	Number	Country	Number
Algeria	1	Malaysia	5
Argentina	3	Mexico	1
Bangladesh	9	Moldova, Republic of	1
Benin	3	Mongolia	3
Bosnia and Herzegovina	1	Mozambique	1
Brazil	3	Nepal	9
Burkina Faso	1	Nicaragua	1
Cameroon	3	Nigeria	6
Chile	2	Pakistan	2
China	15	Peru	3
Colombia	2	Philippines	9
Costa Rica	1	Romania	1
Cuba	2	Russian Federation	2
Ecuador	1	Slovakia	1
Ethiopia	2	Sri Lanka	1
Ghana	7	Sudan	1
Guatemala	1	Thailand	3
Hungary	1	Togo	1
India	23	Tunisia	1
Indonesia	15	Turkey	2
Iran	7	Uganda	1
Kazakhstan	2	Ukraine	1
Kenya	1	Uzbekistan	1
Kyrgyzstan	1	Venezuela	1
Lao People Democratic Republic	1	Vietnam	3
Latvia	1	Yemen	1
Lithuania	1	Zambia	1
Macedonia	1	<b>Total</b>	<b>174</b>

The COC thanks the following donor organizations for providing financial support to the SAP:

- Korea Forest Research Institute
- Korea Green Promotion Agency
- Asia Pacific Association of Forestry Research Institutions
- SK Telecom
- Lifetree Biotech Co., Ltd
- IUFRO (SPDC)

In addition to the SAP, eight delegates from Tunisia were offered full funding to attend the Congress by the Korea International Cooperation Agency. Seoul National University also provided 78 delegates from 23 countries with financial support.

## Trade & Exhibition

### • Exhibition



A week-long Trade & Exhibition took place in conjunction with the XXIII IUFRO World Congress, which aimed to promote economic, environmental and social benefits of forests and to offer visitors a chance to learn about the latest products and innovations in the forestry sector. The Trade & Exhibition was held from 23 to 28 August in Hall C3 and C4, where 82 Korean and overseas companies and organizations showcased their products and technologies in 212 booths, and 13,139 visitors benefitted from those displays.

Table 11. Number of exhibitors

Category		No. of Exhibitors	No. of Booths
Governmental Policies	Government Ministries	4	55
	Related Organization	12	55
Educational & Research Institutes	International Organization	7	10
	Overseas	11	18
	Domestic	17	29
Industries	Overseas	6	6
	Domestic	25	39
<b>Total</b>		<b>82</b>	<b>212</b>





Table 12. Number of Visitors

Date	No. of Visitors
Day 1 (23 August 2010)	2,142
Day 2 (24 August 2010)	2,432
Day 3 (25 August 2010)	2,632
Day 4 (26 August 2010)	2,001
Day 5 (27 August 2010)	3,042
Day 6 (28 August 2010)	890
<b>Total</b>	<b>13,139</b>

The ribbon-cutting ceremony marking the opening of the exhibition was held in the lobby of Hall C3 and C4. The Minister of Korea Forest Service, Chung, Kwang-Soo led a get-acquainted tour for 13 delegates including Minister for Food, Agriculture, Forestry and Fisheries, Chang, Tae-Pyong.

In order to promote forest and forest science, the exhibition was open to the congress registrants as well as to the public. The creative shapes and designs of booths in the exhibition hall added to the show's appeals. Interactive booths let visitors take a virtual "forest tour." Woody paths scented with phytoncide added to the forest ambience.

#### • Bibimbap Event

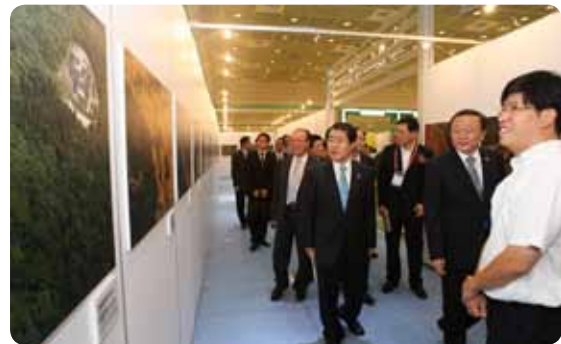
A 15-minute bibimbap performance was one of the most eye-catching IUFRO 2010 events. The Korean dish was prepared on Wednesday, August 25, 2010. About 15 IUFRO officers including President Don Koo Lee, Keynote Speaker on Tuesday Frances Seymour and KFRI Director General Choi Wan-Yong, volunteers, and mascots mixed all the ingredients together in a super-sized bibimbap bowl. What is bibimbap? It is a popular Korean dish consisting of



boiled rice mixed with assorted vegetables and herbs.

#### • Photo Exhibition

This photo exhibition entitled "Colors of Korea," featured a wide range of spectacular landscape of Korea, which were taken from the air by acclaimed Korean photographer Lee, Tae-Hoon over the past two years solely to enable IUFRO 2010 participants to take a peek at the fantastically colorful four seasons in Korea. Visitors could also have a chance to look at the photos of "Korean Big Trees" which were exhibited by the Korea Green Promotion Agency. The exhibit included 20 big and old trees.



## Tours

The Task Force, formed in February 2007, launched preparations of the In-Congress Tours and the Post-Congress Tours at the XXIII IUFRO World Congress. The two tour programs were separated from the beginning because the tour courses had been determined based on their academic and spatial aspects. The Congress theme, accessibility and convenience of each tour route were considered in the run up to the Congress Tours.

In developing the In-Congress Tour programs, priorities were given to the sites of Korea's best afforestation and reforestation practice as well as for demonstration of forest science. Some cultural elements were also included in the program. From early 2007 to late 2008, numerous revisions were made for the In-Congress Tour plans and the eight courses were finalized in Gyeonggi Province, eastern area of Gangwon Province, the northeastern area of South Chungcheong Province.

A total of 12 courses including China, Japan and Mongolia well-known for excellence in history, culture and scenery were proposed for the Post-Congress Tour programs. But, the Congress Organizing Committee and the IUFRO-KOREA finalized the Post-Congress Tour programs composed of eight courses through discussion in many meetings. Two courses were involved by request of the IUFRO Divisions.

### • In-Congress Tours

Delegates had pre-selected their tours when they registered and tours were assigned to the participants on a first-come, first-serve basis. Three courses of the tours had been filled



even before the registration closed.

On 26 August, after three days of meetings and discussions at COEX, many of the delegates grabbed a break and an opportunity to see Korea's forests, forestry, wood processing industry and local tourist attractions with their own eyes.

Shuttle bus pickups were served from the official Congress hotels and COEX to Jamsil Baseball Stadium parking lot where the tour buses departed in the early morning.

More than 1,350 delegates and 150 staff members rolled out of Seoul on 96 buses, fanning out across three provinces for eight tour courses. The one-day tours had been carefully designed to enable delegates to explore a biodiversity area, an experimental forest, a tree breeding facility, a forest education center, an ancient royal forest preserve, a chestnut plantation, a recreational forest, and a successfully reforested area.

A majority of the tours visited three different sites throughout the 9-10 hours, and the most distant excursion stop was about 130 km away from COEX. Since it was such a long trip, 81 tour guides and 48 staff members did their best to make delegates comfortable and pleasant on their way to the sites. The IUFRO volunteers and site speakers also made every possible effort to provide the most instructive and invaluable experience to the delegates.

The tours were met with tremendous enthusiasm and support from local forest-based organizations, interest groups, and tourist attractions with the following spread of tour sites across many organizations:

Organization	Number of Sites
Korea Forest Research Institute	3
Regional Forest Service	3
Korea National Arboretum	1
National Natural Recreation	
Forest Office	1
Korea National Park	1
Korea National Museum	1
Korea Water Resources Corporation	1
Cultural Heritage Administration	2
Seoul Metropolitan Government	1
Temple	3
Industries	5
Non-profit Organization	1
Private	4
<b>Total</b>	<b>27</b>



Braving thick fog and rain that varied from drizzle to downpour, delegates kept their chins up on the tour day as they were going to get a taste of the great outdoors on a visit to diverse sites where they learned about Korea's forests and forestry.

#### IC-01 Protected Area for Biological Diversity

Participants had an opportunity to visit Mt. Odae, one of Korea's national parks. The Odae Mountain National Park functions as a protected area, making a great contribution to the conservation of biological diversity in Korea. All the associated plants, animals, fish and other biological resources in the park are under strict protection. Mt. Odae is also the place where Woljeongsa Temple sits, which was built in 643 during the Silla Kingdom, one of the ancient kingdoms of Korea. They also visited the Wood Trade Center, which produces various kinds of wood products, and Supchewon, a forest education facility.



#### IC-02 Landscape Restoration & Sub-alpine Forest

The focus of the tour was on forest landscape restoration in the Daegwallyeong area, the northeastern part of South Korea. The forest in this area was totally devastated mainly due to slash-and-burn farming in the 1960s. The strong will of the Korean government and active public participation accomplished forest restoration in this harsh environment. Baekdudaegan is the longest mountain range forming



the backbone of the Korean Peninsula that extends about 1,400 km from Mt. Baekdu in North Korea to Mt. Jiri in the southern part of South Korea. Participants had a chance to visit Mt. Balwang, a part of Baekdudaegan and observe a typical sub-alpine forest in Korea. A nearby cultural attraction was the Mok-A museum. They enjoyed over 6,000 Buddhist works including sutras, wooden, stone and bronze objects, paintings and calligraphic works.

### IC-03 Non-Timber Forest Products

Chestnut is one of the most important income sources for farmers in Korea. The participants had a visit to the Jeonganbam Chestnut Agricultural Product Processing Center whose functions lie in assembling, washing, sorting, standardizing, processing, packaging and marketing of chestnuts. While looking around the Center, the participants had an opportunity to taste delicious chestnuts. The Gongju National Museum gave them a chance to enjoy sophisticated and splendid cultural relics of the Baekje Kingdom (B.C. 18 ~ A.D. 660), one of the ancient kingdoms in Korea. They also visited Magoksa Temple which was built in 643.



### IC-04 Conservation & Utilization of Forest Genetic Resources

The tour was designed to show a wide range of softwood/



hardwood tree improvement programs to participants. In Korea, tree breeding programs started in 1956 when the Institute of Forest Genetics, the predecessor of the Department of Forest Resources Development of the Korea Forest Research Institute(KFRI), was established. Participants had a guided tour of seed orchards, clonal archives of plus trees, and cultivar collections of chestnut, walnut and hibiscus. The tour took them to the Korean Folk Village, where they saw and experienced centuries-old tradition and lifestyle. They met potters, weavers, blacksmiths and other artisans who practice their trades in a traditional fashion. Another cultural attraction was the Hwaseong Fortress which was designated as a World Cultural Heritage site by UNESCO in 1997.

### IC-05 Forest & Human Health

Taking a stroll in a forest or “forest bathing” is becoming very popular in Korea because forests can help reduce stress and make people feel at ease. Scientific evidence shows that forests and trees have relaxing effects on mental health and can strengthen the immune system. Participants visited the Saneum Recreation Forest and took part in various “forest therapy” programs including medical checkups, aromatherapy, hydro-therapy and guided walks in the forest. A neighboring cultural attraction was

Yongmunsa Temple which was built in 802. Particularly, the temple is famous for Korea's tallest ginkgo tree. They also had a chance to visit a SFM model forest in the Mt. Maewha area.

#### IC-06 SFM & the Ecosystem Approach

The ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use. The ecosystem approach is based on the application of appropriate scientific methodologies focused on levels of biological organization which encompass the essential processes, functions and interactions among organisms and their environment. It is also the primary framework for action under the Convention of Biological Diversity. KFRI has established a research site in a Korean pine (*Pinus koraiensis*) plantation to develop technologies for the ecosystem approach in forest management. The tour was designed to show participants the research sites. Unfortunately, participants had to view and listen to the presentation from a distance since heavy rain made it difficult to go into the research sites. Meanwhile, they visited a cultural attraction, Nami Island, one of the most popular resort areas in Korea. The island is famous for a beautiful street lined with metasequoia trees.



#### IC-07 Old-aged Natural Forests & Landfill Restoration

Gwangneung is a royal tomb where King Sejo (1417 – 1468) and his queen were buried. Korea has a tradition that protects forests attached to the royal tombs. A total of 2,240 ha of the Gwangneung Forest has been well-preserved for more than 500 years and the forest is a reservoir of biological diversity. KFRI has established Long Term Ecological Research (LTER) sites in the forest to monitor ecosystem dynamics and to develop a strategy for the conservation of biological diversity. Participants had an opportunity to visit one of the LTER sites and the National Arboretum. The National Arboretum is located in the Gwangneung Forest and comprises 15 special arboreta including the Forest Museum. They also visited the World Cup Park that is located in Nanji Island, which was once a beautiful island filled with orchids and various kinds of wild flowers. However, the island was converted into a landfill in 1978. From that time to 1993, 92 million tons of garbage were dumped on the island, resulting in two massive mountains of trash with over 90 meters in height. In 1993, the Seoul metropolitan government launched a project to transform the island into an environmentally-friendly park. The World Cup Park is a stunning result of the city and Seoulites' efforts.

#### IC-08 Wood Processing Industry

Incheon City where the Incheon International Airport is located is a gateway to Korea and has a huge wood industrial complex. Participants visited several factories which manufacture wood products such as plywood, flooring, furniture, windows and doors, boards and musical instruments. This tour also enabled participants to enjoy





the beautiful oceanic view on a cruise ship. Furthermore, this tour provided a chance to visit the World Cup Park. This park is located on Nanji Island, northwestern Seoul. Nanji Island used to be known for a variety of plants including orchids and mushrooms, but amid Korea's rapid industrialization, it turned into a landfill that overflowed with trash and produced methane gas and toxic water. After years of the city government's inexorable efforts, Nanji was transformed into an eco-friendly area containing the World Cup Park and other natural parks.

#### • Post-Congress Tours

The Congress Organizing Committee offered a wide range of Post-Congress Tours, through which participants can experience Korea's diversity that is not only in its geography, climate and culture, but also in its flora and forest vegetation. These tours included visits to technical sites as well.

Ten tours were developed and presented for initial advertisement in the Congress Information Package. The COC finalized the tour courses after asking participants to indicate whether they would take part in any of the tours listed in the Congress Information Package by filling out their preferences of the enclosed Expression of Interest Form. Based on the survey, eight tours were finally offered as follows:

- Historic Sites in Andong & Gyeongju (3 days);
- Seoraksan National Park (3 days);
- Jeju Island (3 days);
- Wooden Architecture in Yeongju & Hapcheon (3 days);
- Forest Health in Paju, Pyeongchang & Uljin (3 days);



- China (4 days);
- Japan (4 days); and
- Mongolia (4 days).

All post-congress tour registrations and payments were made through the official Congress website. These tours included the services of an English-speaking guide, transportation, entry fees, meals, and accommodation.

Eight tours proceeded with 163 participants (see below). The deadline for tour registration was 23 July 2010. However, participants were able to register for tours during the week of the Congress, except the overseas tour courses (China, Japan, and Mongolia).

Course	Number of Participants
Historic Sites in Andong & Gyeongju	35
Seoraksan National Park	42
Jeju Island	36
Wooden Architecture in Yeongju & Hapcheon	5
Forest Health in Paju, Pyeongchang & Uljin	17
China	15
Japan	7
Mongolia	6
<b>Total</b>	<b>163</b>

#### PC-01 Historic Sites in Andong & Gyeongju

This tour took participants to Gyeongju and Andong, the two most popular destinations in the traditional sphere of Korean tourism, which are located southeast of Korea. The historic cities are a 5-hour drive away from Seoul. As the capital of the Silla Kingdom for almost a thousand



years, Gyeongju in many ways still maintains a variety of significant historical heritage sites. Highlights of this tour included the visits to the Gyeongju National Museum as well as Bulguksa Temple and Seokguram Grotto, both of which are UNESCO-designated World Heritage sites. Participants visited the Andong Hahoe Village, which preserves the housing architecture and village structure of the Joseon Dynasty, and the Andong Folk Museum, the home of Confucianism. The Seonghwangnim Forest, representing the Korean forests of the temperate zone, was also visited.

#### PC-02 Seoraksan National Park

This tour featured the spectacular scenery of the Seoraksan National Park with a size of 398,539km<sup>2</sup>, nearby cities and the ocean. The National Park offers amazing scenic views throughout four seasons. Daecheongbong (1,708 m) is the highest peak in the park and the third highest peak in Korea. Due to irregular climate and low temperatures, it is home to various high mountain plants as well as a variety of wild birds. Daecheongbong offers expansive views of Mt. Seorak. On the way back from the Seoraksan National Park, participants visited the coastal city of Sokcho. They went to Naksansa Temple boasting a 1,300-year long history and Sokcho Beach displaying the beautiful view of



its glassy water, white sand and pine forests. On the return journey they visited the Goseong Unification Observatory, the closest location to North Korea, where they had a glimpse of many peaks of Mt. Geumgang.

#### PC-03 Jeju Island



Participants flew one hour from Seoul to Jeju, Korea's largest island. Created by volcanic eruptions, the Island is considered the most popular travel destination among tourists from abroad. It has a temperate climate, warmer than inland Korea. This tour included visits to Cheonjeyeon Waterfalls, named 'the pond of God,' and Jusangjeolli Cliff, stone pillars piled up along the coast. Day 2 included a visit to the natural Bijarim Forest where 2,570 nutmeg-yew trees (*Torreya nucifera*) aged between 300 and 800 years grow. Then participants had a visit to the lava tunnel of the Manjang Cave and Jeju Stone Park, where they could learn about the volcanic and geological history of the Island. Day 3 included Seongsan Ilchulbong (Peak), one of the most fascinating tourist spots of the Island. Seongsan Ilchulbong rose from under the sea in a volcanic eruption over 100,000 years ago. They saw a huge crater, 600m in diameter and 90m in height, from the top of the Peak. They discovered the fantastically shaped rocks decorating the seashores, the hundreds of Oreums (secondary volcanoes) and the rarest



species of flora around the Island.

#### PC-04 Wooden Architecture in Yeongju & Hapcheon



This tour was designed for those who are interested in Korea's wooden structures. The tour first took participants to Yeongju blessed with the natural beauty of Mt. Sobaek and dozens of valleys. The city tour included a visit to Buseoksa Temple. Built in 676, Buseoksa is the oldest wooden temple in Korea and has great value as Buddhist architecture. It differentiates itself from other temples in particular by its huge size. They also took a look at a diverse array of designated National Treasures inside the temple. They stopped over in Andong, the most popular historic cities in Korea. A tour of Andong included a visit to the Andong Hohoe Village that preserves the housing architecture and village structure from the Joseon Dynasty and the Andong Folk Museum, the home of Confucianism. The final destination of the tour was Hapcheon, renowned for Haeinsa Temple, where the Tripitaka Koreana is enshrined. The Tripitaka Koreana (woodblocks) is a comprehensive collection of Buddhist scriptures including doctrines of Buddhism.

#### PC-05 Forest Health in Paju, Pyeongchang & Uljin

This tour was an excellent option for participants who have interest in insect pests and diseases control. The tour first took participants to a natural *Quercus mongolica* forest that has been damaged by the Korea Oak Wilt disease (*Raffaelea quercus-mongolicae*). The second technical site was a *Pinus densiflora* forest damaged by the pine needle gall midge (*Thecodiplosis japonensis*). They had a chance to share their knowledge and experiences in controlling those insect pests and diseases. On the East Coastal Highways with a fantastic ocean view, they traveled to Bulyeongsa



Temple, an old Buddhist temple which was built in 651. The temple was also famous for a majestic *Pinus densiflora* stand that surrounds the site. The tour also included a visit to Buseoksa Temple that is well-known for having one of the oldest wooden buildings in Korea. On their way back to Seoul, they visited Seonbi-chon preserving the housing and village structure of Joseon Dynasty's scholar class and Danyang Palgyeong (eight wonders) being noted for its picturesque peaks and rocks.

#### PC-06 China

It takes only a 90-minute flight from Seoul to Beijing, the capital of China. Participants enjoyed both the historical and technical aspects of Beijing. The tour first took them to a theater to enjoy Shaolin Kung Fu, the famous Chinese martial arts. Then, they visited the Forbidden City, home of the Emperor of China for almost five centuries, and the Summer Palace which was declared as a masterpiece of Chinese landscape garden design by UNESCO. They also visited the Great Wall of China. The tour included a visit to the Badaling Forest Farm located at the foot of the famous Badaling Great Wall, one of the preeminent World Cultural Heritage sites.

#### PC-07 Japan

For those hoping to expand their oriental experience, we

offered a chance to enjoy the unique Japanese culture and natural landscape. Participants flew directly from Seoul to Narita. After arriving in Narita, they first went to Naritasan Shinshoji Temple and then visited the luxurious and elaborate Toshogu Shrine at Ueno Park in Tokyo. The shrine was selected as a technical site and as a cultural and historic spot for its endless Japanese cedar-lined road and centuries-old wooden buildings. A Tokyo City tour was also included in this journey, providing participants with a chance to visit some of the most popular tourist spots of Tokyo, such as Meiji Shrine, Edo-Tokyo Museum, Ueno Onshi Park and Odaiba Artificial Island.

### PC-08 Mongolia

The trip to Mongolia was the right choice for those with adventurous spirit. The land of Genghis Khan, the Mongolian emperor whose empire stretched from the Black Sea to the Pacific Ocean, is composed of mountains, desert, and steppe so that participants could have exceptional experience to enjoy the natural wonders by car, on foot, or on horseback. They visited the Gandan Monastery, the largest and the most important monastery of Mongolia with over 400 monks in residence, and the Natural History Museum, Mongolia's first national museum showing the origin of plants, animals and humans. They also visited the Terelj National Park where they could experience horseback riding, making them visit to Mongolia more enjoyable and unforgettable.

## Optional Daily Tours

The Congress Organizing Committee designed a selection of tours for travel companions and for delegates on their free days. Participants enjoyed the exotic Korean culture full of unique wonders.

All optional daily tour registrations and payments were handled through the official Congress website and on-site as well. These tours included the services of an English-speaking guide, transportation, and entry fees.

Six tours proceeded with 54 participants (see below).

Course	Number of Participants
Korean Wave	3
History of Dolmen	5
Demilitarized Zone (DMZ) Tour	28
Korean Antique Art & Culture	2
Traditional & Modern Tour	4
Visit 'Korea House'	12
<b>Total</b>	<b>54</b>

### OD-01 Korean Wave

The Daejanggeum Theme Park is a replica of the film set of a TV drama 'Daejanggeum,' which is based on the story of a historical figure called Janggeum, the first and only woman to serve as head physician of the king in the rigidly hierarchical and male-dominated society of the Joseon Dynasty. Participants felt like becoming part of the main cast, while taking a leisure stroll here. They got an inside look at the sets and were immersed in the reproduced drama scenes.

### OD-02 History of Dolmen

Ganghwa Island, the fifth largest island in Korea, is located in the Yellow Sea. The Goindol graves (Dolmen) are where the rulers of the Ganghwa Island in the Bronze Age were buried. There are about 80 stone graves around the island. There is also evidence of the Dangunwanggeom, who is considered as the founding father of Korea. Participants walked up the many steps of Chamseongdan in Mt. Mani, and they saw the Yellow Sea and the island at the peak.

### OD-03 Demilitarized Zone (DMZ) Tour

The Demilitarized Zone (DMZ) tour revealed the stark reality of Korea: the world's only divided country. The DMZ, designated in 1953 when the Armistice Agreement was signed, marks the site of the division. Indeed, this was a very special tour destination which offered a vivid experience of the Korean War and a dramatic sense of the tragedy of the separated family members between the two Koreas from the division of the peninsula.

### OD-04 Korean Antique Art & Culture

Samsung Leeum, overlooking the Han River, is located at the foot of Namsan and is easily accessible from Itaewon. Samsung Leeum is divided into Museum 1

and Museum 2, displaying Korea's traditional art and modern contemporary art, respectively. Museum 1 holds approximately 120 pieces of art including some national treasures of Korea. Museum 2 holds approximately 70 pieces of modern works from all over the world. Built with diverse materials and progressive technology, the museum buildings themselves are works of art. N Seoul Tower rises 237 m above the summit of Mt. Namsan at the heart of Seoul. Participants took a panoramic view of the entire city here. The outlook of N Seoul Tower decorated with brilliant lights shone in different colors and patterns depending on seasons or events, making it spectacular at night.

#### OD-05 Traditional and Modern Tour

Mountains are an essential feature of Seoul's landscape. In particular, the area around Mt. Bukaksan is a great place to experience the natural beauty of the capital city. Sukjeongmun is the mysterious north gate and Candle Rock is a popular place for visitors to come and enjoy the magnificent beauty of the sun slowly peeking its way over the edge of the rock face. The Seoul World Cup Stadium resembles a traditional Korean kite, and seen from above, it looks as if a rectangular shield is being flown like a kite. The shape of the stadium represents flight towards victory, and it combines the hopes of the World Cup games and spirit and traditional culture of the Korean people. Nearby the stadium there are a variety of parks, ideal for leisure walks. There are also five theme parks around the stadium: Peace Park, Nanjicheon Park and Noeul Park among them.

#### OD-06 Visit 'Korea House'

In the Korea House, participants enjoyed 30 different kinds of traditional Korean food prior to the performance. The Korea House was the place where participants could experience an entire genre of Korean traditional arts at a time. They were also served Joseon royal cuisine traditionally prepared for the kings.

## Accompanying Persons' Program

A wide array of day tours escorted by professional tour

guides were offered to the registered accompanying persons free of charge. The accompanying persons had the unique chance to visit the local cultural sites, as well as to learn a time-honored Korean custom: making kimchi.

All Accompanying Persons' Program registrations and payments were handled through the official Congress website and on-site as well. These programs included the services of an English-speaking guide, transportation, entry fees, and lunch.

Five programs proceeded with 97 participants as follows:

Course	No. of Participants
Joseon Dynasty Relics Tour	27
Incheon Pottery Village Tour	10
Old & New Seoul City Tour	30
Korean Culture & Han River Cruise	24
Fusion Style Attractions & Electronics Market Tour	6
<b>Total</b>	<b>97</b>

#### AP-01 Joseon Dynasty Relics Tour

The accompanying persons took a chance to learn about the Korean royal family's life. As the capital of Korea for more than 600 years, Seoul preserves a number of palaces and temples along with traditional markets. This tour took them to the city's two most famous palaces, a temple and a traditional market.

#### AP-02 Icheon Pottery Village Tour

The accompanying persons had fun making traditional ceramics at the Icheon Ceramics Village. The village was the center of the traditional Korean pottery during the Joseon Dynasty. There are currently about 80 ceramic workshops congregated at the village. They made their own ceramics!

#### AP-03 Old & New Seoul City Tour

The accompanying persons enjoyed the old and the new Seoul. They learned about Korea's history at the National Museum of Korea and the traditional Korean houses at Namsan Hanok Village. Additionally, they enjoyed the city view from the Seoul Tower, went on a shopping spree at the Dongdaemun Market and got some rest by the

Cheonggyecheon Stream.

#### AP-04 Korean Culture & Han River Cruise

The accompanying persons were brought one step closer to Korean culture by making Kimchi and wearing traditional Korean clothing – Hanbok. Kimchi, fermented vegetables considered by many to be Korea’s “national food,” has earned praise for its amazing health properties. Meanwhile, Hanbok has recently been gaining huge popularity worldwide. The French call it “color of mystique” or “fantasy.” They eat Kimchi they just made, and wore the beautiful Hanbok.



#### AP-05 Fusion Style Attractions & Electronics Market Tour

The accompanying persons spent a day in Samcheong-dong Street and Itaewon Street to experience totally different features. Every street and area in Seoul has a completely different atmosphere. The Samcheong-dong district is lined with famous art galleries, renowned for unique architectural design. Itaewon Street is the most exotic place in Seoul where visitors can enjoy shopping, dining and hanging out.

Director General of the Korea Forest Research Institute, the host organization of the XXIII IUFRO World Congress, were presented to the delegates. On top of it, information on the 2010 Congress and promotional items were given out at Korea Forest Research Institute’s booth at the Trade & Exhibition Hall.

Related information and promotional items were also distributed at the XXIII IUFRO World Congress booths in major international meetings such as the First Asia-Pacific Forestry Week in Hanoi, Vietnam (2008), the International Conference of IUFRO Working Parties 4.01, 4.02, 4.04 in Chuncheon, Korea (2008), the First International Conference on Forest Related Traditional Knowledge and Culture in Asia in Seoul, Korea (2008), the International Conference of IUFRO Working Party 2.02.15 in Yangyang, Korea (2008), the XIII World Forestry Congress in Buenos Aires, Argentina (2009), the Forest Day 3 (UNFCCC COP15 parallel event) in Copenhagen, Denmark (2009), and the 23rd Session of Asia-Pacific Forestry Commission of FAO in Thimphu, Bhutan (2010).

#### Posters and Pamphlets

Three different kinds of Congress posters were printed for distribution. The posters were disseminated to IUFRO Member Organizations, forest and forestry-related agencies, and potential delegates.



The COC also distributed 12 different kinds of booklets, promoting and providing information of the Congress, to forest and forestry-related agencies and potential delegates.

## Press and Publicity

#### Publicity in International Meetings

Congress promotion activities commenced from as early as 2005, since the XXII IUFRO World Congress in Brisbane, Australia. During the Closing Ceremony, promotional presentation which included a traditional Korean dance performance and invitation address by Seung-Jin Suh,

#### Congress Information / Registration Packages

The first Congress Announcement (2008), the Congress Information Package (2009), the Congress Registration Package (2010) and the Congress Trade & Exhibition Package (2010) were printed and disseminated to IUFRO

Member Organizations, forest and forestry-related agencies and potential delegates. All information published in these packages was also posted on the Congress and IUFRO websites (<http://www.iufro2010.com>). The Congress website was also linked from websites of CIFOR, the XIII World Forestry Congress, Korea Forest Service and Korea Forest Research Institute.



### Announcement in Scientific Journals

In order to further promote the Congress, the COC has put the Congress announcements in international scientific journals including *Bois et forêts des tropiques* (N° 301, 2009) and *Annals of Forest Science* [vol 67 (2), 2010], and in local scientific journals such as *Journal of Korean Forest Society* [Vol 98(3), 2009] and *Journal of the Korean Wood Science and Technology* [Vol 37(4), 2009].

### Daily Newsletter

In conjunction with the Congress, a daily newsletter entitled *The Congress Daily* was published for five days and the first issue appeared in the morning of 23 August. Three-thousand copies of *The Congress Daily* were distributed everyday to inform and update participants on the Congress activities. *The Congress Daily* was distributed at 08:00 hours before the Technical Sessions started. The four-page, full-color newsletter included profiles of the keynote speakers, articles and photos of events from the previous day, forest-related stories from the host country



and interviews. *The Congress Daily* was a very successful communication initiative which received highly positive feedback from delegates.

Furthermore, for the international publicity of the congress, IUFRO World Congress Bulletin published by the International Institute for Sustainable Development (IISD) provided updates on the Congress via printed newsletters and online ([http://www.iisd.ca/YBM/FOREST/IUFRO/IUFRO\\_XXIII/](http://www.iisd.ca/YBM/FOREST/IUFRO/IUFRO_XXIII/)).

### Press Conference

Two special media conferences were held in the press room of the Ministry for Food, Agriculture, Forestry and Fisheries. One was in August 2009, one year prior to the opening of the Congress and the other in May 2010, 100 days before the Congress. The Director General of the Korea Forest Research Institute briefed the media representatives about the Congress progress in both conferences.

During the congress, five keynote speakers were invited to the press conference each day, which brought attention of the media to the congress.

### XXIII IUFRO World Congress Commemorative Stamp

The Korea Post (Korean postal service authority) issued a new commemorative stamp on 23 August 2010 to celebrate Korea's hosting of the XXIII IUFRO World Congress. The seven-colour octagonal stamp shows people and animals set among trees of varying shades of green to illustrate the stamp's theme, "Trees and Life." It also represents the Congress title, "Forests for the Future: Sustaining Society and the Environment."

The Korean War and other hardships of the 20th century left Korea's landscape stripped bare. This stamp also celebrates the successful reforestation efforts since those times, during which time more than 10 billion trees were planted. A full sheet of these 16 lovely stamps were included in every delegate's registration package as a souvenir.



XXIII IUFRO World Congress Commemorative Stamps





Addresses  
Keynote Addresses  
Scientific Programs  
Tours  
Exhibition  
Press  
IUFRO Honours and Awards  
IUFRO International Council  
Seoul Resolutions  
IUFRO Officers 2010 – 2014  
Congress Evaluation  
Congress Facilities  
Congress Organizers  
Congress Delegates

XXIII IUFRO  
WORLD CONGRESS REPORT

## Addresses in the Opening Ceremony

Opening Address by

**Don Koo LEE**

President of IUFRO



Your Excellency, Mr. President Lee Myung-Bak; Dr. Eduardo Rojas-Briales, Assistant Director-General of Forestry Department, FAO; IUFRO Honorary Members; IUFRO International Council and Enlarged Board members; Keynote speakers; Distinguished participants; Ladies and Gentlemen,

Buenos dias! Bonjour! Guten morgen! Good morning!, Anyeonghasipnikka!

It is with great pleasure that I welcome you to the 23rd IUFRO World Congress. For 118 years, since 1892, this is the first time IUFRO World Congress is held in the Republic of Korea.

IUFRO is a unique, non-profit, non-governmental and non-discriminatory organization with a time-honored tradition. One of its most important characteristics is the independent and recognized networking for global science cooperation for the benefit of forests and people.

IUFRO unites 15,000 scientists from almost 700 member

organizations in over 110 countries. With this huge network, it pools forest-related scientific knowledge generated by its distinctive membership. It is an unbiased referral point for the provision, assessment and application of forest science advice to international processes. We are all about Green Science, indeed.

Ladies and gentlemen, IUFRO family!

Since the 22nd IUFRO World Congress in Brisbane in 2005, we are gathered once again, this time under the Congress theme “Forests for the Future: Sustaining Society and the Environment.”

Serving IUFRO as President for the past 5 years was such a great learning experience and at the same time challenging with present issues on deforestation and climate change.

Climate change is challenging the roles of forests and forestry sectors in various ways. In lieu of this, it is vital for us to move towards a green growth with emerging low carbon technologies as declared by Mr. President Lee Myung-Bak. Climate change as one of the highest priorities of the United Nations has been also mentioned by Mr. UN Secretary-General Ban Ki-moon. In response to this, the IUFRO-led initiative on Global Forest Expert Panels has successfully completed its first thematic report on forest adaptation.

The continuous declines of forest areas are also a major concern and thus became a driving force behind global forest policy debates, including Reducing Emissions from Deforestation and Forest Degradation (REDD). Desertification, decrease in biodiversity and among others also remain a global challenge.

The fight against poverty and the increase of possibilities for global education are issues that I personally attach great importance to. Here I would like to make reference to the Millennium Development Goals. Forestry, in particular, can contribute to the eradication of poverty and hunger



(Goal 1) and ensure environmental sustainability (Goal 7). This list of issues that affects our decisions as forest researchers is certainly very long, and reminds us that our forests are dynamic and commands both regional and global attention. Therefore, I hope all these issues can be tackled in the 2011 International Year of Forests.

‘Globalization’ nowadays is used in many contexts and refers to the increasing global connectivity, integration and interdependence. Striking a balance among all these is difficult because of the complexity of its interdependence, but not impossible by foresters with a long standing experience.

Strong partnership and collaboration are needed to promote economic growth alongside environmental protection. On the contrary, a wider gap across gender, age, generation and economic classes exists which leads to the deterioration of both environmental and social structures. It is only through sustainability that we can achieve equity and through thorough understanding of the underlying environmental issues that we can find ways to address them using realistic approach.

Dear IUFRO colleagues, Yesterday, we had our tree planting ceremony in Seoul Forest, a model forest located in the metropolitan city of Seoul which was established when Mr. President was the Mayor of Seoul. Tree planting activity should not remain only as a ceremony but as a practice to green the earth. We should thus be proactive in tackling all forestry issues and work together to overcome any challenges.

In conclusion, allow me to stress the importance of sustainability equity, growth and development in the realization that “Forest is our life, our hope and our future.” I therefore look forward to your continuous support to IUFRO.

Before I end, I would like to express my sincere appreciation to all the IUFRO Management Committee, Enlarged Board, and Headquarters for their trust and support. I highly commend them for a job well done. My special thanks to Dr. Jung-Hwan Park, COC Chair, Dr. John Parrotta, CSC Chair, the Korea Forest Research

Institute, and the Korea Forest Service for their concerted and hard effort in organizing this Congress in the Republic of Korea. I now formally declare the 23rd IUFRO World Congress open.

Thank you for your attention. God bless you all!

Congratulatory Remarks by  
**Eduardo Rojas BRIALES**  
Assistant Director General, FAO



The relationship between IUFRO and FAO that lasted over 60 years was a good example in outstanding cooperation and the international forestry dialogue. Forestry serves as a paradigm and the economic revenue, and through it social demands had been listened for a long time.

Climate change is one of the major drivers in change. Forests are essential in mitigating climate change, strengthening bioremediation and bio-sequestration. In enlarging the forests worldwide, Korea's reforestation program contributed a lot for the past 50 years. The program helped reduce the use of fossil energies, open a chapter of new green economy and new windows of possibilities.

We at FAO have observed that fortunately the emissions from forests through forest degradation decreased by about 30 percent in the last decade mainly due to socio-economic changes of the emerging markets, urbanization and industrialization not to speak of the strong forestation program in Asia.

The spontaneous forest recovery amounts to two million hectares adding to six-million-ha forests we have globally.

One of the major driver change is energy. If we move to the future scenario, forestry will only have an opportunity. Fossil emissions are expected to decrease while forests will be enlarged to 500 million hectares if we can keep the carbon emissions level stable in 100 ~ 150 years.

In the future, forests will become a major variable because of the competitive edge and potential effects. The world will not be able to meet the climate change challenges without placing forests at the heart of climate change policies. Otherwise, we will have to drastically decrease the fossil emissions.

Given the multiplier effect of the forestry, the scenario of enlarging global forests to 500 million hectares in 50 years is practically possible in the figures of the Copenhagen accord. We are also supposed to double our efforts to make it happen.

It is important to listen to the opinions of experts outside the forestry sector to bring on board their experience regarding carbon sequestration.

It is equally important to come up with solutions as emerging countries are the most likely to form carbon sequestration and mitigation with their growing economy and income. Meanwhile developed countries as the largest contributor to carbon sequestration tend to be excluded from the carbon trading mechanism. We have to devise a comprehensive carbon model worldwide.

Despite different crises, we observe that there is high demand in forest education and research in the areas of social sciences, carbon diversity and water. In this sense, I always consider re-launching the advisory committee of forest education and research and I strongly count on IUFRO's contribution. Communication is to be or not to be of the future forestry. All the forestry family should take this excellent opportunity and I wish you a very fruitful Congress this week.

Thank you.

Message to the XXIII IUFRO World Congress by

**BAN Ki Moon**

Secretary General of United Nations

On behalf of BAN Ki-moon, Jan McAlpine, Executive Secretary of United Nations Forum on Forests, delivered the message.



I am pleased to send greetings to the twenty-third World Congress of the International Union of Forest Research Organizations. I thank the Republic of Korea, whose forests play such an important role in its green growth strategy, for hosting this event.

Forests are crucial for sustainable development. They contain two-thirds of Earth's known terrestrial species; they provide valuable protection against land degradation, desertification and climate change; and they support sustainable incomes and economic and social stability for hundreds of millions of people across the globe.

The International Union of Forest Research Organizations has created a valuable community of international scientists to advance policies and practices that preserve forests. You play an essential role in strengthening long-term political commitment to sustainable forest management by connecting experts from academia, government and non-governmental organizations.

As governments strive to agree on international frameworks to protect the global environment, your support for the sustainable management, conservation and protection of the world's forests is particularly significant. The knowledge, networking opportunities and assistance to institutions that you provide is central to bringing about local, regional and international change.

In 2007, the United Nations General Assembly adopted the Non-Legally Binding Instrument on All Types of Forests, the world's first framework document to promote sustainable forest management. The Instrument has formalized and strengthened international political will to reduce deforestation, prevent forest degradation and decrease poverty in forest-dependent communities.

To further raise awareness and promote global action, the United Nations has declared 2011 the International Year of Forests. I encourage all members of the International Union of Forest Research Organizations to help us commemorate the Year, and I wish you a most productive meeting.

Welcoming Remarks by

**LEE Myung-bak**

President of the Republic of Korea



Distinguished guests from home and abroad,

I wholeheartedly welcome all of you to the Republic of Korea.

I congratulate you once again on the opening of the 23rd IUFRO World Congress in Seoul. I also thank IUFRO President Lee Don Koo and many other officials for their dedicated efforts to organize this meaningful event.

Despite suffering war and poverty, the Republic of Korea has successfully turned its bleak and barren mountains into green and lush forests in a short period of time. For this reason, I am filled with special emotion to see this significant congress being held in Seoul.

Once again, I would like to offer my warmest welcome to all the distinguished participants who came from some 100 countries to join us here today.

Forests are the source of life. They are fundamental to human life and the first source of energy; they can be said to serve as the earth's lungs, purifying the water and air. In addition, the United Nations Framework Convention on Climate Change (UNFCCC) recognized that forests are the single reservoir to absorb and store carbon dioxide in the midst of the daunting challenges posed by climate change. They also act as the bastion in the prevention of desertification.

Unfortunately, forests half the size of the Korean Peninsula are disappearing each year. From the Amazon rainforest in Brazil only, an area the size of three soccer fields is deforested every single minute.

Forests can absorb about 15 percent of greenhouse gas emissions from the use of fossil fuels. On that account, leaders from countries around the world met in Copenhagen at the end of last year and agreed to a plan for Reducing Emissions from Deforestation and Forest Degradation (REDD).

In my Liberation Day speech about a week ago, I emphasized that in an era of Green Growth, it was necessary to have a highly cultivated attitude that even takes into consideration the forests in the Amazon and polar bears in addition to the wellbeing of individuals and families. Only when we cherish all living creatures as much as we do our own bodies will we be able to find ways for all humanity to survive.

Distinguished guests,

The land of the Republic of Korea was once full of bare red mountains. Nevertheless, the Korean people successfully transformed them into thickly wooded, green mountains in the span of only two generations. It can be ascribed to the fact that people used coal briquettes instead of firewood and planted many trees in mountains across the nation.

As of now, Korea ranks fourth among OECD nations in

terms of the percentage of forests to total land; this is a clear reminder that economic development and environmental conservation can go together.

Two years ago, Korea announced a new national vision of Low-Carbon, Green Growth. The nation now remains committed to developing new energy sources that will replace fossil fuels and has come up with new plans to establish a low-carbon transportation system and buildings. On top of this, the Government is making great efforts to implement various policies aimed at helping to firmly root lifestyles conducive to saving resources in our society.

As a pilot project, businesses that find cutting greenhouse gas emissions a daunting task have joined the Carbon Offset scheme, under which they have to plant trees, instead. Many Korean companies are planting and taking care of trees not only at home but on foreign soil, including Indonesia and nations in South America.

My strong conviction is that through these efforts, we can save the earth and revive the economy as well.

As a matter of fact, since the green growth vision was made public, the number of job opportunities in the new and renewable energy sector has tripled and sales quadrupled.

In the forest sector, social enterprises are emerging one after another. The forestation project has helped create a total of 50,000 new job opportunities annually. The biomass project, which makes use of byproducts stemming from forest management operation, has swung into full gear.

Forests and water are invaluable gifts to humanity.

As IUFRO President Lee Don Koo commented a little while ago, I created an urban park that is well landscaped with water and trees during my tenure as Mayor of Seoul. A large development project was planned for the site of the Seoul Forest where you planted trees yesterday. Based on the judgment that a forest park would have long-term benefits that would far outweigh instant economic gains, however, the site was developed into a forest.

Now Seoul is well on its way to having a green forest

in its center as well as streams where fish frolic in clean water. Not long ago, citizens were more used to asphalt and cement surrounding, but now they have begun to breathe clean air from the woods and enjoy peaceful nature.

Distinguished ladies and gentlemen,

In order to achieve sustainable growth, humanity must put on hold their greed to abuse forests. Together, we have to put a viable Planet-conscious System in place so that the earth and humanity will be able to thrive in harmony. Forests constitute a life-sustaining system for humans, and are about to serve as a new growth engine.

We already have three major international conventions involving climate change, bio-diversity and prevention of desertification. But these agreements can only be carried out successfully when we take up preservation and utilization of forests as a common task and act on it.

To that end, the Republic of Korea will spare no effort. The Korean Government is proposing the establishment of the Asian Forest Cooperation Organization with the vision of sharing its experiences and technologies with other countries concerning preservation of forests. My Administration will also collaborate closely with the Global Green Growth Institute (GGGI), which was inaugurated recently to promote the green movement.

This World Congress is to hold discussions on the theme "Forests for the Future: Sustaining Society and the Environment." Serious exchanges of views are expected on the pressing issues of how to put an end to the continuing deforestation and on how to enhance the quality of forests. As a result, I trust that the meeting will reap an abundant harvest.

I am very pleased to welcome such a group of eminent experts representing diverse countries and international organizations, including the United Nations. While staying in Korea, I hope you will have an opportunity to appreciate the cultural and historical legacies of this country as well as the Seoul Forest and other wooded areas.

As I convey once again my warm heart to every one of you,

I hope your visit to Korea is a joyous and rewarding one.  
Thank you very much.

## Addresses in the Closing Ceremony

Thank You Remarks by

**PARK Jung-Hwan**

Chair of the Congress Organizing Committee



Distinguished Guests & Colleagues, Good afternoon,

We are near the end of the six-day 23rd IUFRO World Congress. I am very thrilled to be here today. I believe our efforts in the past five years have paid off with the great success of this Congress. Countless number of teams and staff members committed themselves to this Congress. I cannot imagine this exceptional IUFRO Congress without their unwavering support.

First, I would like to acknowledge the Korean government who has spared no effort in providing administrative and financial support needed to host this Congress. The strong commitment drove us to be fully devoted in organizing the historic IUFRO Congress here in Seoul.

There is one workaholic whom I should mention here. We are so blessed to have him throughout these years. He spearheaded and piloted all scientific programs for this Congress. Ladies and gentlemen, the CSC Chair John Parrotta from the USDA Forest Service. Despite the time difference of 12 hours across the Pacific Ocean, Dr. Parrotta was always enthusiastic in all conversations

with the COC over the phone during the business hours of Korea. Uncountable phone calls, e-mails and hard work by Dr. Parrotta regardless of day or night made the excellent scientific program happen. Special thanks also to members of the CSC who have given invaluable advices and comments to keep us on track.

I would also like to pay tribute to the Professional Congress Organizer Intercom who did a wonderful job in the last three years. All of you at Intercom had contributed commendable assistance in organizing this Congress. Each and every staff and volunteer in the green shirt, great job! I am deeply impressed.

It is also my pleasure to acknowledge the IUFRO team led by IUFRO President Don Koo Lee particularly the IUFRO secretariat for their close partnership and professional guidance along the preparation of the Congress.

Thank you, Minister and staff members of the Korea Forest Service across the nation for their sincere cooperation in arranging the In-Congress Tours on August 26th. The rainy weather on last Thursday did not deter the participants from taking part in the tours thanks to your support. The fascinating Tours were all that matters.

In the run up to this Congress, the Trade & Exhibition was another challenge for the COC. I am very happy to see the exhibition hall occupied by 82 exhibitors that have not only captivated the attention of the participants but also bringing forest science closer to the hearts of the general public. A big thank you to all exhibitors from home and abroad.

I extend my appreciation to the Congress sponsors for their financial support in IUFRO's Special Programme for Developing Countries and the Scientist Assistance Program. A total of 174 recipients from developing countries benefitted from the SAP whereas 69 forest scientists participated in the Pre-Congress Training Workshop.

I believe we are here today with huge success of the Congress attributed to the concerted efforts of the people mentioned earlier. For those whose names I have not mentioned, but have worked behind the scenes, your

efforts are not forgotten. Yet, it is you, all my respected delegates, who have gathered under the IUFRO flag to make this Congress in Seoul the largest ever in IUFRO's history. In total, 2,734 forest scientists from 92 countries have joined us in this Congress. We had a total of 2,062 presentations including 916 oral presentations for the technical sessions and 1,146 poster presentations. My heartiest congratulations!

My dear COC colleagues! We have come a long way. You were there from the start till the end, endeavored through good times and bad times. These five years, you were amazing, outstanding in your achievements, dedicated to the call of your duties, and it will be remembered. You were the pillar of success in this Congress!

Dear fellow forest scientists, I hope you've experienced a wonderful time during the Congress in Korea, and it will soon be time to let your hair down and bid farewell.

Thank you.

Address by

**Niels KOCH**

The President Elect of IUFRO



Dear IUFRO colleagues and friends,

It is a great honour for me to address you for the first time in my new capacity as IUFRO President. I would like to thank the IUFRO Board and the International Council for the trust put in me, and for giving me the opportunity to lead in the next four years the – in my opinion – best international organization in the world – IUFRO.

When I was 25 years old, I participated in my first IUFRO

World Congress. It was held in Oslo, the capital of Norway, in 1976. That changed the rest of my life – to the better. IUFRO provided me with a global network of the best researchers in the area I studied, and whatever I have created in forest science I owe it to IUFRO that it became much better, than I could have done it without my global network. I also met with colleagues who became some of my best and everlasting friends. And I got a much better understanding and appreciation of other cultures through IUFRO. I became a “Forest Scientist Sans Frontières”/a Forest researcher without any borders, and in that way I also believe that IUFRO makes its contributions to a better, and more peaceful World. I shall work for that all forest researchers in the World get the same excellent opportunities that I got through IUFRO.

I feel humble over this big task, but I am luckily not alone. We are a good leader-team, where I am very pleased to work together with Vice-President Su See Lee from Malaysia, and Vice-President Mike Wingfield from South Africa, our new IUFRO Board, and our excellent IUFRO Secretariat.

One of the great strengths of IUFRO is that it builds so much on voluntary work. It is all of you who constitute the global IUFRO network, and the success of our network most of all depends on your active participation and contributions.

Now that we are about to enter the next Board period 2010 – 2014, I am strongly committed to working with all of you to have an active and lively network that serves your needs in the best possible way. One key element guiding our future collaboration will be the IUFRO Strategy 2010 – 2014 which has been formally adopted by the IUFRO Board and the International Council during this World Congress. It is the product of a 24 month collaborative process of evaluating past achievements and determining the future orientation of IUFRO. The strategy provides us with a new clear and ambitious vision: “As the global network for forest-related research, to serve the needs of all forest researchers and decision makers.”

For the first time, it also sets out a list of thematic areas that we hope will stimulate more collaboration in the IUFRO network. These thematic areas are:

- Forests for people;
- Climate change and forestry;
- Forest biodiversity;
- Forest bio-energy;
- Forest and water interactions; and
- Resources for the future.

These and other major challenges regarding forest and trees are highly cross-sectoral and require us to think outside the “forest box.” The need to create links with other sectors and scientific disciplines has been emphasized on many occasions in the past. Yet, it remains a largely unmet need.

At the same time, it is evident that collaboration across sectors and disciplines requires effective platforms for exchange of information, deliberation and mutual learning. The global IUFRO network is uniquely positioned to provide such a platform and to generate the scientific knowledge needed to tackle these complex challenges. IUFRO brings together scientists and experts with a diverse range of backgrounds and from all regions of the world.

As the new President of IUFRO, I am firmly committed to build on this strength of our scientific network and to expand it where needed. It became evident over the past five days at this congress that some excellent examples of interdisciplinary collaboration exist already, ranging from medical science to bio-engineering. We need more such success stories in the future.

Addressing today’s forest challenges also requires the effective participation of scientists from all regions of the world. Yet, the scientific capacity of developed and developing countries continues to be disproportionate, whereas major positive developments have taken place in the past years, especially on the Asian continent.

As the new IUFRO President, I am committed to strengthening the scientific capacity where it is needed and to support our members and officeholders as best as I can, in other words: “to serve the needs of all forest researchers” as is stated in our new vision. It is also part of IUFRO’s new vision to serve the needs of decision makers.

For the past five years, IUFRO has increased its visibility

in the international policy arena and established itself as an important source of high quality scientific information on issues of global concern. It is my firm commitment to further expand and deepen IUFRO’s work at the science-policy interface.

In this context, I would like to point out the excellent collaboration with FAO, the Food and Agriculture Organization of the United Nations and the other members of the Collaborative Partnership on Forests, especially CIFOR, the Center for International Forestry Research and ICRAF, the World Agroforestry Center.

In the coming four years IUFRO shall also work to further strengthening our very good cooperation with IFSA, the International Forestry Students’ Association. The only difference between IFSA and IUFRO is that IFSA is for younger students of forest science, while IUFRO is for little older students of forest science. We shall create a new Task Force for Forest Education, and we are pleased that IFSA will join this initiative.

IUFRO colleagues and friends, never before in the history of mankind has so many people demanded so many different products, goods and services from the forests. Therefore you need strong national forest research institutions with a stable core funding. And you need an excellent international cooperation in forest research on the global level through IUFRO.

Dear Congress participants, officeholders, member organizations and partners globally, in the regions and in more than 110 countries:

The challenges facing forest research nationally, regionally and globally are huge. Therefore the new vision of IUFRO is ambitious, and the goals of our new strategy are demanding. It is without any doubt, that these goals can only be achieved in a collective effort. Therefore, I would like to ask you to support IUFRO in the next four years in this endeavour.

I shall do my utmost to serve IUFRO in the best possible way, and to further strengthen the global network for forest science collaboration – IUFRO.

Remarks on the XXIV IUFRO World Congress by

**Anne Bartuska**

Deputy Chief of USDA Forest Service



Thank you, thank you so much. I was very pleased to have Dr. Perry Brown join me up here and actually welcome all of you to the future venue Salt Lake City, United States in 2014. On behalf of my Secretary of Agriculture Tom Vilsack and Chief Tom Tidwell, the 29 US forestry schools and IUFRO members and all of us in the IUFRO community and the US are so excited to host you in 2014.

We are a very diverse nation, and a diverse culture and we want to do a little favor for what we do expect you to see four years from now. As I said, we are diverse, diverse in the people who have come to the U.S. and who have begun their lives in that location. We are diverse in cultures, in music some of you recognize. We are also diverse in landscapes. Very special from boreal to tropical, from urban to wild-land forests, which were heard so many about urban forests in this conference. From diverse landownership, from private land owners to public

And we have many recent immigrants as well as other challenges the forests have like bark beetle issues that Canada also shares as well as forest fires. So all of those we have plenty of opportunities to talk about our science and opportunities to think about what the future forest science will be in our community.

Salt Lake City, where is it? It's well positioned to have a chance to see many things from the recreation opportunities to alpine areas. Salt Lake City is a very robust community surrounded by very beautiful mountains. There are many opportunities as well as culture within the city. So many

things rest to celebrate.

It was also a host for the Olympic Games. We have many opportunities to take advantage of sport facilities and unique setting we have with the mountains, our forests, our ranges as well as winter sports. We have plenty of summer sports for you to celebrate.

Because of that, we believe that pre- and post-Congress tours will be very special opportunities to show off many of our diverse landscapes. Nearby, we have – this is our convention center view (indicating the slide). We have already made arrangements with them. They are exploring these opportunities as well as putting together our proposals. They are very enthusiastic to welcome all of you to Salt Lake City and the surroundings.

As we get into some of the post-Congress tour as well as other opportunities, there are a lot of ways to set into Salt Lake City and celebrate the yellow stone in the national park. The grand stones are sort of down the road from Salt Lake City. It is another very special area to celebrate the arches, which are the national monument which is very spectacular setting as well as canyon lands. Very different geographically. Not many trees but a lot of other things to take advantage of and you can come and celebrate that.

We hope to work with other research stations around the country to welcome you. We are very excited to welcome all of you. But also welcome new young foresters to take advantage of that setting.

The last thing I want to announce is I'm so glad that we also have an Executive Director for the Congress Committee and many of you know Dr. Rich Gold has agreed to take on this responsibility. So I know this job will be in good hands.

Thank you very much. See you in 2014!



Closing Address by  
**Don Koo LEE**  
President of IUFRO



IUFRO Honorary members, Board members, International Council members Dr. Wan Yong CHOI, Director General of the Korea Forest Research Institute, IUFRO World Congress delegates, distinguished guests,

Ladies and gentlemen, IUFRO colleagues,

It is my privilege to bring the 23rd IUFRO World Congress to a close. Over the past week, it has been inspiring to see a prominent group of researchers, academicians, decision makers, and business leaders display such a deep and broad commitment toward the future of the forests for sustaining society and the environment.

I am encouraged by your willingness to share knowledge and experiences, and openly discuss challenges. Working together across nations to address the most pressing issues of our world today is the trademark of this IUFRO World Congress.

We started off earlier this week with a strong message from the President of the Republic of Korea that we are in the midst of the greatest drive against many global environmental issues. And with the increasing needs of addressing these, the role of forests and forestry sector are being challenged. Hence, green growth using low carbon technologies should be put into practice not only by Korea but other countries as well.

Forests can always sustain lives by providing invaluable environmental, economic and social benefits. It is therefore

fundamental that we strive to reach the Millennium Development Goals by all means.

However, reports show that deforestation is taking place worldwide at an alarming rate creating further ecological dilemmas. This implies that we need to speed up our efforts to compensate a time lost. As time does not wait, immediate actions are imperative. More than ever, it is critical now that we avoid any stagnation or reversal in the significant progress we have made in sustaining our society and environment.

After a strenuous week of convening this Congress, we have increased our knowledge and our collective commitment in ensuring the future of our forest. Yet as we all know, actions speak louder than words. So as we leave this Congress with plans to meet again four years later in Salt Lake City, let us do our share to give practical meaning to the outcomes and resolutions generated.

I call on all academicians, researchers, policy makers, students, non-governmental organizations, students and other stakeholders who attend this Congress to ensure that all experiences, knowledge and views are echoed within their groups. I also call on the governments to sustain their commitment in formulating policies rooted on societal and environmental needs.

We need more understanding and analysis of the past and present situations to improve our future. Also, as Charles Darwin has mentioned, though we cannot stop change we can aim at finding adequate responses to change or even be an active part of change. Therefore, in this “speedy era”, it is important to have not only IQ (Intelligence Quotient) but also EQ (Emotional Quotient) and NQ (Networking Quotient) to sustain our efforts and partnership.

Furthermore, I call on my colleagues in IUFRO to provide continuous support to all members in advancing the spirit of moving forestry development forward. Thank you very much for your contributions in crafting the Congress’ Resolution. I hope our strategies and actions for the coming years will be guided by this.

IUFRO family,

As a whole, the activities of the Congress, such as the tree planting ceremony, plenary, sub-plenary, and technical sessions, in-congress tour, exhibits and booths, poster presentations are indeed excellent. For serving the IUFRO for the last five years, I must say that I did my best in promoting global forest cooperation and at the same time I have enjoyed working for the IUFRO.

In closing, I would like to thank again the IUFRO Board members, International Council members, and IUFRO Headquarters for their relentless support. I would also like to thank my assistants, students and of course my family for their constant support. Sincere gratitude is given to the Korea Forest Research Institute for their commendable work in organizing this Congress. Also, special thanks are given to Dr. Jung-Hwan Park, Chair of the Congress Organizing Committee, and Dr. John Parrotta, Chair of the Congress Scientific Committee for their tremendous effort. I would also like to thank our major sponsors for their support in making the 2010 IUFRO World Congress a success. To all delegates who came from different corners of the world to be part of this significant event, I truly appreciate your support. We will surely miss each other. I hope all is well and have a safe trip home.

I now declare this 23rd IUFRO World Congress formally closed.

Thank you very much and see you again in the 2014 IUFRO World Congress in Salt Lake City. Kamsahamnida!

## Addresses in the Tree Planting Ceremony

Opening Address by  
**CHOI Wan-Yong**

Director General of Korea Forest Research Institute



Distinguished guests, Ladies and Gentlemen, Good Afternoon.

I would like to thank all of you attending this Tree Planting Ceremony, which has been a long standing IUFRO tradition. Let me extend my sincere gratitude to you on behalf of the XXIII IUFRO World Congress Organizing Committee.

Distinguished guests,

Today we are going to plant eight pine trees, Sonamu in Korean language, in this area which is specially designated as the IUFRO Garden in celebration of the Congress in Seoul. Sonamu is one of the most favored tree species among the Korean people due to its implication of the Korean spirit. One of eight trees is an offspring of Jeong-Yi-pum Sonamu, which is the most famous pine tree/ among the natural monuments for its anecdote related to royalty. According to the legend, King Sejo was on the road and a Sonamu bowed in courtesy. The king praised it and granted the tree with the high-ranking position called “Jeongipum” of the Joseon Dynasty, and it has been personified over 600 years since then.

Jeong-Yi-pum Sonamu is very old and now in danger of

withering. In order to preserve this invaluable heritage, KFRI obtained its offspring from crossing between Jeong-Yi-pum Sonamu, as a father tree and a selected mother tree in 2001. The offspring to be planted today is eight years old and 1.7 meters tall. I am so proud and happy to plant this tree in commemoration of the occasion of the XXIII IUFRO World Congress in Seoul.

Please join me in congratulating it with pleasure. Thank you.

Welcome Address by

**Don Koo LEE**

President of IUFRO



Dr. Wan-Yong Choi, Director General of Korea Forest Research Institute, Mr. Young-Kyu Kwon, Vice Mayor of Seoul Metropolitan City, IUFRO Board members, Distinguished guests and participants,

Good afternoon and welcome to the beautiful Seoul Forest. In line with IUFRO tradition, this Tree Planting Ceremony is being launched ahead of the Grand Opening Ceremony of the IUFRO World Congress. This Tree Planting Ceremony officially marks the beginning of the week-long celebration of the 23rd IUFRO World Congress in Seoul. We hope that through this simple ceremony the importance of trees in the lives of the people could be recognized. Planting of trees is not just burying tree root but putting our mind, spirit and life for sustaining society and environment – combating global warming, increasing biodiversity, providing clean air and water which have been the focus of the IUFRO Strategy.

Korea is a country of forest having about 64% forest cover. This country's forest is a product of all Koreans' utmost endeavor to recover from the devastated forest after the tragic Korean War. The First and Second 10-year Reforestation Plans which started in 1973 had reforested more than 4 million ha of degraded areas in this country within just 15 years.

Seoul Forest or Seoul Sup in Korean is a haven of greenery and exquisitely landscaped gardens and other areas of recreation. It now serves as a model forest for Public Park in the Metropolitan City of Seoul, which was made possible through the citizen's participation in 2005.

Pine tree species, such as *Pinus densiflora*, will be planted in today's ceremony. In addition to its good quality timber and straight stem, *Pinus densiflora* became an important species because of its role in the country's economy, environment and society. It is also deeply associated in the tradition, culture and history of Korea. Pine has been loved mostly by Korean people.

I hope that this activity will serve as the successful start of the convening of the 23rd IUFRO World Congress.

Thank you very much!

Congratulatory Address by

**KWON Young-Kyu**

Vice Mayor of Seoul Metropolitan Government



First of all, I'd like to extend a warm welcome to President of the IUFRO, Dr. Don Koo Lee, Vice Presidents Dr. Niels Elers Koch and Dr. John Innes, and Director General of the

KFRI, Dr. Wan-Yong Choi, for visiting our clean and attractive global city.

Also, I'd like to express my sincere appreciation to all of the participants here today for attending this meaningful tree planting ceremony. Moreover, allow me to extend my heartfelt congratulations on the opening of the 23rd IUFRO World Congress in Seoul as well.

The IUFRO, since its foundation in 1893, has played a leading role in promoting global cooperation on forest-related research through its international network of world-renowned scientists.

It is also making committed efforts to address many recent forest-related global issues such as climate change, biodiversity, and desertification.

The park in which we are gathered today is the Seoul Forest. This area used to be a beautiful sand island 50 years ago. Throughout the years, our city was confronted with pressure to develop this area. However, the Seoul Metropolitan Government made determined efforts to create a large forest park.

Today, this area has become the Seoul Forest, a park where our citizens can relax and have an enjoyable time with their family and friends. The Seoul Forest is a good example of the importance of planting trees and creating forests.

Currently, the Seoul Metropolitan Government is making consistent efforts to expand forests in our city. One of

our main policy objectives is “Low Carbon and Green Growth,” and planting trees and expanding forests are helpful ways to achieve this goal.

Last year, we opened the ‘Seoul Dream Forest,’ a 900,000 square meter park created in the northeastern part of Seoul. We also opened the ‘Westlake Park,’ a park created in the southwest part of Seoul. We will continue our efforts to plant trees and expand forests in our city.

As the role of forests become increasingly important in addressing various environmental issues, the responsibility of the IUFRO World Congress becomes all the more significant as well.

I understand that the theme of this year’s IUFRO World Congress is “Forests for the Future: Sustaining Society and the Environment.”

I sincerely hope that the 23rd IUFRO World Congress in Seoul will be a great success and a good opportunity to discuss the sustainable use of forest resources, forest products and production processes for a greener future and Asia's forests for the future. In addition, I hope that our city can receive many invaluable insights.

In closing, I wish that as “Geumgangsong” the pine tree that we are planting today grows for centuries to come, the IUFRO can continue to grow and develop as well.

Thank you.

# Keynote Addresses

## An Act of Grace from the Forest: How is Absolution Possible?

**KO Un, Poet**

Chair Professor, Dan Kook University



I skip the old Korean custom of giving a long greeting of delight.

The title of this speech was initially “Crime and Punishment,” a rather ungraceful, if not ungrateful, title for the occasion. It would also have been a conspicuous reminder of Dostoevsky. The title that emerged as an alternative was just as flawed. When one recalls the selling and buying of indulgences in the Catholic Church in late medieval times, one wonders about the respectability of such profane practice. In the end, I used the second title as the subheading for a new one. As long as the subject is the forest, our reality today is that human civilization cannot ignore my lament. The story of the forest today must not be a story but a cry.

Leaving aside the question of sincerity, people are calling the twenty-first century the “century of the environment;” there is little objection, and the reason is self-evident. The rampage perpetrated by industrialization since the late twentieth century, which came on the heels of two thousand and five hundred years of destruction of the forest, indeed revealed the reality of the human desire to privatize the earth and even the universe beyond. This rampage is unlikely to be controlled any time soon because

its intensity is unrelenting; the desire to expand the human footprint knows no bounds.

The “century of the environment” is probably a name that came in the wake of the realization, belated though it was, that the earth’s ecosystem and natural environment have lost their final powers of endurance. In fact, if we think about it, the legendary 30-year period of rapid economic growth in Korea was all about catching up with the late twentieth-century industrial powers. Words such as “advanced” or “underdeveloped” are still used to describe a country. The controversy over whether or not such “development” refers to a simple imitation of industrialization is often meaningless. What is clear is that the happiness that comes with advanced industrialization is a happiness implicated in irremediable disasters. Ever faster, and ever more convenient, highways are being built constantly, and every day more forest disappears.

Whether or not there is an archeological consensus on the matter, the forest is the home of the human race. Fear of the forest allowed humans to know where gods and goddesses resided, and allowed humans to be humans. To defend their lives in the forest, human beings had to engage in certain essential social behaviors. Because of this, humanity can never be considered innocent of undermining the sacredness of the forest that is its very origin. The sins are becoming greater today, and it is only natural that the retributions are becoming greater, too.

As part of the respect I have for you, who have come here from all over the world with the spirit of the forest in your hearts, let me assure you that I derive my courage to speak so urgently to you about the forest from that very spirit.

The earth, an insignificant planet flourishing for merely a moment in the immeasurable history of the universe, is humanity’s only habitat. The reasoning behind this claim has led poet Gary Snyder to call the earth a village in the universe, and has led me to call my mother tongue a dialect of the universe. We both recognize that humans are not

the only inhabitants of the earth. This is evident when we look at the earth's long history before the emergence of the human race.

Humans live only as part of this reality that is earthly but true. The remorseful thesis of the late twentieth century that there is "only one earth" can only mature when it rids itself of human-centrism. The many champions of the glorification of nature – those who suddenly mention that ancient Eastern philosophies refer to the unity of nature and humans; or those who claim that the Western dualism of separating nature and human is a human hubris that must be overcome – are thus themselves sources of great hubris. That is to say, nature itself does not exist in an eternal and immutable environment. Mutation, and constant creation and extinction, have probably been the actual state of affairs throughout nature's long history. Thus, one cannot permanently and immutably make a statement that nature itself is truth.

I would like us human beings to open our eyes as one of the many natural species living on earth, in a state free from prejudice, a "zero" state lacking the edification of ideology or even consciousness. Accordingly, it should not be only a few enlightened persons who make privileged statements about how unreasonable it is that, as only one of many species living on earth, humans are calling the shots for the fate of all bio-species on the planet. This should not be a matter of concern only to a few eco-elites but an everyday awareness lodged in the bone marrow of every human being on earth. Human civilization so far has devoted itself mostly to immature and reckless adventures. Agriculture, for example, started out as an attempt to civilize part of nature, but from the start it sowed the seeds of industrialization that objectifies the whole of nature. Cultivation was culturally significant because it made it possible for us to change nature. However, this act of utilizing nature went beyond overcoming nature's limitations to enabling its destruction; and from a certain point in time civilization itself became no longer sustainable. Crime and punishment are not two discrete concepts.

Now the era has arrived in which the glaciers in the Arctic Ocean no longer guarantee the safety of urban splendors in temperate climate zones. There are predictions that reckless

logging in the Amazon jungle will not stop at being a tragedy disintegrating the lives of local indigenous people but will become an unrestricted global calamity that will cut off the oxygen supply to residents around the world. The modern rules of perspective are invalid. The melting of the Himalayan ice cap, eight thousand meters above sea level, is a matter of concern for Seoul and Lisbon. The fact that the Nepalese government held a cabinet meeting at the base of one of these mountains as a protest is a warning to cabinet ministers in every government that exists on earth. How long can the suburbanites of Helsinki, the urban model for a clean environment, remain clean when the subtropical forest of Yunnan Province in China is being razed for real estate development? Today, pain in places farthest from me cannot but become pain in the very heart of my body. The world is an Indra's Net, of bad things, too.

This very building in which we are gathered, without thinking too deeply about it, is merely an imitation of a forest shelter from the Stone Age. The inner life of humanity is full of unconscious instincts that persist from our experience of living in the forest in the distant past. That we have all flown here by airplane is an imitation of birds both sedentary and migratory: at night sedentary birds would take shelter in forests and then soar out of them when the morning sun poured down, and migratory birds would embark on long journeys to return to their habitat. This place also imitates the cool breeze of the forest with air conditioning, which also protects us from the August heat wave and from direct exposure to the scorching sun. Our civilization, at best, is a civilization based on an exaggerated imitation of nature. This echoes what the ancient Greek sage said about art: that it is an imitation of nature.

Unfortunately, human civilization, either as an imitation or representation of the forest, is accelerating human illiteracy concerning nature as it pursues a goal we must no longer allow it to pursue. Furthermore, for a long time the savagery of production and development has looted the forest as if it were another exploitable "consumer good," a process justified in the name of "civilization;" the non-civilized are disparaged by this so-called civilization as "savage" or "primitive." Without a shred of guilt, no less.

Venice is a “floating city,” a jewel of human creation and a symbol of civilization. It is different from the floating villages of Cambodia on the Mekong River. The floating city that is Venice is being supported by 1.9 billion wooden piles underneath it, wood that came from across the Adriatic Sea, from Lebanon and Greece, and from the forests of the Mediterranean coast. The destruction of the forest on such a scale is at least visible; most of the lumber consumed in constructing human civilization and the forests destroyed in the process have not and cannot be counted. The river basins of the Tigris, the Euphrates, and the Nile were once green, as was the Amazon Rainforest in South America. The greenery in the Sahara and Greece disappeared, leaving only deserts and bare stone mountains.

The Yellow River basin in China was once a basin of forests. For one million years of hunting and gathering, it remained so. In the span of four thousand years of agriculture and barely a few hundred years of industrialization, most of the forests in the basin have been destroyed. Today, four billion people, out of a human population of six billion, rely on wood burning for cooking, heating, and lighting. The Yellow River basin forests from the Bronze Age or Iron Age in China have long disappeared. Perhaps Confucianism, a set of ethics venerating the memory of the past, was adopted as the state ideology as an institutional device to prevent further expansion of civilization.

The poet Du Fu from the Tang Dynasty wrote, “Though the nation perishes, the mountains and rivers remain.” Despair over the defeat of his nation in the war with northern tribes overlaps with his hope that the mountains and rivers still remain the same. If he were a poet today, he would have written a different poem. If he were to be a poet tomorrow, he would write yet different verses. About ten years ago I wrote the following: “A poet from the past/ said that though a nation perishes the mountains and rivers remain/ A poet from today/ says that though mountains and rivers perish, the nation remains/ A poet from the future/ will say/ Alas/ mountains and rivers have perished/ and the nation has perished, too/ You/ and I, too, have perished.” In fact, an alarming adage has been circulating since the last century. Some attribute the saying to Chateaubriand\* and others to

\* François-René de Chateaubriand (1768–1848) is considered the founder of Romanticism in French literature

Toynbee. It goes like this: “Forests precede civilizations, deserts follow them.”

If there are limitations to the humanities studies that came with modernity, or with the spirit of humanism that emerged during the Renaissance, it is because while they raised human dignity and improved human rights, they objectified the dignity of nature. By “nature” I mean every form of life. Also, a certain religion not only rejected other forms of religion as heresy, but also objectified all life forms other than human. In contrast with the nature-friendly perspective of ancient Asian philosophies, European thought took nature as the object of human control; given this background, it is ironic that Europe is now preserving the natural environment and Asia is suffering considerably from environmental destruction. Of course European civilization has procured necessary materials from Africa and other regions under its control. The United States, which has the longest continuous history of destroying the largest areas of forest in human history, now imports trees from a neighboring country, Canada, for Christmas decorations in order to preserve its own forests.

Taking a look at the paper manufacturing and lumber industries in Korea or Japan, one can say that these countries are participating in the overcutting of rain forests in Borneo, an action at the furthest remove from the growing movement to “go green” in their own lands. The equatorial tropical and subtropical rainforests, I understand, do not have the same regenerative power as forests in the temperate zones. After a decades-long race to industrialize, Korea is currently in the process of planting ten billion trees. Despite the severe deforestation during the colonial period and damage from the war, Korea is a model nation that has succeeded in unprecedented national forestation efforts. Currently Korea has forests that, nationwide, absorb 40 million tons of carbon dioxide every year. This is equivalent to the capacity for purifying the exhaust emissions of five million passenger cars per year. It is also comparable to the great work of the Black Forest of Germany that has been nurtured for the past 150 years. However, if industrialized countries strengthen their forest policies but do not stop importing forest lumber from other countries, ultimately they will have looked the other way in the face of a serious global problem.

Thus a Human Charter for the Forest (Forest Charter) is warranted; it should be declared to prevent any further atrocities committed against forests after the cumulative crime of forest destruction perpetrated over previous centuries by human avarice. Moreover, voluntary institutions are also urgently needed to ensure that such a declaration does not become a mere slogan. If the glorious wonders of human civilization that the human race is so proud of are the result of slaughtering most of the forests on earth, then that glory can only be accepted to some degree after restoring, by the utmost human efforts, the prehistoric sacredness of the forest. Considering that the life expectancy of the planet earth is believed to be about 13.7 billion years, the future of the human race can probably be guaranteed only if we make the forest spirit the principle value for the spirit of humanity.

Starting around two million years ago, our human ancestors began inhabiting the forest, and humanity has lived there for ninety percent of its evolutionary history. Some forest-dwelling instincts are still intact in the human unconscious. Now the last few decades in a few hundred years of industrialization are threatening to sever humanity from its own long evolutionary history. Zhuangzi said long ago that all things envelop each other. This is also an appropriate concept for stressing the importance of a universality bringing the entire earth together as we lay to peaceful rest the ghosts of dead forests, the forests we killed off in the past.

From then on, as we live this century of the environment given to us, we shall restore the sublime instinct humans have had for the forest and nature. By doing so, we shall reflect upon the mistaken epistemology of modern philosophy that claimed victory over the ontology of ancient philosophies and begin to understand nature within the framework of a new ontology of life. There may be no need to eagerly subscribe to the ecological fundamentalism whose credo is that everything modern is evil, and it would be impossible for us to return completely to life in the forest; however, we need to correct the mistake of concentrating only on the happiness that modern life—a life not always comparable to that of ancient or prehistoric times—grants us. The United Nations should also play a different role in the future: it should transcend its political role of mediating

between countries or mediating international conflicts and give greater priority to mediating between humanity and ecology and the environment at the planetary level.

In ancient India, spending a period in the forest was a mandatory rite of passage. It may be possible in modern human society to promote a return to, reliance upon, and familiarity with nature by institutionalizing forest experiences based on such a virtuous legacy. Accordingly, I make the following few suggestions:

1. All schoolchildren, at every grade level, should be required to take a class on learning the names of trees and planting trees, and meditating and doing physical and mental training in the forest. Once or twice each semester, teachers should take students to a forest and give them a lecture on mountains, forests, and nature.
2. In workplaces also some working hours should be allocated to “forest time.” In Korea, youth are referred to as “the trees of the future;” the eldest son in a family is called *gidung* (pillar) or *daedeulbo* (crossbeam); and a talented person is referred to as *injae* (“human timber”). Accordingly, it would be more than fitting to celebrate birthdays, admission to schools, finding a job, promotions, marriages, the birth of children, recovery from sickness, or even deaths and their commemoration by planting a tree. This should become a social custom.
3. Korea Forest Service and other relevant government administrations should be raised in status and advanced to the rank of top government agencies, and appointments to important government positions should require that candidates have tree – planting experience. Such a campaign for the forest at the national level should strengthen solidarity with neighboring and other countries and regions and help bring about “debordering” of forests. Along with these measures, tree planting should be designated as the first article of social ethics.
4. We should ensure that boasting of increasing the forest volume tenfold over thirty years in South Korea does not foster a sense of superiority over North Korea with its impoverished forests. We should find ways to implement tree planting in North Korea and other regions.

Also, we must not stand idly by and watch the desertification of northern China; instead we must implement the brotherhood of forests through tree-planting



campaigns there.

There should be efforts to make sure that such comprehensive approaches to forest rehabilitation campaigns based on regional solidarity eventually become globalized. A prize should be established and given to persons deserving recognition for such world-wide forest campaign efforts; such an award should promote a global forest rehabilitation campaign. In addition to these measures, a festival that explores forest culture as the basic instinct of the human race would create an opportunity for brainstorming about various forest-related ideas and wisdom; such a festival would have great importance.

The forest is the future for all of us. By declaring that “the forest is the future,” I am not suggesting that we return to the age of the prehistoric forest. But I am certain that human life will no longer be sustainable if we continue to exclude the forest from our daily lives and continue as a civilization that knocks down forests. The northern European god Odin is the god of the forest. This god is not as humane or cultured as the Greek gods. He is rough and simple. However, his genuineness is more heroic than the heroism of the gods in any other mythology. According to the story of Dangun, the Korean creation myth, Dangun established the first city under Sindansu (神檀樹), a tree that is the mediator between heaven and earth. Sinsi (神市, “the City of Spirits”) was thus established there five thousand years ago. We see here that the divine forest called Sindansu is where a nation was founded. Such stories reflect forest history. If we could achieve a “century of the forest” through critical reflection on our civilization, that would be a human creative achievement that is truly sacred.

My thesis is that the crime can no longer remain buried, punishment can no longer be evaded, and absolution is too shameless; this thesis is a subset of the larger thesis that the grace of the forest still endows us with blessings to the extent that we serve the forest. Nature is still the main body of all life forces and leads to the healing of all pollution and sacrilege. Humanity today must return at least part of itself to nature. The nations of tomorrow will succeed as nations only if they are nations of the forest. I hope that today’s meeting is the meeting of forests.

The servant of the forest is indeed a saint.

Thank you.

## Forests, Climate Change, and Communities: Making Progress up the Learning Curve

**Frances Seymour**

Director General, Center for International Forestry Research (CIFOR)



### Introduction

Thank you Niles for that kind introduction. It is certainly an honor and a pleasure to share a stage with such a distinguished moderator, and humbling to follow the poetry of yesterday’s speaker.

Let me take the opportunity to commend the IUFRO Organizing Committee and our Korean hosts for the extraordinary preparations that have gone into this Congress. It was a full year ago that I was asked to confirm my availability for this address, and it is not my custom to plan so far ahead!

It’s also an honor to be asked to speak to this audience of colleagues from forestry research organizations. But it’s also a challenge. Most of my speeches and presentations are designed to bring research results to policy audiences. Today I’ll reverse my usual role and share some thoughts about what we as a community of researchers and research organizations need to do to service the urgent needs of forest policy – more like a sermon than a technical presentation.

Accordingly, you'll note that I'm doing without powerpoint. My father, a Baptist minister, preached a sermon every Sunday for more than 40 years without powerpoint, so I guess I can do it at least once.

### The Topic

My topic today is "Forests, Climate Change, and Communities: Making Progress up the Learning Curve".

My main argument is that we stand at a critical juncture in the history of forestry research and practice. One body of knowledge – on the roles of communities in forest management—is reaching maturity, just as another – on the roles of forests in climate change – is taking off.

Picture us – the community of forestry researchers – as a hardy band of mountaineers gradually gaining altitude, step by step, ice axes in hand, ascending the learning curve of knowledge about forests and communities, seeking enlightenment at the top. Just as we thought we were gaining glimpses of the sunlit summit through the clouds, the storm of climate change has blown in, and avalanches of new research challenges have pushed us back down the slope.

As we brush ourselves off, we need to figure out where we are, and we need to survey the mountain's – I mean the learning curve's – newly-configured topography, and prepare to make a second ascent.

The road map to my talk is as follows:

First, I will irritate many of you by presenting a dramatic oversimplification of research on forests and communities over the last few decades;

Second, I will irritate others of you by presenting a dramatic oversimplification of the relevant research imperatives associated with forests and climate change; and

Third, I will seek to stimulate discussion over the course of the week by advancing some propositions about where we as a research community need to go from here.

### Forests and communities

Most people would date interest in the role of communities

in forest management back to the 1970s. When I was doing research for a paper in graduate school, I remember reading about the experience here in Korea, where Village Forestry Associations planted more than a million hectares as part of a national reforestation effort in the 1970s. And some of you will recall that "Forests for People" was the theme of the Eighth World Forestry Congress in Jakarta in 1978. It has proven a hardy perennial: the theme of next year's International Year of the Forest is....Celebrating Forests for People.

Interest in community forestry came from the convergence of several different motivations among governments, donor agencies, and public interest groups. These included:

- A desire to address high rates of deforestation and degradation
- A search for livelihood strategies that would work for the rural poor
- And a commitment to more democratic and equitable ways of managing societies' natural resources.

Which of these are ends, and which are means continue to be different for different stakeholders.

By the mid-1980s, countries around the world had initiated a sizable population of community forestry projects and programs, along with associated research efforts. So as a research community, we've been climbing this learning curve for about a quarter century. And we've certainly learned a lot.

We've learned just how important forests are as a source of livelihoods for rural communities:

Local people in East Kalimantan identify more than 2000 different forest species with more than 3600 different uses, 119 of which have no known substitute.

Rural populations in the Congo Basin derive as much as 80 percent of the protein and fat in their diets from bushmeat. Data from the Poverty and Environment Project, collected from more than 10,000 households in forest-adjacent villages, shows that on average, 25 percent of household income in these sites is derived from forest products.

We've also learned about the many constraints faced by communities in managing forests as a source of

sustainable income:

There are constraints on the productivity of the resource base – when non – timber forest products are harvested on commercial scale in the absence of regulation, they tend to be depleted.

There are constraints on the ability of communities to assert rights to forest land and resources, and even when those rights are recognized by the state, defending them can prove fatal.

There are constraints on market access. Many forest communities are remote and lack capital, and mechanisms such as certification can be unintentionally biased against small – scale enterprises.

Communities are not homogenous, and interests of some groups such as women may be different from those of others, and not necessarily represented in decision-making. We've also learned about trade-offs:

As Bill Jackson of IUCN reminded us in the CPF sub-plenary yesterday, the large literature on integrated conservation and development projects has chipped away at the notion that biodiversity conservation and income objectives can be simultaneously maximized at the same place at the same time.

But perhaps one of the most important things we've learned is the critical role of institutions in mediating the relationship between communities and forests. It turns out that it matters who makes and enforces the rules. And I hope Elinor Ostrom will not mind my appropriating her recent Nobel Prize in Economics as a key indicator of progress up the learning curve! She can speak for herself on Friday.

But approaching the summit of knowledge on forests and communities has not always taken the most direct and efficient path. Over the last quarter century, we've probably spent the equivalent of at least a few years just debating terminology. Is it community forestry, participatory forestry, social forestry, community-based natural resource management, joint forest management, or co-management?

More than 20 years ago, I remember spending a couple of hours debating with Indonesian colleagues whether it was PERhutanan Sosial or KEhutanan Sosial in Bahasa Indonesia, and confess that I still don't understand the difference.

Another thing that has slowed us down is what I'll call the tyranny of the case study. Earlier this year, CIFOR, CIRAD, and IRD convened a seminar in Montpellier to take stock of research on smallholder and community forestry. Those who started with the presumption that communities are inherently more virtuous stewards of forests had case studies to prove their point; those who believe that communities are rational economic actors who will destroy forests if their incentives are aligned to do so had case studies to prove their point as well. Participants in the seminar identified two needs that I strongly endorse, and that I'll return to later in the context of climate change.

The first need identified at the Montpellier seminar is for more rigorous, global comparative studies to overcome the tyranny of the case study. An enormous amount of effort has gone into attempts to retroactively tease out robust conclusions from heterogeneous studies that were not designed for that purpose. Our stakeholders want to know the answer to the following question: What is the relationship between community management of forests, livelihood outcomes, and forest condition outcomes? And it would be great to be able to have an answer that goes beyond, "It depends."

We've got some good examples out there, including the International Forests Resources and Institutions (or IFRI) Program and its associated data set from 14 countries and 250 sites. Researchers associated with that program have already generated a number of papers suggesting answers to the question, telling us what, specifically, outcomes related to livelihoods and forest condition depend on. But I will boldly assert that there have been too few examples of research designed this way, and our progress up the learning curve would have been accelerated if there had been more of them, sooner.

The second need identified by participants in the Montpellier seminar is for more research that takes into

account the political economy of forest management in the countries where we work. Broader political and economic forces condition the outcomes of individual community forestry initiatives more than we originally thought. Of course a lot of this research has already been done:

It was clear from the earliest days of “community forestry” that states were quick to surrender management roles to communities where forests were already degraded, and devolve to them responsibility for planting trees. But governments tended to be much more reluctant to give up control over land with valuable standing forests.

We understand now that concentration of forest-related decision-making in capital cities leads to a systematic “tilting of the playing field” in favor of state and corporate elites and at the expense of rural forest users, not least because of the economic rents available to be captured.

And we understand that one of the biggest challenges faced by community forestry is that widely heralded processes of decentralization and devolution of forest management remain largely incomplete.

But I’ll boldly assert that overall, research attention to these factors has been too little and too late, and our progress up the learning curve might have been faster had we focused on them sooner.

### Forests and climate change

Let me now turn my attention to our new research challenge, forests, communities and climate change.

The two-way linkage between forests and climate change has been recognized for a long time in the research community, but the policy audience for such research is really brand new; I would date it from the publication of the Stern review in late 2006. So compared to research on forests and communities, which is now of a certain age (along with those of us who were its early practitioners), research on forests, communities, and climate change is still in its infancy.

But the big questions have a familiar ring:

Under what conditions, if any, can policies and programs

for Reducing Emissions from Deforestation and forest Degradation or REDD, be effective in terms of reducing emissions, while also being equitable, not least with respect to local communities?

Under what conditions, if any, can policies and programs to promote forest-related adaptation strategies be effective in promoting local and societal resilience, while also being equitable, not least with respect to local communities?

And alas, we do not have the luxury of 25 years to answer these questions. This week’s heat wave in Seoul is only one of many palpable hints that we should be listening to what the climate data is trying to tell us about the urgency of addressing these problems.

But as we regroup for another summit ascent on the learning curve, let’s pause to consider the challenges before us. The first is that while in theory the UNFCCC COP13 in Bali produced a “road map,” we don’t really have one. REDD is a moving target. We went from RED with one D to the second D to the “plus” in a few short years.

And it’s not just that researchers can’t agree on terminology, but negotiators are having trouble as well. Even as the theory of REDD – in terms of being an international payment for performance scheme – is not yet well elaborated or understood beyond a small inner circle, the practice of REDD is getting underway in dozens of countries and demonstration projects. So our maps are constantly being outdated, and practice is getting out ahead of theory. If that weren’t bad enough, the research community is under enormous pressure to have something useful to say about all this in impossibly short time frames, driven by negotiation schedules and funding cycles.

As a result, I fear that we will be tempted to fall back under the tyranny of the case study, and selectively marshal evidence that supports our pre-existing views. The prospect of REDD seems to be functioning as something of a Rorschach test:

Some look at it and see the possibility for all kinds of unintended negative consequences for communities, while others look at it and see possible benefits for communities,

including enhanced rural income and improved forest governance.

Especially as researchers, we need to steer between the Scylla of being overly cynical about the possibility of positive change, and the Charybdis of irrational exuberance about what REDD can possibly achieve. Both positive and negative outcomes are of course possible, and we need to focus our research effort on what conditions and approaches are more likely to produce one or the other.

Happily, early REDD research shows signs of accelerated progress up the learning curve, piggy-backing on insights achieved through the decades of attention to communities and forests:

Some colleagues have already demonstrated that the lack of clear forest tenure rights will be a constraint on payment-based REDD schemes.

Others have used the IFRI data set to illuminate how institutional arrangements affect forest condition, and associated carbon density.

Still others have enumerated the potential barriers to participation of the poor in REDD.

And a small army of researchers in conservation organizations have analyzed how to minimize trade-offs and enhance synergies between REDD and biodiversity conservation objectives.

But this “first generation” of literature on REDD is of necessity speculative in nature, given that a global REDD mechanism does not yet exist. Indeed a negotiated agreement appears to be receding on the horizon just now, and REDD policies and projects are just getting started. So the concept itself is being invented simultaneously in the context both of formal negotiations and of associated pilot efforts at national and local levels.

Nevertheless, a theme that appears across all of the early REDD literature is that REDD creates a giant optimization problem, characterized by trade-offs among multiple objectives. For all of these reasons, new research on REDD

needs to focus on empirical analysis of what actually happens as REDD policies and projects move from ideas to implementation on the ground.

Before turning to implications for the way forward, let me say just a brief word on adaptation. If anything, the challenges of designing research on communities and forest adaptation efforts are even greater than those for REDD. The theory and practice of ecosystem-based adaptation strategies are even less well developed. As in other sectors, we’ve had trouble distinguishing conceptually between forest-related actions undertaken for adaptation, and those that should be undertaken anyway in the interest of sustainable development. Agreement on financing, and how to achieve equity in funding allocations, is elusive. So research on the impacts of adaptation interventions is at this point even more speculative than on those of REDD.

### Implications for the way forward

So, where do we go from here? We’ve learned a lot from our decades of experience trying to understand the relationships between communities and forests. But the addition of climate change to the mix means we have a new learning curve to ascend, and it can’t be a leisurely climb.

Just a few years ago, the authors of a review of research on community forestry concluded [and I quote]:

“Community forestry in theory holds promise as a viable approach to forest conservation and forest community development. Gaps remain, however, between community forestry in theory and in practice”.

Imagine the review article 25 years from now....“Gaps remain between REDD in theory and in practice.” The authors also remarked [and I quote] “It may be too soon to evaluate fairly the social and economic outcomes of community forestry...[as] bringing about change in forest governance is a slow process.”

Okay, I admit that if you look up the word “impatient” in the dictionary, you’ll find a little picture of me beside the definition. But surely you’ll agree that with climate change already upon us, we’ve got to accelerate progress up that learning curve!

How do we do that? I have three suggestions:

First, we need to whatever we can to communicate what those of us in Forestry World know about forests and communities to colleagues in Climate World.

Here, I pick up where Eduardo Rojas-Briales of the FAO left off yesterday in his point stressing the importance of communications. We forget that what's already conventional wisdom to us are fresh insights to policy analysts and negotiators who came to climate debates from the energy sector or from financial institutions or from other non-forestry backgrounds. It won't be very interesting to conduct research on how mistakes of the past have been repeated, so it's in our own self-interest to ensure that they're not!

We've got get out there in climate-related policy arenas and practitioner communities, and push the research results that we already have in hand. We have to be relentless – and if possible, charming rather than boring – in stressing:

- The significance of forests as contributors to rural livelihoods,
- The importance of secure rights and tenure and of local institutions,
- of the risks of excluding women and other marginalized groups,
- and the role of the broader political economy that can support, or thwart, real community management of forest resources.

A great opportunity to share such knowledge will be at a happy confluence of geography and timing when the UNFCCC COP 16 meets in Cancun this December. The venue will make it possible to showcase experience with community forestry in Mexico and Central America to a captive audience of people who otherwise live in Climate World. You are all hereby invited to participate in the fourth annual Forest Day on December 5th, where CIFOR and other members of the Collaborative Partnership on Forests are putting together a full slate of events to do just that.

Second, we need to build our forest and climate research agenda on the foundation of what we've learned from research on forests and communities.

There are a lot of things we've learned on our progress up the learning curve on forests and communities that can speed our progress on forests and climate change. In the new context of climate change, we need to understand the institutions and governance mechanisms needed to underpin solutions that yield effective, efficient, and equitable outcomes:

How can REDD and adaptation schemes find the optimal position between centralized and decentralized approaches?

How do local property rights and other institutional variables influence their effectiveness?

What are the actual impacts of forest adaptation and mitigation actions on the rights and livelihoods of forest communities?

How can synergies be maximized and trade-offs reduced?

As we stand on the mountainside and look back down, we can take heart from the progress already made on these questions before they were specifically posed in the context of climate change.

But climate mitigation and adaptation actions also bring new questions:

Will REDD's innovation of payment-for-performance shape, or be shaped by, the pre-existing political economies of forests?

What institutions are most supportive of community-level adaptation initiatives?

Does it matter that climate change mitigation and adaptation are now becoming the overriding objectives of involving communities in forest management?

So there's a lot of climbing to do, but there's scope for accelerating our learning.

One proposal that may be hopeless is to spend less time debating definitions. Let's define what REDD is for the purposes of research and get on with it.



A second is to overthrow the tyranny of the case study. Let's not wait for case study material to accumulate and superimpose research design later. Instead, we can proactively work with policy-makers and project designers to build in from the beginning features of REDD and adaptation interventions that will facilitate impact assessment later on.

Let's not repeat the experience of Integrated Conservation and Development projects. Those who have tried to draw lessons from that experience have struggled not only with very different approaches in different places. In many cases, project approaches did not appear to be the result of well-thought-out design that made plausible linkages between interventions and expected outcomes.

Compared to our colleagues in the health sector, for example, those of us in Forestry World have done very few rigorous Before/After/Control/Intervention impact assessments. It's time to up our game by engaging practitioners, and helping them design interventions that can plausibly be evaluated later. And we need to ensure that livelihood and governance variables are measured along with carbon emissions. When it comes to forests and climate change, we will need to have robust answers to the question, "What works?" in more like five years rather than 25.

Another way to accelerate progress will be to focus much more attention, earlier, on the broader political economy of forests and climate change. Our research needs to illuminate not only the underlying causes of deforestation and degradation, but also the interests that they serve, and the institutions through which those interests operate, both formal and informal. Such analysis can help inform proponents of REDD and adaptation measures of the potential for unintended negative consequences. A lesson from the community forestry literature is that even well-intended interventions can serve to entrench vested interests and social injustice.

In many ways it should be easier to include an explicit political economy dimension to our research this time around. Many topics such as corruption and indigenous peoples' rights that were difficult to talk about in some

countries even ten years ago are now on the table for discussion.

To give you just one example, earlier this year, CIFOR published an analysis of the history of the Reforestation Fund in Indonesia, and the lessons learned from that experience for financial management in future REDD schemes. In the past, such an analysis might have caused serious friction in our host country relationship, dealing as it did with the sensitive issue of corruption. But this time, our colleagues at the Ministry of Forestry welcomed the report, and even contributed to a joint press release in which they embraced recommendations for increased transparency in the management of forest finances to avoid repeating mistakes of the past.

Third, we need to be brave enough to commit to "big science" on forests, communities, and climate change. What do I mean by "big science"?

Last year, the CGIAR's Science Council commissioned a review of the state of social sciences in the CG System, and suffice it to say that not all of the findings were flattering. Let me read you the paragraph that resonated with me: 11

"CGIAR social science today is plagued by too much "small think". The CGIAR has a hard-earned reputation for micro-level studies in rural areas of developing countries and it must continue excellence in that area. But it also needs to aggregate better to larger-scale, more strategic issues concerning agricultural development at regional and global scale, both for strategic research prioritization and for policy analysis and advocacy. The present void at larger scale impedes the emergence of a culture of evidence-based agricultural and rural policymaking, in both public and private spheres, which hampers the pursuit of CGIAR goals."

The review team went on to recommend that the CGIAR invest in a network of "sentinel sites" at which quantitative and qualitative research would take place over the long haul. Through the use of standardized methods for data collection and analysis, the sites would generate a metadata set sufficient to answer some of the big questions about the drivers of changes in landuse, livelihoods, and governance.

I'm quite sympathetic to both the review team's diagnosis and its prescription. In fact, as mentioned by Tony Simons of ICRAF in yesterday's CPF sub-plenary session, we and other CGIAR Centres are trying to address them in a new research program being developed under the CGIAR Consortium.

It seems to me that one of the lessons from research on the relationships between communities and forests has been that it has consistently proven "worth it" for our organizations to invest in ambitious global comparative studies. I think of the one undertaken earlier this decade on livelihoods and non-timber forest products, the soon-to-be ready Poverty and Environment Network data set, and the IFRI Program mentioned earlier.

But let's be clear how hard this is:

Since no single organization has the capacity to do big science alone, it requires subsuming our narrow individual and institutional agendas to a collective effort. Next month, a group of policy research and advocacy organizations are getting together with help from the World Bank and FAO. Their objective is to try to agree on approaches and indicators for measuring governance conditions relevant to REDD. I commend such attempts to pool resources rather than to compete with each other.

Big science also requires long hard negotiations to standardize data collection and analysis methods and rules for managing and sharing data. Many of you might have seen the article in the New York Times earlier this month, describing how agreement on common methods and data-sharing among Alzheimers researchers had dramatically accelerated progress in understanding that disease.

And if we were ever going to do big science, now is the time, as climate change has generated political attention and associated funding opportunities as never before. At least based on CIFOR's recent experience, being ambitious can create a positive feedback loop:

Having big plans attracts research partners, who want to be part of something significant.

Having big plans also attracts interest from target audiences

among both policymakers and practitioners – especially in an era of payment for performance, we find that there's never been so much interest in our research results.

And not least, an ambitious research agenda attracts funding. What with billions on the table for REDD alone, it doesn't take much of a percentage for research to add up to real money.

If we build it, they will come.

Let me close by dispensing with the mountain climbing image and leave you with another one. As I was preparing this "sermon", I struggled to think of a metaphor for the multiple tasks I'm proposing that we as forestry researchers take on – communicating to Climate World, engaging with project designers, launching big science. And doing them all at the same time.

And last night at the welcoming reception, it came to me:

All we have to do is dance, play the drum, and keep the streamers off the back of our hats doing circles in the air. All at the same time.

Can't wait to see us try.

Thank you.



# Integrating Scales and Sectors to Foster Sustainable Livelihoods, Landscapes and Forests

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(Tropical Agricultural Research and Higher Education Center)



XXIII IUFRO WORLD CONGRESS

### Key messages

- Reductionist approaches are widespread (not only in forestry)
  - Advantage: reduced transaction costs
  - Disadvantage: isolated interventions would not properly address complex R&D issues
- System approaches are necessary for addressing complexity and achieving sustainable development
- But, they come at a price: require interdisciplinarity, multi-stakeholder platforms/mechanisms, intense coordination and negotiation ➡ increased transaction costs
- To achieve sustainable livelihoods, landscapes and forests, there is no alternative to system approaches

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### Global context and challenges: approaches needed

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### Integrating scales and sectors to foster sustainable livelihoods, landscapes and forests

Campos, J.J.; Alpizar, F.; Beer, J.; Carrel, L.; De Camino, R.; Faustino, J.; Einegas, B.; Galloway, G.; Gutierrez, I.; Herrera, B.; Ibrahim, M.; Kammerbauer, J.; Madrigal, R.; Somarriba, E. and Stolan, D.

CATIE, Costa Rica

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### Sustainable rural solutions to address global challenges and local needs

- Challenges are complex, dynamic and interconnected: require integrated and collaborative solutions from local to global scales
- Rural areas are strategic for the provision of ecosystem services and human well-being
- Social and ecological resilience is key for local and global sustainable development
- 70% of poor live in rural areas (dependent on agriculture, forests and natural resources)
- Sound development of agriculture and natural resources is key for sustainable rural development
- Local system approaches aligned with adequate policies and institutions at national/global scales offer good potential to address global challenges

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### Outline

- Global context and challenges: approaches needed
- Sustainable livelihoods, landscapes and forests through system approaches
  - Agroforestry systems
  - Integrated development of value chains
  - Payment for ecosystem services
  - Restoration of degraded pasturelands
  - Locally led biological corridors
  - Collective action through local governance and comanagement
- Need for innovation in forestry education
- Concluding remarks

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### Paradigms Implemented in Latin America

- Purpose: to enhance social and ecological resilience via human, social, cultural and political capitals:
  - Integration of multiple scales:
    - » Genes, stand/production system, landscape, ecoregion
    - » Farm, household, municipal, national, global
  - Reconcile production and conservation in managed and wild ecosystems, maintaining or enhancing their capacity to provide services: SFM, AFS, silvopastoral and sustainable agriculture
  - Economic and market-based instruments to foster ecosystem services
  - Policy incidence to create enabling environment for implementation of sustainable and competitive practices

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### System approaches

Livelihood assets/capitals, vulnerability context and overall institutional environment. Goal: sustainable livelihoods

All actors from production to final consumption. Goal: increased social responsibility and equity

Environmental x socio-economic interrelationships in biophysical and political-administrative spaces. Goal: sustainable territories

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### Tree density and growth can be managed to enhance carbon storage without adversely affecting yields

System	Mean storage (tC/ha)	Mean fixation rate (tC/ha/yr)
Follies (natural regeneration)	90	8.5
Trees on crop plantations		
Cocoa low C level	30	0.8
Cocoa medium C level	40	1.3
Cocoa high C level	30	1.3
Banana	20	1.8
Plantain	8	0.8
Greenlands	16	0.8
Riparian forests	70	0.1

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### Sustainable livelihoods, landscapes and forests through system approaches

1. Agroforestry systems
2. Restoring degraded pasturelands
3. Inclusive value chains
4. Payment for ecosystem services
5. Locally led biological corridors
6. Collective action through local governance and comanagement

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### Helping rural people benefit from increased demand for environmental and social responsibility in value chains

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### Improving livelihoods of poor rural families through agroforestry systems

- AFS cultivated by millions of farmers with important livelihoods and conservation roles
- Trees are usually planted for shade/shelter for crops/animals, goods for household use/sale; conservation is an externality
- Technological and institutional solutions to enhance income generation and environmental conservation:
  - From genetic improvement to interventions at farm to national scales
  - Improving farmers' organizations and business management
- Research and education essential for environmentally sustainable and financially attractive production systems

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### Forest and timber product value chains: the problem

- Low prices paid to local communities for tropical timber in existing supply chains
- NTFPs have relatively little commercial value (though important for subsistence)
- PES still in early development stages
- Gender inequity in capturing benefits
- Low technical, managerial and financial capacities limit feasibility of SME
- Political, legal and institutional frameworks do not enable forest enterprise development

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### Timber trees in cocoa farms as safety nets

Timber harvested from cocoa farms when *Monilia*-depressed cocoa yields and prices were very low. *Cordia alliodora*, Costa Rica, 1980s

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### Forest and timber product value chains: proposed solution

- Link local communities with socially responsible companies through win-win relationships
- Lower transaction costs through innovative PES mechanisms for smallholders and forest-dependent communities
- Capacity building and improved access to funding for higher local value
- Promote involvement of women in all stages of forest management
- Effectiveness and articulation between technical, business development and financial services
- Create enabling political frameworks through increased dialogue between public and private sectors and civil society

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Forest and timber product value chains: solution from R&D

- Promoting ecosystem approaches to SFM and forest conservation
- Catalytic function to forge partnerships between local communities and socially responsible companies
- Technical assistance for identifying promising NTFPs
- Analytical capacity and policy incidence for PES mechanisms
- Capacity building and linkages with alternative financial service providers
- Methodologies and tools for promoting gender equity and articulation between technical, business development and financial services
- Facilitating role to foster policy dialogue among stakeholders



Restoring degraded pasturalands to enhance the provision of ecosystem services

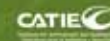


Implementing effective payment for ecosystem services with local community participation

- Need to innovate (traditional command and control policies have failed)
- PES schemes should be regarded as a complement (rather than a substitute for other instruments)
- PES must be guided by a demand responsive approach
- Community participation from the very beginning (design and implementation) is key for long-term sustainability



Incremental Ecosystem Services Index points per ha in farms with and without payment schemes (PES)

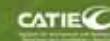
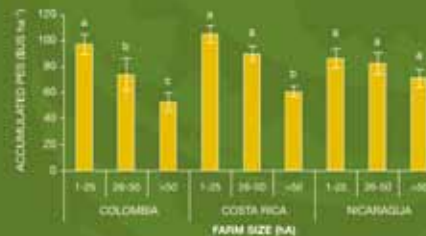


Implementing effective payment for ecosystem services with local community participation

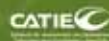
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- PES must be guided by a demand responsive approach
- Community participation from the very beginning (design and implementation) is key for long-term sustainability



Accumulated payment per ha according to farm size

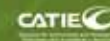


- Scientific backstopping to secure effectiveness
- Effective payments:
  - Clear stepwise actions (e.g. incremental soil conservation practices)
  - Pay for improvements, but compensate for past actions
- Even if main concern is effectiveness with regards to environmental goals, evaluation of impact on equity and poverty might be important in developing countries



Effects of PES on milk productivity and household gross income for different poverty groups farmers in Nicaragua, 2007

Indicator	Group	2003	2007	Change (%)
Milk productivity (kg/ha/year)	Non-poor	395.3x103.3x	434.6x108.8x	8.7
	Poor	429.6x171.2x	791.1x102.1x	26.7
	Extremely poor	425.3x187.3x	803.5x176.4x	37.3
Household gross income/capita/year (USD)	Non-poor	3050.6x221.0x	4987.6x386.2x	63.3
	Poor	1182.6x170.8x	2422.5x1029.3x	108.3
	Extremely poor	854.2x210.7x	1403.4x246.0x	74.3



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### Making landscapes work for biodiversity through locally led biological corridors

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### Collective action through effective local governance and co-management processes

- Collective action require effective governance and institutional arrangements involving local groups in decision-making and implementation
- Based on participatory action research in watershed management, model forests and biological corridors experiences, an adaptive comanagement model is been constructed
- Common feature is that it focuses on achieving shared goals building organizational processes/structures at different spatial scales

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### From conservation biological theory to implementation on the ground: locally led biological corridors in Mesoamerica

Biological corridors and conservation

Conservation tool that connect PAs to mitigate the effects of habitat fragmentation in human-dominated landscapes

- Increase habitat area
- Reduce vulnerability
- Response to climate change

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### Elements of an adaptive comanagement approach

- Platforms at municipality and inter-municipality or other territorial structure (watershed, BC, model forest)
- Construction of a shared vision, territorial agenda and roles of different actors
- Ecosystem services as the vehicle to link providers and beneficiaries and institutional arrangements to guarantee their delivery
- Jointly managed environmental funds/financial mechanisms to implement the priority actions in critical areas
- Generating relationships among stakeholders and local organizations including state authorities at different scales

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### Regional and landscape context

- 10% of Mesoamerica under PAs
- Recognition of need to work outside PAs to achieve conservation objectives
  - 56% of PAs are small - <10,000 ha
  - mean area 18,400 ha
  - only 18 areas >100,000 ha
- Mesoamerican Biological Corridor a regional system to connect PAs

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Proposed as a general adaptive co-management model to address local governance in natural resource poor resources (adapted from Kaimowitz et al. 2012)

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### Locally led biological corridors

- BC in Costa Rica are based on grassroots initiatives
- Nationwide coordinated by National Biological Corridors Program
- Each BC management is coordinated by local councils, bringing together governmental, NGOs, municipalities and local organizations from tourism and agricultural sectors
- 47 BC covering 1.8 million ha (35 % of the country's land area, potentially connecting 160 PAs)
- 24 BC have a functioning local council
- A two-way relationship:

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### A virtuous circle for sustainable development

More sustainable livelihoods, landscapes and forests

Based on Emery and Flork 2006

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## Innovation in forestry education



1. Social and ecological resilience are interdependent and are key for sustainable livelihoods, landscapes and forests
2. Reductionist approaches in forest R&D have limited our contribution to sustainable development
3. System approaches are necessary for addressing complexity and achieving sustainable development
4. But, they come at a price: require interdisciplinarity, multi-stakeholder platforms/mechanisms, intense coordination and negotiation => increased transaction costs

- Forestry profession undergoing profound transformation
- Indicates need for "new" professionals
  - broader, multidisciplinary understanding of forestry sector and its interdependence with other sectors
  - integration across scales, disciplines and sectors calls for skill sets not fostered in many forestry educational programs
- Challenge: to prepare professionals with strong disciplinary skills capable of working and/or facilitating cross-disciplinary collaboration

5. Implementing these approaches also requires:
  - collaborative and participatory research
  - committed and capable leadership
  - long-term commitment from policy-makers, donors, development practitioners and researchers
6. To achieve sustainable livelihoods, landscapes and forests, there is no alternative to system approaches

### Attributes of a forestry education program to prepare "new" professionals

- Link students to ongoing development initiatives through thesis research and case studies (reflects clear response to societal needs and problems)
- Foster key cross-cutting skills
  - Understanding of complex systems
  - Communication with a broad range of stakeholders
  - Participation in group and interdisciplinary exercises
  - Leadership and project management
- Strong exposure to international agenda



감사합니다  
Thank you

## Concluding remarks



## The Potential Role of Communities in Sustaining Forest Resources

**Elinor Ostrom**

Professor, Indiana University



### Why is it So Difficult?



- Many biophysical and human causes of forest or other resource conditions (extent, composition, diversity, & change)
- Complex, intertwined processes
- Measuring working institutions more difficult than paper institutions
- No discipline has a monopoly on relevant knowledge
- Need to build inter-disciplinary TEAMS rather than PROJECTS

### What I Hope to Cover Today

- An quick overview of the approach taken by the International Forestry and Institutions (IFRI) research program
  - With findings from field studies
  - Complemented by analysis using over-time, remotely sensed images

## The Potential Role of Communities in Sustaining Forest Resources

**Elinor Ostrom**

Workshop in Political Theory & Policy Analysis  
Indiana University  
Center for the Study of Institutional Diversity  
Arizona State University

### Challenges for Studying Effects of Diverse Forms of Governance



No consistent scientific language  
No consistent, social and ecological data over space & time  
The International Forestry Resources and Institutions (IFRI) research program tries to meet these challenges

### Challenging to Address This Question

- Very few empirical studies examine forests in multiple settings, governed by diverse institutional arrangements, overtime
- Need to understand social-ecological interactions

### What is IFRI?

- A long-term, interdisciplinary, international research network established in 1992 & now coordinated by Arun Agrawal at University of Michigan
- A growing international database of cross-national, time-series data on forests, the people using forest resources, and institutions for managing resources



## IFRI's Central Questions

- How do alternative systems of governance and tenure affect social and ecological conditions?
- What conditions favor collective action for the provision of resource management?
- How do people respond to changing ecological and social conditions?
- How do diverse actors – user groups, local associations, governments, interact & jointly affect forest conditions

## Lets Review Some Findings from Field Studies

- In all of our field studies, we have explored the impact of institutional arrangement on ecological conditions.

## Countries with IFRI Research Sites



## Is Formal Designation as a Protected Forest Associated with Higher Vegetation Density?

- Tough question to answer across ecological zones since forest mensuration data is not meaningful across zones
- The forester or biologist who leads an IFRI team in each site is asked to evaluate forest density **AFTER** completing a random sample of forest plots in a forest
- Asked to evaluate vegetation density of this forest compared to other forests in this region

## Within Sites, Data Collected On

- Trees and shrubs (dbh, height, species)
- Forest extent and change over time
- Signs of illegal activities
- Formal governance arrangement
- Organization of forest users
- Activities of forest users (planting, harvesting, monitoring activities by others)

Comparison of Forester's Field Evaluation of Vegetation Densities in 76 Parks and 87 Non-parks

	Vegetation density				
	Very sparse	Some-what sparse	About average	Some what Abundant	Very Abundant
Officially designated parks (N = 76)	13%	21%	36%	26%	4%
Non-parks (N = 87)	6%	22%	43%	26%	3%

Kolmogorov-Smirnov Z score = 0.472,  $p = .979$ . **No significant difference.**  
Source: Adapted from Hayes and Ostrom, 2005, p. 607.

## IFRI's Strategy for Obtaining Comparable Data Over Time



- Common data-collection methods
- Extensive joint training
- Multi-country teams whenever possible
- Repeat studies
- Extensive reporting to communities and relevant officials

## Findings from Repeat Visits to Same Forests

- Now can use forest measures (Basal area, Diameter Breast Height, Number of Stems, etc)
- 42 IFRI forests visited for 2<sup>nd</sup> time by 2006
  - India – 5 forests
  - Kenya – 3 forests
  - Nepal – 10 forests
  - Uganda – 18 forests
  - USA – 6 forests
- Not a random sample of forests but based on a random sample of plots inside each forest and first study of this type

**Impact of Formally Designated Tenure and Forest Monitoring on Changes in Forest Condition: Assessment using ANOVA**

Independent Variables	Change in DBH	Change in Basal Area	Change in Stem Count
Ownership <sup>a</sup>	F = 0.89	F = 2.52	F = 1.00
Involvement of User Groups in Monitoring Rules <sup>b</sup>	F = 0.28	<b>F = 10.55**</b>	<b>F = 4.66*</b>

<sup>a</sup> Government, community, private  
<sup>b</sup> At least one user group is involved in regular monitoring of rules of forest use  
 \*Significant at .05      \*\* Significant at .01  
 •Ostrom & Nagendra, 2006, *PNAS*

**If Formal Designation Does Not Make a Difference – What Does?**

- **Monitoring by users themselves consistently found to be important**
  - Cross-sectional study of 178 Forest User Groups (Gibson, Williams & Ostrom, 2005)
  - Group interviews asked users about regularity of their own monitoring the rule conformance of other users
- **Strong statistical relationship between regular monitoring and forest density: controlling for formal organization, dependence on forests, & social capital**

**Tenure Type and User Monitoring**

- **Given importance assigned to type of formal management in current policy debates it is important to**
  - Assess relative strength of ownership type on changes in DBH, Basal Area & Stem Count
  - Assess strength of regular involvement of user groups in monitoring rules on same forest measures

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**New Study by Chhatre and Agrawal (PNAS, 2008)**

- Draw on 152 IFRI cases from 9 countries with data collected at two time periods
- Studied change in forest conditions over last five years based on interviews with users and forest specialists on tem
- Find that forests with higher probability of regeneration tend to be small to medium in size, with low commercial value, high levels of local enforcement, & strong collective action to improve quality of forests

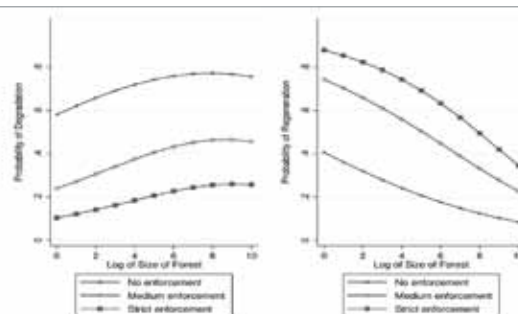


Fig. 3. Relationship between the size of the forest commons and the predicted probabilities of degradation and regeneration. Each curve represents change in probability of degradation (Left) and regeneration (Right) with change in the log of forest size for a given level of local enforcement, holding all other variables in the model at their median values. Source: Chhatre and Agrawal (2008: 13288).

**Measuring Illegal Uses on the Ground in Uganda Forests**

- The Ugandan team measured illegal uses (grazing, firewood, pit-sawing, farming)
- In randomly selected forest plots in five forests
  - Private forest: evidence of illegal uses in less than 20% of plots
  - Government forest where indigenous community monitored forest use: evidence of illegal uses in less than 15% of plots
  - Three government forests, relying on own officials, had evidence of illegal uses in 66% of forest plots
- Source: Banana and Gomba-Ssembajwe (2000)

**Number of sample plots with evidence of illegal consumptive disturbance (N = 30 per forest) (1 private forest and 4 government forests in Uganda)**

Name of Forest	Charcoal	Pit-sawing	Commercial Firewood	Grazing	Farm	No Illegal Consumptive Disturbance
Namungo (P)	1	2	2	0	0	25
Lwamtunda (G)	3	8	10	0	0	9
Mbale (G)	10	1	5	22	4	4
Echuya' (G)	0	0	3	1	0	26
Bukaleba (G)	0	0	12	2	5	11

P = privately owned forest; G = government-owned forest  
 \*Additional monitoring provided by the Abayanda community who live in forest  
 Source: Banana, Abwot, & William Gomba-Ssembajwe. 2000. "Successful Forest Management: The Importance of Security of Tenure and Rule Enforcement in Ugandan Forests." In *People and Forests: Communities, Institutions, and Governance*, ed. Clark Gibson, Margaret McKean, & Elinor Ostrom, 87-98. Cambridge, MA: MIT Press.



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## Now Lets Review a Few Findings from the Air

### Field Results Puzzle: Why Do Users Monitor Others?

- **Voluntary effort to produce a "public good" of rule conformance**
- **Game theoretic predictions – no one will voluntarily contribute to provide a public good**
- **Earlier findings from field studies of farmer irrigation systems led to a series of laboratory experiments at IU**

### Part 2: Lets Now Review Some Findings from the Air

- Focus on effect of institutional arrangements over time
- First to Maya Biosphere Reserve in Guatemala

### Aggregate Results of CPR Experiments

Experimental Designs using 25 Token Endowments	Average Net Yield as % of Maximum*	Average Net Yield Minus Fees & Fines	Defection Rate (%)
(A) Baseline Experiment: No Communication (3)	21	-	-
(B) One-shot Communication (3)	55	-	25
(C) Repeated Communication (6)	73	-	13
(D) Imposed Sanctioning Institution (8)	37	9	-
(E) One-shot Communication & Imposed Sanctioning Institution (3)	85	67	1
(F1) One-shot Communication Endogenous Choice of Sanctioning Institution - None Chosen (2)	56	-	42
(F2) One-shot Communication Endogenous Choice of Sanctioning Institution - Sanction Chosen (4)	93	90	4

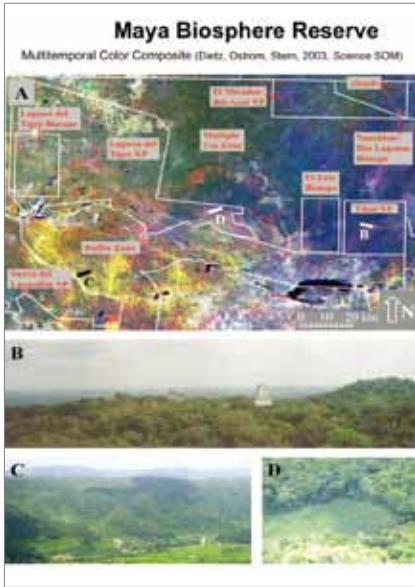
\*Nash equilibrium for all designs is a net yield of 39% of maximum (Adapted from: Ostrom, Walker, and Gardner, 1992: p. 414)

### After Observing Users Sanctioning Each Other in the Field

- Designed experiment where subjects could pay a fee to fine another subject
- Game-theoretical prediction – no one will voluntarily sanction others
  - Since they would be paying a cost to produce a benefit shared by everyone?
- Prediction *not* supported in our lab or other labs!
- Subjects do sanction one another – too much!
- NEW article in *Science* (Janssen, et al., March 30, 2010) stresses the importance of communication to enable users to sanction one another in a way that leads to higher returns

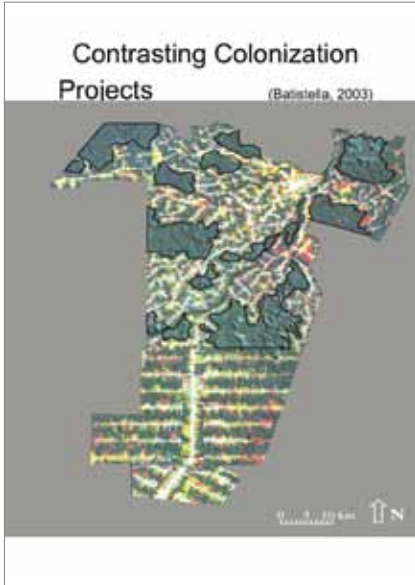
### Maya Biosphere Reserve

- Four National Parks (NPs) in close proximity
- Tikal NP has large budget to pay for extensive fences and guards
- El Mirador protected by nature
- Laguna del Tigre severely overharvested
- Sierra del Lacandón severely overharvested
- Same formal institution:
  - Two are sustainable, but different causal process
  - Two are vulnerable to massive illegal harvesting



**To Rondônia, Brazil**

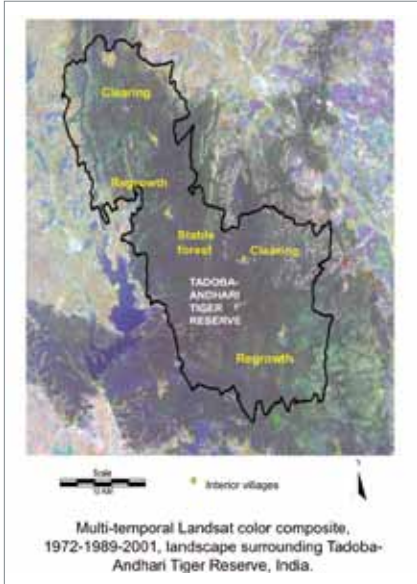
- Two colonization projects assigned private property & obligation to preserve half of the forested land
- Established side by side in 1980s
- Southern project laid out "typical" rectangular plots. Farmers obliged to preserve 50% of land assigned to them
- Northern project
  - Topographically sensitive layout
  - Established separate forest reserves
  - Private owners had full control of smaller plots
  - Rubber tappers monitor the forest reserves (not government officials)
- Northern project is more sustainable than most Brazilian colonization projects that assign farmers responsibility to preserve 50% of forest on their own land



**Now to India**

- Todoba-Andhari Tiger Reserve
- An under-funded national wildlife reserve with multiple outcomes
- Stable forests in the core
- Park guards are not able to control harvesting along sections of the borders
- Complementary field studies find
  - Consistent harvesting of non-timber forest products
  - Existence of considerable conflict between guards and local people

• Nagendra & Ostrom, PNAS, 2006





Cattle entering the TATR boundary (marked by the yellow topped pillar in the background) on their daily foraging beat.



Bicycles and trucks confiscated from timber poachers stealing large logs

### What Are Our Major Conclusions

- It is feasible to combine disciplines AND research methods to study communities in complex SESs
- It is, however, challenging. We address many of the challenges in a new book:
  - (Poteete, Janssen, Ostrom, 2010. *Working Together: Collective Action, the Commons, and Multiple Methods in Practice*)
- Findings from one method help explain the findings from other methods

### No Panaceas

- Most important policy-relevant finding -- reinforced in multiple studies
- Presumption that we have top down solutions to complex problems of sustaining SESs over time is **WRONG**
- Need nested polycentric institutions that fit particular attributes of a resource as well as of the users
- Users need to be included as real participants in the crafting of governance to make these systems work well over time

### Questions?

## The Disastrous Trajectory of the Rain Forests: Research Imperatives

**Peter Shaw Ashton**

Emeritus Professor, Harvard University



- There are many reasons for the disappearance of the lowland forests. The reason most often given is that they cannot compare, either in productivity or financial return, with commodity crops.
- This reason relies on the low cost of energy in this last century, especially for fertilizer and pesticide manufacture. That may be about to change

- Overwhelmingly in tropical Asia, the indigenous forest estate is owned by governments on behalf of the people. Their policies should therefore be in the long-term economic interest. We all know that that responsibility has been almost universally betrayed (as it was in temperate developing economies in the past)
- What are the costs, and can anything be done?

My experience is in Asia, where rain forests are concentrated in the Far East, and with the taxonomy and ecology of the dipterocarps.

Today, I am presenting a point of view, based on preliminary research, but crying out for testing, by more. That, I suggest, will require a change in research priorities.

- Forest conversion has proceeded further in Asia than in tropical Africa or the Americas.
- It therefore shows what is to come, if the same policies continue.

- 1.  
The colonization of the Asian tropics by western powers brought with it a serious attempt at sustainable management, but focussed more or less exclusively for timber, and industry rather than communities and the products and services that are important to them.  
Success in sustainably managing for timber outturn was not easy to achieve in hyperdiverse forest, which had traditionally been valued for a multitude of products as well as services.

- Indigenous forests are increasingly confined to land too steep for safe conversion to commodity and other crops, where their importance in minimising erosion remains appreciated. In many regions now, the lowland mixed dipterocarp forest, the rain forest most productive of timber throughout the world, is reduced to patches often less than 10,000 ha.
- Does that matter?

- Methods were successfully developed for lowland forests, but not for the hill forests. There, silvicultural ecology is profoundly different, with lower stocking and slower growth.
- In the present era, insufficient research and almost no silvicultural implementation, vital for the continuation of timber production in the forest types that now remain, has been carried out.

Comparison of an unlogged, and a logged area after 12 years, of hill dipterocarp *Shorea curtisii* (seraya) dominated forest: Trees >10 cm dbh

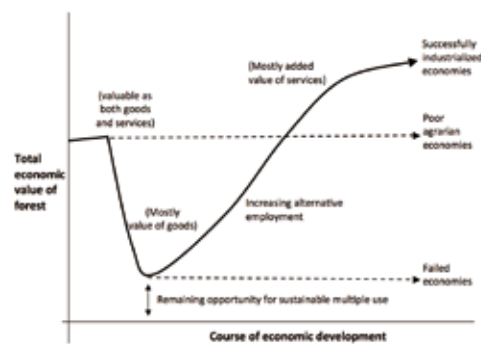
Bukit Lagong, Selangor <sup>1</sup>			Jengal Forest Reserve, Terengganu <sup>2</sup>		
Tree family	No./ha.	%	Tree family	No./ha.	%
Dipterocarpaceae	57	12	Myrtaceae	156	28
Flacourtiaceae	47	10	Lauraceae	31	6
Euphorbiaceae	36	7	Anacardiaceae(Swintonio)	28	5
Rhizophoraceae	26	5	Ebenaceae	28	5
Tiliaceae	22	4.5	Myristicaceae	27	5
Sterculiaceae	21	4	Burseraceae	24	4
Lauraceae	19	4	Sapotaceae	23	4
Anacardiaceae	19	4	Lecythidaceae	21	4
Myristicaceae	18	3.5	Clusiaceae(Colophyllum)	16	3
Burseraceae	16	3	Dipterocarpaceae(Vatica)	12	2
Other families	213	44		173	32
Total density	494			368	

1. After Manokaran & Swaine 1994  
2. After Wan Mohd Shukri & al. 2005

### 3.

Temperate forests are under major threat from introduced pests and pathogens, which can only increase as global travel increases. These easily spread in species-poor forests with windy climates.

Species-rich tropical forests, in climates lacking prevailing winds appear less susceptible



Changes of the economic value of forests during the course of national development.

- Rain forest biodiversity likely actually owes its existence, and persistence, to the balance of power between the complex chemical defenses of the primary producers – individual tree species – and the equally complex de-activating chemicals of their insect and pathogen enemies.
- There is increasing evidence (Gilbert) that this balance is mediated by the dispersal distance of pathogen spores: Nearby conspecific trees are most liable to infection, leaving space into which other species, resistant to the pathogens of that tree species (but susceptible to others) will invade, thereby building species diversity.

## 2. Why worry about the loss of the lowland forests?

Palm oil plantations yield much higher net, pre-tax, profits than forest timber production ever could, US\$ 528-790/ hectare in Peninsular Malaysia (Nantha & Tisdell 2009), as opposed to less than \$100/ha for a sustainably managed indigenous hardwood timber production forest, in tropical Asia or the temperate north .

In summary, tree species diversity increases forest stability and decreases risk, especially in the management of long-lived crops. These properties are likely to increase in intensity and the relative economic value of indigenous tropical forest

- The added hydrological service value of indigenous forest over oil palm is small, on evidence from comparing erosion rates.
- Oil palm (in spite of claims to the contrary) is a net contributor to atmospheric carbon – when the carbon released from fertiliser and herbicide manufacture, and transportation – are included. Lowland forest may be a net sink of carbon, and is one of the greatest carbon banks per unit area.
- But who is going to pay, say \$350/ha/annum for it?

- This chemical cornucopia has long been recognised as a source of traditional medicinals, and in the search for new pharmaceuticals. In the future, it will be more important – arguably irreplaceable – as a source of chemicals for tree crop protection.
- Rain forests are also therefore libraries of gene sequences vital for genetic modification aimed at protection against pests and diseases.

**Conclusion**

- Conservation of rain forest biodiversity will vital for the future of tree agriculture (as well as plantation forestry) in the tropics.
- The cost of protecting monocultures is going to rise: How much preparation is going into that?

**What is required?**

- How big a biodiversity reserve is big enough? Cases: Bukit Timah, CTF5 50 ha plots
- How should priority locations be chosen?
  - Lowland forests are the richest.
  - Rain forests on different geology support different biodiversity
- Are some forest types more endangered than others?
  - Yes: Those on the most fertile soils, and those in the most accessible habitats

It is still feasible to conserve most of the necessary tree species diversity in Asian tropical forests

**4.**

- Can biodiversity reserves be carefully managed for sustained timber production?
- Many vertebrates, including large terrestrial mammals and some birds, actually increase in successional forest, while maturing stands can support the more demanding subcanopy and other species. Strangling figs and other keystone species can be protected



- How big a biodiversity reserve is big enough? Cases: Bukit Timah, CTF5 50 ha plots
- How should priority locations be chosen?
  - Lowland forests are the richest.
  - Rain forests on different geology support different biodiversity
- Are some forest types more endangered than others?
  - Yes: Those on the most fertile soils, and those in the most accessible habitats

Taxation	Baka N.P.	Leak N.P.	Selat Siring, Sarawak
Tree characteristics	dominant species consist of large diameter trees; shading under soil	tree canopy is high; grass understorey; scattered many trees; soil, ridge road	forest understorey; large fallen branches; clay under soil
Profile diagram			
Number of species	121	121	121
No. pioneer spp. (m)	13(11)	20(9)	13(14)
secondary spp. (m)	23(4)	40(12)	30(7)
shade tolerant spp. (m)	111(10)	147(14)	40(14)
dipterocarp spp. (m)	9(10)	14(12)	17(14)

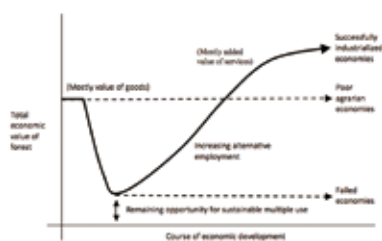
Tree species richness in Mixed Dipterocarp forest at three sites in Sarawak. Species richness expressed as the number of trees >10cm dbh/1000 individuals. Dipterocarps cross-hatched.

**Conclusion: Sadly, no**

The full plant species complement is sustained by a canopy gap frequency and average size which is steady and predictable at the time scale of a tree life cycle. Successive harvesting, by changing the gap regime, will cause increasing local and wider extinctions. Besides, the track record for long term careful management is poor.

- Plant species can only be augmented by exotic weeds, not by native species which take centuries to spread owing to poor dispersal and demanding establishment requirements.
- Vertebrates, in contrast, can almost all be conserved in the hill production forest estate.

- How much compensation would be necessary to secure 30, 5000 ha strict virgin forest biodiversity reserves?
- Probably  $\$30 \times 5000 \times \frac{1}{2} \text{million} = \$75,000,000$  *per annum*, for Asia alone.
- Who will be willing to pay?
- (Bear in mind that Malaysia netted \$14 billion, Indonesia 5.5 billion from oil palm in 2007 (Wall Str. Jour., Asia Jan 18 2008)



Changes of the economic value of forests during the course of national development.

# Scientific Programs

The following summaries represent those received from the respective Session Organizers and / or Session Moderators

## Summaries of Sub-plenary Sessions

### SP-01 Reading the pulse of forest science – IUFRO Priorities 2010–2014

**Organizer :** Peter Mayer, *IUFRO Headquarters, Austria*

**Moderator :** Niels Elers Koch (*Denmark*)

On the occasion of the XXIII IUFRO World Congress, the IUFRO Board adopted the new IUFRO Strategy 2010–2014 “Reading the pulse of forest science for the benefit of forests and people”. This new strategy includes six thematic areas which will guide the science collaboration in IUFRO in the coming years. The six themes are: Forests for people, Climate change, Biodiversity, Bio-energy, Water, and Resources for the Future. During the session, the Coordinators of the IUFRO Divisions presented their perspectives on these six themes and their implementation.

The Coordinator of Division 1 “Silviculture”, Björn Hånell, emphasized the need to encourage and support the participation of more young scientists from developing countries in the IUFRO network. For Division 2 “Physiology and Genetics”, Bailian Li, pointed out the growing importance of intensive genetically modified and cloned plantation forestry for meeting increasing wood demand. Hans Heinemann stated that the focus of Division 3 “Forest Operations Engineering and Management” will be to expand interdisciplinary work, compile best practices, and analyze eco-profiles for eco-efficiency. Margarida Tomé highlighted research priorities for Division 4 “Forest

Assessment, Modelling and Management”, including the development of improved multi-source inventories and more complex forest modelling.

For Division 5 “Forest Products”, Dave Cown stressed that IUFRO must improve public outreach by ensuring public access to knowledge and popularizing forests through the media. Perry Brown, Coordinator of Division 6 “Social, Aspects of Forests and Forestry” underlined the importance of improved forest education. For Division 7 “Forest Health”, Mike Wingfield expressed concern about the increased frequency and intensity of forest pests and diseases and discussed the role of genetic modification for growing trees in the future. Last, but not least, Jean-Michel Carnus described the priorities of Division 8 “Forest Environment”, including feedback between land cover, disturbances and climate change, and effects of land-use change on watershed hydrology.

In the general discussion, the important role of IUFRO as a provider of independent, high-quality scientific information was emphasized. It was stated that IUFRO should further strengthen and expand its activities at the science-policy interface in order to inform decision making. Furthermore, the importance of reaching out more strongly to scientists working in related scientific disciplines, and of promoting young talent was pointed out.

### SP-02 Can forestry and forest sector activities contribute to mitigating climate change?

**Organizer :** Werner A. Kurz, *Natural Resources Canada, Canada*

**Moderator :** Werner A. Kurz (*Canada*)

This subplenary session included six presentations addressing the potential role of the forest sector to mitigate climate change. Dr. Frank Werner (Switzerland) presented a national-scale analysis of alternative forest management



scenarios and assessed the implications on greenhouse gas balances of carbon storage in forests, harvested wood products and from product substitution. Dr. Reid Miner (USA) summarised the results of a study conducted for FAO on the global carbon footprint of the forest products industry. It emphasised the opportunities to provide carbon, fibre and energy through sustainable forest management. Dr. Ben de Jong (Mexico) reported on research to reduce emissions from deforestation and degradation in Mexico and highlighted that to assess benefits from avoided deforestation a transparent, robust, and verifiable reference scenario and monitoring system are required. Dr. Richard Harper (Australia) spoke about afforestation programs in Australia, emphasising the opportunities to plant trees where agricultural crops are not viable. Dr. William Keeton (USA) summarised results of a global analysis on carbon storage in temperate old-growth forests and the importance of forest conservation. Dr. Werner Kurz (Canada) provided a synthesis on the potential of the forest sector to mitigate climate change and highlighted the need for comprehensive analyses that consider all carbon costs and benefits and their timelines. These analyses should include carbon storage in forest ecosystems, harvested wood products, and the substitution benefits achieved by using wood instead of more emissions-intensive products such as concrete, steel and plastics.

### SP-03 Conservation and sustainable use of forest genetic resources

**Organizers :** **Yongqi Zheng**, *Chinese Academy of Forestry, China*; **Heok-Choh Sim**, *APAFRI-Forest Research Institute Malaysia, Malaysia*; **Kyu-Suk Kang**, *Korea Forest Research Institute, Republic of Korea*

**Moderator :** **Heok-Choh Sim** (*Malaysia*)

This session discussed the latest advances and emerging issues in forest genetic resources (FGR). Topics included: 1) current status of FGR and critical challenges; 2) new technologies for improved FGR conservation and utilization; 3) strategies for FGR conservation and breeding; 4) sharing of FGR information and genetic materials; 5) FGR management in response to climate change; 6)

national, regional and international FGR programs and cooperation in FGR conservation and utilization; 7) principles, standards and procedures of prioritizing FGR conservation. The session involved six oral presentations: *Identification of critical problems in forest genetic resources conservation and sustainable use: a global assessment* (Zohra Bennadji, Uruguay); *Understanding, tracking, and documenting genetic resources of forest trees to improve management practices* (Judy Loo, Italy); *Seed orchards in a warm future* (Dag Lindgren, Sweden); *Sustainable utilization and conservation of forest genetic resources through tree breeding and seed orchard management in Korea* (Kyu-Suk Kang, Republic of Korea); *Managing diversity of forest genetic resources for adaptation to uncertain environmental changes* (Yongqi Zheng, China); and *Forest conservation banks and their management as a genetic resource* (Lilia del Carmen Mendizábal Hernández, Mexico).

\* The summary for this session was written by the COC.

### SP-04 Forest biodiversity – the key to healthy and resilient forests

**Organizers :** **Tim Christophersen**, *Convention on Biological Diversity, Canada*; **Ian Thompson**, *Natural Resources Canada, Canada* **Robert Nasi**, *CIFOR, Indonesia*

**Moderator :** **Ian Thompson** (*Canada*)

The session commenced with a short film celebrating the 2010 International Year of Biodiversity. Speaker presentations highlighted the importance of forest biodiversity for human well-being, by providing essential ecosystem goods and services. In particular the linkages between forest biodiversity and ecosystem resistance and resilience were explored, as well as the function of resilience as a key factor for adaptation, and risk mitigation strategy for forest investments. The session involved a panel discussion and four oral presentations: *The relationship between biodiversity and forest ecosystem resilience and relationship to climate change* (Ian Thompson, Canada); *Defaunation, resilience, and tropical forests* (Robert Nasi, Indonesia); *Arbuscular mycorrhizal diversity and pioneer plant species growth responses* (Michiko Nakajima,

Japan); and *The effect invasive of Acacia spp. to native species on resilience boundary in Pleihari Tanah Laut natural conservation area, South Kalimantan* (Yusuf Bahtimi, Indonesia).

\* The summary for this session was written by the COC.

### SP-05 Biodiversity, climate change and forestry - Perspectives of the Collaborative Partnership on Forests

**Organizer :** Peter Mayer, *IUFRO Headquarters, Austria*

**Moderator :** Peter Mayer (*Austria*)

The session of the Collaborative Partnership on Forests (CPF) provided an opportunity for session participants to learn about the activities of the CPF on climate change, biodiversity and the role of forest landscape restoration. The CPF is a voluntary arrangement among 14 international organizations and secretariats with substantial programmes on forests. Its mission is to promote the management, conservation and sustainable development of all types of forest and strengthen long term political commitment to this end.

The Chair of the CPF, Eduardo Rojas-Briales (Assistant Director-General, Food and Agriculture Organization of the United Nations) provided an introduction to the goals and achievements of the CPF. A keynote presentation addressing the theme of the session was provided by William Jackson (IUCN, Switzerland). In his presentation, Mr. Jackson recommended “nature-based solutions,” such as REDD, with an emphasis on all forest values.

Ahmed Djoghlaif (Executive Secretary, Convention on Biological Diversity, Canada), described the importance of the upcoming tenth meeting of the Conference of the Parties of the Convention on Biological Diversity, taking place in October 2010 in Nagoya, Japan, to adopt a new ten year Strategic Plan to guide international and national efforts to save biodiversity, as well as a new international protocol on access to and sharing of the benefits from the use of the genetic resources.

Emmanuel Ze Meka (Executive Director, International Tropical Timber Organization, Japan) described reducing

deforestation and forest degradation and enhancing environmental services in tropical forests (REDD). He identified several REDD research priorities, including: multi-purpose forest inventories; enhancement of environmental services in production forests; and capacity building and demonstration.

Tony Simons (Deputy Director General, World Agroforestry Centre, Kenya), emphasized the importance of good communication. Saying that although the word “forestry” is now contained in 40 million Internet addresses, some much less inspiring searches bring up many times this number.

Jan McAlpine (Director, United Nations Forum on Forests Secretariat; United States of America), stressed the need to recognize that large populations depend on forests. On cross-sectoral connections, McAlpine described the UNFF 360 degree perspective on forests as an initiative valuing and creating institutional partnerships beyond the forestry sector, including with several UN conventions and the ITTO.

### SP-06 New frontiers of forest economics

**Organizers :** Shashi Kant, *Faculty of Forestry, University of Toronto, Canada*; Martin Hostettler, *Tensor Consulting AG, Zurich, Switzerland*; Hans R. Heinemann, *Swiss Federal Institute of Technology, Zurich, Switzerland*

**Moderator :** Shashi Kant (*Canada*)

The existing paradigm of forest economics is focused on the economics of timber, and is based on neo-classical economics. In this century, many other forest ecosystem services are becoming as important as timber, and therefore, forest economics has to be economics of forest ecosystems and not timber economics only. Similar, many streams of economics have challenged the basic foundations of neo-classical economics, such as behavioral economics is trying to move economics from assumptions-based to actual human-behavior-based analysis. Ecological economics, institutional economics, public choice, and social choice theory provide better frameworks for the economic analysis of forests. In light of these emerging themes, the moderator and four invited speakers provided

an overview of new frontiers of forest economics.

Prof. Shashi Kant, in his introduction, discussed five key features of the new forest economics. First, forests are not stands of timber but are ecosystems that include timber. In these ecosystems, different components are not disaggregated but connected and connections are more important than the components. Second, markets are not economics and economics is not markets but economics includes markets. Third, people are neither rational fools nor social morons, they are rational but their rationality is much beyond the rationality of selfish man. Fourth, a clear understanding of values of forest ecosystems is critical but values do not mean dollars only, and assigning dollar values to ecosystems is not critical, but the most critical is changing the value systems of decision makers and others. Finally, the market is only one of many institutions, including governments and communities, for efficient allocation of scarce resources.

In the first paper, Prof. Elinor Ostrom (Nobel Laureate, Indiana University, USA) presented a comparative analysis of the assessment of forest change obtained from forest plots, foresters' evaluation, and users' evaluation. The three assessments were largely congruent, but each method provided different information. The diversity of information raises many questions related to economic efficiency and transaction costs, and demands the use of different approaches in economic modeling of forest management. In the second paper, Prof. David Laband (Auburn University, USA) highlighted the importance of public choice theory to understand the structure, functioning, and performance of forestry sector, and discussed the cases of democracy, rent seeking, and public versus private interests in science. The paper clearly demonstrated the need to use public choice theory to understand forest related international, national, and provincial decisions. In the third paper, Prof. Urs Fischbacher (University of Konstanz, Germany) discussed the potential role of experiments in forest economics, such as to empirically investigate people's contributions to public goods, impact of institutions on cooperation, and the structure of non-selfish preferences, and presented some experiments that demonstrate interactions between institutions and non-selfish preferences. In the fourth paper, Karl-Gustaf Löfgren (Umeå University, Sweden)

discussed Lucas critique that is to predict the effects of a change in economic policy on the basis of relationships observed in existing empirical data, and presented a method to overcome that critique in economic models of forestry sector.

Papers from this session and from some other sessions will be published as the 4th volume of the book series on Sustainability, Economics, and Natural Resources (SENR), edited by Shashi Kant, and published by Springer.

### SP-07 Agroforestry: the way forward

**Organizers :** **P.K. Nair**, *University of Florida, USA*;

**Tony Simons**, *World Agroforestry Centre-ICRAF, Kenya*

**Moderators :** **P.K. Nair (USA) & Tony Simons (Kenya)**

Agroforestry is now recognized as a science-based approach to sustainable land-use. Today there is a global consensus that integration of trees on farms, ranches, and in other production landscapes, helps promote social, economic, cultural, ecological, and environmental benefits. Adoption of agroforestry innovations is envisioned to enrich and greatly enhance the achievement of the various global agendas and conventions. Thus, we are now better positioned than ever before to benefit from agroforestry. This session provided a global forum for sharing and debating on the advances in agroforestry research and how they can lead to realistic action plans for capturing the promise of agroforestry. The major topics included: the role of agroforestry in climate change mitigation and adaptation, enhancing environmental services from agricultural landscapes, and the bioenergy – food security nexus. Three oral presentations were involved in the session: *Agroforestry: the way forward* (Ramachandran Nair, USA); *Carbon sequestration potential of agroforestry in the African Sahel* (Eike Luedeling, Kenya); and *A global prognosis for tropical timber supply from farm land* (Fergus Sinclair, Kenya). A panel discussion and a general discussion were also included.

\* The summary for this session was written by the COC.

## SP-08 Keep Asia Green: rehabilitating and restoring forest ecosystems in Asia

**Organizers :** **Don Koo Lee**, *Seoul National University, Korea*; **Michael Kleine**, *IUFRO Headquarters, Austria*

**Moderator :** **Michael Kleine** (*Austria*)

Over a period of four years from 2006 to 2009, IUFRO implemented a scientific synthesis project on the rehabilitation and restoration of forests in the Asia Pacific region (“Keep Asia Green”). Under the leadership of Professor Don Koo Lee, IUFRO President, forest scientists from the various regions in Asia (i.e. Southeast Asia, Northeast Asia, South Asia, and West and Central Asia) shared their expertise on the history, current status, successes and failures of forest rehabilitation efforts in their countries. A total of four books were produced under this project and published as IUFRO World Series No 20. The publications are intended as a source of sound information for investors, policy-makers, educators and the general public who are interested in the rehabilitation and restoration of forest ecosystems in the region. In his opening remarks Professor Lee highlighted that this session aims at summarising the results of the Keep Asia Green Initiative by means of six presentations representing the Asian sub-regions.

Zhiqiang Zhang, Beijing Forestry University, presented on afforestation and ecological restoration in the Northeast Asia region. He emphasised that despite dramatic forest land use changes in the past resulting in deforestation and forest land degradation, extensive forest-related land rehabilitation activities undertaken in the region have achieved a significant level of restoration of forest cover in some countries. However, much remains to be done, in order to further enhance afforestation activities, particularly for the benefits of rural communities in developing countries.

Victor Teplyakov, Seoul National University, discussed forestry issues in the Russian Federation’s Far East region. Systematic forest management over more than hundred years has shaped the landscape including significant efforts on reforestation.

Lucrecio Rebugio, University of the Philippines, provided an overview on successful cases and lessons learned on rehabilitating degraded forest lands in Southeast Asia. In spite of efforts, the forest area continues to decline in most of the regions’ countries.

Promode Kant, Institute of Green Economy, India, reported on rehabilitating forests and extending tree cover in South Asia. He emphasised the importance of an appropriate regulatory framework with forest laws and policies; community-based forest management; and establishment of rehabilitation projects.

Almazbek Orozumbekov, Kyrgyz Agriculture University, Kyrgyzstan, informed about forest and land rehabilitation in Central Asia. Because of significant political changes in the recent past, the countries in the region are currently applying new forest policies characterized by decentralization, increasing community involvement, enhancement of environmental services, expansion of conservation areas and forest rehabilitation.

Khosro Sagheb-Talebi, Research Institute of Forests and Rangelands, Iran presented on forest landscape restoration activities in West Asia. Established systems include site-specific planning; application of participatory approaches; watershed rehabilitation in mountainous regions; combating desertification through flood-water spreading and rain-water harvesting.

## SP-09 Enhancement of service life of wood in an environmentally conscious global society

**Organizers :** **Andrew wong**, *University Malaysia Sarawak, Malaysia*; **D. Pascal Kamdem**, *Michigan State University, USA*; **Joran Jermer**, *SP Technical Research Institute, Sweden*.

**Moderators :** **Andrew wong** (*Malaysia*), **D. Pascal Kamdem** (*USA*) & **Joran Jermer** (*Sweden*)

Of several abstracts reviewed by the organizers, 6 were selected for oral for SP-9 over 2 hours to 60 attendees held

collaboratively with The International Research Group on Wood Protection (IRG, [www.irg-wp.com](http://www.irg-wp.com)). Seven abstracts were accepted as posters (Technical session E-09) being regarded of similar importance as oral presentations concerning key information dissemination on wood protection and wood durability research of the above theme. The session opened with an introduction about the IRG and its cooperation with IUFRO [by Joran Jermer (Sweden)]. Three papers [Gerard Deroubaix (France), Koichi Yamamoto (Japan) and Andrew Wong (Malaysia)] discussed issues such as the role of (and specifications for) wood preservation/protection and naturally durable species in sustainable construction to meet increasing demand for long life harvested wood products as carbon sinks acknowledged by IPCC, which indirectly promotes sustainable wood production/forestry while mitigating the release of carbon dioxide synonymous with climate change. The intrinsic role wood protection plays in mitigating climate change is emphasized.

Another paper discussed wood recycling strategies and how to improve the re-use or recycling of wood products as a carbon storage, energy-independent resource for increased sustainability and green market competitiveness for wood construction products [Henrik Heräjärvi (Finland)]. Considerable potential of fungal bioremediation of CCA-treated wood from demolition wood waste is also emphasized [Gyu-Hyeok Kim (Korea)] for alleviating environmental concerns on the way treated wood at the end of its service life is disposed. With nanotechnology making inroads into wood protection, the biomechanical properties of a new generation nanosized copper-based biocide in wood composite protection whereby appreciable glue-bond strength of flakeboard is achieved compared to that treated with conventional copper preservatives, is discussed (Pascal Kamdem, USA). Feedback on session presentations was positive with appreciation on presentations on the chemical aspect of wood protection.

Summary of poster topics are: EMC issues of wood (A. Enayati et al, Iran), Effects of CCA contamination of soil by leaching from wood (S.M. Kang et al, Korea), nano-copper effects on flakeboard properties (W. Gao et al, China), Ecological river technology using brushwood mattresses (D.H. Lee et al, Korea), Forst by-products for

environmentally friendly construction materials (D.H. Lee et al, Korea), Chemistry and seasonal yield of essential oil of *Chamaecyparis obtusa* leaves as antimicrobial actives (J.Y. Min et al, Korea) and comparative international standardization of tools for measuring formaldehyde and VOC emissions from wood-based materials to contribute to clean indoor air environment (S.B. Zhang, China).

During the All Division 5 Business Meeting, the idea of reinstating a working group on Biosecurity, Quarantine, Trade, Wood Packaging and food safety was widely raised as important aspect of wood protection and worthwhile for a joint IRG- IUFRO session at the 42nd IRG conference, May 2011, New Zealand. The in-coming D5 coordinator from Malaysia (Andrew Wong) proposes that the 43rd IRG conference in Kuala Lumpur, Malaysia, May 2012 be jointly sponsored with IUFRO 5.03 (Wood Protection). Ideas for wood protection themes for the next D5 conference in Portugal are now being sought by the incoming 5.03 coordinator (Pascal Kamdem).

### SP-10 IUFRO Director's Forum: forest monitoring in times of climate change

**Organizers :** **Konstantin von Teuffel**, *Forest Research Institute Baden-Württemberg, Germany*; **Peter Mayer**, *IUFRO Headquarters, Austria*

**Moderators :** **Konstantin Von Teuffel** (*Germany*) & **Ann Bartuska** (*USA*)

The IUFRO Directors Forum provides a global platform for directors and heads of forest research and education organizations to discuss common challenges and problems and to deliberate the future cooperation of forest research and education organizations. The Directors Forum held on the occasion of the XXIII IUFRO World Congress focused on the theme "Forest Monitoring in Times of Climate Change".

In their opening remarks, co-moderators Konstantin von Teuffel (Forest Research Institute Baden Württemberg) and Ann Bartuska (US Forest Service) pointed out that scientific forest monitoring provides data and information relevant for policy decisions on almost all levels. Additional needs forest monitoring arise from political decisions

notably in the field of forests and climate change. However, big discrepancies exist in systems and capacity for forest monitoring between developed and developing countries. Participants were invited to discuss the desirability and feasibility of working towards a global solution for forest monitoring, especially taking into account the needs developing countries.

In her keynote presentation titled “How global forest monitoring could be designed for the future”, Mette Loyche Wilkie (Food and Agriculture Organization of the United Nations, Italy) described additional information needs regarding forests and trees. She pointed out that data gaps were identified in FAO’s Global Forest Resources Assessment 2010 especially regarding net changes in carbon stocks, previous and current deforestation rates, and carbon emissions from deforestation. She stressed that REDD-plus offers an opportunity to improve forests and forest data that should not be missed.

The keynote presentation was followed by a panel discussion of experts representing different geographical perspectives. Ben Chikamai (Kenya Forestry Research Institute, Kenya) pointed out the lack of technical and sustainable financial capacity for long-term monitoring in Africa. José Joaquín Campos Arce (CATIE, Costa Rica) underlined the importance of forest monitoring as an adaptive management tool and stressed the need for better communication of research results to stakeholders. Joon-Hwan Shin (Korea Forest Research Institute, Republic of Korea) emphasized additional information requirements related to climate change and pointed out financial implications of a global forest monitoring system. Klaus-Herman von Wilpert (Forest Research Institute of Baden-Württemberg, Germany) presented the outcome of forest monitoring in Central Europe as a basis for sustainable forest management. George S. Foster (US Forest Service, United States) noted the critical demand for increased forestry monitoring information and stressed the need for, inter alia, further integrating satellite data with ground level information; a focus on innovations to lower monitoring costs; and better understanding what forest change really means.

As a result of the discussion, the need was identified for IUFRO member institutions and external stakeholders to renew and strengthen forest monitoring activities and

support global monitoring efforts.

## SP-11 Forest biomass utilization for bio-energy: technology, economics, and environment

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**Organizers :** **Woodam Chung**, *University of Montana, USA*; **Greg Jones**, *U.S. Forest Service, USA*

**Moderator :** **Woodam Chung** (*USA*)

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The overall objective of this subplenary session was to introduce emerging technologies for forest biomass handling and utilization for bioenergy and discuss the economic and environmental effects of biomass utilization. In this session, a total of eight presentations addressed the following important issues related to forest biomass utilization: 1) technologies of forest biomass feedstock production, handling, and utilization, 2) financial and economic feasibility of forest biomass utilization, and 3) environmental impacts of biomass removal.

The lead paper “Outcomes of a multi-scale, integrated research program to assess the feasibility of using pyrolysis to produce biochar and liquid fuels from forest biomass in Oregon, USA” presented by Nate Anderson from USA summarized the issues and knowledge gaps surrounding the use of pyrolysis technologies for forest biomass conversion. As the preliminary results of his research, the speaker showed the economic and environmental performance of alternative technologies and operations of forest biomass feedstock handling, a method to predict feedstock flows and costs, field deployment of a mobile pyrolysis reactor, and energy and carbon balances associated with pyrolysis operations.

Christian Suchomel from Germany presented the second paper that introduced challenges of firewood harvesting in coppiced forests in Germany. The paper also showed an application of the cut-to-length harvesting system in coppiced forests which was designed to overcome the challenges and improve the operational efficiency. The third presenter, Han-Sup Han from USA, addressed the cost efficiency issues related to forest biomass collection and transportation. He presented innovative equipment

options and machine arrangements to remove and transport forest biomass from landing areas. The results indicated that using small trucks such as roll-off containers and dump trucks to transport biomass slash from landings to a central grinding location improved access to slash piles in remote areas, as well as operational efficiency in slash grinding. Ren Xueyong from China introduced a fast pyrolysis conversion process to convert larch wood sawdust into bio-fuel using a fluidized-bed reactor. The speaker also presented his experiments designed to test various reaction conditions and showed the optimal reaction condition found from his experiments for the maximum bio-oil production.

The fifth presenter, Young-Seop Choi from the Republic of Korea, presented comparisons of two types of wood fuels (wood pellets and wood chips) in terms of production costs and market values. The results showed that the production cost of wood chips was lower than that of wood pellets, but wood pellets could have other benefits such as producing less ash and being able to be used in small scale boilers. Kazuhiro Aruga from Japan then introduced the current challenges and issues related to forest biomass utilization in Japan. He summarized his research findings on production cost of biomass feedstock from clear-cut and thinning operations. The results showed that the costs were more expensive than the current market value of the materials, but the energy balance and the savings on carbon dioxide emissions could justify the use of forest biomass for energy. In the seventh and eighth papers, the environmental impacts of forest biomass removal from forest stands were addressed. Deborah Page-Dumroese from USA presented the potential impacts of fuel reduction treatments and biomass removal on soils. She highlighted that successful implementation of best management practices is important to maximize the positive benefits of fuel reduction thinning and biomass removal, as well as to minimize negative effects of such activities. The last speaker, Lisa Sennerby-Forsse from Sweden, provided an overview of environmental concerns regarding intensive utilization of forest biomass for energy. Her presentation also provided different approaches to mitigate negative environmental impacts while increasing the environmental and economical value of bio-energy from conventional forestry.

## SP-12 Forest health in a changing environment

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**Organizers :** **Elena Paoletti**, *National Research Council Plant Protection Institute, Italy*; **Mike Wingfield**, *University of Pretoria-FABI, South Africa*

**Moderators :** **Elena Paoletti** (*Italy*) & **Mike Wingfield** (*South Africa*)

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The session was intended to provide an update for forest scientists and managers regarding new breakthroughs in the field of forest tree health. Further, to provide an improved understanding of the multi-faceted aspects of climate change. Six invited speakers summarised: air pollution impacts on forest ecosystems in a changing climate (Elena Paoletti, Italy); how climate changes increase the damage potential of many forest pathogens (Nicola La Porta, Italy); invasions of forest insects as agents of global change (Andrew Liebhold, USA); the latest developments in forest monitoring in Europe (Martin Lorenz, Germany); the concept of “exotic” ecosystems and a case study of forest decline under multi-stressors (William Otrosina, USA); and the responses of forest pests to climate change (Andrea Battisti, Italy). Fourteen posters showed case studies of pest, pathogen and pollutant impacts on forests in Asia, North America and Europe.

The main message from this session was that only healthy forests can provide many important services – air quality and water cycle regulation; biodiversity and soil protection; carbon sequestration and mitigation of climate change, and social and cultural value. Historically, climatic extremes, air pollution, insects and disease have been the main factors adversely affecting forest health. More recently, climate change has become one of the greatest threats to forest and tree health. Understanding how these stress agents are affected by, and respond to climatic change is fundamental to our efforts to mitigate the impacts of a changing environment.

### SP-13 Promoting urban forest services in partnership between scientists and communities

**Organizer :** Cecil C. Konijnendijk, *University of Copenhagen, Denmark*

**Moderator :** Cecil Konijnendijk (*Denmark*)

The session started with an introduction to the theme by the moderator, focusing on e.g. the wide range of societal trends that affect urban forestry. He stressed the importance of scientists, policy makers, practitioners and communities to work together for sustainable and multifunctional urban forests.

David Nowak of the US Forest Service then discussed partnering with urban communities to secure data on urban forests and their benefits, in order to promote sound decision-making and management. He specifically introduced the iTree tool, which provides communities in the US and across the world with excellent tools for assessing urban forest resources and their multiple contributions to urban societies.

The next speaker, Kjell Nilsson of the University of Copenhagen, presented PLUREL, a European research project that addresses peri-urban land use relationships. Nilsson mentioned that the interface between urban and rural areas is often overlooked by policy-makers. He therefore called for improved governance and integrated territorial policy, as well as for a better understanding of the urban-rural interface.

In the third presentation, Jay Bolthouse of the University of Tokyo, illustrated how forests can bridge the urban/rural divide for the case of the satoyama landscapes in Japan. This particular community forestry programme was heavily dependent on the involvement of volunteers.

The speakers, together with Michelle Gauthier of FAO, then engaged in a panel debate. Gauthier stressed the need to also address the specific challenges faced by developing countries. Here urban forestry often plays a rather different role, focusing less on amenity and more on environmental and livelihood aspects. The panel debate also addressed

topics such as how to establish successful partnerships; the need for internationally standardised tools for urban forest assessment; and matching policies to the needs and aspirations of the public.

### SP-14 An honest conversation about decentralization and forest livelihoods in a globalized world

**Organizers :** S. Denise Allen, Joleen Timko, Juan Chen, *University of British Columbia, Canada*

**Moderator :** Carol Colfer (*USA*)

This sub-plenary session was historic, in being IUFRO's first session composed of an all-female panel. The five presentations were short, designed to stimulate discussion and present findings from around the world.

Reem Hajjar led off with a comparative discussion of the legitimacy of people's management authority over their forests, based on six case studies of community forestry in Brazil and Mexico. She provides a framework for assessment using a grounded approach that identifies criteria of relevance to community members' rights and day-to-day activities.

Building on her long term involvement in Indian community forestry, Monika Singh compares joint forest management in Gujarat, India with Community Forest Agreements in British Columbia, Canada, focusing on access, control and benefit sharing. She emphasizes the need for greater decision-making authority at the local level and better integration of customary laws and practices in formal agreements.

Joleen Timko evaluates the community forest model in Cameroon, based on semi-structured interviews and a literature review. She identifies a series of problems in concept and implementation (e.g., forest areas too small, too degraded; application procedures too complex, too prone to conflict between customary and statutory systems).

Turning to China, Juan Chen addresses efforts to eliminate the obstacles to the implementation of sustainable forest management and forest certification there. Focusing on two



case study sites, Yong'an in Fujian province and Tonggu in Jiangxi province, she found considerable progress toward more sustainable forest management, with some remaining hurdles (e.g., widening gap between rich and poor, illegal tenure trading, and elite capture).

The presentations concluded with S. Denise Allen's discussion of the importance of cultural factors in the lives of peoples living in forests. She uses materials from her work among the Office of the Wet'suwet'en First Nation in British Columbia, Canada to illustrate her point that sustainable forest management is linked with cultural preservation, which in turn relates to forest stewardship.

The format was designed to encourage audience participation, which it did quite effectively. Issues raised in the discussion included some skepticism about the sustainability of community management, questions about conflict resolution, the different skill set needed for interacting with communities, the importance of integrating community-related issues in forestry education, and much more.

### SP-15 IUFRO award winners – the next generation

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**Organizers :** **Su-See Lee**, *Forest Research Institute Malaysia, Malaysia*; **Michaël Rivoire**, *International Forestry Students' Association, France*

**Moderators :** **Su-See Lee** (*Malaysia*) & **Michaël Rivoire** (*France*)

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During this Congress a major change was made in the presentation of the IUFRO Outstanding Doctoral Research Award (ODRA) and the IUFRO Student Award for Excellence in Forest Sciences (ISA). Instead of the usual roll call of recipients coming to the stage to receive their awards, this year's awards were made during a special sub-plenary session where award winners were first presented with their awards followed by a panel discussion. During the panel discussion, the award winners had an opportunity to present short overviews of their award winning research, and discuss the motivation, challenges and experiences in conducting their research. A common motivation among

the panelists for their research was to produce useful results which could be translated into practice. While each panelist had his/her own unique challenges in conducting their research, they were unanimous that they all benefitted from an improvement in their skills as well as gained a deeper insight into critical topics for the future. An important common point stressed by all the awardees was the importance of international collaboration in conducting their research.

Three students received the ISA. Tnah Lee Hong, Forest Research Institute Malaysia won for her research on a DNA profiling database designed to identify sources of illegally logged timber. Marco Contreras, University of Montana won for devising an innovative optimization technique to solve forest transportation planning problems which took into consideration minimizing harvesting and transportation costs and social and ecological impacts. Mahbulul Alam, Ehime University won for research on the management and economics of "home gardens" in Bangladesh. There were eight ODRA recipients, among them three women. Guillermo Gea Izquierdo, Swiss Federal Research Institute, won for research on silvopastoral models for western Iberian open woodlands. Finnvid Prescher, Svenska Skogplantor AB won for research on models to improve seed orchard management and seed procurement. Jürg Andreas Stüchelberger, EcoEng Ltd., won for research on a forest road network design model which determines the set of Pareto-optimal solutions between forest harvesting costs and negative ecological impacts caused by road construction and timber harvesting in mountainous European areas. Guillermo Trincado, Universidad Austral de Chile won for developing a dynamic model of crown, branch and knot formation in loblolly pine essential for forest management and industrial conversion processes. Jiali Jiang, Chinese Academy of Forestry won for her research on the effects of temperature, time and frequency on the dynamic viscoelasticity of wood. Fiona Yang, Ontario Ministry of Natural Resources, won for her economic analyses of Ontario's stumpage pricing system. Marieka Gryzenhout, University of Pretoria-FABI, won for evaluating the taxonomy of a group of important tree pathogens. Andreas Schindlbacher Federal Research and Training Centre for Forests, Natural Hazards and Landscapes, Austria, won for research on the effects of

soil warming on greenhouse gas emissions in the northern Austrian Alps.

## Summaries of Technical Sessions

### A-01 Climate change in the boreal forest zone: impacts and interactions

**Organizer :** Susan Conard, U.S. Forest Service, USA

**Moderator :** Susan Conard (USA)

Both recent climate data and climate projections suggest that the most rapid changes in climate will occur in the boreal and arctic regions. The vast boreal forests contain some 30 percent of the global terrestrial carbon, are a source of valuable natural resources, and include vast areas of relatively undisturbed forests that are critical for biodiversity. Effects are already being seen in migrations of plant species, changing patterns of insect infestations, melting of permafrost, and changing fire regimes. This session focused on the impacts of climate change that are currently being observed in boreal zone forests, projections of future impacts, potential feedbacks between changing vegetation and disturbance patterns and climate, and the implications of these changes for sustainable management of the boreal forest resource.

A total of nine oral presentations were given as follows: *Potential effects of climate change on tree distribution in eastern North America* (Sylvie De Blois, Canada); *Climatic effects on endemic insect herbivory in forests of northern Europe* (Mikhail Kozlov, Finland); *Long-term trends in wood production of Siberian spruce and Scots pine in the Komi Republic (northwestern Russian Federation)* (Eugene Lopatin, Russian Federation); *Climate change and variation of air-filled porosity in boreal forest soils: a model approach* (Kari Makitalo, Finland); *Recent impacts of climate change in Alaska and other boreal regions* (Anthony McGuire, USA); *Dramatic forest vegetation changes with short-term climate oscillations during the past 90,000 years in the Lake Baikal region, Russia*

*Federation* (Koji Shichi, Japan); *Productivity of northern Eurasian forests in a changing world: a synthesis* (Anatoly Shvidenko, Austria); *Potential land cover change in Siberia in a warmed climate and its feedback to surface albedo* (Nadezda Tchebakova, Russian Federation); and *Importance of seasonal precipitation quantities on tree growth in the Alaskan taiga forest* (John Yarie, USA). Two poster presentations were also included.

\* The summary for this session was written by the COC.

### A-02 Biodiversity and climate change: direct and indirect linkages in adaptation and mitigation

**Organizers :** Eckehard Brockerhoff, Scion / NZ Forest Research Institute, New Zealand; Hervé Jactel & Jean-Michel Carnus, INRA, France

**Moderators :** Eckehard Brockerhoff (New Zealand) & Jean-Michel Carnus (France)

This session generated considerable interest; it included 12 oral presentations and eight posters. An introductory paper by Eckehard Brockerhoff, co-authored by Hervé Jactel and Jean-Michel Carnus, provided background information about climate change and mitigation measures, including methods to enhance carbon sequestration by means of afforestation and partial substitution of fossil fuels by biofuels. There are fears that such 'carbon forests' could result in biodiversity loss, particularly if they involve the use of exotic species that may replace 'natural' vegetation. Conversion of old-growth forest for the production of biofuel feedstocks may even result in a net carbon loss that could take decades to compensate. However, there are opportunities for combining carbon sequestration and biodiversity conservation objectives by planting mixed forests of native tree species. Even plantations of exotic trees can provide valuable forest habitat if biodiversity conservation objectives at the stand and landscape-scale are considered among the criteria for species selection and forest management.

David Flaspohler outlined options for maintaining habitat quality and integrating biodiversity protection within

intensive bioenergy systems. To maintain habitat quality for forest birds, the retention of older trees provides nesting sites while having minimal effects on productivity. Danesh Miah outlined how CDM afforestation projects in Bangladesh can result in substantial rates of carbon sequestration while simultaneously providing forest restoration benefits for biodiversity and humanity. Juergen Bauhus presented results of a survey of forest managers in Germany revealing potential conflicts between silvicultural adaptation strategies and nature conservation objectives. These can be minimised if silvicultural adaptation strategies maintain a focus on desired future ecosystem functioning. Chan Ryul Park reported on the distribution of birds along an altitudinal gradient in Korean mountains. Some birds may be affected negatively by a reduction in the amount of habitat due to climate change. Alexander Belokurov (WWF International) outlined how protected areas may contribute to climate change and mitigation strategies. This requires more attention to achieve the full potential of these benefits from protected areas.

Yeon Kyeong Lee provided preliminary results on the identification of genes involved in the climatic adaptation of Norway spruce seedlings. This may have implications for the adaptability of forests exposed to a changed climate. The wider implications of climate change on Lithuanian forests were discussed by Remigijus Ozolinčius. During the past two decades potential consequences of climate change included an increase in temperature, phenological shifts, and increased tree growth, but also increased insect pest and disease problems. Amadé Ouedraogo reported on the status of woody plant biodiversity along a latitudinal gradient in Burkina Faso, revealing a need for improved conservation programmes in semi-arid areas, for example by enriching protected areas with threatened species to prevent their potential extinction. Several other presentations covered related subjects. The session concluded with an overview by Stewart Maginnis and Jeff Sayer (International Union for the Conservation of Nature) about possible “nature-based adaptation and mitigation strategies” that can accommodate biodiversity conservation objectives within our climate change adaptation and mitigation efforts. Guidelines are available from IUCN to assist forest managers with meeting these new challenges.

### A-03 Can forestry and forest sector activities contribute to mitigating climate change?

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**Organizer :** **Werner A. Kurz**, *Natural Resources Canada, Canada*

**Moderator :** **Werner A. Kurz**, *Natural Resources Canada, Canada*

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This technical session included six presentations on regional and national analyses of the potential role of the forest sector to contribute to climate change mitigation. Dr. David MacLean (Canada) summarised regional analyses using optimization methods that examined the trade-off between carbon storage in forest ecosystems, harvested wood products and the benefits achieved from product substitution. Dr. Antti Kilpeläinen (Finland) reported results from a life cycle assessment of forest bioenergy production in Finland. Dr. Leif Gustavsson (Sweden) examined the potential future benefits from enhance growth rates through climate change and the implications for wood production and substitution benefits in Sweden. Ms. Sara Ohrel (USA) described the evolving institutional and legislative constraints for forestry and agricultural carbon off-set projects in the USA. Dr. Florian Kraxner (Austria) summarised analyses of opportunities for climate change mitigation through the reduction of emissions from deforestation and degradation (REDD) and through bioenergy use to substitute fossil fuels. Dr. Yasushi Mitsuda (Japan) summarised progress on the development of a national-scale forest carbon accounting system for Japan and its application to estimate carbon dynamics in

### A-04 Competing roles of forests in climate change mitigation

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**Organizers :** **Lauri Valsta**, *University of Helsinki, Finland*; **Birger Solberg**, *Norwegian University of Life Sciences, Norway*

**Moderator :** **Lauri Valsta** (*Finland*)

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Marc Hanewinkel, Forest Research Institute of Baden-Württemberg, forecasted that Germany’s business as usual timber harvest volume and growing forest stock

will increase carbon stocks until 2026 on a level above the national cap set by Kyoto Protocol targets.

Bishnu Chandra Poudel, Mid Sweden University, showed that temperature rise will significantly increase forest biomass production in Sweden and that a large net reduction of carbon emissions is possible if wood replaces concrete and biomass residues replace fossil fuels.

Lauri Valsta, University of Helsinki, stressed that climate policy must recognize that forests provide multiple benefits. The level of climatic benefits from wood use and the societal time preference affect the climatically optimal management of forests.

Hans Verkerk, European Forest Institute, explained that European forests are expected to remain a net carbon sink, but that this sink will decline with business-as-usual practices and that the increased harvest levels could exacerbate the decline.

Dodik Ridho Nurrochmat, Bogor Agricultural University, warned that a strong REDD scheme will have negative multiplier effects on associated industries and communities in timber exporting countries, thereby increasing illegal logging.

Yoon-Hyung Kim, Ohio State University, discussed the impact of US and European biofuels policies on forest carbon. Kim found that the US and EU will lose significantly more forests than predicted by other models, and that Southeast Asia will actually gain forest.

Christine Fürst, Dresden University of Technology, spoke about the land-use modeling tool “pimp your landscape” to help communities and decision-makers choose from scenarios to mitigate climate change in Saxony, Germany. This tool uses a visual matrix for assessing trade-offs among social, ecological and economic objectives.

Rapporteur: Lauri Valsta (Finland)

## A-05 Plantation forestry under marginal conditions: water use and water use efficiency

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**Organisers :** **Nathalie Long**, *Murdoch University-CSIRO, Australia*; **Andrew Merchant**, *University of Sydney, Australia*

**Moderators :** **Nathalie Long & Andrew Merchant** (*Australia*)

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The sequence of presentations was designed to discuss the concept of water use efficiency (WUE) at a range of spatial and temporal scales and the development of tools for use in the plant sciences and plant production. Encompassing examples taken from a diversity of ecosystems and plant species, the session highlighted differing approaches to quantifying the exchange of carbon and water in forested landscapes.

In the first presentation Dr. Oliver Brendel (France) discussed the genetic determinism of WUE in pedunculate oak and a QTL association mapping approach. This was followed by Miss Nathalie Long (Australia) who discussed the genetic variability of WUE in *Eucalyptus globulus*. Both presentations illustrated that despite the multigenic control of WUE, significant progress is being made in the development of biomarkers for use in plant breeding and monitoring systems. From the genome scale, the session then moved to the leaf scale with three presentations spanning three continents; Europe, Asia and Australia. Dr. Andreas Bolte (Germany) discussed the WUE of central and marginal provenances of European beech followed by Go Eun Park (South Korea) who discussed growth, biomass and water use efficiency of one-year-old *Ulmus pumila* seedlings under different irrigation intervals. Dr. Lucas Cernusak then discussed the WUE of tropical tree seedlings under elevated carbon dioxide. All three presentations illustrated the complex and often counterintuitive responses of trees to the predicted effects of elevated atmospheric CO<sub>2</sub> concentrations and the central role that WUE will play in whole tree physiological processes. In keeping with whole plant physiology and relating this to the stand level, Dr. Melanie Zeppel (Australia) then discussed seasonal patterns in leaf and stand scale WUE in Australian temperate woodlands

highlighting the central role of water availability across such systems. This discussion was well complimented in the next presentation by Professor Dan Binkley (USA) on the potential productivity of Eucalyptus in Brazil: the key role of water supply. Dr. Binkley highlighted that water, and concepts relating to WUE are key to the growth and productivity of Eucalypts outside their natural distribution. The poster session included many applications of WUE at various scales for use in forests across Europe, South East Asia, the Americas and Australia. Of particular note was the development of WUE and chemical biomarkers as selection criterion for improving the performance and resilience of trees growing under marginal conditions.

#### **A-06 Assessment of forest management strategies for facilitating adaptation and mitigation in rapidly changing forest systems**

**Organizer :** *Anne-Helene Mathey, University of British Columbia, Canada*

**Moderator :** *Craig Nitschke (Australia)*

Our environment is changing the context in which we are making forest management decisions. Most notably, climate change is already impacting ecological processes, forest productivity, ecological services, and carbon sequestration in many regions and these impacts are predicted to intensify. Our social and economic structures are also evolving rapidly with new markets, new demands, urbanization, and the decentralization of governance. These changing contexts are interacting with one another at local, regional and international scales which are complicating management. The objectives of this session were to highlight methodologies and modeling tools that explore the interactions between forest management and rapidly changing environments. Papers in this session presented novel approaches for assessing the sustainability of current or alternative management actions taking place in a changing world. Papers also addressed environmental, social and/or economic changes and highlight the consequences of such changes on our ability to conserve biodiversity and/or manage forest resources sustainably. A

total of six oral presentations were given in this session as follows: *Optimization of cork debarking rotation for sites of different cork productivity and quality* (Joana Paulo, Portugal); *Different scale approaches to forest and water interactions in the NW-European ForeStClim headwater catchments* (Gebhard Schüler, Germany); *Proxy indicators of thermodynamic efficiency and ecosystem resilience to environmental change in contrasting old-growth and managed forests* (Peter Hobson, United Kingdom); *Vulnerability assessment of mountain ecosystems in the Philippines using a geospatial-based environmental vulnerability index: case study of the Makiling Forest Reserve* (Cristino Tiburan, Japan); *Climate change challenges to management* (John Stanturf, USA); and *Managing forests to maintain ecological integrity and social acceptability under climate change – a case study from the Champagne and Aishihik Traditional Territory, southwest Yukon* (Patrick Waeber, Canada). The session included six poster presentations.

\* The summary for this session was written by the COC.

#### **A-07 Is climate change leading to global increases in drought-induced forest die-off?**

**Organizers :** *Ted Hogg, Natural Resources Canada, Canada; Craig Allen, U.S. Geological Survey, USA*

**Moderators :** *Craig Allen (USA) & Ted Hogg (Canada)*

There has been a notable increase in global reporting of drought-related forest die-off episodes over the past decade (Allen et al. 2010), prompting serious concerns for the future of the world's forests under climate change. Session A-07 provided an in-depth overview of recent research on this topic through presentations from 13 countries and 5 continents. The opening presentation by Craig Allen (USA) provided a global overview showing over 80 well-documented examples of increased tree mortality due to drought from all of the world's forested continents. His talk highlighted key knowledge gaps that limit our ability to predict forest mortality in response to climate change, including the need for a globally-coordinated

observation system.

The session provided valuable insights from global and region-specific perspectives. Alistair Jump (UK) discussed the global implications of recent forest decline along hot-dry tree range limits in mountainous regions: large areas of lowland forests are at risk of future decline as the earth continues to warm, especially in tropical regions. Haroun Chenchouni (Algeria) highlighted the threat posed by global desertification and presented results showing massive mortality of cedar forests along the northern edge of the Sahara following the worst drought in over 500 years. He showed the complexity of factors leading to tree mortality and presented a model for assessing areas of sensitivity to desertification. Lucy Amissah (Ghana) presented an analysis showing the importance of annual rainfall and rainfall seasonality to the distributions of tropical forest species, and highlighted the need for conservation measures.

Michel Vennetier (France) discovered that recent drought contributed to multi-year forest decline through its impact on branching patterns and tree architecture. Phillip van Mantgem (USA) showed that background tree mortality of old growth forests has increased during the recent period of warming and drying across the western United States. Andreas Rigling (Switzerland) presented results from 10 years of multi-disciplinary research into the biotic and climatic mechanisms of pine mortality.

Presentations by John Shaw (USA) and Zhen Zhang (China) showed many examples of large-scale tree mortality following drought in combination with insects or diseases. Jong-Hwan Lim (Republic of Korea) showed the role of warm, dry winters as a driver of recent forest dieback. Andreas Bolte (Germany) presented a physiological model for projecting tree species responses to future droughts. Bernard Dell (Australia) highlighted a new, interdisciplinary program aimed at understanding climate change impacts on the health of West Australian forests and woodlands. Posters highlighted research on forest decline and its causes in France (Vennetier), Japan (Kawaguchi), Korea (Chun), and South Africa (Roux).

In the closing talk, Ted Hogg (Canada) emphasized the need

for multi-scale approaches to quantify drought-induced losses of forest biomass across large, complex landscapes. Such estimates are needed for assessing drought impacts on carbon cycling and on the supply of forest products at regional and national scales.

Collectively, the presentations revealed a disturbing, global pattern of widespread forest die-off following recent, severe droughts, and demonstrated the value and urgency of expanded international collaboration to address the critically important question posed by the session's title.

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### A-08 **Silviculture and Global Change: Managing Forest Structures for Ecosystem Resiliency and Carbon Storage**

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**Organizers :** **Kevin O'Hara**, *University of California-Berkeley, USA*; **Jürgen Bauhus**, *University of Freiburg, Germany*

**Moderators :** **Kevin O'Hara** (*USA*) & **Jürgen Bauhus** (*Germany*)

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This technical session included eight papers on silvicultural strategies for creating stands that were resilient to global climate change or that were efficient at storing carbon. This session also featured 18 posters. Both oral and posters featured a variety of strategies for ecosystem resiliency and carbon storage from around the world. The session included papers or posters from Europe, North America, Asia, southeast Asia and Central America. Juergen Bauhus presented the overview presentation that discussed ways of achieving multiple objectives in a world with changing climates. Takayoshi Koike presented a paper on effects of elevated CO<sub>2</sub> on sprouting. A paper by William Mason demonstrated efforts to create mixtures in Sitka spruce plantations in Scotland to increase resilience. Hasenhauer presented a global model capable of modeling silvicultural treatments and their effects on carbon, nitrogen and water. O'Hara presented on the variation in carbon storage with the stems of individual trees and potential for underestimating carbon storage using current methodologies. Together, the oral presentations and posters demonstrated that there is considerable effort being expended on research towards silvicultural implications of global climate change. These

vary from more accurate estimates of carbon storage, to understanding effects of elevated CO<sub>2</sub> levels in the atmosphere, to models for predicting likely consequences of global climate change, to conceptual models and case studies that describe management alternatives.

## **A-10 Adapting to future wildland fire regimes & A-11 Fire and sustainable management of future forests**

**Organizers :** **William J. de Groot**, *Natural Resources Canada; Canada*; **Ahmad Ainuddin Nuruddin**, *Universiti Putra Malaysia, Malaysia*; **Douglas McRae**, *Natural Resources Canada, Canada*

**Moderators :** **William J. de Groot** (*A-10, Canada*) & **Douglas McRae** (*A-11, Canada*)

The two fire and climate change sessions were opened by an overview of global fire and climate change and summary of recent research by Mike Flannigan (Canada). This was followed by five presentations in the first oral session that covered social and environmental impacts of changing fire regimes. This included examples from Mediterranean-type ecosystems (L. McCaw, Australia) and from southwestern China (X. Tian, China). Other presentations were made on the effects of new, evolving fire regimes on forest vulnerability to future fire (E. Chuvieco, Spain), biodiversity (A. Nuruddin, Malaysia), and impacts of air pollution on forest susceptibility to fire (N. Grulke, USA).

There were eight presentations in the second oral session that discussed forest fire management and sustainable forestry under future fire regimes. This included an overview of current global fire trends and human dimensions of wildland fire (J. Goldammer, Germany), with specific discussion of the anticipated future fire environment in North America (J. Stanturf, USA), and the current potential for wildfire disaster as exemplified by the recent 2009 Victorian fires in Australia (L. McCaw, Australia). Other presentations included managing human-caused fires (M.S. Won, Korea), effects of drought and fires on forest ecosystems (M. Vennetier, France), community-based fire management (L. Ram Prasad, Nepal), assessing forest fire

risk for conservation (J. Jung, Korea), and wildland fire risk and managing fire in the Chernobyl region (A. Hohl, USA).

Both oral sessions were well-attended and active discussion followed the presentations in each session. Much of the discussion was related to fire management best practices in a world of increasing fire activity, climate change, shifting population demographics and migration, changing fuel conditions, escalating suppression costs, and increasing global occurrence of wildfire disaster. The oral sessions were followed by a poster session with 18 presentations on a wide range of forest fire topics.

## **A-12 Adaptation of temperate and boreal forests to climate change: what experimental trial system is needed?**

**Organizers :** **Andreas Bolte**, *Johann Heinrich von Thuenen-Institute, Germany*; **Mirko Liesebach**, *VTI-Institute of Forest Genetics, Germany*; **Palle Madsen**, *University of Copenhagen, Denmark*

**Moderators :** **Andreas Bolte** (*Germany*) & **Palle Madsen** (*Denmark*)

The oral presentations and the posters of the session addressed assessments of climate change impacts and adaptation of forest in the boreal and temperate zones of the northern and southern hemisphere.

The first paper presented by Klaus von Wilpert (with H. Puhlmann) showed methods to assess drought risk in central Europe using forest monitoring data based on soil hydraulic traits and derived pedo-transfer functions. Exemplary maps of soil texture, rooting depth and soil skeleton were displayed from regionalized model data for the region of South-West Germany.

In the second paper Somidh Saha (with co-authors) emphasized the importance of heat and drought-tolerant oak species for future well-adapted forest in temperate central Europe and presented a novel approach using a mixed effect meta-analysis for assessing tree quality development comparing bio-groups and row plantings.

The third presenter Palle Madsen (with co-authors) drew attention to the important role of refugial populations for forest adaptation. He demonstrated that in Europe many forests may have lost their largest genetic diversity and probably highest adaptive potential when leaving their refugial sites, using European silver fir (*Abies alba*) as an example.

The following four papers dealt with different concepts to adapt temperate forests to climate change. For the southern hemisphere Peter Clinton and co-authors presented the 'Functional forest' approach in New Zealand that tries to optimize the multiple services of forests based on new multi-species trials. Peter Spathelf introduced different adaptive management strategies for central European forests (perpetuation of forest structures, active and passive adaptation) and proposed an integrative adaptive management concept that links international, regional and local scales. John Stanturf (with co-authors) focussed on the restoration of degraded woodlands and pointed out that adaptive approaches must consider restoring resistance and resilience. Marcus Lindner (with co-authors) presented adaptation strategies for different European regions showing that the selection of suitable species and provenances that should be combined with activities to support the inherent adaptive capacity of forests.

In the final panel discussion (panelists: Konstantin v. Teuffel, Germany; Marcus Linder, Finland; Peter Clinton, New Zealand; John Stanturf, USA; Andreas Bolte, Germany) several perspectives and pathways were offered for implementing an international experimental trial system on forest adaptation.

Eight posters were presented in the main poster exhibition. Six of them focussed on the ecological and ecophysiological response of tree species as well as forest composition to climate change in Korea (first authors: K.T. Cho, M.S. Cho, S.H. Choi, J.K. Jeong, H.R. Kim, H.C. Shin). Pierre Balandier showed that the interaction of under- and overstorey must be considered in adaptive silvicultural systems and Francisco Javier Silva-Pando provided information about the REINFORCE project that aims at establishing 32 arboreta and various demonstration trials over the Atlantic regions of Europe.

### A-13 Climatic gradients in mountains: opportunities for studying forests facing climate change

**Organizers :** **Heinrich Spiecker**, *University of Freiburg, Germany*; **Peter Brang**, *Swiss Federal Institute for Forest, Snow and Landscape Research, Switzerland*; **Roque Rodríguez Soalleiro**, *University of Santiago de Compostela, Spain*

**Moderator :** **Heinrich Spiecker** (*Germany*)

The environmental gradients found in montane regions, formed by differences in altitude and aspect, and sometimes also by variations in bedrock, offer the opportunity to study climate change impacts and reactions in highly different environments that are located within short distances of one another. The objective of the session was to explore the opportunities of using the steep climatic gradients found in mountain terrain for studying impacts of changing climate on forests, and subsequent reactions of affected forests. The main impacts to be covered in the session are those related to the occurrence of disturbances and changes in tree growth. The main reactions to be considered are regeneration processes, with a particular focus on the question of whether the recruiting young growth is more adapted to future climate than the existing forest. A total of six oral were made in this session as follows: *Influence of forest architecture on carbon assimilation along an elevation gradient in Hawaii: linking field measurements, airborne waveform LiDAR, and modeling* (Eban Broadbent, USA); *Altitudinal gradients to study the impact of climate change on natural forests* (Matthias Dobbertin, Switzerland); *Temperate deciduous forests research network: Adaptation of the beech family (Fagaceae) to a changing environment* (Palle Madsen, Denmark); *The alpine timberline of Mt. Fuji is moving to a higher altitude* (Hitoshi Sakio, Japan); *Assessment of phytodiversity, biomass production and carbon stocks in some natural forests of Garhwal Himalaya, India* (Chandra Mohan Sharma, India); and *Long-term consequences of hybridization between high-altitude and low-altitude populations in *Abies sachalinensis*, locally-adapted in their native altitudinal zones* (Susumu Goto, Japan). Two poster presentations were given in the session.

\* The summary for this session was written by the COC.



## A-14 Impacts of climate change on forest ecology, ecosystem processes, and management

**Organizer :** **Jean-Michel Carnus**, *National Institute for Agricultural Research, France*

**Moderator :** **Jean-Michel Carnus** (*France*)

This session was very well attended and generated interest and discussion. It included 7 oral presentations and 24 posters from all continents. Four main themes were dealt with in relation with changing climates: (1) hydrological processes; (2) carbon cycles and sequestration processes; (3) spatial distribution of forest species and changes in habitats; (4) interactions with silviculture. Most presentations concerned tropical and sub-tropical forest ecosystems in Africa, Asia and Australia.

Dr. Combalicer presented a regional study where climate information was downscaled from GCM model and was used to assess impacts of climate change on hydrological processes in a forest reserve in the Philippines. Besides effects on global water balance with increasing stream flows in the future, the study also showed how changes in land use cover can dramatically affect hydrological events and can be used to mitigate effects of climate change. Similarly, Geoff Stoneman presented the impacts of current and future climates on surface water systems and groundwater yield from forested catchments in South Western Australia and how forest and land management will need to be adapted for water conservation purpose and drinking water supply under drier conditions.

Syed Ashraful Alam presented current estimates of carbon densities for semi-arid woodland biomass and soils across central Suddan and how different SRES (10) can affect those densities in the long term future (2070 – 2099). It was outlined that carbon sequestration potentials of semi-arid forests wood are largely correlated to rainfall distribution patterns across the studied region; it is yet unclear how those patterns will be changing in the future. Monitoring and long term measurements of net carbon exchanges between forest and atmosphere is an important step in validating carbon sequestration estimates, as demonstrated by Dr. R.B.S Rawat with the example of eddy covariance

flux measurement tower established in mixed subtropical forests in India.

Lots of research efforts have been dedicated in the recent years to investigate effects of climate changes on species distribution and habit changes. Bioclimatic envelopes modelling techniques were used and presented by Dr. N.G Gouwakinou to predict current and future distribution of a local fruit tree species of multipurpose use in Northern Benin; consequences for species conservation in a potentially larger suitable area in the future were discussed. On the basis of envelope models predicting actual distribution of 10 conifers species in Japan, Dr N Tanaka outlined results of predicted distributions under two climate change scenarios in 2081 – 2100. Five species appear to be the most vulnerable with their habitats decreasing or disappearing in some regions; however, some potential refugia could be identified for those threatened species and biodiversity conservation measures can be proposed.

Jerry Vanclay introduced future scenarios for Australian forests focusing on main forest types in Eastern Australian from semi-arid to humid subtropical forest ecosystems. Responses of those systems to water shortages were outlined, as well as practical silvicultural interventions such as reduction of stand density to adapt to future environmental conditions.

## A-15 Strategies for linking climate change mitigation and adaptation: securing livelihood options in tropical forestry

**Organizers :** **Sushil Kumar**, *Indian Institute of Management-Lucknow, India*; **Bruno Locatelli**, *CIRAD-CIFOR, Indonesia*; **Bastiaan Louman**, *CATIE, Costa Rica*; **Daniel Murdiyarso**, *CIFOR, Indonesia*

**Moderators :** **Sushil Kumar** (*India*) & **Daniel Murdiyarso** (*Indonesia*)

The session presented five papers dealing with the strategies and framework for linking mitigation of and adaptation to climate change in forestry sectors. I was then followed by examples in both mitigation and adaptation measures at

community level in developing countries, namely Brazil, Cameroon, and Nepal.

When forests were used for climate change mitigation it is important to note that land tenure is key to secure carbon benefits and rights. Without such a clear tenure system it was hard to ensure participation at community level. Meanwhile the success of adaptation to climate change in forestry sector was affected by exogenous and endogenous factors from which community forestry will rely on, including village infrastructure and “supra” structure dealing with governance issues. Links with other development agenda, such as health and poverty reduction were identified. An ecosystem-based adaptation was therefore recommended.

Community forestry may not be a magic solution to climate change but provide a unique opportunity to climate change adaptation which would naturally provide a nice entry point to climate change mitigation. In addition, both measures should not be treated as dichotomous and therefore may well be implemented in integrated manner. Forest governance at community level may have to be revisited to allow the integration of the two.

Different size of the farm across the study area, however, leaves the challenges for further studies regarding livelihood options. There was no clear cut whether forest-based or agriculture-based entity would effectively address climate change and poverty alleviation simultaneously.

### **B-01 New perspectives in landscape patterns – changes in edges, connectors, and landscape matrix**

**Organizers :** **Kurt Riitters**, *U.S. Forest Service, USA;*  
**Peter Vogt**, *European Commission-JRC,*  
*Italy*

**Moderators :** **Kurt Riitters (USA) & Peter Vogt (Italy)**

The eight presentations and five posters in this session addressed the impacts of landscape patterns on biodiversity and other forest resources over time and space. A particular emphasis was placed on the reliable and meaningful pattern

assessment as a pre-requisite for a better understanding and interpretation of landscape ecological processes.

K. Bahadur analysed human-induced landscape transformations in a mountainous watershed in Nepal. A shape complexity index (SCI) indicated worsening of the forest habitat in the highland part and higher edge effects at the forest patch level.

S. Blazquez identified the relative importance of connecting elements in landscape networks and showed how to place connectivity in a broader context of conservation policies.

J. Chen used a probability matrix to show the impact of alternative forest management strategies on the distribution of 292 plants. Areas in close proximity to roads and edges had the highest plant species richness.

O. Kwon illustrated effective riparian management based on landscape ecology. Segregation of biotopes by roads requires the design of riparian protection areas to link existing fragmented sites as a network.

E. Laszczak estimated potential connectivity of European bison herd ranges using a habitat suitability index to delineate bison herd patches and to compute a friction surface to proxy dispersal costs. A cost graph model showed smaller patches having the potential to serve as stepping-stones.

K. Riitters outlined three fundamental measures of pattern (area density, landscape mosaic, and physical structure) at multiple spatial scales to summarize grassland, shrubland, and forest at landscape and sector level.

S. Saglam described forest fragmentation in the city of Istanbul using a core set of patch- and class-level to predict forest basal area. A regression model extrapolates the response variable over other urban forest fragments indicating consistent relations between spatial and silvicultural variables.

P. Vogt applied Morphological Spatial Pattern Analysis to reliably detect coherent forest change areas as a prerequisite for a meaningful understanding of forest landscape dynamics.

Poster sessions included an analysis of the landscape matrix and fragments of Brazil's protected Atlantic Forest Guarapeçaba to verify the mosaic functionality for the maintenance of local biodiversity; Biotope fragmentation in small cities neighboring metropolitan areas in Korea and requiring an ecological management of urban green space under consideration of the biotope network in and around the city; A case study of Lushuihe Forestry Bureau about sustainable timber harvest strategies using appropriate settings for cutblock size, rotation length, and forest age class; An analysis of urban forest landscape structure using landscape indices and nearest features model. Forest distributions in Korean metropolitan cities predominantly show radial patterns, which are known to offer a better environment for moving of wildlife among urban forest patches; An analysis of landscape metrics and topography in a Japanese mixed forest resulting in a guideline for sustainable forest management.

## B-02 Aquatic biodiversity conservation in forests

**Organizers :** **Deanna Olson** *US Forest Service, Pacific Northwest Research Station, Oregon, USA*; **Melvin Warren**, *US Forest Service, Southern Research Station, Mississippi, USA*

**Moderators :** **Deanna Olson**(USA) & **Melvin Warren**(USA)

This session marked the initiation of a new IUFRO Division 8, Biodiversity working party focusing on Aquatic Biodiversity in Forests, addressing two Priority Topics for Division 8: 1) Forest-Water Interactions; and 2) Biodiversity Conservation. Another session of this topic is being planned for the IUFRO Biodiversity conference in Cork, Ireland, in August 2012. Case studies of aquatic biodiversity topics across the northern hemisphere were presented.

Tadashi Nakashima's talk entitled "Debris from the natural forest watershed in a mountain region in Japan" covered the effects of periodically intense storms on stream systems in Japan. Over a decade of monitoring showed considerable

variation in woody organic matter transportation in streams, in particular in association with two intense typhoons in 1998 and 2000. The typhoons essentially were responsible for the vast majority of the wood loadings observed in the streams.

Moving 7,400 km west, Heli Suurkuukka's presentation "Are biodiversity patterns concordant on both sides of the forest-stream interface?" addressed stream biota in Finland. Using data from 50 headwater streams in Finland, she assessed whether riparian forest protection also benefited instream organisms including bryophytes and insects. All four taxa that she studied increased in species richness with the increase in 'naturalness' of the forest stand. However, although stream and riparian bryophytes were concordant in their diversity among sites, aquatic insects responded more to riparian quality than did terrestrial insect counterparts (coleopterans), and hence, the terrestrial insect fauna could not be easily predicted from riparian community composition.

Melvin Warren's talk "Response of fishes to constructed, woody microhabitats in sand-bed streams of the upper Coastal Plain, Mississippi, USA" took the audience another 7,500 km west. He also looked at stream study sites across a gradient of conditions (natural to degraded stream channels), and experimentally manipulated small woody habitats and assessed fish responses. He found that regardless of stream condition, fish use of small woody habitats was high, but fish assemblages in the habitats varied considerably among streams, and fish responses to small wood habitats were mediated by the disturbance history of the stream.

Moving west another 3,000 km, and now 8,000 km from Japan, Deanna Olson spoke about Oregon, USA streams: "Up and over: extending riparian reserves into headwaters and over ridgelines to integrate fish and amphibian conservation in forested landscapes." She found riparian reserves to be an effective management provision along the aquatic continuum but are often not extended into headwaters. She presented alternatives for headwater linkage areas aimed at managing headwater debris-flow-prone areas for downstream fish habitat attributes, and overland connectivity for amphibians. Criteria for linkage

area selection included landscape-, drainage basin-, and forest stand-scale considerations such as locations of target species, land ownership patterns, total number of links established, connectivity among discrete major river basins, and climate change predictions. Although the proposed linkage areas target headwater species by design, the resulting web of connection across the landscape would be expected to benefit numerous forest-dependent species.

### B-03 Improving livelihoods through research and action in biodiversity-rich tropical forest landscapes

**Organizers :** Jean-Laurent Pfund, Terry Sunderland & Robert Nasi, CIFOR, Indonesia

**Moderator :** Robert Nasi (Indonesia)

Scientists and conservationists have become aware that conservation approaches based on targeting threats and establishing protected areas are necessary but not sufficient. Forest patches, secondary forests, agroforests and plantations play a key role for biodiversity conservation in the tropics. They are often beyond the direct control of the government and their institutions and subject to pressures originating from sustaining people's livelihoods or conversion to a more profitable agricultural system. The objective of the session is to contribute to new ways of conducting research in tropical forest landscapes to support the integration of biodiversity conservation and livelihood concerns into adaptive forest management processes. Based on research and development activities conducted in several countries, presentations highlighted the key drivers for biodiversity conservation and livelihoods observed in the studied landscapes, focusing on accessibility to markets, landscape patterns, local rights and governance. The discussion focused on multidisciplinary options to study and approach forest landscapes and the way to design research so that it can catalyze adaptive management for improved livelihoods. The session included seven oral presentations as follows: *Quantitative analysis of forest fragmentation: biodiversity patterns in northeast Madagascar* (Mihajamanana Fetra Rabenilalana, Madagascar); *Land-use modifications and wildlife security in the Bia-Goaso forest block in western Ghana* (Emmanuel

Danquah, Ghana); *Analysis of pattern, dynamics and driving forces of forest landscapes at the community level in Lingshui Li Autonomous County, Hainan Province, China* (Qinglin Huang, China); *Forests and livelihoods: pursuing spatial concepts for better research, analysis, and action* (Gill Shepherd, United Kingdom); *Gender differentiation, rule attributes, and forest condition: user group dynamics and sustainability in the context of forest resource decentralization* (Esther Mwangi, Indonesia); *Governance of landscape mosaics: experiences at five tropical sites* (Carol J.P. Colfer, USA); and *Carrots and sermons don't work without a baton: economic incentives fail to protect the Bukit Barisan Selatan National Park in Indonesia from encroachers* (Patrice Levang, Indonesia).

\* The summary for this session was written by the COC.

### B-04 Uneven-aged silviculture in temperate and tropical forests: towards paradigm expansion

**Organizer :** Kevin O'Hara, University of California-Berkeley, USA

**Moderator :** Kevin L. O'Hara (USA)

This technical session included eight oral presentations and nine poster presentations. The objective of this session was to include researchers working with uneven-aged stands from boreal, temperate and tropical forests. The session was highly successful in meeting this objective as presentations on a variety of different forest types were included. Hubert Hasenhauer began the session with a presentation on stocking control for small ownerships in Austria. This was followed by a presentation from Abdul Rahman Kassim on stocking control in Malaysia and Haruni Krisnawati on stocking control in Indonesia. All three of these presentations covered very different procedures for stocking control. Other presentations included Hiromi Mizunaga who discussed gaps and ecological restoration in Japan. Shinichi Tatsumi gave an excellent presentation on boreal forests and Christian Wehenkel discussed management of uneven-aged forests on dry sites in Mexico. The poster presentations primarily featured research in Asia on topics including beech seed response to light environments, biodiversity and soil effects,

and logging systems effects in uneven-aged forests. There was also one poster on cork oak management from Portugal and one on selection cutting of *Nothofagus* forests in Chile. This session met its goal of integrating tropical uneven-aged work with that from the temperate and boreal regions. It was also notable for the outstanding presentations from all speakers in the technical session. The moderator was also pleased to see outstanding contributions from some very young researchers from developing countries.

### **B-05 Bushmeat in Central Africa: beyond the ecological crisis**

**Organizer :** *Nathalie van Vliet, France*

**Moderator :** *Robert Nasi (Indonesia)*

Hunting for food in Central Africa is an issue of concern because there is strong evidence illustrating that the scale of hunting, occurring in these regions, poses a real threat to many tropical forest species. The so-called “bushmeat crisis” is the focus of many conservation organizations and of a number of development programs throughout Central Africa. However most of the debate has concentrated in the ecological impacts of the bushmeat trade, while the links between bushmeat and livelihoods, health, culture and local economy, are either poorly understood or not properly taken into account. The purpose of this session is to provide stronger evidence of the hidden links between bushmeat and livelihoods, beyond the ecological crisis. We particularly focused on: 1. The bushmeat market chain and its contribution to local economy; 2. Integration of tradition related to bushmeat consumption in modernized Central African societies; 3. Health and nutrition issues related to bushmeat consumption and trade. Our discussions will result in recommendations to policy makers on how to regulate hunting and bushmeat trade to ensure the continued benefits from the sustainable use of wildlife without threatening the most endangered species. Five oral presentations were included in the session as follows: *Empty forests, empty stomachs* (Andrew Taber, Indonesia); *Bush meat consumption in the Central African Republic* (Christian Fargeot, France); *Motives for urban wild game players in Central Africa* (Shannon Randolph, USA); *The role of bushmeat and other wildlife products in the local*

*economy: a comparative study from Equatorial Guinea* (Noelle Kumpel, United Kingdom); and *Sustainability and dynamics of bushmeat trade using market data in Kisangani* (Nathalie van Vliet, France).

\* The summary for this session was written by the COC.

### **B-06 Reporting on sustainability of temperate and boreal forests using criteria and indicators: 1**

**Organizers :** *Se Kyung Chong, Korea Forest Research Institute, Republic of Korea; Richard Guldin, U.S. Forest Service, USA*

**Moderator :** *Se Kyung Chong (Republic of Korea)*

In the B-06 session, Christopher Woodall and Kurt Ritters (US Forest Service) presented new approaches to large-scale assessment of the forest productivity and biological diversity for national reporting in the United States. Jari Parviainen (Finnish Forest Research Institute) discovered how we can update C&I to better serve the needs of society and for other sectors and emphasized the importance of communication dialogue. Toshiro Iehara (Forestry and Forest Products Research Institute of Japan) presented a method creating a local-level biodiversity map. Christopher Woodall introduced assessing carbon stocks and fluxes of forest ecosystem and products and some uncertainties due to the variability of forest ecosystem as well as other external factors. Byung Oh Yoo (Korea Forest Research Institute) explained national forest inventory system of Korea by introducing layouts and design of sample plots.

### **B-07 Reporting on sustainability of temperate and boreal forests using criteria and indicators: Part 2**

**Organizers :** *Takeshi Goto, Forestry Agency, Ministry of Agriculture, Forestry and Fisheries, Japan; Richard Guldin, U.S. Forest Service, USA*

**Moderator :** *Takeshi Goto (Japan)*

The objective of this 2-part session is to highlight recent scientific advances in monitoring, assessing, and reporting

on sustainable forests using sets of criteria and indicators. The 12 Montreal Process countries are in the midst of preparing second-generation national reports in a 2008-2010 time frame. At the same time, the Montreal Process Working Group (MPWG) has been collaborating with the Pan-European Process (MCPFE) and the International Tropical Timber Organization (ITTO) to advance the use of criteria and indicators to track progress in conserving and sustainably managing forests in their member countries. Speakers at this session highlighted the advances made in their countries/organizations towards improving the quality and consistency of information available for national reporting and the ways that information is being used to inform policy making within the country and in international forums. This first of sessions (B-06) focus specifically on advances in criteria for biological diversity (Montreal Process criterion 1), forest health (Montreal Process criterion 3), soil and water resources (Montreal Process criterion 4), and climate change (Montreal Process criterion 5). The second session (B-07) focuses on the other three Montreal Process criteria (forest productivity, criterion 2; social and economic indicators, criterion 6; and legal/institutional, criterion 7). Three oral presentations were given as follows: *Localizing the Montreal Process criteria and indicators for local-level forest planning of cool temperate forest landscapes in north Ibaraki Prefecture, Japan* (Yasushi Mitsuda, Japan); *Enhancing our view of sustainable forest management—reviewing the Montréal Process criteria and indicators* (Tim Payn, New Zealand); and *Evaluating the sustainability of socio-economic benefits from forests for the United States using the Montreal criterion 6 indicators* (Kenneth Skog, USA). The session also included three poster presentations.

\* The summary for this session was written by the COC.

### B-08 Conservation of arthropods on forested landscapes

**Organizer :** John Spence, *University of Alberta, Canada*

**Moderator :** John Spence (*Canada*)

The speakers in this session are present a cross-section of cutting edge research focused on how forestry practices can be best modified to conserve arthropod diversity, especially

those associated with the forest floor and coarse woody material. The program addressed the sorts of species that are most threatened and why, in addition to explaining research that is needed to design, apply and test the effectiveness of various conservation strategies on forested land subject to harvest. Each speaker was encouraged to directly address management and policy implications of their research. A total of seven oral presentations were made in the session as follows: *Spiders, beetles, and moths in exotic plantations and native woodlands: indicators of forest biodiversity at stand and landscape scales* (Anne Oxbrough, Canada); *Identifying ecological indicator species: a study of a ground beetle assemblage in a managed forest* (Sonomi Shibuya, Japan); *Colonization sequence and co-variation between species of saproxylic beetles and fungi during 15 years on high spruce stumps* (Jan Weslien, Sweden); *Contribution of microarthropods on leaf litter decomposition of three dominant tree species in the Phayeng sub-tropical forest ecosystem, Manipur* (Thingbaijam Binoy Singh, India); *Occurrence of trees important to biodiversity in urban areas* (Elina Peuhu, Finland); *Effects of reserve patches on saproxylic beetles in boreal white spruce stands* (Seung-II Lee, Canada); and *Termite biodiversity in tropical savannas: comparing gallery forest versus Hevea plantations in Llanos Orientales of Colombia* (Olga Pinzon, Colombia). Five poster presentations were included in the session.

\* The summary for this session was written by the COC.

### B-09 Scientific theory and practical realities in sustainable forestry

**Organizer :** Jamie Barbour, *U.S. Forest Service, USA*

**Moderator :** Jamie Barbour (*USA*)

The concept of sustainable forest management seems simple: find the intersection of ecological, social, and economic goals for a landscape. Putting this concept into practice is extremely difficult. This session explored these difficulties and offered solutions based on research and practical experience. Speakers considered alternative policy goals for achieving sustainable conditions on large landscapes with mixed public and private ownership. It examined successes and challenges of existing practices

and offered ideas on new ways to encourage landowners to act in consort to achieve goals of sustainable forestry. Seven oral presentations were included in the session as follows: *Defining and implementing sustainable management in forests* (Jamie Barbour, USA); *Great apes and logging: recommendations for viable coexistence of the timber trade and biodiversity conservation* (Alexander Belokurov, Switzerland); *An integrated approach to evaluate and design biodiversity management strategies and forest ecosystem services* (Sandra Luque, France); *Biodiversity conservation incentive programs for European and American forest owners* (Päivi M. Tikka, Finland); *The forest concession model in Venezuelan Guayana: lessons learned and the way forward for sustainable management* (Emilio Vilanova, Venezuela); *Sustainable resource management in a world of conflicting interests* (Sofia Wennberg DiGasper, Sweden); and *Ecological design of forest eco-tourism in the perspective of negative planning: a preservation practice of an urban forest in the process of urbanization* (Wu Yaoyu, China). Additionally, three poster presentations were made.

\* The summary for this session was written by the COC.

## **B-10 Advances in the conservation and management of forest genetic resources**

**Organizers :** **Yongqi Zheng**, *Chinese Academy of Forestry, China*; **Heok-Choh Sim**, *APAFRI-Forest Research Institute Malaysia, Malaysia*; **Kyu-Suk Kang**, *Korea Forest Research Institute, Republic of Korea*

**Moderators :** **Kyu-Suk Kang** (*Korea*) & **Yongqi Zheng** (*China*)

There were 13 oral presentations and 26 posters in this session, covering aspects of genetic assessment using morphological traits and molecular, management and deployment of FGR and new technologies for FGR management and conservation. The oral presentations are summarized below.

Dangasuk from Kenya presented a study on genetic diversity of *Acacia senegal* (L.) Willd, a valuable species for gum arabic production in Kenya, using 12

morphological traits and 5 ISSR markers. He found geographical sub-structuring of the populations and proposed to select individual trees within populations for improvement of gum arabic yield and conservation. In the presentation by Muratova from Russia on Karyotype diversity in 8 Larch species, she found a higher number of genome and chromosome mutations in species growing in extreme conditions and irregularities of mitosis in Siberian larch in extreme conditions. She subdivided the genus *Larix* into some karyotypic groups based on the number of secondary constrictions in chromosomes. Ballian from Bosnia and Herzegovina presented a study on Genetic differentiation of *Picea abies* Karst. among 12 natural and 1 artificial populations in the western Balkans using isozyme markers. He found that major genetic variation was among individuals within the populations and the inter-population differentiation was low. In his second presentation, he studied the possibility of seed usage of *Quercus robur* L. in Bosnia and Herzegovina based on analyses of genetic structure using microsatellite markers. He suggested that seeds and seedlings from the seed base be used at disposal but with the great risk of genetic contamination of local populations. Hashimoto from Japan made a presentation on genetic variation of *Fagus crenata* Blume in Shikoku Island using cpDNA non coding regions and microsatellite markers and found that human activities were the main cause for reduction of genetic variation. Schmidting from the USA presented a study on allozyme variation in a provenance trial of 6 populations of *Pinus elliottii* and 10 populations of *P. massoniana* in the southeastern US. He found a lower allelic diversity in *P. massoniana*, which may indicate a higher level of inbreeding in the species.

Optimal sampling strategies for conservation of *Pinus densiflora* based on genetic variation parameters in Korea and China was presented by Kim from Korea, he used allelic and genotypic diversity as the main indicators to be maximized in each sample for conservation. A simulation program was used to depict the association of genetic diversity with the sequential sampling, and to determine the optimal number of populations and individuals to be retained. In the presentation on rescue of forest timber species at critical extinction risk given by Corea from Costa Rica, he introduced the establishment of *ex-situ* genetic collections and development of vegetative propagation

technologies for timber species at risk of critical extinction, and suggested that massive reproduction has great potential for the rescue of genetic variation of endangered tropical hardwood species. Hossain from Bangladesh described the vanishing forest genetic resources of Bangladesh and the strategy for their conservation, pointing out that commercial plantations of a few fast growing exotics accelerated the erosion of the native genetic resources.

Park from Korea presented a study on metabolite-assisted early selection of *Pinus densiflora* families with fast-growing traits using a retrospective approach, where 12 open-pollinated families were grown and ranked in field trials to age 35 years, to compare the growth of their seedlings (3- to 6-month-old) in a nursery trial with the age 35-year growth index. Significant correlations were found between the growth performances of nursery seedlings and age 35-year trees, providing an important insight into the usefulness of metabolite-assisted breeding as a valuable tool to accelerate the selection process for fast-growing traits in *P. densiflora*. Goh from Malaysia presented management and deployment options of teak genetic resources. She recommended the uses of non-destructive wood analyses and molecular markers for refining the initial genotypic selections for plantation establishment. An analysis of associations between polymorphisms and carbon isotopic composition in *Populus nigra* L. was presented by Chu from China, he investigated the relationships between DNA sequence variation and phenotypic variation in water use efficiency (WUE) in *Populus nigra* L. and found that 6 single nucleotide polymorphisms (SNPs) were significantly associated with stable carbon isotopic composition ( $\delta^{13}C$ ), which is a reliable measure of plant WUE, and that *Exp1* might be a promising candidate gene for further study.

### B-11 The contribution of science to the fight against illegal logging

**Organizer :** Andreas Ottitsch, *University of Cumbria, United Kingdom*

**Moderator :** Andreas Ottitsch (*United Kingdom*)

The session objectives, based on work compiled by the Task Force “Illegal Logging and FLEGT-Processes”, are

to explore the contribution of science towards identification of the types and consequences of illegal logging, as well as evaluation of approaches to combat illegal logging. Session presentations were based on recently completed research results as well as ongoing research activities, ranging from field-research in producer countries to policy evaluation research related to recently implemented and ongoing processes in consumer countries. A total of seven oral presentations were made in the session as follows: *Socio-economic implications of chainsaw milling on the rural and national economy of Ghana* (Beatrice Darko Obiri, Ghana); *Beyond legality: exploring synergies between FSC and FLEGT* (Andre De Freitas, Germany); *Potential forensic application of DNA profiling in combating illegal logging* (Soon-Leong Lee, Malaysia); *Modeling the impact of EU FLEGT and other trade policies on the use of wood for energy in the EU* (Alexander Moiseyev, Finland); *Comparative evaluation of anti-illegal trade policies in Europe and the United States* (Andreas Ottitsch, United Kingdom); *Forest certification chain-of-custody analysis: perspectives of manufacturers and suppliers in the Asia-Pacific region* (Mihyun Seol, USA); and *The use of microsatellite markers to confirm the flow of Bangkirai timber (Shorea laevis): a field testing in a forest concession holder in Central Borneo* (Tedi Yunanto, Indonesia). One poster presentation was included.

\* The summary for this session was written by the COC.

### B-12 Sustaining tropical timber species: is science making a difference?

**Organizer :** Sheila Ward, *Mahogany for the Future, Puerto Rico, USA*

**Moderator :** Sheila Ward (*USA*)

High-value tropical timber species are still harvested unsustainably in natural forests, and also suffer from poor regeneration, reduced genetic variation, and insect predation. These problems of sustainability are similar in the eastern and western hemispheres. The successful management of these species in natural forests will help maintain their biodiversity at the genetic and species levels, and also help maintain associated species and the local human communities that depend on forest resources. In this



technical session we evaluated the impact of research and technical transfer on the management and sustainability of high-value tropical timber species, including natural forest management for regeneration and growth, conservation and use of genetic resources, use of genetic markers to track illegal logging, and control of insect attack. The session included a moderated panel discussion. Seven oral presentations were made in the session as follows: *Are molecular data influencing forest management? Results from American and African species* (Stephen Cavers, United Kingdom); *Verifying the geographic origin of mahogany (Swietenia macrophylla King) with DNA-fingerprints* (Bernd Degen, Germany); *Occurrence and pressure of logging through forest management in Acre State, Brazil* (Patricia Mattos, Brazil); *Application of mahogany and Spanish cedar research in Mexico* (Patricia Negreros-Castillo, Mexico); *Dynamics and developments of timber trees in different production systems in the high forest zone of Ghana* (Kwame Antwi Oduro, Ghana); *Integrated approach to restore African mahogany in Ghana's forest estate* (Emmanuel Opuni-Frimpong, Ghana); and *Using the genetic diversity of mahogany and Spanish cedar in plantations in Costa Rica* (Sheila Ward, Puerto Rico/USA). The session also included six poster presentations.

\* The summary for this session was written by the COC.

### B-13 Speaking with one voice – scientists and stakeholders in forestry

**Organizer :** Daniela Kleinschmit, *SLU, Department of Forest Products, Sweden*; Ingwald Gschwandtl, *Lebensministerium, Austria*

**Moderator :** Daniela Kleinschmit (*Sweden*)

The session was jointly organized from the IUFRO Task Force on “Communicating Forest Science” and the UNECE/FAO Forest Communicators Network. The main target audience has been communicators from forest science organization as well as from other stakeholders and scientists dealing with forest communication issues.

The aim of the session was first to give voice to the communicators dealing with forest issues. The second aim was to investigate and discuss the potential of a common

and comprehensive strategic approach of forest science and forest stakeholder.

Three presentations have been held in the session. The first presenter Cinthya Miner talked about her experiences as a communicator in the USDA Forest Service. She presented how stakeholders in management have been recognized of a forest science organization. The second presenter, Gerben Janse presented the European Forest Week 2008 as an example of a common communication strategy of forest scientists and stakeholders. The third presenter Ludmilla Marusakova gave an idea of a practical communication model from Slovakia.

After these presentations a panel discussion has taken place. The discussion focused on the challenges of a common forest communication strategy but as well on practical issues of communication and public relations. In particular the last indicated the need for a forum of forest communicators to exchange experiences, problems and solutions.

The poster presenters have been involved in the discussion.

### B-14 Multiple-use management and sustained use of tropical production forests

**Organizers :** Plinio Sist, *CIRAD, France*; Manuel Guariguata & Robert Nasi, *CIFOR, Indonesia*

**Moderator :** Plinio Sist (*France*)

Although the conceptual and practical underpinnings of multiple-use forest management (MFM) in the tropics were laid out more than a decade ago, Multiple forest management (MFM) is still poorly implemented in the tropical forests. The objective of this session was to debate about the present situation regarding the implementation of MFM systems in the three continents where tropical rainforest still occurred (Amazon basin, Congo Basin and SE Asia).

The first presentation by Plinio Sist set up the general

concept of Multiple use of forests in the tropics, focusing on the promising and limiting factors for their implementation. The presentation focused on the Brazilian Amazon and demonstrated that the region presents a huge potential for multiple use forest management implementation. However, there are still very few initiatives in the field and pilot research project aiming to test and assess models of multiple forest management systems are urgently needed. Manuel Guariguata presented a case study carried out in the tri-national frontier of Madre de Dios, Peru, Acre Brazil and Pando, Bolivia, in which the perceptions of representatives from four stakeholders groups on integrated management of timber and Brazil nuts at the community and industrial scale were assessed. Results showed that capacity-building of producers and foresters was considered the dominant strength of Brazil nuts and timber, and high management costs and policy barriers were considered the main weaknesses. These results were used as a platform for a tri-national multi-stakeholder workshop to identify research and development interventions toward policy change. Robert Nasi explored the management models in Central Africa logging concessions and the possibilities for actively managing both timber and biodiversity with a special emphasis on residual timber stands, wildlife, and certification. This study concluded that true multiple-use could only be realized through new innovative land-use units, allowing a spatial cohabitation of the interests of local people, conservation proponents, and extractive industries in the same unit with an optimized and equitable share of the various goods and services. Milton Kanashiro presented a case study of a multiple use species of the Amazon (Andiroba: *Carapa guianensis*) used for both, its high timber value as well as for the oil extracted from its seeds. In the region of Santarém (Brazil) 101 trees with dbh  $\geq 10$ cm were monitored during the fruit dispersion peak season which occurred from February to March 2009. Individuals with 30-60 cm dbh showed the highest mean production (8.6 kg/tree) whereas smaller (10-30 cm dbh) and bigger trees (dbh > 60 cm) produced significantly less fruits. The results suggested that trees with dbh 30-60 cm should be preferred for seed collection, preserved from logging while bigger individuals with dbh > 60 cm could be selected for logging. K. A. Ouduro presented the opportunities and challenges of multiple use forest management strategies in Ghana examining the strengths,

weaknesses, opportunities, and threats of current policies with respect to multiple use forest management. The paper concluded with some recommendations for future research. Finally, N. Kumpel compared different methods used in Ghana and Cameroon to help logging companies to improve their wildlife management as part of the timber certification process. Their applicability for monitoring biodiversity in REDD projects under different types of management were then discussed.

## B-15 Silvicultural systems for tropical forests: challenges and progress

**Organizers :** Robert Nasi, CIFOR, Indonesia; Sylvie Gourlet-Fleury, CIRAD, France

**Moderator :** Robert Nasi (Indonesia)

The complexity of tropical silviculture for natural forests has substantially increased as a result of a wider range of often conflicting management objectives, a wider range of forest ecosystem conditions, and forest users. Within this increasingly complex working environment, tropical silviculture and in particular management systems aimed at achieving long-term sustainability of timber yields, remains challenging. Silvicultural management systems currently used in tropical forests are typically high impact systems that often do not result in strictly sustainable yields in terms of the original species and size class composition; producing permanently altered and impoverished secondary forests. While reduced impact logging practices, while important, are insufficient to achieve true long-term sustainability and maintenance of biodiversity. The objectives of this session are to examine the current state-of-art in tropical silviculture, identify prevailing inadequacies/limitations, and to explore new approaches that are better aligned with tropical forest dynamics, biodiversity conservation and economic realities. The session included six oral presentations as follows: *Integrating rural livelihood needs with silvicultural management for timber harvesting in Miombo woodlands* (Stephen Syampungani, Zambia); *A toolbox for developing silvicultural systems capturing nature's way towards sustainable forest management: analyses from a forest inventory in Gabon's tropical moist forest* (Coert J. Geldenhuys, South Africa); *The high value*

*of logged tropical forests: lessons from northern Borneo* (Keith Hamer, United Kingdom); *Scientific basis for plant diversity recommendations in Southeast Asian production rainforests* (Yves Laumonier, France); *Silviculture and sustainability in the Meliaceae* (Sheila Ward, Puerto Rico/USA); and *Limits of selective logging techniques including RIL in tropical forests to sustain timber yields and to achieve sustainable forest management in general* (Plinio Sist, France). Five poster presentations were given in the session.

\* The summary for this session was written by the COC.

## **B-16 Sustainable Forest Recreation Management: a discussion on social criteria and indicators**

**Organizers :** **Tuija Sievänen**, *Finnish Forest Research Institute, Finland*; **Ulrike Pröbstl**, *University of Natural Resources and Applied Life Sciences, Austria*

**Moderator :** **Tuija Sievänen** (*Finland*)

This session discussed social criteria and indicators in the context of sustainable forest recreation management. As a background there are several international ongoing processes such as the Montreal Process and the Ministerial Conference on the Protection of Forest in Europe (MCPFE) related to the session topic. The presenters introduced the topic interestingly from different scales of management, planning and decision making processes, and from different aspects of needs and purposes for indicators.

Wolfgang Haider (Canada) discussed social indicators from a perspective of regional land use planning and management of natural resources. He pointed out that there were not good criteria and indicators developed to indicate relevant aspects of recreational use in large scale planning. As a consequence outdoor recreation is considered in local and regional management processes when it is relevant, but it is generally overshadowed by other social concerns in more strategic debates and frameworks.

Second presentation by Frank S. Jensen (Denmark) introduced the Danish National Forest Inventory system,

where measures for recreational use have been adopted recently. The Danish experience show that national forest inventories can relatively simply and cost-effectively be expanded to include a number of social indicators that are not available otherwise. The continuity of the measurements is a valuable addition to sustainable knowledge-based management and policy decisions.

Tuija Sievänen (Finland) presented the outcomes of recent project where country specific indicators to monitor implementation of National Forest Program were developed. The major problem to choose good indicators is the limited supply of data, which would cover the whole country, include time series of same measures, and could be cost-effectively produced.

The presentation of Ulrike Pröbstl (Austria) discussed the process to evaluate the applicability of the existing European Framework of Sustainable Forest Management (SFM) in the context of the Austrian Nature Parks. An initial analysis reveals that crucial proposed indicators for recreation are not useful. The relevance and the value of a close to nature forestry for the local tourism business are not captured by the actual set of criteria and indicators.

The last presentation offered an Asian perspective to the session theme. Won Sop Shin (South Korea) described how indicators are developed for planning and management of individual recreation forests. The presentation introduced criteria and indicators of sustainable recreational forest management in terms of the quality of visitors' recreation experience and the resource base. Using Delphi with a pool of experts in outdoor recreation, this study identified 7 criteria and 34 indicators.

Some time was reserved for the discussion of the need for internationally comparative criteria and indicators of sustainable forest recreation planning and management. Hopefully the information and experiences from different continents and countries shared in the session improved understanding of the need and use of social criteria and indicators as a tool for better planning and management of forest recreation resources.

## B-17(1) Evaluation management effectiveness of protected areas

**Organizer :** Alexander Belokurov, *WWF International, Switzerland*

**Moderator :** Fifanou G. Vodouhe (*Benin*)

The five presentations in Session B-17(1) addressed the relevant topics of the evaluation of protected areas management. The first presentation, A. Belokurov (WWF International, Switzerland) showed out how the modified of management effectiveness tools could be relevant to climate change threat. Tools modified to fit in this challenge are rapid assessment and prioritization of protected areas management methodology and the management effectiveness tracking tool. For management effectiveness evaluation in South Korea's protected areas system, Heo H. Y. (Korean National Park Service, Republic of Korea) recommended to develop more regional conservation approaches, to strength protected areas system planning, to improve participatory approaches in protected areas management and to review staff management practices. Islam Md. W. (Khulna University, Bangladesh) and Vodouhê F.G. (University of Abomey-Calavi, Benin) addressed the importance of co-management in sustainable conservation of protected areas biodiversity. The first participant presentation was focused on the effectiveness of co-management at Lawachara National Park through the development of community-based projects. Concerning Vodouhê F.G. research, he analyzed Pendjari National Park surrounding people's view on ongoing participatory management activities and their perceptions towards biodiversity conservation within the park. The last oral presentation done by Kim S.G. (Seoul National University, Republic of Korea) developed and refined the process to assign the category system of IUCN in Korea.

Mr. Christian M.Y. (International Cooperation Center for Agricultural Education, Japan) under poster presentation showed the impact of illegal harvesting of indigenous fruits species on the sustainable management of Ivindo National Park. In his poster, Mr. Dizon J.T. and collaborators (University of the Philippines) addressed the importance of participatory upland development action to ensure Mt.

Makiling Forest Reserve's productive and sustainable management. Nielsen M.T. (University of Copenhagen, Denmark) documented on his poster the effects of joint forest management in Tanzanian national forest reserve while Sivacioglu A. (Kastamonu University, Turkey) addressed the precautions to avoid unfavorable impacts on the local community. Suratman M.N. (Universiti Teknologi MARA, Malaysia) provided an assessment of species composition and determined the level of tree species diversity in Pahang National Park.

## B-17(2) Evaluation management effectiveness of protected areas

**Organizers :** Vinod B. Mathur, *Wildlife Institute of India, India*; Alexander Belokurov, *WWF International, Switzerland*

**Moderator :** Fifanou G. Vodouhe (*Benin*)

The five presentations in Session B-17(2) addressed the relevant topics of the evaluation of protected areas management. In the first presentation, A. Belokurov (WWF International, Switzerland) demonstrated how the modified management effectiveness assessment tools could be relevant to climate change threat. Tools modified to fit in this challenge are Rapid Assessment and Prioritization of Protected Area Management methodology and the Management Effectiveness Tracking Tool. For management effectiveness evaluation in South Korea's protected areas system, Heo H. Y. (Korean National Park Service, Republic of Korea) recommended to develop more regional conservation approaches, to strengthen protected areas system planning, to improve participatory approaches in protected area management and to review staff management practices. Islam Md. W. (Khulna University, Bangladesh) and Vodouhê F.G. (University of Abomey-Calavi, Benin) addressed the importance of co-management in sustainable conservation of protected areas biodiversity. The first participant presentation was focused on the effectiveness of co-management at Lawachara National Park through the development of community-based projects. Concerning Vodouhê F.G. research, he analyzed Pendjari National Park surrounding people's view on ongoing participatory management activities and

their perceptions towards biodiversity conservation within the park. The last oral presentation done by Kim S.G. (Seoul National University, Republic of Korea) developed and refined the process to assign the IUCN category system in Korea. Participants of the session were able to ask additional questions to each of the presenters.

Mr. Christian M.Y. (International Cooperation Center for Agricultural Education, Japan) under poster presentation showed the impact of illegal harvesting of indigenous fruits species on the sustainable management of Ivindo National Park. In his poster, Mr. Dizon J.T. and collaborators (University of the Philippines) addressed the importance of participatory upland development action to ensure Mt. Makiling Forest Reserve's productive and sustainable management. Nielsen M.T. (University of Copenhagen, Denmark) documented on his poster the effects of joint forest management in Tanzanian national forest reserve while Sivacioglu A. (Kastamonu University, Turkey) addressed the precautions to avoid unfavorable impacts on the local community. Suratman M.N. (Universiti Teknologi MARA, Malaysia) provided an assessment of species composition and determined the level of tree species diversity in Pahang National Park.

### **B-18 Identifying and monitoring old growth forests in boreal, temperate and Mediterranean environments**

**Organizers :** Anna Barbati & Piermaria Corona,

*University of Tuscia, Italy; Thomas Spies,  
U.S. Forest Service, USA*

**Moderators :** Anna Barbati (Italy) & Thomas Spies (USA)

The eight contributions in this session addressed topics related to the conservation of old-growth forests with a focus on the temperate forest biome where – especially in the Northern hemisphere – because of a long history of logging and land clearing, old growth forests are relatively scarce. A diverse set of approaches and techniques applied in Europe, North and South-America and Australia were presented for addressing the following topics:

- i) How to identify and monitor temperate and old-growth forests;
- ii) How to bring together new concepts to manage temperate old-growth forests whether for conservation or multiple-use.

Thomas Spies (USDA Forest Service, USA) focused on old growth forests in the US Pacific Northwest, highlighting varied and complex definitions for old growth and different pathways by which these forests develop. He recommended a simple, structurally focused definition for effective monitoring.

Rod Keenan (University of Melbourne, Australia) discussed events leading to Australia's policies for old growth protection. Detailing operational definitions used to map and designate protected areas, he stressed the need for adaptive approaches, for the conservation of old-growth forests under climate change pressures.

Anna Barbati (University of Tuscia, Italy) presented operational approaches based on structural variables to identify forests that have developed old-growth attributes (old-growthness) in the Mediterranean region of Europe; due to a long-history of anthropogenic disturbance finding these forests requires looking in hard to access remote locations that have been under limited management or remnants of forests protected since long in National Parks.

William Keeton (University of Vermont, USA) explained that forests in the US Northeast were almost entirely cleared but are now re-growing. He discussed a study examining harvesting treatments designed to encourage development of old growth attributes in secondary forests.

Grant Wardell-Johnson (Curtin University, Australia) addressed the protection of tall open forests in southwest and southeast Australia. He stressed the importance of climate change when thinking about the conservation of old growth, noting, inter alia, carbon retained in old growth forest soils and changing temperature and precipitation affecting the viability of protected forests.

Jan Bannister (University of Freiburg, Germany) reviewed research investigating the development of swamp and upland stands of old growth *Pilgerodendron uviferum*

forests in Patagonia, showing the tree species is stress and shade tolerant and can regenerate without large disturbances.

Alfredo Di Filippo (University of Tuscia, Italy) presented findings from a study of old-growth beech forests in northern and central Italy that reconstructed tree-life histories to analyze the transition of these forests towards old growth status from their previous state as managed forests.

Kris Verheyen (Ghent University, Belgium) discussed long-term changes in understory vegetation in European forests based on an analysis of archived plots. He offered a synthesis quantifying the rate and nature of change in understory vegetation and their key environmental drivers. Selected papers from this session will be published on a special issue of *Plant Biosystems*.

### **B-19 Statistical methods in biodiversity assessment and biodiversity responses to silviculture**

**Organizers : Tzeng Yih Lam, & Douglas A. Maguire**  
*Oregon State University, USA*

**Moderator : Tzeng Yih Lam (USA)**

In the face of many current critical environmental issues such as climate change, deforestation, and desertification, biodiversity conservation has become a top priority for scientific discussion and research. In order to adequately assess changes in biodiversity, baseline information is essential and statistical tools that could provide this information reliably are paramount to successful management and policy. This session addressed the use of various advent statistical methods in assessing biodiversity and its responses to silviculture through oral and in-session poster presentation. The structure of the session was split into four components: a general address on past and current research, silvicultural experiments, theoretical consideration, and practical constraints in biodiversity assessment.

Four keynote speakers were invited to talk on each of the

components. Guariguata (CIFRO Indonesia) presented the status, trends and challenges in biodiversity conservation effort in tropical forest management drawing informations from literature and his own experiences. Lu (CAF China) presented a manipulative experiment in silvicultural restoration of degraded forest and how to achieve desirable structural diversity. Kassim (FRIM Malaysia) presented how to translate biodiversity research results into a practical tools which could be used by different stakeholders of diverse interests in forest management. Lastly, Gosselin (CEMAGREF France) presented philosophical discussion on interpretation of statistical results.

Additionally, An (Michigan State University USA) presented a new sampling and estimation methods in assessing rare and aggregated species whereas Ledo (Universidad Politécnica de Madrid Spain) presented improved method in assessing spatial distribution of a species. These two presentations have contributed to the general discussion at the end of the oral presentation on interpretation of statistical results.

During the in-session poster presentation, two posters (Xiang, Beijing Forestry University, China; Chiarucci, University of Sienna, Italy) were missing and the presenters have not contacted the session moderator during the IUFRO conference. Hence, the reasons for the presenters missing the poster presentation were unknown. One poster (Silva, Brazilian Agricultural Research Corporation, Brazil) was voluntarily withdrawn due to unforeseen circumstances. The other three posters were presented as scheduled with Han (Seoul National University, Korea) presenting a ordination method in associating environmental factors with species diversity, Itô (FFPRI, Japan) presenting a Bayesian Hierarchical model in analyzing species abundance and Lam (Oregon State University, USA) presenting structural equation modeling in assessing ecological processes. Discussion on the poster presentation was held after all posters were presented. Two disadvantages of in-session poster presentation were that (1) it was difficult to gather attendants after the oral presentation, (2) noise-level outside the session room was interfering with the discussion and presentation.

A concluding remark from the discussions and presentations

was an agreement to continue organizing and holding meetings similarly to this session to further discussion on statistical methods and interpretation of statistical results

## **B-20**    **Analysing the “translation” of global discourses on forest governance to regional, national and local levels**

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**Organizers :** **Karl Högl**, *Department of Economics and Social Sciences, University of Natural Resources and Applied Life Science (BOKU), Austria*; **Daniela Kleinschmit**, *Department of Forest Products, Swedish University of Agricultural Sciences (SLU), Sweden*

**Moderator :** **Daniela Kleinschmit** (*Sweden*)

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Background of the session is that international discourses on SFM and forest governance have manifested in a huge variety of forms and forums: e.g. in international deliberations on forest and their outputs, non-state market driven forest certification schemes etc. The first presenter Bas Arts emphasized that in contrast to many critiques the Global Forest Governance processes made progress in the last decades. The increasing areas of certified forests as well as the decreasing net loss of deforestation of the last years have been used as positive examples. The next speaker, David Humphreys concentrated in his presentation on the global discourses. David Humphreys investigated in the nature of discourses by identifying the power structure and the underlying neo-liberal understanding. He finalized his presentation with a positive example of governance from Bolivia. The last speaker has been Karl Högl. He concentrated on the factors influencing the affects of international forest policy approaches at the domestic policy level and concluded that the domestic policy subsystems' pre-existing configuration in terms of i) leading policy paradigms and styles and ii) actor networks configurations explain the sort and degree of domestic response to international impulse to quite some extent.

After these presentations the poster giver had a chance to give a short overview on the subject of their posters. All of these presentations have been on the discourses. Alejandra Real reported about the international forest science

discourse. Sara Holmgren presented a study comparing the framing of the REDD discourse at the global level with the Swedish media discourse on REDD. The poster on the different framing of the tiger in international and national – Bangladesh – media has been presented by Daniela Kleinschmit on behalf of Nazmus Sadath.

All presentations have been lively discussed and linkages between the different research perspectives and results have been made in the discussion. The feedback of the session from the audience and the presenters has been very positive. s

## **B-21**    **Assessing the effects of forest management on biodiversity over large landscapes : tools, trends and implications for conservation**

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**Organizers :** **Ken Sugimura**, *Forestry and Forest Products Research Institute, Japan*; **Sandra Luque**, *French Institute of Agricultural and Environmental Engineering Research-CEMAGREF, France*; **David Langor**, *Natural Resources Canada, Canada*

**Moderator :** **Sandra Luque** (*France*)

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Maintenance of biodiversity in forest ecosystems that are increasingly perturbed by global environmental changes and resource exploitation presents a huge challenge to forest managers. The destruction of habitat is the largest cause of species extinctions. Affordable and efficacious tools and approaches are needed to assess and monitor over large forested landscapes the impact of human pressures on the health and persistence of the species that depend on these ecosystems.

In order to answer to this challenge the session provided a good geographic representation with seven oral presentations and seven posters from eight different countries, in all three continents represented with different realities and different approaches and tools to tackle forest biodiversity decline in the face of global change and increasing human pressures. Mitigation and adaptive management based on new harvesting strategies was in

the agenda as presented by Guillermo Pastur (Argentina) and Lena Gustafson (Sweden). With different case studies they presented separately how selective forest retention can assure the economically and ecologically sustainability of forests. A workshop will be organized next year on the specific topic of forest retention. Furthermore, L. Gustafson presented a multi-scaled, integrated ecosystem approach based on land-owners responsibilities applied in Sweden with similarities on other Nordic countries. Marc Hanewinkel (Germany) presented a wide range of European forest types under different intensities of forest management examples. Main focus was on disturbance regimes in relation to forest dynamics. Sandra Luque (France) following with the European experience presented contrasting examples from boreal forest in Finland and temperate mountains forest in France to show a common modelling approach at different scales to improve regional planning in managed forests. She showed how habitat quality assessment and modelling can be used to manage complex landscapes in a way that retains and enhances biodiversity value. Then comparing mixed temperate forests in Alaska, Japan and central Europe, Robert Deal indicated that appropriate forest management practices with the use of partial cutting, selection harvesting and mixtures of different tree species, increased structural diversity and enhanced biodiversity. In contrast, Toru Koizumi suggested that nationwide surveys would be an effective tool to understand the interactive relationship between forest management and wildlife. Ken Sugimura developed a methodology that evaluates species diversity, giving higher weight to those with smaller distribution area, compared results among areas with different levels of landscape changes and suggested that an anthropogenic change of forest landscapes tend to result in a decrease in bird species diversity, in particular diversity of rare species that have relatively small distribution area.

The symposium was followed by a panel discussion with a highly motivated crowded room full of questions.

## B-24 Ecology and management of mixed species stands under changing climatic conditions

**Organizers :** **Bogdan Strimbu**, *Louisiana Tech University, USA*; **Norocel-Valeriu Nicolescu**, *Transylvania University, Romania*; **Bing Guan**, *National Taiwan University, Taiwan*

**Moderator :** **George Gertner** (*USA*)

The objective of the session was to present the latest advancements in the mathematical representation of the mixed-species stands. The session focused on the new methodologies used to analytically represent the composition of the mixed-species stands, as well as techniques and results quantifying the biomass dynamics and the impact of the species composition on the components of the biomass, wildlife and stand and forest vulnerability. In additional, some of the presentations discussed methodologies and techniques for assessing uncertainties in such investigations. It was in common agreement throughout most of the presentations that mixed-species stands are the most diverse forest ecosystems, and are the main player in biodiversity conservation. Furthermore, mixed-species stands have larger total biomass than the corresponding pure stands, making them the most suited terrestrial ecosystem for carbon storage. They are the most sustainable, robust and resilient forests

## B-25 Frontiers in wildlife ecology and management

**Organizers :** **C.A.M. Sylvestre Djagoun**, *Université d'Abomey-Calavi, Benin*; **Xuemei Han**, *Yale University, USA*

**Moderators :** **C.A.M. Sylvestre Djagoun** (*Benin*) & **Xuemei Han** (*USA*)

Habitat management is crucial for wildlife well being, thus although wildlife ecology issues are peripheral to most IUFRO scientists, this technical session highlighted the interdependence of wildlife and habitat. It gave an overview of the interactions between habitat management and wildlife ecology, and inspired further investigations of



the threats to wildlife. A total of four oral communications and one poster were presented.

In the first presentation, Djagoun Sylvestre (Université d'Abomey-Calavi, Benin) examined the distribution of small carnivores in southern Benin, the impact of heavily disturbed habitats on their survival, and the level of sustainability of the actual hunting pressure. In the second presentation, Xuemei Han (Yale University, USA) highlighted the effects of forest dynamics under various management scenarios on tiger habitat and concluded that forest stand structure is one of the major limiting factors for tiger populations. The third communication, presented by Ghanbari, S. (University of Tehran, Iran), focused the impact of deforestation on the status of the Caucasian Black Grouse (*Lyurus mlokosizwiczii*) in the Arasbaran protected area in northwest Iran. Then, Park, C.R. (Korea Forest Research Institute, Republic of Korea) presented a habitat suitability model for white-backed woodpeckers (WBWs) in Jeju experimental forests, provided potential habitats of WBWs known as keystone species, and suggested management scenarios of biodiversity for sustainable forest management at local level. The last presentation, a poster, concluded that the habitat requirements of forest birds differed. While ground-foragers are clearly dependent on intact forest, canopy and mid-layer foragers including various globally threatened species, are also frequent in early succession habitats created by disturbance, at forest edges, or even in relatively open, agricultural landscapes, if they retain at least a small amount tree cover.

Finally, during the discussion other work experiences from the participants were shared and some remarks were made about the fact that IUFRO deals less with the wildlife community and Dr. John Parrotta, who also attended the session, clarified that a task force on wildlife management ecology and conservation exists through Division 8, led by Professor Rudolf who was also present. Considering the interest of the participants to be more involved, we have to recognize that forest management is synergetic with wildlife management and the interplay between these goals must be accounted for more consciously and more actively if a better balance between wildlife and forest is to be achieved.

## B-26 Sustainable management and use of non-wood forest products

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**Organizer :** Nirmal Bhattarai, ICIMOD, Kathmandu.  
*Nepal*

**Moderator :** Nirmal Bhattarai (*Nepal*)

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The session began with Nirmal Bhattarai's presentation highlighting ICIMOD's efforts in conservation, sustainable management and development of prioritized medicinal plants in parts of five South Asian countries (Nepal, India, Pakistan, Sri Lanka and Bangladesh) having varied socio-economic, cultural and environmental variations. For effective management and development of the NWFP sector for rural livelihoods, we must follow the entire stepladder starting from awareness creation through in situ management and ex situ cultivation to technical inputs including value addition, processing and marketing, as per the site specific needs. In the second presentation J. L. Chamberlain (USA) highlighted his research efforts to establish a correlation between above-ground biomass and underground parts focused on natural populations of Black cohosh (*Acatea racemosa*). The attempt has been to develop an inventory method based on height and crown of the plant to predict the underground biomass. In the third presentation V. J. Ingam (The Netherlands) highlighted the poor status of *Prunus africana* in Cameroon that has been included in the IUCN Red List and CITES restriction. Ingam informed of the participatory developed national management plan in the trade chain that has succeeded in domesticating the endangered species and analyzed the planning process for conservation and sustainable management together with critically reviewing the management plan. The last oral presentation from D. R. Pelz (Germany) emphasized the need to assess timber and non-timber forest functions as a basis for forest planning. He suggested an approach based on external factors that are stable over time and over large areas including those influenced by management decisions. The suggested approach included multi-purpose application including ecosystem health suitable for the simultaneous assessment of both timber and non-timber related forest functions.

Among the 26 self-explanatory posters displayed under this

session in the Poster Hall, the following were representatives of the posters: Pereki et al. (Togo) reported 172 species of plants having potentials for producing cosmetics and skin care in Togo; Dasgupta (India) report production of antifungal proteins from certain medicinal plants; Herawati et al. (Indonesia) provided information on dyes obtained from *Indigofera* spp.; Kwon et al. (Korea) reported the effects of number and size of boring on sap collection of *Acer mono*; Park et al. (Korea) described the anatomy of inoculated Korean mistletoe using Japanese apricot (*Prunus mume*) and mulberry (*Morus bombycis*) as the host plants; Yang et al. (Korea) reported the production of mushroom salt from *Lentinus edodes*, *Pleurotes ostreatus* and *Auricularia polytricha*; Winami et al. (Indonesia) analyzed the physio-chemical properties of dragon's blood (*Daemonorops draco*) and Ipoh bark (*Antiaris* spp.) yielded from traditional processing by the Indonesian tribes, and Winami et al. in a separate poster described the local-level processing technology for improving the quality of dammar (*Shorea javanica*) from Lampung, Indonesia.

The session concluded with an animated and thorough discussion of issues relating to sustainable management and use of wide array of non-wood forest products. On the whole, this session was productive that has provided enough food for future research effort on various NWFPs.

### B-27 Innovative approaches to forest ecosystem restoration

**Organizers :** Stephen Syampungani, *Copperbelt University, Zambia*; John Stanturf, *U.S. Forest Service, USA*

**Moderators :** Stephen Syampungani (*Zambia*) & John Stanturf (*USA*)

Session B-27 had five oral presentation and three posters all of which addressed issues of forest ecosystem restoration once disturbed. The presentations were of wide geographical coverage ranging from Africa through Europe to Asia. In the first presentation, Geldenhuys, Mala and Syampungani dealt with the understanding of various development stages of the Congo Basin tropical moist forest, Southern African woodlands and the warm

temperate forests of South Africa to provide a basis for developing a basis for forest rehabilitation towards biodiversity recovery and socio-economic benefits. In the second paper, Isikhuemen of Nigeria discussed how biodiversity loss and land degradation could be reversed across agricultural landscape in southern Nigeria through eco-friendly cropping mixtures and agroforestry practices. Nagashima dealt with the early-stage vegetation recovery processes at abandoned plantation clear-cut sites. Another study, (Stanturf and Madsen) gave an account of how contemporary forest restoration can be practiced internationally based on literature review from recent IUFRO conferences. Thomae, De Keersmaeker, De Schrijver, Nandekerkhove and Verheyen discussed the tree species may impact on establishment of herbaceous species in post-agricultural forests.

All the three posters dealt with issues of recovery of forests. Paeredes, Nutto and Berker discussed how the utilization of lesser-known tree species in secondary semi-deciduous tropical forests in Colombia may contribute to ecosystem restoration and sustainable forest management while Sale-Come from the Philippines presented on how leaf trait variability and plant morphology may be preferred for mixed-species reforestation in Leyte, Philippines. Lastly, Tekpetey of Ghana's poster illustrated how bamboo may be used in restoring mined sites in Ghana.

### B-28 Contemporary challenges in forest ecosystem management and silviculture

**Organizers :** Björn Hånell, *Swedish University of Agricultural Sciences, Sweden*; Khosro Sagheb-Talebi, *Research Institute of Forests and Rangelands, Iran*

**Moderators :** Björn Hånell (*Sweden*) & Khosro Sagheb-Talebi (*Iran*)

Some ecological parameters which are important to be considered in forest management and silvicultural decisions have been presented in this technical session by four presenters from three different continents. Wind, regeneration felling, natural regeneration, ground cover vegetation and ecological models were discussed.

In the first presentation, Juan Blanco (University of British Columbia, Canada) described the legacy of forest management in tropical plantations. He emphasized on ecological models that are useful tools to compare alternative management regimes. In this paper, the long-term influence of forest management on tree growth was explored by using the FORCAST model, calibrated for a *Pinus caribaea* plantation in western Cuba.

The second speaker, Andrés González-Melo (Universidad Distrital, Colombia) introduced the mechanism of seed production of the Andean oak in two forests of Colombia under natural situation which is important for management strategies. Fruit production of 15 trees was monitored monthly using fruit/seed traps under the tree crowns.

Then Mohammadreza Neghadarsaber (Research Center of Agriculture and Natural Resources-Fars, Iran) illustrated the impact of ground cover vegetation, shrubs and bushes on regeneration of wild Pistachio (*Pistacia atlantica*) in a semi-arid region of Iran. He emphasized on the positive effect of Almond species on improvement of regeneration. Finally, Alvaro Promis (Universidad de Chile, Chile) presented the effect of regeneration felling under shelterwood system on wind speed in a *Nothofagus pumilio* forest of southern Patagonia. The hourly maximum wind speed on the managed forest was on average 2.38 times higher than in the unmanaged forest

### C-01 Stand structure: a key issue in managing forests for timber, wildlife, water, and NTFP resources

**Organizers :** Valerie LeMay, University of British Columbia, Canada; Peter Newton, Natural Resources Canada, Canada

**Moderator :** Valerie LeMay (Canada)

Management of stand structure has become a primary issue in the provision of ecosystem services. In the past, management of woodland areas was focused on the provision of timber resources, with secondary objectives of long-term ecosystem stability. Stand structure management has now changed towards the provision of a variety of

resources including water, soil stability, wildlife habitat, and non-timber forest products, while providing for timber products revenue. This change in focus has resulted in the need for changing measurement and management, as stands become more diverse to meet multiple management objectives. The session objective is to highlight the changes in management towards more diverse stand structures to provide a diversity of ecosystem services, and to determine the gaps in research. To achieve this objective, we included speakers from a number of continents and talks on management and measurements for a variety of products. The session was divided into two parts, morning and afternoon sessions, because we had lots of contributions. In total, 12 oral presentations were given. Morning session included following six oral presentations: *Effects of cutting intensity on regeneration of natural spruce-fir conifer and broadleaved mixed forest in Changbai Mountain (Xingang Kang, China)*; *Stand structure classification to facilitate modelling and mapping of forest succession (Ian Moss, Canada)*; *Dendrometrical structure of one fragment of the semi-deciduous seasonal forest in Brazil (Jose Imaña, Brazil)*; *Spatial patterns in untouched beech (Fagus orientalis Lipsky)-dominated stands within forest development stages in the Caspian region of Iran (Reza Akhavan, Iran)*; *Effects of fertilization and stand structure on new culm production of Dendrocalamopsis vario-striata stand (Benzhi Zhou, China)*; and *Stand structure versus carbon fixation under different management systems (Ignacio Barbeito, Spain)*. Afternoon session also included six oral presentations as follows: *Diversity of non-timber products of the Sal (Shorea robusta C.F. Gaertn) forests of Bangladesh (Md. Mizanur Rahman, Bangladesh)*; *Forest bark structure: an indicator of forest biodiversity and health (David W. MacFarlane, USA)*; *Long-term changes in rainfall runoff response with afforestation in a coniferous forest catchment (Hyung Tae Choi, Republic of Korea)*; *How attractive are timber production forests for nature-based tourism in Finland? (Liisa Tyrväinen, Finland)*; *Competing land uses challenging “The Swedish Forestry Model” (Camilla Sandström, Sweden)*; and *The community structure of Pinus densiflora forest in the preservation area around the Wangpicheon basin of South Korea (Hongduck Sou, Republic of Korea)*. On top of it, a total of 11 poster presentations were made.

\* The summary for this session was written by the COC.

## C-02 Integrating forest products with environmental services

**Organizer :** Robert Deal, *U.S. Forest Service, USA*

**Moderator :** Robert Deal (*USA*)

This session received a considerable amount of interest on a broad range of topics related to carbon sequestration, wood production, sustainable forest management, ecosystem services, biodiversity and forest policy to integrate forest products with ecosystem services. The session included seven oral presentations and 12 posters in a moderated poster symposium.

For the oral session, Chadwick Oliver (USA) presented a global vision for integrating carbon sequestration and wood products and some of the tradeoffs associated with intensive forest management to maximize carbon and passive management of forest lands as preserves and parks. He provided some provocative ideas on global forest management and the importance of including wood as a building material and as a critical engine to sequester carbon to mitigate climate change. Margarida Tome (Portugal) provided an excellent talk on wood production and carbon sequestration using cork plantations in Portugal. She presented some surprising findings on the importance of cork oak in the long term sequestration of carbon. Tohru Nakajima (Japan) highlighted his work on an optimization model for the joint production of timber and carbon sequestration in Japan. This work is being used in the carbon offset system currently being implemented in Japan. Taulana Sukandi (Indonesia) presented a fascinating case study of forest land use and rehabilitation in the Gunung Kendeng Resort highlighting the importance of the participatory process to accomplish sustainable forest management. Peter Khaite (Canada) presented a comprehensive model that incorporated many disparate ecosystem services in a broadly integrated model for sustainable forest management. Vitalie Gulca (Moldova) provided a thought provoking comparison of the importance of ecosystem services from forests in developing, emerging and developed countries. The importance of ecosystem services was essential in all countries but the policy and implementation of markets

varied considerably among rich vs poor countries. Finally, Rupa Basnet Parasai (Nepal) presented a fascinating legal treatise on the distribution of benefits from carbon forestry and the implications of laws and incentives on community forest management in Nepal.

Twelve poster presentations were included in a well attended poster symposium. Posters were included from around the world including India, Italy, Australia, Malaysia, Korea, Taiwan, USA, Czech Republic, Nicaragua, Japan and China. The topics ranged from natural oils to enhance ecosystem services, to policy models to valuation research to water quality to carbon in soil to enhancement of biodiversity. The poster symposium was a big success and gave presenters an opportunity to briefly present research to an interested audience.

## C-03 The use of quantitative forest sector modeling in environmental policy analysis

**Organizers :** Birger Solberg, *Norwegian University of Life Sciences, Norway*; Margareth Shannon, *State University of New York-Buffalo, USA*; Ilpo Tikkanen, *European Forest Institute, Finland*

**Moderator :** Birger Solberg (*Norway*)

During the last decades we have seen that quantitative forest sector modeling has been increasingly used as information provider in policy analysis where environmental issues like biodiversity protection or climate change are involved. This has created an interesting interface between modeling, economics and policy analysis. The session aimed at exploring the experiences gained so far and main improvement possibilities.

In the first presentation, Janaki Alavalapati (USA) gave an overview of the types of models his research group has been using (ranging from forest simulation models to general economic equilibrium models) and experiences gained. Silvain Caurat (France) then presented a study on the effects of climate change on the French forest sector, and Lauri Hetemäki (Finland) a study on the viability of forest biorefineries under different policy and price

structures. A. Maarit I. Kallio (Finland ) presented a study of the impacts of nature conservation on the European Forest Sector, and Hanne K. Sjølie (Norway) compared and contrasted harvest levels and carbon dynamics under various scenarios of carbon pricing using forest models with and without wood price endogeneity. James Turner (New Zealand) gave an overview of how the global forest products model has been and could be used in environmental policy analyses.

The session ended by a panel discussion, where among other things the following points were emphasized: Forest sector modeling is important in policy analysis. However, policy makers as well as some policy researchers are reluctant in using these tools as they do not understand or are skeptical to the functioning of the models and the main assumptions they build on. This is a challenging task, and one way out for improving the situation is to involve decision makers and other skeptics as early as possible in the modeling work and make them understand how the models function.

#### **C-04 The role of institutions and institutional economics in sustainable forest management**

**Organizers :** **Shashi Kant**, *Faculty of Forestry, University of Toronto, Canada*; **Martin Hostettler**, *Tensor Consulting AG, Zurich, Switzerland*; **Yaoqi Zhang**, *Auburn University, USA*

**Moderators :** **Yaoqi Zhang** (USA) & **Shashi Kant** (Canada)

Sustainable Forest Management (SFM) is a reflection of environmental, social, and economic value systems of our society, and policy makers and forest managers face a challenge to design optimal institutions that incorporate these value systems. In this session, speakers and poster presenters provided an overview of institutions from different countries covering different aspects of SFM.

In the first paper, Prof. Bruce Lippke (University of Washington, USA) presented the results of Life Cycle Analysis (LCA) to identify positive and negative leverage

points in reducing carbon emissions and their impact on old forest habitat. The authors reported that ethanol subsidies, forest carbon credits and renewable energy standards steal the feedstock of higher leverage uses, while a carbon tax effectively penalizes the largest emitters.

In the second paper, Prof. Runsheng Yin (Michigan State University, USA) provided an overview of China's various ecological restoration projects, and argued for the application of a comprehensive approach that must include better planning and management practices; strengthened program governance, active engagement of local people, an independent and competent monitoring system, and effectiveness and impact assessment.

In the third paper, Meyanga Tongo Yves (National Centre of Education, Cameroon) presented the impacts of the timber export ban on the promotion of timber resources, harvesting and tax revenues in Cameroon. The author found that export ban increased the local use of prohibited and un-prohibited species but resulted into a sharp fall in timber revenue. The author also discussed impacts of increasing tax on the local wood companies and lifting the ban.

In the fourth paper, Mr. Xiuying Xu (Zhejiang Forestry University, China) presented the results of a study of forestland usage right markets from eight villages of Linan and Anji counties, Zhejiang province. About 50% households participated in this market. Households got land from the collective usually through bid, while transfer between households is usually by private negotiations, and mostly within their own villages. The main purpose of getting more land is to raise management scale, while transferring out land is due to the lack of labor, capital or remote location of land.

In the last paper, Dr. Krishna Bahadur KC (Nepal) presented the analysis of agricultural land use change in Nepal during the period of 1976 to 2000. The authors reported that: (i) agricultural land use increased by 35% at the cost of forestland, and agricultural expansion was most conspicuous at higher elevations; (ii) forests loss was smaller in high-income areas and near administrative centre. The overall land change patterns are largely explained by physical factors, such as elevation, and socioeconomic

conditions, and institutions governing access to land. Four posters were also presented covering the areas of financial instruments for non-market environmental services (Roman Sluop, Czech Republic), sustainable management of non-timber products (Yueqin Shen, China), role of forests in the global account of greenhouse gases (Alexander Laletin, Russian Federation), and actors in private forests management (Ryoko Ishizaki, Japan).

Selected papers from this session and from some other sessions will be published as the 4th volume of the book series on Sustainability, Economics, and Natural Resources (SENR), edited by Shashi Kant, and published by Springer.

### C-05 Short rotation forestry for livelihood security, energy and carbon sequestration

**Organisers :** **Sanjeev K Chauhan**, *Punjab Agricultural University, Ludhiana, India*; **Thomas Lewis**, *Energieautark Consulting, Austria*

**Moderator :** **Sanjeev K. Chauhan** (*India*)

IUFRO 1.03.03 (Applied Tropical Short Rotation Forestry) in collaboration with an Energy consulting group of Austria conducted the session on Short Rotation Forestry for livelihood security, energy and carbon sequestration. The session scheduled on the last day of the congress i.e., 28.08.10 included seven oral presentations. Additionally nine posters were also presented by the participants. Eleven different countries (India, China, USA, UK, Sweden, Czech Republic, S.Korea, China, Taiwan, Italy and Finland) were represented in total 16 presentations (oral as well as poster).

The presentations recognizing the problems of increasing pressure of swelling human and livestock population, shrinking per capita land, deteriorating natural resources, acute shortage of energy, increasing wood demands, etc. stressed to place major emphasis on short rotation forestry for livelihood security, energy, environment, natural resource conservation, environment and sustainable development. The paramount importance was placed on fast growing trees not merely due to their ability to meet basic needs of the people but also their beneficial effects on

our deteriorating environment. This practice will generate employment, meet ever growing energy requirements and is source of carbon sink. Besides these, SRF helps in saving the virgin forests' wealth and act as vegetation filter.

The potential of short rotation tree species for energy were addressed by Sharma (India) and Han (China). Two presentations by Shibu Jose (USA) and F. Sinclair (UK) emphasized on the agroforestry for sustainable landuse and livelihood security, whereas, Elias (Indonesia) and Kim (Republic of Korea) emphasized on carbon sequestration potential of fast growing tree species. Dimitriou from Sweden stressed that many opportunities exist for linking dendro-remediation with tangible biomass economic opportunities such as bio-energy, solid wood products, reconstituted products, and SRF has proved itself economically and environmentally sustainable. Poster presentations stressed specifically on biomass, plantation management, carbon sequestration potential, genetic improvement, etc.

The discussion followed the presentations in which, number of related issues were discussed. More specifically the short rotation forestry and water issue was highlighted and emphasized to generate information on the same. Another issue of adoption of short rotation forestry by the farmers was stressed and it was emphasized that the adoption is market driven and technical and market information to the adopters is lacking thus making it difficult for adoption. IUFRO Coordinator of Silviculture section (Bjorn Hannel from Sweden) and Lars Christersson (Former IUFRO coordinator of Short Rotation Forestry from Sweden) emphasized the importance of short rotation forestry in taking care of number of material and environmental issues and stressed for international collaboration in research on short rotation forestry for environmental benefits. As a followup action, presentations of this session have been uploaded on the website [www.benwood.eu](http://www.benwood.eu) for the benefit of those who could not attend the congress/session.

## C-06 Forest carbon credit markets and the forest sector

**Organizers :** **David N. Bengston**, *U.S. Forest Service, USA*; **Yeo-Chang Youn**, *Seoul National University, Republic of Korea*; **Zuomin Wen**, *Nanjing Forestry University, China*; **Hemant Kumar Gupta**, *Forest Survey of India, India*

**Moderator :** **David N. Bengston** (*USA*)

This session was well attended and generated great interest from those who attended. The opening paper by Bigsby (Lincoln University, New Zealand) addressed the need for flexible carbon markets to meet the needs of small forest owners. Carbon banking was proposed as a flexible alternative for marketing sequestered carbon and provide an opportunity for small forest owners to participate in carbon markets. This was followed by a paper detailing the evolution of Australian climate change forest policy in the post-Kyoto period by Harper and Buizer (Murdoch University, Australia). Mi Sun Park presented a comparative analysis of the legal framework on forest policies and carbon markets relating to climate change in the USA, New Zealand, Japan and Korea, co-authored by Koo, J. Chun, Youn (Seoul National University, Republic of Korea) and J. Chun (Korea Legislation Research Institute, Republic of Korea). The climate change legislation and legal instruments form a backbone of these government's strategies to mitigate and adapt to climate change. Mihyun Seol (University of Washington, USA), with co-authors Cao (University of Washington, USA) and Young (Seoul National University, Republic of Korea), presented research on the opportunities of forest carbon offset projects in the USA voluntary carbon market. Unlike other countries, forestry projects have been popular for carbon offsets in the USA. The often neglected issue of urban forests and carbon credits was addressed by Siry and Poudyal (University of Georgia, USA) and Bowker (USDA Forest Service, USA). Presented by Siry, this paper was based on a survey of local governments in the USA. Respondents revealed that their willingness to participate in carbon markets was driven by a degree of urbanization, the awareness of their voting constituents and the need for additional revenues. Wen

(Nanjing Forestry University, P. R. China) examined mixed economic instruments for forest carbon credit markets. The paper systemically analyzed the various elements of carbon credit market using externality theory, and discussed the impacts of mixed policy tools on forest carbon credit market. Finally, Youn and Koo (Seoul National University, Republic of Korea) discussed an analysis of willingness-to-pay for forest carbon offset projects based on a survey of large and small South Korean companies.

## C-07 To what extent can payments for forest environmental services be pro-poor?

**Organizers :** **Stephen Garnett**, *Charles Darwin University, Australia*; **Terry Sunderland**, *CIFOR, Indonesia*

**Moderator :** **Terry Sunderland** (*Indonesia*)

Payments for Environmental Services (PES) was not initially conceptualised as an approach to alleviate poverty, and many authors insist that poverty should not be considered as a primary goal in the implementation of PES. However, others argue that conservation and poverty in developing countries cannot be separated, and that it can be detrimental to exclude poor communities from PES schemes, as this could result in ineffectiveness or failure of PES. This session aims to explore the possibility of pro-poor PES for forest environmental services. It includes an overview presentation followed by case studies on specific PES schemes. Four oral presentations were made in the session as follows: *Why are poor people to be engaged in PES schemes?* (Sim Eun Suh, Republic of Korea); *Hearing voices from the poor: effective communication of PES ambitions and capabilities* (Lisa Petheram, Australia); *Payments for forest environmental services: institutional forms and experiences in Eastern Africa* (Elizabeth Okwuosa, Kenya); and *PES for the poor: lessons from Vietnam* (Stephen Garnett, Australia).

\* The summary for this session was written by the COC.

## C-08 Culture, economics, and sustainable forest management

**Organizers :** **Shashi Kant**, *Faculty of Forestry, University of Toronto, Canada*; **Martin Hostettler**, *Tensor Consulting AG, Zurich, Switzerland*; **Hans R. Heinemann**, *Swiss Federal Institute of Technology, Zurich, Switzerland*

**Moderators :** **Martin Hostettler** (*Switzerland*) & **Shashi Kant** (*Canada*)

This session was the continuation of Sub-Plenary Session (SP-6): New frontiers of forest economics and five papers were presented in this session.

In the first paper, Dr. Martin Hostettler (Tensor Consulting, Switzerland) presented a novel approach to forest economics characterized by dynamic social coordination, disequilibrium, frictional exchange, public square, politics without information and romance, sparse information processing, Knightian uncertainty, and Kirznerian discovery and entrepreneurship, and Smith-Menger-Hayek-Polanyi type of coordination. The author emphasized that forest economics is complex science, and muddling thru is probably the best method. In the second paper, Prof. Yaoqi Zhang (Auburn University, USA) highlighted the limitations of the Faustmann model. The model does not incorporate context-dependent and dynamic nature of preferences, and therefore the model cannot explain diversity of forest rotations decisions followed by forest managers that are based on biological maturity of forests, sustained timber supply based on the production capacity of a manufacturing-unit, and economic and social needs of private forest owners. Similarly, the estimated land values based on the Faustmann Model are unable to reflect the market values of forestland. The author emphasized the need of research to reduce these gaps between theory and real world. In the third paper, Dr. Stibniati Atmadja (CIFOR, Indonesia) presented empirical estimates of discount rates and their relationship with forest management decisions of small woodland owners from the USA. The author reported that discount rates are poor predictors of behaviors such as contacting forest management consultants, and investing in forest improvement, and the importance of discount

rates is not uniform across behaviors. In many cases, other factors – such as acreage, distance to woodland, and tenure – are more closely related to forest management behavior. In the fourth paper, Prof. Colin Price (University College North Wales, UK) discussed the problems associated with sustainable forest management resulting from human impatience and the inconsistency between affective and cognitive views of “otherness”, and raised the question that whether institutions can or should be created, that bind future generations to maintaining fully the sustained programs of resource use. In the author’s view only empowerment of cognitive judgements, as in cost-benefit analysis and like decision structures, together with ethical and social support for the rule of conscience, offers the distant future some hope that forests – and natural resources generally – will be managed sustainably by preceding generations. In the final paper, Professor Shashi Kant (University of Toronto, Canada) presented the results of economic experiments on other-regarding preferences (ORP) of Aboriginal people from Canada. The author reported that the key results were: (i) Aboriginal peoples’ ORP are stronger when they have any information about the other person as compared to no information; (ii) Aboriginal peoples’ ORP are much stronger when the other person is an elder; (iii) Aboriginal peoples’ ORP are due to fairness, equity, reciprocity, and altruism, and ORP based on fairness are stronger than other ORP.

Papers from this session and from some other sessions will be published as the 4th volume of the book series on Sustainability, Economics, and Natural Resources (SENRR), edited by Shashi Kant, and published by Springer.

## C-09 Economic valuation of forest ecosystem services

**Organizer :** **Mohammed Ellatifi**, *Sylva-World, Morocco*

**Moderators :** **Larry Mason** (*USA*) & **Richard Yao** (*New Zealand*)

With growing interest worldwide in the development of market mechanisms that can protect, sustain, and enhance ecosystem services from forests, questions arise as to what are ecosystem services and how might assigned values be effectively quantified. This session brought together



presenters from six countries to provide presentations that took the audience from case study exercises in valuation to macro discussions about the inherent obstacles and opportunities for assigning economic values to ecosystem functions.

Robert Deal (US Forest Service) illustrated the potential benefits of establishing an integrated program in the USA focusing on the bundling of emerging markets for forest ecosystem services which include carbon credits, water quality trading, and wetland and species mitigation banking. Based upon an extensive literature review, the progress and issues for forest economic valuation methodologies in China were evaluated using meta-analysis by Shuirong Wu (Chinese Academy of Forestry – China). Larry Mason (University of Washington – USA) provided evidence that schemes, such as certification and carbon credits, may allege to compensate for ecosystem service provision but inadvertently produce consequences detrimental to desired environmental outcomes.

Recent developments and successful enforcement of forest eco-compensation claims were presented by Peter Herbst (Forest Lawyer, Austria), quoting negotiations to offset environmental damages caused by large scale oil and gas pipelines in the Republic of Georgia. Dietwald Gruehn (Dortmund University – Germany) discussed the popular importance of forest vistas for scenic quality in landscapes in Central Europe. Eduardo Ditt (Instituto de Pesquisas Ecologicas – Brazil) showed an application of GIS to understand how the values of ecosystem services are influenced by land use changes. This GIS method facilitated the creation of economic value maps to inform integrated planning to integrate private transactions and government policy development for forest conservation. Richard Yao (Scion – New Zealand) presented the results from travel cost method showing economic values derived from walking and mountain biking in an iconic planted forest in New Zealand. Richard also presented the results of the choice experiment analysis showing that recreationists preferred to see more forest diversity at both stand and landscape levels.

## C-10 Impact of global environmental change on forest ecosystem services

**Organizers :** **Pavel Cudlín**, *Academy of Sciences of the Czech Republic, Czech Republic*; **Elena Paoletti**, *CNR, Italy*

**Moderator :** **Pavel Cudlín** (*Czech Republic*)

Six oral presentations and four posters disclosed how global environmental change impact on forest ecosystem services.

Cudlín presented a review of present knowledge about the impacts of global environmental changes on forest ecosystem services with focus on the energy, water and nutrient cycles. Deterioration of forest health status over the past 50 years has resulted not only in decrease of biomass production (provisioning service) but also in transpiration rate (air-conditioning service), root system development (water regulation service), ability of forests to create biotopes (supporting service) etc. He stressed that due to changing temperatures, precipitation amounts and patterns or increasing atmospheric CO<sub>2</sub> concentration the capacity and the long-term stability of forest ecosystem service provision will probably be negatively affected in the future.

Human society derives from natural ecosystems many essential goods and fundamental life-support services. Goio see climate change as a serious and long-term challenge for natural ecosystems and for semi-natural alpine ecosystems which are important multi-output production systems. He proposed a simulation model for the Autonomous Province of Trento (Italy) which evaluates i) the impact of temperature increase on the annual benefits produced by semi-natural alpine ecosystems and ii) the pressures driven by agricultural sector with the extensions of the cultivations.

The role of world's forests in the provision of forest products and services is well known, however the effects of global climatic change on this provision are not fully understood. Lukac presented the current state of knowledge on how future levels of atmospheric CO<sub>2</sub> and increasing ambient

temperature will impact forest productivity, explained the implications for forest biodiversity conservation and the forests' capacity for carbon capture and storage.

As mentioned above the forest ecosystem functions are strongly dependent on the photosynthetic activity, which is a key physiological process supporting their life and enabling the biological pumping of atmospheric carbon into biomass and forest soils. However, Marek underlined that this relation is complicated because of a weak quantitative linkage between photosynthesis and growth of woody biomass.

O'Donnell reported social values of forest environmental services at risk from wildfire in northwest Montana. They described the findings of a choice modeling non-market valuation survey that inquired about wildfire management preferences of residents of Flathead County, Montana and defined their management strategies. These findings suggest the focus of wildfire managers on structure protection is not efficient in Flathead County and social benefits could be enhanced by redirecting wildfire management resources to the protection of forest ecosystem services.

Santini focused on the impact of biological invasions on forest ecosystem services under global change. During last 30 years, these ecosystems were exposed to the pressure of an increasing connectedness and globalization which caused amplification in the frequency and effects of biological invasions. Also climatic change can increase vulnerability of forest ecosystems to infestation by native and introduced pests and pathogens. It can lead to less diverse and less productive ecosystems unable to exert their multifunctional roles.

Two posters of Park et al. were focused on carbon sequestration that represents one of the most important environmental services provided by forests in a changing climate. They emphasized the importance of hydrologic carbon export particularly that of particulate organic carbon, for C storage and loss in forest soils. They reported climate risks to stream water quality in a forested mountain watershed.

Herkendell's poster introduced recent studies on climate change predicting a clear and rapid hydrological change

in mountain catchments driven primarily by rising temperatures and changing precipitation patterns.

Palma et al. described a preliminary Web-Explorer of Forest Ecosystems Services (<http://home.isa.utl.pt/~joaopalma/projects/tranzfor/wefes>) which was developed in New Zealand for the predictions of the different forest environmental services under current and future climate for each location in the territory. Carbon storage, soil erosion, biodiversity, nitrate leaching, water balance are the preliminary forest environmental services envisaged.

### C-11 New developments in forest management accounting and reporting to ensure sustainability

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**Organizers :** **Hans Jöbstl**, *University of Natural Resources and Life Sciences Vienna, Austria*; **Bernhard Möhring**, *University of Göttingen, Germany*

**Moderator :** **Bernhard Möhring** (*Germany*)

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Management accounting is essential for forest managers at the enterprise level and on a broader regional, national or international level for forest policy makers. On all levels multiple forest services have to be evaluated and optimized to meet the superordinated goals and future challenges. Despite the increasing demand for valid information current approaches often fail to fully represent forest values and their non-market goods and services. In this session innovative approaches to improve forest accounting were presented.

In the first speech Mordechai Shechter from the University of Haifa (Israel) elucidated the results of an international EU-funded COST Action on elaborating non-market valuation. He explained the good practice protocol for non-market forest valuation, targeting the total economic value (TEV) and additionally pointed out crucial problems as double counting and the influence of non-linearities on TEV aggregation.

The next speaker was Ilaria Goio from the University of Trento (Italy), she presented the results from an experimental evaluation of biodiversity for an alpine forest,

using the total economic value approach. She compared the estimates of the values of biodiversity and market goods of two alternative forest management scenarios (maximum of wood production versus natural driven multi-functional forest management) and showed that the value of biodiversity in the multifunctional forest is greater than the loss of wood production.

Hye-jung Roh from the Korea Forest Research Institute (Republic of Korea) introduced the results of her study to develop criteria and factors of eco-friendly forestland development to harmonize the objectives of conservation and development. Technical operations like limiting the building heights and keeping green space ratios etc. were presented to maintain the shape of forestland.

The last speaker was Bernhard Möhring from the University of Göttingen (Germany) who explicated how natural risks could be integrated into forest valuation criteria, referring the escalation of the frequency and intensity of natural hazards due to climate change. He used a two parameter WEIBULL-function to describe the age-dependent survival probability and demonstrated how the alteration of the parameters of the survival function influences economic evaluation criteria.

Active discussions after each speech and three posters completed this instructive session.

## C-12 Energy forests - social impacts and environmental services

**Organizers :** **Jaime Amezaga**, *Newcastle University, United Kingdom*; **Davis Neil Bird**, *Joanneum Research, Austria*

**Moderators :** **Jaime Amezaga** (*United Kingdom*) & **Davis Neil Bird** (*Austria*)

New policy drivers are underpinning forestry schemes in many regions of the world. The price rises in fossil fuels have led to a renewed interest in forestry as alternative sources of possibly lower cost bioenergy. But what are the water resource implications of these schemes? What might the costs/benefits be in relation to other societal,

biodiversity and carbon sequestration factors? The session looked at some of these interacting impacts of forest energy crops on society and environmental services, and invited presentations discussing relevant methodological developments and specific examples. Case studies from India, China and Africa dealt with either forest biomass for solid fuels or forest crops such as jatropha used for liquid biofuels. The session opened with an overview of findings of social and environmental impacts of bioenergy projects in Asia and Africa, and continued with presentation of individual papers of case studies on the interacting impacts of forest energy crops on society and environmental services. A total of eight oral presentations were made as follows: *Bioenergy and forest resources: what strategies provide energy and climate change mitigation* (David Neil Bird, Austria); *Impact of short rotation coppice (SRC) cultivation on water quality* (Ioannis Dimitriou, Sweden); *Potential impacts of Jatropha plantations on key ecosystem services in Southern Africa* (Graham Von Maltitz, South Africa); *Understanding social impacts of bio-energy programs: a case study from India* (Sunandan Tiwari, India); *Analysis of bioenergy production models in India and Uganda through stakeholder engagement* (Jennifer Harrison, United Kingdom); *The expansion of plantations in Indonesia's Papua: avoiding deforestation while promoting responsible investments* (Heru Komarudin, Indonesia); *Forest-based energy in China: transitions and sustainability* (Yufang Su, China); and *Firing socio-economic questions in the forest: what are the impacts of fuelwood in the Democratic Republic of Congo?* (Jolien Schure, Cameroon). Three poster presentations were included in the session.

\* The summary for this session was written by the COC.

## C-14 Management impacts on forest hydrology, biogeochemistry and water quality

**Organizers :** **Liisa Ukonmaanaho**, *Finnish Forest Research Institute, Finland*; **Ruth Yanai**, *State University of New York-Syracuse, USA*

**Moderators :** **Liisa Ukonmaanaho** (*Finland*) & **Ruth Yanai** (*USA*)

The session started with Prof. Ruth Yanai's presentation of 'Budgeting nitrogen fluxes in a temperate hardwood forest: uncertainties and changes in sources and sinks.' It is typical for ecosystem nutrient budgets to report values for pools and fluxes without any indication of uncertainty, which makes it difficult to evaluate the significance of findings. In Yanai's presentation a Monte Carlo approach was used to estimate error in calculating the N budget for the Hubbard Brook Experimental Forest in New Hampshire, USA. There is a significant accumulation of N in the ecosystem (precipitation inputs exceed streamwater outputs) but the changes in internal pools, such as soils, had a greater uncertainty than this difference.

The second presentation dealt with the effect of forest practices on stream water acidification (Carina Sucker & Klaus Von Wilpert: Statistical indicators for trends in stream acidification: impact of silvicultural management practices). Sucker indicated, based on data from over 100 forested catchments in Germany, that forest management can affect stream water acidification. In monoculture sites there is more imbalance in ionic concentration (anion concentration tending to increase) than in mixed forest stands.

Dr. Liisa Ukonmaanaho presented results of whole tree harvesting (WTH) effects on nutrients and heavy metal leaching in forested peatlands. Most of the recent studies onto WTH have been carried out on upland sites; so far little is known about drained peatland forests. Preliminary results indicated that phosphate, nitrogen, and mercury concentrations increased in drainage water after WTH in drained peatlands. The topic is timely because renewable fuels for energy production are of great interest to mitigate impacts of climate change, and in Finland increased use of renewable energy sources will be obtained almost entirely by harvesting biomass from trees.

The next two presentations showed what kind of impact forest thinning and other human impacts have on water quality and quantity in watersheds near Istanbul, Turkey. Dr. Suleyman's presentation focused on stream water nutrient quality and quantity after thinning (oak-beach-mixed forest) (Nutrient budgets of forest ecosystems in terms of clean water production). Element concentrations were lower in precipitation than stream water, whereas

mass basis calculations stream water values were lower than precipitation. Dr. Serengil's presentation focused on human impacts on watersheds (Ecological monitoring to predict human disturbance in urban watershed). In stream cross sections, they measured both hydrologic and ecologic parameters, such as bankfull discharge level, flood depth, riparian width etc. and established linear regression equations from these parameters. With these equations municipalities can predict the human impact on watersheds by surveying the stream cross section below it.

The final presentation was about landslide occurrence as a function of forest tending, presented by Ho-Joong Youn (Analysis of landslide occurrence affected by forest tending). Results indicated that rate of landslides increased at the beginning of forest tending but decreased gradually with time. The recommended tree density after forest tending is 700–900 trees/ha, if landslides are to be averted. Because all the presentations addressed the impacts of forest management from different point of view, there was a separate discussion after each presentation. In addition there were nine posters in the session, which mostly dealt with hydrological aspects of forest ecosystems.

## D-01 Recreation management in protected areas: Asian perspectives

**Organizer :** Tsuchiya Toshiyuki, *Tokyo University of Agriculture and Technology, Japan*

**Moderator :** Tsuchiya Toshiyuki (*Japan*)

Most of the protected areas in Asian countries are characterized by zoning systems on multipurpose land use. Recreation managers are therefore forced to have considerations for other industries (e.g. forestry and tourism). Furthermore, the framework is complicated by peculiar patterns of land ownership and bureaucracy. This session provided a forum for discussing the issues on recreation management within the protected areas framework in Asian countries. In total, seven speakers gave an oral presentation as follows: *The relationship between urban forest visitors' motivation and their behavior in Noppo Forest, Hokkaido, Japan* (Tetsuya Aikoh, Japan); *Perceived sustainability impacts of*

ecotourism activities through a co-management approach at Lawachara National Park in Bangladesh (Md. Wasiul Islam, Bangladesh); *Social network structure in Rebus lady-slipper (Cypripedium macranthos var. rebunense) conservation* (Kazsuhieg Yamaki, Japan); *Verifying governance system of world heritage areas from an aspect of common-pool resources: a case study of Yakushima Island, Japan* (Shigemitsu Shibasaki, Japan); *Utilization of forest environmental services through religious tourism management at Alas Purwo National Park, East Java, Indonesia* (Ika Satyasari, Indonesia); *A case study to assess the scenic quality of mountain forests using GIS* (Hee Han, Republic of Korea); and *Visitor preferences for a low-risk option: a new guided-tour in Shiretoko National Park, Japan* (Yasushi Shoji, Japan). Five poster presentations were also included in the session.

\* The summary for this session was written by the COC.

## D-02 Biology, ecology and management of *Pinus koraiensis* in East Asia

**Organizer :** **Jae-Seon Yi**, Kangwon National University, Republic of Korea

**Moderator :** **Jae-Seon Yi** (Republic of Korea)

*Pinus koraiensis*, a mountain species found in the Russian Far East, northeastern China, the Korean peninsula and Japan, is severely threatened by human disturbances and climate change, which is already affecting the distribution of natural distribution of many alpine tree species. While wild populations of this culturally and economically important pine species are declining, large areas of plantations have been established, especially in South Korea and north-eastern China, mainly to produce timber and edible pine nuts. The objectives of this session are to: examine the latest scientific advances related to the biology, genetics and breeding, forest health issues (including effects of climate change), ecology, silviculture, and management of natural and artificial (planted) *P. koraiensis* forests; and to establish an international network for research and conservation on this species, including monitoring of plant-climate relationships, throughout East Asia. A total of 11 oral presentations were made in two separate sessions (D-02(1) and D-02(2)) as follows: *Dynamics of*

*Korean pine stands in mixed forests* (Olga Ukhvatkina, Russian Federation); *Population structure of Pinus koraiensis in understory of Quercus forests in northern Korea* (Satoshi Ito, Japan); *Abundance and growth of naturally regenerated Pinus koraiensis in the Quercus mongolica forest, South Korea* (Sang Hoon Chung, Republic of Korea); *A study of stand structure and growth in Pinus koraiensis plantations* (Ju-Won Shin, Republic of Korea); *Undisturbed Pinus koraiensis–broadleaved forest in the Bikin River valley as a base for preservation of forest ecosystems and a model for sustainable forest management* (Evgeny Lepeshkin, Russian Federation); *The characteristics of coarse woody debris in a mixed broadleaved–Korean pine forest in the Xiaoxing’an Mountains, China* (Yanyan Liu, China); *The effective method of forming the Korean pine forests* (Alexander Alexeenko, Russian Federation); *The regeneration of Pinus koraiensis in mixed broadleaved–Korean pine forest in Liangshui Natural Reserve, China* (Tie Feng Piao, Republic of Korea); *Photosynthetic plasticity of Pinus koraiensis seedlings based on assessment of current year and 1-year-old needles exposed to different light intensities* (Jiaojun Zhu, China); *Twelve-year growth monitoring of Pinus koraiensis plantation by thinning intensity in Korea* (Jung-Kee Choi, Republic of Korea); and *Crown shapes for easy cone collection of Pinus koraiensis trees* (Jae-Seon Yi, Republic of Korea). Twelve poster presentations were also included in the session.

\* The summary for this session was written by the COC.

## D-03 Rehabilitating and restoring forest ecosystems in Asia under extreme environmental conditions

**Organizers :** **Michael Kleine**, IUFRO, Austria; **Don Koo Lee**, Seoul National University, Republic of Korea

**Moderator :** **Michael Kleine** (Austria)

This session presented the results of the “Keep Asia Green” Initiative, a scientific synthesis project on the rehabilitation and restoration of forests in the Asia Pacific region. Over a period of four years, forest scientists from the various regions in Asia (i.e. Southeast Asia, Northeast

Asia, South Asia, and West and Central Asia) shared their expertise and compiled papers on the history, current status, successes and failures of forest rehabilitation efforts in their countries. Presentations during the session examined a wide array of ecological, social and economic aspects of rehabilitating and restoring forest ecosystems. Substantial experience on forest rehabilitation has been brought together in this project and has helped to derive a number of important lessons learned that are essential to further improve future sustainable management of forest resources in Asia. The session included seven oral presentations as follows: *Evaluating and monitoring early achievements of rehabilitation projects in Mongolia* (Jamsran Tsogtbaatar, Mongolia); *Stabilizing shifting sand dunes in South Gobi of Mongolia* (Akhmad Khaulenbek, Mongolia); *Different characteristics of xylem water potential of four species (*Ulmus pumila* L., *Larix sibirica* L., *Pinus sylvestris* L., *Caragana arborescens*) seedlings in Mongolia* (Go Eun Park, Republic of Korea); *Rehabilitation of a degraded forest ecosystem in Zagros region of western Iran with *Amygdalus scoparia* Spach* (Yaghoub Iranmanesh, Iran); *Establishment of productive forest on ex-mine sites in Indonesia: lesson learn from the Newmont Minahasa Raya Co, a gold mining company in north Sulawesi, Indonesia* (Irdika Mansur, Indonesia); *Status and growth performances of mangrove species in a fragmented forest of Chakoria Sundarbans in Bangladesh* (Mohammed Kamal Hossain, Bangladesh); and *Ecological restoration and management of a degraded area for Baekdudaegan conservation* (Young-Kul Kim, Republic of Korea). On top of it, a total of 25 poster presentations were included in the session.

\* The summary for this session was written by the COC.

#### D-04 Advances in plantation forest management in Asia

**Organizers :** **Sudhindra Naik**, *University of Agricultural Sciences-Dharwad, India*; **Haruni Krisnawati**, *Forestry Research and Development Agency, Indonesia*

**Moderator :** **Haruni Krisnawati** (*Indonesia*)

This session discussed advances in the knowledge of

plantation forest management in Asia, including the challenges and opportunities faced by Asia's plantation forests, innovative practices and management strategies for growing plantation species. Seven interesting papers were accommodated in the oral presentation session while the other ten papers were adapted for inclusion in the poster session.

In the first paper, Yanfei Duan (Remnin University of China) presented the impact of global economic crisis on China's timber industry and trade, the response and progress to recover the economic downturn.

In the second paper, Benjamin Engler (University of Freiburg, Germany) introduced concepts for a combined production of valuable broadleaved trees for wood processing industry and fast growing tree species for energy (the so called ValWood) which combined techniques of planting, logging and silvicultural treatment based on the research project in China. Then, Khitlaxay Kokmila (Korea University, Korea) demonstrated a GIS-based mapping approach to identify appropriate areas for rubber tree plantation and develop land use function maps for sustainable land use management in local areas of Lao PDR.

Different types of environmental costs based on the necessity of environmental management for industrial plantations in China were addressed in a paper by Zhiyong LI (Chinese Academy of Forestry, China) which he then proposed the National Codes for Ecological and Environmental Management to promote sustainable management of industrial plantations in China.

In the fifth and sixth papers, studies on optimum density and thinning effect on stand structure were demonstrated by Wenjun Liang (Beijing Forestry University, China) and Dar-Hsiung Wang (Taiwan Forestry Research Institute, China Taipei). Liang's study aimed to determine time of planting and cutting scheme for *Larix principis* plantations based on crown competition indices. Similarly, Wang's study was based on spatial structural index to investigate the gap and stand structure before and after thinning on *Cryptomeria japonica* plantations in Taiwan. The authors then concluded that thinning is a prerequisite activity to

tend the plantations.

The last paper by Huong Vu Dinh (FSSIV, Vietnam) presented the research findings on site management and productivity of *Acacia*-based plantation in South Vietnam which could improve knowledge for increasing and sustaining productivity of successive rotations of acacia plantations, particularly on the residue, vegetation and nutrient management.

Other contributions in poster sessions included information on nutrient productivity, future tree species, epicormic shoot formation, effect of SCB liquid fertilizer, sap-flow seasonal variation, snow-damaged trees, and foliar macro-nutrient element for particular plantation species in Asia. In addition, information on small-scale plantation management, growth and yield modeling, and development of new industry was also presented.

#### D-05 Managing Asian bamboo forest in a changing world

**Organizers :** Yueqin Shen, Zhejiang Forestry University, China; Yaoqi Zhang, Auburn University, USA; Shashi Kant, University of Toronto, Canada

**Moderator :** Yaoqi Zhang (China)

Bamboo forest plays an important role in rural development in Asia, providing materials, food security as well as environmental services and cultural heritage. However, the emerging economies, globalization and climate change are posing new opportunities and challenges to management of bamboo forests in Asia. The session addressed four specific questions. (1) How can the role of Asian bamboo forests, through carbon sequestration, be enhanced in meeting climate change obligations of Asian countries? (2) How can the role of Asian bamboo forests be improved in rural development? (3) What will be the necessary institutional, land and bamboo tenures, requirements to enhance the role of Asian bamboo forests in climate change and rural development? (4) How can we use the legacy of social and cultural perspective to promote bamboo forest development? Topics included: (1) bamboo

management for carbon sequestration; (2) bamboo carbon measurement and monitoring, (3) design and mechanism of payment schemes for bamboo carbon, (4) bamboo industry for rural development, (5) institutional reforms and bamboo management, (6) bamboo and culture. Six oral presentations were made in the session as follows: *Soil and water conservation in moso bamboo forest in the low hills of the Chaohu Lake area in China* (Jian Gao, China); *A comparison of throughfall and stemflow chemistry in plantations of bamboo and Japanese cedar* (Masaharu Sakai, Japan); *Bamboo sector reforms and local rural development in Zhejiang Province, China* (Yueqin Shen, China); *Multiplication of mature and juvenile bamboos: intricacies of micropropagation* (Ramasamy Yasodha, India); *Biomass carbon in a sympodial bamboo plantation in south China* (Benzhi Zhou, China); and *Measurement and evaluation of carbon storage in a bamboo (*Phyllostachys pubescens*) system* (Guomo Zhou, China). Eleven poster presentations were included in the session.

\* The summary for this session was written by the COC.

#### D-06 Challenges and issues of forest management and utilization in Asian countries

**Organizers :** Sang Seop Lim, Korea Forest Service, Republic of Korea; Im-Young Lee, Korea Forest Engineers Association, Republic of Korea; Shougong Zhang, Chinese Academy of Forestry, China; Ajith Chandran & Juan Chen, University of British Columbia, Canada

**Moderators :** Shougong Zhang (China) & Shirong Liu (China)

The objectives of this session are to present and discuss the challenges and opportunities facing Asia's forests, particularly the problems associated with developing economies in the current global economy; to facilitate a discourse on the role of forests in the mitigation of the severe environmental issues facing rapidly growing economies; and to reflect on the efficacy of some key forestry reforms and to what extent they are being effective in maintaining and promoting Asia's forests. This session provided an

opportunity for young Asian forest scientists to present their work on Asia's forests. A broad spectrum of aspects pertinent to Asia's forests was addressed, encompassing the role of decentralization, China's six key forestry programs, the introduction of innovative forest practices, and the role of community forestry in developing economies.

The session was composed of two separate sessions, session 1 and session 2. Seven oral presentations were included in the session 1 and six oral presentations were made in the session 2. The 13 papers presented in the two sessions are as follows: *Deforestation and poverty in North Korea, Mongolia, and the tropical Asian countries* (Matti Palo, Finland); *The School of Environmental Conservation and Ecotourism Management in Indonesia* (Ho Sang Kang, Republic of Korea); *After colonial forestry: the development and future management of Japanese cedar (*Cryptomeria japonica*) plantations in Taiwan* (Dar-Hsiung Wang, China-Taipei); *The future forests of China – issues, challenges and prospects* (Shuogong Zhang, China); *China's six key forestry programs* (Juan Chen, Canada); *Key issues and challenges in designing sustainable forest management strategies in India* (Nabaghan Ojha, India); *Use of plants in healthcare by local communities in and around Rema-Kalenga Wildlife Sanctuary: seeking for new avenues of protected area management in Bangladesh* (Mohammad S.H. Chowdhury, Bangladesh); *Conditions for successful implementation of participatory forest management and its impact on forest resource and people's livelihood: some evidence from Nepalese community forestry* (Maheshwar Dhakal, Nepal); *Study of gender equity in community-based forest certification programmes: experiences from Nepal* (Shoana Humphries, Germany); *An assessment of domestic production potential of industrial roundwood in the Republic of Korea* (Rin Won Joo, Republic of Korea); *Economic development and wood products import-export trade of China* (Yeo-Chang Youn, Republic of Korea); *How does China's forest product industry secure wooden raw materials under globalization?: An analysis of the timber processing sector in Dalian City* (Yuichiro Hirano, Japan); and *Overview of and changes in today's forest products sector in Japan* (Masami Shiba, Japan). Sixteen poster presentations were included in the session.

\* The summary for this session was written by the COC.

## D-07 The future of forest plantation health in Asia

**Organizers :** **Jolanda Roux**, *University of Pretoria-FABI, South Africa*; **Simon A. Lawon**, *Queensland Forestry Research Institute, Australia*; **Xudong Zhou**, *China Eucalypt Research Centre, China*

**Moderator :** **Jolanda Roux** (*South Africa*)

The objectives of the session are to highlight some of the current and future threats to plantation health in Asia, posed by pathogens and pests. Asia is the most rapidly expanding region in the world with regards to plantation forestry. The session consisted of two parts; both dealing with a mix of pathogens and insects as well as insect fungal interactions. In mixing these topics, we hope to foster much closer relationships between forest pathologists and forest entomologists in the region (often very isolated from each other) and to highlight opportunities for collaboration. The speakers were specifically asked to cover both insect and pathogens in their talks and to appropriately source co-authors to achieve this objective. We would hope to cover pests and pathogens both in the native and in the plantation environment and to focus on the many fascinating interactions between these domains. Five oral presentations were given in the session as follows: *Future prospects for forest plantation health in Asia* (Michael Wingfield, South Africa); *Diseases in plantations of Acacia and Eucalyptus in Asia* (Su-See Lee, Malaysia); *Current status and future prospects of forest health management in China* (Xu Dong Zhou, China); *Biological control of insect pests in acacia and eucalypt plantations in Indonesia* (Budi Tjahjono, Indonesia); and *Future prospect on pests and diseases of *Falcataria moluccana* in Indonesian planted forests* (Sri Rahayu, Indonesia). Three poster presentations were included in the session.

\* The summary for this session was written by the COC.



## D-08 Role of trees outside forests in Asia's changing forestry environment

**Organizers :** **Padam Prakash Bhojvaid**, *The Energy and Resources Institute, India*; **V.P. Singh**, *National Agriculture Science Centre, India*;  
**Shashi Kant**, *University of Toronto, Canada*

**Moderator :** **Padam Prakash Bhojvaid** (India)

In recent decades there has been a paradigm shift in forest management in Asia with emergence of three distinct forest management approaches: conservation forests for ecological services and protection and sustainable development of biodiversity; production forests for economic benefits; and restoration forests for rehabilitation of degraded wastelands. There has also been a major shift in balance of trade with respect to wood, pulp and timber products in Asia, with trees outside forests contributing a major share in the overall wood use and trade, and large-scale plantation of exotics tree species and resurgence of lesser-known native tree species in production forests. In light of these changes, the socio-economic, legal, political, environmental and technical issues related to these production systems need to be considered to balance this unique situation in the region for sustainable forest management. This session focused on two aspects related to sustainable management of trees outside forests (in agroforestry, private and industrial commercial plantations), namely; tenure, legal and other policy issues, including private-public partnerships in Asia; and the potential of trees outside forests in climate change mitigation. The session included four oral presentations: *Trees outside of forests: a case study on species composition, structure, and role of homestead forestry in Bangladesh* (Nur Muhammed, Bangladesh/Germany); *Factors influencing adoption of agroforestry among smallholder farmers in Zambia* (Hugh Bigsby, New Zealand); *Community-based forest management: an organizational perspective?* (Sushil Kumar, India); and *Ecological and cultural values of native trees: a case study of Ficus trees in South India* (Dhanya Bhaskar, India). The session also included five poster presentations.

\* The summary for this session was written by the COC.

## D-09 Changes in climate and air pollution – new directions in forest monitoring, research and modeling

**Organizers :** **Marcus Schaub**, *Swiss Federal Institute for Forest, Snow and Landscape Research WSL, Switzerland*; **Lisa Emberson**, *University of York, United Kingdom*; **Marco Ferretti**, *TerraData Environmentrics, Italy*

**Moderators :** **Lisa Emberson** (United Kingdom) & **Marcus Schaub** (Switzerland)

The main objective of this session is to evaluate how and how well climate change and air pollution effects on forests can be detected while climate and pollution have changed. We aim to define research activities and hence monitoring requirements that may be particularly important in terms of policy. This may vary depending on the scale (site-specific catchment, national to regional and global) of the respective investigations. Presentations and discussions focused on current and projected direct and indirect effects of changing climate and air pollution on forest ecosystems and carbon sequestration in the eastern hemisphere, appropriate monitoring system to detect air pollution and climate change effects on forests, ways in which monitoring may be targeted to address particular research and policy questions that may vary by region and with different scales, future changes related to different emission trend projections, and how drivers of these changes may be related to the expected supportive capacity of forests. A total of five oral presentations were given: *The EANET challenge on the catchment-scale analysis for the future integrated monitoring* (Hiroyuki Sase, Japan); *The use of electronic dendrometer bands to detect responses of tropical trees to drought* (Marcus Lingenfelder, Germany); *Warming-determined spatial and temporal patterns of forest dieback in Inner Asia* (Hongyan Liu, China); *Vulnerability of mountain biogeography and biogeochemistry to changes in climate, CO<sub>2</sub>, and tropospheric O<sub>3</sub> in the Yunnan Province, southwest China* (Ben Poulter, Switzerland); and *The carbon balance of forest ecosystems in China* (Shilong Piao, China). The session also included one poster presentation.

\* The summary for this session was written by the COC.

## D-10 Mountain forestry in a changing world – challenges for research and education in continental Asia.

**Organizers :** **Alfred Pitterle**, *Harald Vacik University of Natural Resources and Applied Life Sciences, Austria*; **Brigitte Winklehner**, *Eurasia-Pacific Uninet, Austria*

**Moderator :** **John Innes** (*Canada*)

This session addressed the critical issue of mountain forests in a world where the demands for goods and services from forests are continuously changing. Mountain forests in Asia are particularly important, as they provide important protective functions for the many people that live in or close to mountain areas. Landslides, floods and erosion have all adversely affected the lives of people in mountain regions and beyond, and mountain forests provide an important means of reducing such impacts.

In this first paper, P. Datta and P. Schack-Kirchner (Freiburg University, Germany) showed how a digital elevation model (DEM) might be used to aid in the assessment of degradation hazard. They compared the SRTM and ASTER DEMs, suggesting that the former was more reliable for soil erosion modelling in mountainous areas.

R.P. Lamsal (Ministry of Forest and Soil Conservation, Nepal) emphasized the importance of mountains to people in Nepal. Two major participatory approaches have been adopted: community forestry and community-based conservation areas. He compared the two approaches, drawing on their relative advantages and disadvantages, and suggested possible improvements to the management approaches.

S.J. Peng (Gent University, Belgium), Z.Z. Sun (Yunnan University, China) and X.K. Ou (Yunnan University, China) also addressed the issue of community-based forest management. They used an adaptive cycle framework in an attempt to identify sustainability indicators for rural forest management, focussing on Tibetan-oak forest system in southwest China. They advocated for the need for process-based indicators when examining the factors underlying decision-making in forest management.

A. Seol, J. Chung and J. Song (Seoul National University, Republic of Korea) examined the causes of forest conversion in the mountainous areas of the Republic of Korea. While the area of forest loss has been about 8,000 ha annually, the number of incidents involving forest loss has increased. A major cause of recent forest conversion has been the construction of golf courses, prompting debate about the relative importance of environmental protection and the provision of recreational opportunities.

Finally, J. Song, A. Seol and J. Chung (Seoul National University, Republic of Korea), described the regional characteristics of land-use change in the Republic of Korea. The changes were analyzed using principal component analysis, and the three principal components chosen explained 71% of the variation in the data. The components covered population, infrastructure construction and the development of military installations, communications facilities and farmland.

Posters in the session covered a range of topics, including green tourism in mountains (S.I. Ahn, J.C. Woo, and I.H. Choi, Republic of Korea), forest characteristics in the Qingling Mountains of China (C. Dai and A. Reif, Germany), seed production in mountain forests in Korea (H.J. Kim and D.K. Lee, Republic of Korea), afforestation characteristics in Korea (H.S. Kim, S.W. Bae and K.J. Lee, Republic of Korea) and forest dynamics in the Okuchichibu Mountains of Japan (G. Tanaka and S. Sakurai, Japan).

## D-11 Trends in Asian forest fire: effects on carbon, nutrient cycling and regeneration

**Organizers :** **Makoto Kobayashi**, *Hokkaido University, Japan*; **Yeonsook Chung**, *Kangwon University, Republic of Korea*; **Yojiro Matsuura**, *Forestry and Forest Products Research Institute, Japan*

**Moderators :** **Makoto Kobayashi** (*Japan*), **Yeonsook Chung** (*Republic of Korea*) & **Yojiro Matsuura** (*Japan*)

Along with the changes of human activities, land-use and

forest cover, fire regimes in Asian forests has been changing. Given the immense value of Asia's forests for both biodiversity conservation and carbon storage there is a need to enhance understanding the effects of changing fire regimes on these forest ecosystems. In this session, scientists engaged in the fire ecology research in Russia, China, Korea, Mongolia and Indonesian forests, presented the current situations of fire regime and research results related to carbon and nutrient cycles and vegetation recovery after fire in Asia. Eight scientists made an oral presentation: *Effects of frequent surface fires on the forest structure and carbon stock in mixed conifer-broadleaved forests, southern part of Russian Far East* (Makoto Kobayashi, Japan); *The forest fire situation in Mongolia* (Baatarbileg Nachin, Mongolia); *Climate change impacts on fire weather severity of the Great Xing'an Mountains boreal forests, northeastern China* (Guang Yang, China); *Ten years' vegetation regeneration in Pinus densiflora forests following fire* (Yeonsook Choung, Republic of Korea); *Estimation of carbon emission from Pinus densiflora stands burned by crown fire in South Korea* (Byungdoo Lee, Republic of Korea); *Effects of management on the regeneration of plant communities after forest fire, Korea* (Kyu Song Lee, Republic of Korea); *The dynamic of forest ecosystem after fire: changes of biodiversity composition and its structure* (Chandradewana Boer, Indonesia); and *Fire-induced disturbances of CO<sub>2</sub> exchanges between peat swamp forest and the atmosphere in Southeast Asia* (Takashi Hirano, Japan). Three poster presentations were included in the session.

\* The summary for this session was written by the COC.

## D-12 Forest restoration and economic valuation for poverty reduction and environmental conservation in Southeast Asia

**Organizers :** **Lucrecio Rebugio, Leni D. Camacho,** *University of the Philippines Los Baños, Philippines;* **Monton Jamroenprucks,** *Kasetsart University, Thailand;* **Su-Young Woo,** *University of Seoul, Republic of Korea*

**Moderators :** **Lucrecio Rebugio & Leni D. Camacho** *(Philippines)*

The technical session had two sub-sessions. The morning

session dealt on "Forest ecosystems restoration for poverty reduction and environmental conservation in Southeast Asia" while the afternoon session dealt on "Socio-economic assessment and valuation for sustainable forest ecosystems management in Southeast Asia". Both sessions presented some current initiatives of the ASEAN-Korea Environmental Cooperation Project and other selected countries in order to contribute to the sustainable and equitable forest and environmental management and rehabilitation of deforested areas in the tropical forest ecosystems. There were more papers proposed than could be accommodated in the available time slot, hence, a number of papers were included in the poster session.

The morning session started with the presentation of Dr. Hadi Pasaribu on the technology for the restoration of degraded areas such as recycling tailing waste in the establishment of fast growing trees which produce better carbon biomass in Indonesia. Then Dr. Ang Lai Hoe reported on the potential of trees for carbon sequestration and phytoremediation in the degraded tropical ecosystem of Malaysia. The next presenter, Dr. Nathaniel Bantayan reported the biodiversity and other natural resources in the Mt. Makiling Forest Reserve, Philippines and discussed the tool for assessing and monitoring biodiversity in the area. Also, Dr. Thaug Naing Oo presented the tree species diversity, composition, and stand structure of tropical deciduous forests in Myanmar and explained the impacts of disturbances in the conservation of tree species diversity and composition. Lastly, Dr. Monton Jamroenprucks reported a success story of using agroforestry species for rehabilitating degraded forest land and biodiversity in a watershed area in Thailand

The afternoon session began with Dr. Leti Sundawati's presentation on participatory agroforestry project for energy production through planting agroforestry fuelwood species to help the farmers in the rural areas of Indonesia. Then Dr. Renezita Sales-Come reported on the mixed species approach to reforestation, on how effective the polyculture works and the different considerations in order to strike a balance between biodiversity and productivity for smallholder conditions. The last three presenters, Dr. Ladawan Puangchit, Dr. Antonio Carandang and Mr. Hoang Lien Son discussed the application of valuation

methods on mangrove ecosystems services and functions in Thailand, Philippines and Vietnam, respectively. They highlighted the initial results of their AKECOP researches on collaborative mangrove economic valuation and stressed the important role of mangroves in the life and livelihood of coastal population in their respective countries in terms of the multiple benefits and value they provide. The papers provided initial information on the total economic value of mangroves. Although the results presented were only initial results, the values are expected to be much higher if more benefits will be included in the estimate of the total economic value.

The papers (including the poster papers) provided good prospects for sustainable forest ecosystem management through appropriate forest restoration and poverty alleviation strategies. The fundamental issue raised was how to reconcile sustainable livelihood improvement and effective forest restoration strategies.

### D-13 Biology and ecological functions of forested peatlands

**Organizer :** Tetsuya Shimamura, *Ehime University, Japan*

**Moderator :** Tetsuya Shimamura (*Japan*)

This session brought together scientist working on all aspects of biology in forested peatlands. The lead speaker Tetsuya Shimamura presented importance of biodiversity to keep carbon sequestration in tropical peat swamp forests.

Shigeo Kobayashi indicated the importance of proper management of tropical peat by reviewing his works in Burnei and Sumatra. Kristell Hergoualch presented method to quantify changes in carbon storage associated with land use changes in a ecosystem. Ryuuichiro Abe pointed out some social causes, such as inappropriate land ownerships, that nullified several attempts to rehabilitate degraded tropical peat lands in Central Kalimantan. Abdul Rahim Nik reviewed ecosystem approach, a strategy for the integrated management to preserve tropical peat swamp forest, and indicated the importance of consultative process

and management planning. Hesti L. Tata reported ecological and silvicultural aspect of *Gonystylus bancanus* trees, the most important commercial trees in tropical peat swamp forests. She addressed a demand for establishing a system of harvesting and timber transportation that considers both natural and social environments. Haris Gunawan presented a case study in Riau's biosphere that evaluates secondary succession by comparing species compositions of degraded forests and natural forests, and inferred changes in species composition along the secondary succession. The last speaker of the oral sessions Sue Page summarized the current state of knowledge pertaining the vegetation dynamics of degraded peatlands and the attempts to rehabilitating peatland hydrological and carbon sequestration functions in Central Kalimantan. She noted importance of re-wetting the peat and re-establishing forest cover to rehabilitate degraded peatland and concluded a management planning that is grounded in scientific knowledge and considers socio-economic circumstances is needed.

Seca Gandaseca a poster presentator reported a case study in Sarawak that investigates effects of logging on water quality. He concluded selective logging has less impacts on water quality in tropical peat swamp forests. Erna S. Poesie the other poster presentator, reported about ecological characteristics of small mammal community in Central Kalimantan. She indicated the importance of larger seeds as food sources for small mammals.

### D-14 Comparative analysis of forest sustainability transitions in developed and developing countries

**Organizers :** Yeo-Chang Youn, *Seoul National University, Republic of Korea*; Wil de Jong, *Kyoto University, Japan*; Wen Tiejun, *Renmin University of China, China*

**Moderator :** Yeo-Chang Youn (*Republic of Korea*)

There were five papers presented on the issue of forestry transitions in five countries including China, Finland, Korea, Russia and the Philippines, and a paper on the theory of forest transition.

Dr. Bae overviewed the forest transition in Korea using time series data from 1927 to 2007. He classified three stages of forest transitions. He placed Korea as a country of high forest cover with low deforestation rate. YOUN Yeo-Chang and Mi Sun Park presented a comparative analysis of forest transition in Korea by comparing the contrasting cases of South Korea and North Korea in the aspects of forest policy environment and arrangement. The authors concluded that a broad policy mix is important in succeeding in rehabilitation of deforested lands with the evidences from Korean peninsula with two different political settings.

Matti Palo compared the forest transitions in Finland and the Philippines based on the theory of property right. He argued the deforestation in the Philippines is due to 'socialistic forestry'. Liu Jinlong and Zhang Qiaoyun overviewed the transition in Chinese forestry and forestry norms of governing sustainable forest management in China and assessed the norms with an international perspective of Sustainable forest management. Victor Teplyakov overviewed forest transition in Russia due to a number of factors including forest and population distribution, land use and forest composition change over last few centuries as well as uneven forest cover fluctuation in different parts of Russia. At the end of the session, Wil de Jong presented a theoretical review of forest transition and proposed a collaborative research project on forest transitions in Asian countries.

## E-01 Green forest products marketing and business management

**Organizer :** Richard Vlosky, *Louisiana Forest Products Development Center, USA*

**Moderator :** Richard Vlosky (*USA*)

The Forest Products Marketing and Business Management group held two sessions in Seoul. The Seoul meeting, as well as a pre-congress session in Japan, was held jointly with the United Nations Economic Commission for Europe/FAO Team of Specialists on Forest Products Marketing. Both sessions were well attended with participation ranging from 30 to 50.

Submissions to the sessions were many more than could be accommodated. Accordingly, many were presented only as posters in the general poster session. Over 15 posters from seven countries covering a wide range of topics were included. Following the theme of "green", the presentations primarily covered topics of corporate social responsibility, forest certification, and the views of the design community regarding wood products.

Despite the fact that forest certification is now a long-lived issue, four of the eleven oral presentations were focused on certification, exploring the issue in Asia and North America. The topic was covered from a consumer-behaviour as well as an organizational decision-making perspective.

Forest Products marketing researchers are increasingly concentrating on the design community with a goal of better understanding how architects and engineers perceive wood products as well as their decision making processes when specifying building products. The growing trend toward "green" buildings is likely driving this level of interest by researchers. Presentations covered this topic in the US, Australia, Norway and Sweden.

The pre-Congress meeting in Japan was lead by Toshiaki Owari and his team from the University of Tokyo. The meeting included a full day of scientific presentations followed by two days of forest and manufacturing study visits. A total of 13 presentations were given following four themes:

1. *Environment and the green economy*
2. *Building construction*
3. *Markets, present and future*
4. *CSR, business practices and innovation*

## E-02 Value chain optimization in the forestry industry context

**Organizers :** Jean Favreau, *FPInnovations, Canada*;  
Lennart Rådström, *Skogforsk, Sweden*

**Moderator :** Jean-François Gingras (*Canada*)

Today, doing businesses require new approaches to manage the way of producing goods. Value Chain Optimization is

an approach that can be used to better manage operations for companies that operate in complex environments. It is particularly valuable in businesses, like forest products manufacturing, where companies are divided into a number of separate business units. For these companies, value chain optimization provides tools that help to maximize profits across the entire organization rather than just within a single business unit. Many industrial sectors are practicing supply chain management in order to increase the net value of their final products. The forestry sector is still very focused on reducing costs. Practicing Value Chain Optimization is very challenging for the forest industry in many countries due to its specificity and the traditional way of managing the supply chain. Objectives of the session are to: (1) Present the key issues and the latest concepts of Value Chain Optimization in different parts of the world, and (2) Provide examples of functional and optimized Supply Chain Management in the forest industry. Five oral presentations were made in the session: *From good to great: forest to industry interaction in Sweden from a value chain optimization perspective* (Lennart Rådström, Sweden); *FPIInnovations and Canadian university network in value chain optimization* (Jean Favreau, Canada); *Internet-based, technology-driven supply chain optimization in the forest sector* (Richard Vlosky, USA); *Genetic improvement of Eucalyptus grandis and economic impact at the forest industrial chain in Uruguay* (Isabel Andreoni, Uruguay); and *The symbiosis mechanism of green supply chain in forestry-paper integration system* (Zhiquang Zhang, China). Furthermore, six poster presentations were included in the session.

\* The summary for this session was written by the COC.

### E-03 Utilization of forest biomass as raw materials for green biofuels and chemicals

**Organizers :** **Ingyu Choi & Joon Weon Choi**, Seoul National University, Republic of Korea;  
**Soomin Lee**, Korea Forest Research Institute, Republic of Korea

**Moderator :** **Ingyu Choi** (Republic of Korea)

In this session, eight selected oral presentations as well as 35 poster presentations related to harvesting of woody

biomass, biomass conversion technologies to biofuels and biomass derived biochemicals, which are recently highlighted as worldwide interesting topics in the field of biomass and bioenergy, were discussed.

As for the topics of woody biomass harvesting, the feasibility of biomass harvesting system for biofuel production was analyzed in terms of efficiency, productivity and cost. In addition, new mechanism for bundling process for forest residues and its efficiency was also evaluated. Since the importance of solid fuels, woody chip and pellet, has been recently emphasized due to soaring price of fossil fuels and environmental concerns, some papers discussed versatile utilization potential of solid fuels as renewable energy to co-generation, gasification and co-mixed with coal fly ash and the market opportunities and barriers for wood pellet and briquette in Korea were presented. This session introduced physicochemical properties of “hyper wood pellet” produced newly modified pelletizing method by heat treatment of wood chip around 250 – 300°C. This session addressed several types of biomass conversion technologies to liquid biofuels: e.g. pretreatment processes of woody biomass, saccharification and biological fermentation to bioethanol as biochemical conversion technologies and fast pyrolysis process as thermochemical conversion process, as well as biodiesel production from the seeds of oil plant *Jatropha curcas* L.. Biomass pretreatment is an indispensable process for cellulosic bioethanol production from woody biomass to disentangle the crystallinity of cellulose. In particular, this session introduced the catalytic effect of sulfuric acid, magnesium chloride and sodium hydroxide during the organosolv pretreatment of soft wood species. For consecutive process after pretreatment saccharification processes were necessary for bioethanol fermentation and supercritical water treatment and enzymatic saccharification were demonstrated as representative saccharification processes, in which supercritical water treatment was focused on the process optimization as well as sugar yields and enzyme saccharification were especially focused on the purification of efficient enzymes from *Formitopsis pinicola* strain for xylan hydrolysis. Several papers dealt with fast pyrolysis system as a representative thermal conversion of woody biomass to liquid biooil. The topics of those papers were summarized to system optimization of fast pyrolysis,

correlation between moisture content of biomass and biooil properties as well as biooil utilization for phenolic resins. This session also noted the future objective of biorefinery based on woody biomass, which was targeted to create a novel bioactive products or biomedically active components from various wood extractives, such as polyphenol, terpenes, lipids and tannins etc. In addition, this session included some other promising topics, such as purification of hemicelluloses from woody biomass for utilization to value added materials, production of bio-based plywood adhesives from wood bark by copolymerization with phenol-formaldehyde.

#### **E-04 Integrating engineered biocomposites from wood and other bio-based materials to promote sustainability**

**Organizers :** **Marius Barbu**, *Transilvania University of Brasov, Romania*; **Salim Hiziroglu**, *Oklahoma State University, USA*

**Moderator :** **Marius Barbu** (*Romania*)

Prof. Barbu, as coordinator of this WG called the Business Meeting on August 24 at 3:23 pm. He gave background information about IUFRO 5.05.00 Working Group within Division 5. He also reviewed some of the activities carried out in the working group last 5 years, since the last IUFRO World Congress in Brisbane (2005) and Division 5 Conference in Taipei (2007).

He and Dr. Hiziroglu (deputy coordinator of 5.05.00) asked to the audience (16 scientists from nine countries) for people who are interested in serving in working group as volunteer. Dr. Raymond Okai from Ghana, Dr. Sudin Rahim from Malaysia, Dr. Ajayi Babatunde from Nigeria and Dr. Tatsuya Shibusaya from Japan showed their interest in serving as Deputy Coordinator in 5.05.00 working group after 2010.

Location of the next meeting in 5 years was asked and Dr. Chris Risbrudt stated it was decided that Division 5 conference will be held in Portugal in July 2012.

Technical sessions of E-04 were held 4:00-6:30 pm on

August 23 and 25, 2010 during at COEX, Seoul. A total of 16 oral presentations were delivered in both sessions covering different aspects of engineered biocomposite materials manufactured from wood and non-wood resources within the perspective of sustainability and non-conventional aspect. Main themes of the presentations were in three areas, namely using waste material from processing in panel manufacture, converting alternative lignocellulosic resources such as rice husk, coconut husk, palm, bamboo and wheat straw into value-added products and development of wood plastic composites and molded materials. Each session had 52 participants from different countries. In addition to oral presentations 34 poster presentations were also given within E-04 during the congress. Poster sessions were displayed in specified area and scheduled time so that presenters had opportunity to discuss with interested parties. Emission reduction was one of the main issues covered in poster sessions.

Dr. Barbu mentioned that there is a possibility to produce proceeding of this year meeting in our group if the coordinators can get some help from any governmental organization. Colleagues from Trabzon, Turkey offered support in this matter. Meeting adjourned at 4:05 pm.

#### **E-05 Sustainability impact assessment of the forest-based sector**

**Organizers :** **Kaj Rosén**, *Skogforsk, Sweden*; **Jean-Michel Carnus**, *National Institute for Agricultural Research, France*; **Margarida Tomé**, *Instituto Superior de Agronomia, Portugal*

**Moderator :** **Kaj Rosén** (*Sweden*)

A number of methods and evaluation tools have been developed to assess the environmental performance of industrial activities, including forestry and forest-based industry, although few take into account all aspects of sustainability. There is, therefore, a need for new tools for sustainability impact assessment of forestry and forest-based industry operations to support political and cooperative development strategies for a sustainable development of the society. The Session explored new

approaches for sustainability impact assessment (SIA) of the forest-based sector. The need for and applicability of SIA as a tool to evaluate the complete business sectors from all aspects of sustainable development was discussed. Topics in this session included: background, motives and methods for assessing sustainability impact of industrial activities; ToSIA – the EFORWOOD approach to sustainability impact assessment; case studies from local to global scales; and evaluation and stakeholder involvement in SIA. Eight oral presentations were included in the session: *Assessing sustainability impacts of forestry-wood chains* (Risto Päivinen, Finland); *ToSIA – a tool for sustainability impact assessment of forest-wood chains* (Marcus Lindner, Finland); *Public policies as institutions for sustainability: potentials of the concept and findings from assessing sustainability in the European forest-based sector* (Filip Aggestam, Austria); *Long-term simulation of forest sustainability under a multifunctionality context* (Susana Barreiro, Portugal); *Sustainability impact assessment: a useful concept for regional comparative studies?* (Franka Brüchert, Germany); *Application of Natura 2000 concepts in the context of mountain forestry: assessment of sustainability impacts of different approaches on a regional basis* (Gero Becker, Germany); *Criteria of assessment of forest work performance in Polish forestry* (Adam Lubera, Poland); and *Incorporating recreational value into sustainability impact assessment of the European forest-based sector* (Frank Jensen, Denmark). Nine poster presentations were also made in the session.

\* The summary for this session was written by the COC.

## E-06 Properties and utilization of plantation timbers

**Organisers :** **Kee See Gan**, *Forest Research Institute Malaysia, Malaysia*; **Pekka Saranpää**, *Metla, Finland*

**Moderators :** **Pekka Saranpää** (*Finland*) & **John Moore** (*UK*)

The demand for wood as a renewable and sustainable construction material as well as for other uses, including energy generation, is increasing. Plantations provide a source of material to meet this demand and offer an

alternative to the exploitation of old growth forests, while at the same creating a carbon sink. Various wood processors have different raw material requirements, and therefore wood quality is a relative term. The properties/grade of products such as sawn timber for use in construction applications are strongly influenced by raw material quality, which in turn is affected by forest management and environment. Many processors that have traditionally relied on wood from natural forests are now beginning to transition to a raw material supply from plantations, which they often view as being inferior. While good knowledge exists on the effects of silvicultural practices on branch size, stem taper and tree form, less is known about how these practices affect internal wood properties such as density and stiffness. Such knowledge is required as processors are increasingly demanding raw materials with particular wood properties. These properties are also strongly affected by environmental characteristics, and therefore it is expected that they will be affected by future climate change. The ability to meet the needs of end-users of wood products now and into the future is a key challenge for the forestry sector.

The first presentation in this session was given by Dave Cown. He talked about recent developments in resource characterisation in radiata pine plantation in New Zealand. Recent research has focused on improving the understanding of factors affecting wood quality in radiata pine and developing methods and tools for more effective data collection. He underlined that blemishes such as resin defects and intra-ring checks must be detected at the earliest possible opportunity and such material should be segregated to avoid unnecessary processing costs.

Fauzi Febrianto gave the second presentation on the physical and mechanical properties of particleboard made from a mixture of flakes from *Paraserianthes falcataria*, *Maesopsis eminii* and *Acacia mangium* woods with and without pre-treated in cold water immersion. According to Dr. Febrianto, the results indicated that mixing higher flake density with lower flake density improved the dimensional stabilisation (water absorption and thickness swelling) of flakeboard, vice versa. Flakeboard made from whole *A.mangium* wood pretreated with cold water immersion yielded superior mechanical properties.

John Moore summarised a number of studies that have been



conducted to investigate the opportunities for improving the utilisation of the UK's plantation resource. The majority of sawn timber produced in the UK is Sitka spruce (*Picea sitchensis*), while a substantial amount is Scots pine (*Pinus sylvestris*). However, of the material sold as construction timber, very little is used for producing the prefabricated timber frames and trussed rafters used in mainstream house construction. In order to improve the value of the UK's forest resource, it is important to get more locally-produced timber into this higher value component of the construction market. This requires continuous work to improve timber quality, maintain local timber production and to grow its share of the construction market.

H. Q. Ren from Chinese Academy of Forestry showed the results for mechanical stress grading of Chinese fir dimension lumber for light frame wooden houses Chinese fir (*Cunninghamia lanceolata* Lamb. Hook) is one of the major tree species for plantations and widely used in Chinese traditional wooden houses. The mechanical properties of Chinese fir dimension lumber were obtained using full-size specimens in order to establish different grades for mechanical stress grading (MSG). The correlation between mean values of strength and modulus of elasticity (MOE) were stronger as MOE were divided into intervals, and the relationships among strengths can be used to guide MSG.

Unfortunately one oral presentation was cancelled due to acute illness.

The session included 22 posters covering a wide range of topics related to the properties and utilization of plantation timber such as tracheid properties of *Pinus caribaea* in Cuba and wood properties of rubber tree (*Hevea brasiliensis*) planted in Cambodia.

### E-07 Sensing wood properties and allocation of round wood with respect to product requirements

**Organizer :** Gero Becker, *University of Freiburg, Germany*

**Moderator :** Gero Becker (*Germany*)

For most industries, process efficiency and product quality depend to a large extent on the specific properties of the raw material input. Using a well defined raw material for a given specific production process and product makes the process more cost effective and the product more competitive. While industrial demands are both very specific and well defined, the round wood coming from forests varies widely with tree species, age, dimension, quality and structure properties. This diversity is even more pronounced where modern silvicultural concepts (mixed, uneven stands, close-to-nature forestry) are applied. A product-specific allocation of the raw material could radically improve yield, profitability, new product development and customer orientation for the wood product companies. The challenge is to map these properties at the stand level and to develop an accessible and flexible geo-referenced database for forest industry use. This session considers these issues and technological developments through individual papers presentations and posters. Seven oral presentations were made in the session: *Analysis of moisture movement in wood using NIR spectroscopy and strain-stress occurrence in wood during drying* (Hwan Myeong Yeo, Republic of Korea); *Characterisation of tracheid cross-sectional dimensions of Scots pine and Norway spruce* (Mikko Havimo, Finland); *Towards a quality-optimised timber production: measurements of knots in roundwood prior to sawing using CT technology* (Udo H. Sauter, Germany); *Improving the efficiency of the wood supply chain in the United Kingdom by segregating logs based on their mechanical properties* (John Moore, United Kingdom); *Wood properties and use of near infrared spectroscopy and terrestrial LiDAR to improve optimal bucking and wood value recovery* (Mauricio Acuna, Australia); *Matching forest raw material with industrial requirements to enable optimal wood allocation to the industry: decision support system based on quality information derived from airborne LiDAR* (Martin Opferkuch, Germany); and *Improved wood allocation with respect to product requirements and sustainability based on property measurements, models, and forest resource databases* (Sven-Olof Lundqvist, Sweden). Two poster presentations were included in the session.

\* The summary for this session was written by the COC.

## E-08 Surface processing and treatment technologies for wood and wood based materials to enhance durability and performance

**Organizers :** **Bernie Dawson**, *Scion, New Zealand*;  
**Koichi Yamamoto**, *Forestry and Forest Products Research Institute, Japan*;  
**Andrew Wong**, *Universiti Malaysia Sarawak, Malaysia*

**Moderators :** **Koichi Yamamoto** (*Japan*) & **Andrew Wong** (*Malaysia*)

There are around 20 contributions related to wood protection, both poster and oral presentations in E-08 group. Topics were mainly categorized into chemical modification (3), carbonization or thermal treatment (8), fire proof (2), and performance and durability of wood/treated wood (7).

Technical Session E-08 was made up of six oral presentations. Chih-Shen Chuang (China-Taipei) showed intumescent coating system with vinyl acetate-based chemicals applied to red lauan plywood passes the fire retardant class 2 in Chinese standard. Fire proof technology of timber should be more focused to expand wood utilization in higher story buildings and interior goods in public buildings. Ratnasingam J. (Malaysia) stated current heat treatment technology applied to rubber wood which intends to improve the dimensional stability and surface properties. There are a lot of discussions about cost and degree of treatment intensity. Suyong H. (China) presented the antibacterial property of China fir/TiO<sub>2</sub> composite made by sol-gel process. The products will be used as interior commodities in hotels with the demand of health and safe. M. Khairun Uyup (Malaysia) indicated the weathering result of ply-bamboo after one year outdoor exposure. Phenolic-treated one (15~20% of weight gain) remains superior strength (only 35% reduction) compared with untreated one. Consideration to distinguish fungal and UV degradation is mentioned by an audience.

The session had a good chance to discuss the future of wood protection. As less durable plantation timber becomes major role of wood resources, various technologies for treatments

appropriate to local species also become important.

Both sessions of E-08 and SP-09 “Enhancement of service life of wood an environmentally conscious global society” were supported by IRG(International Research Group on Wood Protection). Full papers submitted to IRG will be sorted into the IRG documents.

## F-01 Detecting, monitoring and modeling forest fire and carbon emission using remote sensing and GIS

**Organizer :** **Yousif Ali Hussin**, *University of Twente, Netherlands*

**Moderator :** **Yousif Ali Hussin** (*Netherlands*)

In the last two decades, fire has become one of the greatest threats to world forests, and it has an extraordinary influence on forest vegetation and on dependent fauna, soils, stream flow, air quality and climate. Fire is now recognized as a significant global source of atmospheric carbon emission, contributing more than half of all the carbon released into the atmosphere. Accurate detection, monitoring and modeling of forest fire is needed, and reliable estimates of carbon emission from forest fires are crucial. The objectives of the session are: (1) to present the state of the art: data, methods and techniques of remote sensing and geographic information system (GIS) systems used to accurately detect, monitor and model forest fire and carbon emissions, and (2) to improve our understanding of forest fire and its effects on climate and the carbon cycle dynamics. Four scientists made an oral presentation in this session as follows: *Modelling fire-induced carbon emissions in tropical forests of Ghana* (Yousif A. Hussin, Netherlands); *Mapping burn severity by using spaceborne high resolution MS data* (Cheon Kim, Republic of Korea); *Optimizing tree-removal to efficiently minimize crown fire hazard* (Marco Contreras, USA); and *Optimization for the forest fire management program of the Bio-Bio region in Chile* (Pedro Real, Chile). Four poster presentations were also included in the session.

\* The summary for this session was written by the COC.

## F-02 Contemporary frontiers in forest inventory and assessment using successive remotely sensed data

**Organizers :** **Temesgen Hailemariam**, Oregon State University, USA; **Cris Brack**, Australian National University, Australia

**Moderators :** **Cris Brack** (Australia) & **Temesgen Hailemariam** (USA)

Forest management and silvicultural prescriptions have become increasingly complex, relying on analyses of various layers of vegetation, microclimate, and micro-site parameters. The development of layers requires detailed knowledge of forest structure, composition, and diversity. Emerging technologies such as light detection and ranging (LiDAR) offer unprecedented opportunities to quantify forest attributes, identify change, and tackle other emerging challenges. The purpose of this session was to facilitate the exchange of ideas between researchers, scientists, and practitioners with common interests to improve inferences in forest resource inventories and assessments using successive remotely sensed data. The session provided a forum for discussion of current research findings and the exchange of ideas related to the following questions: (1) How can successive remotely sensed data be collected and analyzed efficiently to advance precision in forestry? (2) What magnitude of changes in forest attributes is detectable using successive remotely sensed data? (3) What are the accuracy and precision of changes detected with successive remotely sensed data? (4) Can successive remotely sensed data be used to characterize both linear and nonlinear forest attributes including stand structure and diversity? (5) What are some of the challenges and opportunities in using successive remotely sensed data? A total of nine oral presentations were included in the session: *Challenges and opportunities in estimating biomass change using successive remotely sensed and ground data in coastal Alaska forests* (Temesgen Hailemariam, USA); *Integration of Landsat time series and LiDAR to understand trajectories of forest change* (Warren Cohen, USA); *Using multi-temporal airborne laser scanning data to monitor changes in forest structure on the Kenai Peninsula of Alaska over a 5-year period (2004-2009)* (Jacob Strunk,

USA); *Using the SSEB-ET model to characterize the seasonal and spatial dynamics of forested regions in the Greater Horn of Africa* (Gabriel Senay, USA); *Spatial monitoring of late-successional forest habitat over large regions with nearest neighbor imputation* (Janet Ohmann, USA); *Utilization of non-parametric methods to map forest attributes using airborne laser scanning data* (Matti Maltamo, Finland); *The analysis of vegetation restoration after natural disturbance with multi-temporal remote sensing images and field survey data* (Jeng-I Tsai, China-Taipei); *Improving vegetation classification from Landsat and IRS image: evaluation of unsupervised and supervised classification through band ratios and DEM in a mountainous landscape in Nepal* (Krishna Bahadur KC, Germany); and *Automatic stem location mapping using several single-scan TLS for plot-wise forest inventory* (Xinlian Liang, Finland). Five poster presentations were also included in the session.

\* The summary for this session was written by the COC.

## F-03 Biotechnology applications in forest breeding and plantation management

**Organizers :** **Liisa Vihervuori**, University of Helsinki, Finland; **Bailian Li**, North Carolina State University, USA

**Moderators :** **Liisa Vihervuori** (Finland) & **Bailian Li** (USA)

Biotechnology is a growing study field in forest sciences that can be applied in different ways both in basic and applied research from gene level to population level. The seven (one presentation was cancelled) oral presentations were focused on biotechnology applications ranging from forest breeding techniques to plantation management. Also species conservation was envisaged in several presentations. The first half of presentations covered tree physiology and transgenic trees and their interactions in ecosystems. The second half put emphasis on plantation management, an item that was discussed particularly from the viewpoint of tissue rejuvenation and propagation.

The first group of presentations were related to transgenic trees from the viewpoints of characterization and ecological

aspects. Sang-Soo Kwak showed that transgenic plants with an enhanced tolerance to multiple environmental stresses may be developed. Studies on ecological interaction showed that transgenic trees may have variable non-target effects on herbivorous co-organisms (Liisa Vihervuori) and that the horizontal gene transfer from transgenic leaves to soil microbes seems possible (Qiyu Wang). Also a regulating role of brassinosteroids to tree lignin biosynthesis was demonstrated by Mi Kwon.

The topics of the second group ranged from different applications in plantation management to tree conservation. RamasamyYasodha concluded that rejuvenation of tree clones may be important in the conservation of high yielding ortets. The cancelled presentation of S.K. Roy discussed the question whether in vitro technology is a viable alternative for the continuous supply of planting materials for recalcitrant tropical trees. Yuji Isagi and Gustavo Maruyama Mori used biotechnological tools called microsatellites to study and conserve endangered tree species.

The 12 poster presentations covered especially genetic diversity related studies including genetic markers and microsatellites which help to study population genetics and conserve genetic resources. The difficulties in species identification were addressed in several posters. Application-oriented studies were discussed regarding two aspects. The first one was preserving tree genomics and species and the second one producing transgenic trees for different purposes: to gain stress tolerance and to combat desertification. All the presentations in the session showed that with tree biotechnology it is possible to gain versatile information about trees which is vital for both producing new kinds of trees for different purposes and to conserve the endangered ones.

#### F-04 Achievement in seed orchards, somatic embryogenesis, and seed science for forest productivity and conservation

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**Organizers :** **Kyu-Suk Kang**, *Korea Forest Research Institute, Republic of Korea*; **Yill-Sung Park**, *Natural Resources Canada, Canada*

**Moderators :** **Yill-Sung Park** (*Canada*) & **Kyu-Suk Kang** (*Republic of Korea*)

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A total of 22 papers were presented at the technical session F-04: Achievement in seed orchards, somatic embryogenesis, and seed science for forest productivity and conservation. There were five oral and 17 poster presentations in the session. The session dealt with three aspects of forest reproductive technology: seed orchard management, vegetative propagation by somatic embryogenesis, and seed technology. Discussion focused on the integration of the three technologies to promote forestry practices and balance socioeconomic benefits, biodiversity, and climate change.

Yill-Sung Park (Canadian Forest Service - Canadian Wood Fibre Center, Canada) took the role of session moderator. He led the oral presentation on various applications of somatic embryogenesis (SE) in forestry. The use of SE technology offers exciting new opportunities in research to elucidate genetic response to environmental factors, diseases, and insects, providing an additional dimension for species conservation and restoration, and for the implementation of multi-varietal forestry for prime-site high-value plantation forestry. Dag Lindgren (Swedish University of Agricultural Sciences, Sweden) summarized how to maximize genetic value while maintaining genetic diversity in seed orchard management. He presented clone deployment and selective harvest model algorithms to minimize group coancestry for the seed orchard management when clonal mixtures contain candidates that are related. Seug-Gu Son (Korea Forest Research Institute, Republic of Korea) presented an empirical study on seed development of *Chamaecyparis obtusa*, depending on cone harvest time in order to increase quantity of sound seeds. Under microscopic examination, different types of embryos were observed

depending on time of harvesting; the best picking time was found to be mid-October. Budi Leksono (FORDA, Indonesia) presented the status of forest tree improvement of *Eucalyptus pellita* in Indonesia, giving results of first-generation genetic improvement after two generations of breeding in a seedling seed orchard program. Mean realized gains in the second generation were around 13–19% for growth and stem form, and selection in the first generation has favored improvement in growth traits rather than stem form. For *E. pellita*, a 5-year breeding generation cycle should be achieved with 8-year rotations. The last speaker was Mariano Toribio (IMIDRA, Spain) who presented work on the development of cork oak varieties of high quality and productivity by cloning selected trees through SE. He developed a protocol that allows the cloning of adult cork oak trees by SE, and proposed the protocol be used to develop varieties from trees selected on the basis of their high quality and productivity of cork in southwest Spain. Exchange of information on all aspects of forest regeneration technology was fostered in technical session F-04 to meet the objectives of reforestation and restoration for sustainable forest management.

### F-05 Advances in handling missing data in sustainable forest management

**Organizers :** **Temesgen Hailemariam**, Oregon State University, USA; **Valerie LeMay**, University of British Columbia, Canada; **Göran Ståhl**, Swedish University of Agricultural Sciences, Sweden

**Moderator :** **Temesgen Hailemariam** (USA)

Forest management decisions are rarely based on single objectives, and hence, managing forested landscapes requires information to support several forest management goals such as timber production, wildlife habitat, fire hazard mitigation, biodiversity, and carbon balance. Timely, accurate, and precise information about the entire forest resource is needed. However, missing data on some units limits the sustainable management of forests. Missing data is a universal problem in forest inventory, monitoring, and planning. To alleviate this problem, various methods have been developed for forestry applications. Some of

these methods include complete-case analysis, weighting procedures, and imputation-based approaches. The purpose of the session was to bring together researchers, scientists, and practitioners with common research interests and to exchange ideas related to some of the challenges and opportunities of handling missing data in forestry applications and current research findings to mitigate missing data problems in Sustainable Forest Management. Eight oral presentations were given in the session: *Nearest-neighbour imputation for edge correction of sample plots* (Valerie LeMay, Canada); *Comparing k-NN and linear regression: is there reason to select one over the other?* (Annika Kangas, Finland); *Using imputation for risk mapping of disease when climate changes: an example from the temperate rainforest of Alaska, USA* (T.M. Barrett, USA); *A comparison of spatial regression models in determining the influence of climate on productivity in coastal Alaska forests* (Gregory Latta, USA); *Design-based calibration of k-NN estimates by histogram matching* (Piermaria Corona, Italy); *Missing observations in long-term monitoring data for parameterizing both empirical and process based forest growth models used for sustainable forest management* (George Gertner, USA); *Imputing branch volume or mass from changes in tree bole shape* (David W. MacFarlane, USA); and *Kriging with external drift in model localization* (Minna Rätty, Finland). The session included four poster presentations.

\* The summary for this session was written by the COC.

### F-06 Remote sensing in carbon balance evaluation and monitoring

**Organizers :** **Tomasz Zawila-Niedzwiecki**, Forest Research Institute, Poland; **Mathias Schardt**, Joanneum Research Institute of Digital Image Processing, Austria

**Moderator :** **Tomasz Zawila-Niedzwiecki** (Poland)

An operational system to quantify carbon stock and stock changes on national and continental scales will be essential to countries for meeting their international climate change commitments to monitor and improve the source-sink function of its forests. Remote sensing (SAR and optical) represents an ideal instrument for the objective and

standardized assessment of carbon stocks. In comparison to other inventory systems it offers a highly cost efficient alternative. The potential of satellite remote sensing for carbon stock assessment has been demonstrated by many investigations and the development of innovative models to improve remote sensing based inventory tools is currently under way. Many studies clearly demonstrated that classifications can be significantly improved when remote sensing data and terrestrial inventories are combined. The session included papers and posters demonstrating innovative methods for carbon assessment that are based both on SAR and optical airborne or satellite remote sensing data. Seven oral presentations were given in the session: *The use of optical remote sensing for the assessment of deforestation and degradation* (Mathias Schardt, Austria); *Criterion-based procedures applied to Landsat TM data for variable selection in an automated classification schema for Bavarian forests* (Juan Ygnacio López Hernández, Germany); *Using MODIS time series to characterize the annual dynamics of photosynthesis in tropical forests of Central Africa* (Valery Gond, France); *Carbon assessment of a tropical rainforest: evaluating a REDD baseline in northeastern Madagascar* (Rakoto Ratsimba Harifidy, Madagascar); *An active remote sensing method for biomass assessment and its potential impact on the global forest resource assessment* (Kazimierz Becek, Brunei Darussalam); *Estimation of above-ground biomass in tropical forests for mapping carbon sequestration using radar satellite images* (Yousif A. Hussin, Netherlands); and *Long-term net primary production and carbon budget prediction at different spatial scales using the 3-PG model* (Margarida Tomé, Portugal). Three poster presentations were also included in the session.

\* The summary for this session was written by the COC.

## F-07 Forest monitoring and inventories by means of LIDAR, photogrammetry and HR satellite data

**Organizers :** **Mathias Schardt**, *Joanneum Research Institute of Digital Image Processing, Austria*; **Tomasz Zawila-Niedzwiecki**, *Forest Research Institute, Poland*

**Moderator :** **Mathias Schardt** (*Austria*)

Effective forest monitoring is necessary to help decision makers to take the right measures in order to assure the ecological and economic health of forests today and in future. As conventional monitoring and inventory methods are time-intensive and expensive, forest authorities ask for cost-effective methods. The availability of new and innovative sensor systems such as high resolution remote sensing data, laserscanning and digital photogrammetry will significantly increase the potential of remote sensing, allowing the establishment of monitoring systems at different scales and level of detail. The combination of information derived from these techniques and the integration with other data sources using geographic information systems (GIS) will enhance the results of forest monitoring and inventory projects and, therefore, improve practical work processes. This session reviewed both operational applications and innovative techniques in the field of remote sensing data assessment and analyses. The session was divided into two sub-sessions, session 1 and session 2. In total, 12 oral presentations were given in the session (six in the session 1 and six in the session 2): *Assessment of coniferous forest carbon sequestration in the northern Rocky Mountains, USA, using LiDAR remote sensing, field surveys, and a forest growth model* (Andrew Hudak, USA); *Airborne laser scanning in tropics: industrial plantations in Brazil and REDD mapping of natural forests in Lao PDR* (Matti Maltamo, Finland); *Using optical data and small footprint LiDAR for plot-level estimation of forest biomass in a central European landscape* (Hooman Latifi, Germany); *Estimating growth factors based on stand level using airborne LiDAR data* (Hyun-Kook Cho, Republic of Korea); *Estimation of above-ground biomass of mangrove forest using crown area obtained from high-resolution satellite data* (Yasumasa Hirata, Japan); *Use of satellite data sets to analyse vegetation structure and to predict bird habitat in temperate woodlands, southwestern Australia: a case study in the great western woodlands* (Peter Lee, Australia); *Application of low-cost UAV for silvicultural forest management* (Eugene Lopatin, Finland); *Estimation of species-specific growing stock by airborne laser scanning data* (Petteri Packalén, Finland); *Mapping of thermal belts on the mountain slope by Landsat ETM+ data* (Min-Gee Hong, Republic of Korea); *Landscape-level mapping of forest stand structure and type by combining multispectral reflectance and radar backscatter using K-mean algorithm*

(Maung Moe Myint, USA); *Principles of derivation of tree biomass volume on the basis of terrestrial digital photos* (Robert Marušák, Czech Republic); and *Spatial monitoring of a complex forest: inventory of a Pro Silva Demonstrational Forest by means of terrestrial laser scanning* (Géza Király, Hungary). Additionally, 12 poster presentations were included in the session.

\* The summary for this session was written by the COC.

## **F-08 Innovation in the forest sector – maximizing the sector’s competitiveness**

**Organizer :** **Lyndall Bull**, *Australian National University, Australia*; **Eric Hansen**, *Oregon State University, USA*; **Ewald Rametsteiner**, *University of Natural Resources and Applied Life Sciences, Austria*

**Moderator :** **Eric Hansen** (USA)

This session was well attended with the number of participants ranging from 35 to 50. Six presentations were included in the session and nine posters were part of the general poster session.

Guy Smith addressed knowledge exchange and the adoption of innovations in the context of Canada with a goal of identifying what needs to change in Canada. Filip Aggestam used data from the EU Community Innovation Survey to identify patterns of cooperation and their impacts on innovation in European wood-based industries. He found that suppliers to the industry are the main collaborators and that this tends to focus companies on process innovation. Na Yu gave an overview of the potential for employees in facilitating production innovation in the Chinese furniture industry, emphasizing that there are over 5 million employees and 5 thousand firms in the sector. Scott Leavengood looked at the impact of focusing on quality management and/or innovation on innovation performance. Dharam Uprety outlined projects in Nepal with community forest enterprises for reducing poverty through innovation systems. Finally, Anders Roos summarized the body of work exploring innovation in the wood products industries in Sweden.

Posters covered a myriad of topics including the relationship between innovation and investments in fixed assets and corporate social responsibility. Behaviour of forest owners in adopting innovation was explored in Sweden and Slovakia. Several posters connected to the Oregon Wood Innovation Center explored the role and success of the Center as well a summary of research conducted through the Center and a recent project regarding commercialization potential of densified wood. Recovery and utilization of wastepaper was explored using a diffusion of innovation approach. Finally, one poster explored innovation the US furniture industry.

## **F-09 Forest Biomass utilization for bio-energy: technology, economics, and environment**

**Organizers :** **Woodam Chung**, *University of Montana, USA*; **Greg Jones**, *U.S. Forest Service, USA*

**Moderator :** **Greg Jones** (USA)

This session generated a great deal of interest and substantially more papers were proposed than could be accommodated in the time available. Some of the papers were moved to a sub-plenary session with the same title that was established to accommodate the number of proposed papers, and some were adapted for inclusion in the poster session.

The lead paper “Forest Bioenergy in the Koreas: An Integrated Techno-Biophysical and Socio-Economic Approach” was delivered by Florian Kraxner. This paper presented an analysis of the potential bioenergy supply from natural and plantation forest in Korea, as well as a map for the proposed location of combined heat and power plants based on a spatially explicit optimization model of the supply chain of bioenergy and forest sector industries. Results suggest that incentives to increase forest biomass utilization for bioenergy are essential for a sustainable renewable energy system in Korea. Benefits of biomass utilization include rural development, additional markets for forest managers, and environmental effects such as flood prevention and reductions in greenhouse gas emissions.

A paper delivered by Erik Trømborg titled “Spatial analyses of biomass costs for large-scale bioenergy plants in Norway” analyzed how regional biomass supply, transport costs, import opportunities and local biomass demand affect the feasibility of large scale bioenergy plants in Norway. The results show the trade-offs between economies of scale and increasing biomass procurement and transport costs. The paper also discussed how excess supply analyses can be used to analyze cost of biomass products with limited intersectoral demand like harvesting residuals, whereas equilibrium models are more feasible for analyses of products like wood chips.

Jyrki Hytönen presented a paper titled “Effect of harvesting method on the nutrient content of logging residues and nutrition of Scots pine on drained peatlands.” Based on six field experiments they found that the amount of logging residues left on site was highest after cut-to-length harvesting, and the logging residues left on site by whole-tree harvesting was 33-66% of the amount left by stem-only harvesting. The removal of potassium and boron was the greatest, especially in whole-tree harvesting. Regardless of the differences in the nutrient amounts left on site, harvesting method had only a minor effect on foliar nutrient concentrations five years later in the residual stand.

“Unveiling counterproductive carbon mitigation incentives” by Bruce Lippke discussed how incentives to promote the use of woody biomass for energy production can be detrimental to attaining greenhouse gas reduction objectives. This is particularly problematic when logs and chips are diverted from the production of solid wood building products to produce energy. Wood-based building products sequester carbon for long periods of time, and more-over, require much less energy to produce than non-wood building products, such as cement and steel. Using woody biomass residues for energy is a good option in cases where it will be burned anyway and use of bole wood for energy products can be desirable in geographic locations where solid wood product infrastructure is lacking.

The fifth paper “A techeconomic analysis of PF resin production using bio-oil derived from forest residue by fast pyrolysis” authored by Jinsheng Gou, Jianmin Chang, Xueyong Ren, Hue Si, Yanxue Han, and Yu Huang, was

added to the session after the program was printed. An extensive technological evaluation and dynamic economic analysis showed that there is an enormous economic benefit of utilizing wood waste and forest residue to producing PF resin through fast pyrolysis technology. Sensitivity analysis shows that feedstock cost is the most important factor in economic viability.

The poster session contained 14 posters on a variety of biomass utilization subjects. Poster topics varied from factors affecting wood pellet quality, to a new technique for measuring the moisture content in wood chips, to topics related to the quantity and quality of woody biomass feedstocks, to economics and sustainability of woody biomass utilization for energy, to a number technical topics in the utilization of woody biomass for energy.

## F-10 Managing the data deluge: the challenge of emerging technologies

**Organizer :** Roger Mills, *Oxford University, UK*

**Moderator :** Roger Mills (*UK*)

Roger Mills (Oxford Forest Information Service) opened the session by describing the many challenges involved in the successful long-term management of forest-related data in its many forms, and the variety of skills required, which necessitated a team approach. Margaret Sraaku-Lartey (FORIG, Ghana) showed how institutional repositories can be used as a mechanism for preserving institutional memory, and providing access to original research data which may never have been published. Stella Britwum Acquah (FORIG, Ghana) explained how the newly-established FORNESSA Information Service (FORNIS) has been developed to provide a regional gateway to such data sources and relevant expertise, describing the logistical and technical hurdles to be overcome. Vanda Santos (FAO) underlined that many of these are educational, citing experiences in the development of a platform for forestry education materials being developed for Central American and Caribbean countries, which aims to provide a repository for materials otherwise unavailable and links to other information bases and forestry schools to simplify discovery.



Andrea Wirth (Oregon State University Libraries) then described how the Oregon Spatial Data Library has been developed as a collaborative resource to provide access to over 200 spatial datasets relating to Oregon to users in many jurisdictions, curating data for maximum use and minimum duplication of effort. Gillian Petrokofsky (Oxford University) proposed, in a paper delivered by Roger Mills, a collaborative register of data and fugitive literature as a world-wide resource for those preparing systematic reviews summarizing research for decision-making. Randy McCracken (US Forest Service) concluded the session by emphasising the usability issues which must be taken into account in designing the end-user interface so that all these projects can actually be accessed and utilized in real-world situations.

Accompanying posters showed how archives of data can be utilized in the field using augmented reality techniques (Fujiwara et al., University of Tokyo) and conversely how bioacoustical information can be relayed from the forest to urban locations (Kobayashi et al., University of Tokyo). Sanaev et al. (Moscow State Forest University) showed how the Russian segment of the Global Forest Information Service (GFIS) is being developed to integrate Russian forest science into international scientific society, while Vibrans et al. (Brazil) showed how a geo-referenced floristic and forest inventory is being developed as a public online resource for the state of Santa Catarina, with data digitised from the state's four herbaria. Roger Mills (UK) summarised the seven stages that institutions need to consider in data management planning in order to survive the deluge and ensure that expensive research data continues to be available to meet future needs over a long time scale.

### G-02 New insights into roles of ophiostomatoid fungi in bark beetle-fungus symbioses

**Organizers :** **Diana Six**, *University of Montana, USA*;  
**Mike Wingfield**, *University of Pretoria-FABI, South Africa*

**Moderator :** **Diana Six** (*USA*)

While extensive research has been conducted on bark beetle-fungal symbioses over the last century, there remains considerable controversy over the role fungal associates play in the ecology of their hosts. The classic paradigm postulating that the fungi act as virulent pathogens that aid in the killing of trees is increasingly being questioned. Competing hypotheses have emerged and are being tested with intriguing results. In this session, speakers conducting cutting edge research on bark beetle-fungus symbioses from around the world presented their work. Namely, five scientists gave an oral presentation: *Who are killing the trees – the beetles or the fungi?* (Paal Krokene, Norway); *Role of ophiostomatoid fungi in beetle establishment on conifers, novel hypotheses* (François Lieutier, France); *Problems with the classic paradigm: what we have learned applying symbiotic theory to the study of bark beetle-fungus symbioses* (Diana Six, USA); *Novel associations between wood-inhabiting insects and pathogens threaten forests* (Michael Wingfield, South Africa); and *Host-tree phytochemistry has non-additive effects on mycangial fungi isolated from *Dendroctonus brevicomis** (Thomas Davis, USA).

\* The summary for this session was written by the COC.

### G-03 Effect of multiple ecosystem stressors on tree and forest ecosystem health

**Organizer :** **Nancy Grulke**, *U.S. Forest Service, USA*

**Moderator :** **Nancy Grulke** (*USA*)

At the 23rd IUFRO World Congress held in Seoul, Korea 22 – 28 August, 2010, two sessions of the effect of multiple ecosystem stressors on tree and forest ecosystem health were organized as contributions from Division 7, Forest Health, Air Pollution and Climate Change, Multiple Stressors Effects on Forest Ecosystems (7.01.07). The intention of the Working Party is to raise awareness on the multiple, interactive effects of air pollution (ozone, nitrogen oxides, excess nitrogen deposition) and climate change (increase in CO<sub>2</sub>, temperature, extreme climatic events) on forest ecosystems and the services they provide. By forest ecosystem services, we refer to those functions that are valued by humans (e.g., water quality/quantity, clean air, carbon sequestration, habitat protection), but which

are taken for granted and/or are difficult to quantify. The sessions represented most of these topics from scientists from 10 countries. Students and professionals from universities, government agencies, and NGOs presented on the interactive effects of physical and chemical atmospheric changes on forest systems, environmental pollutants in both freshwater and marine intertidal ecosystems, the role of macro- and micro-nutrient imbalances in affecting forest health under current or future stressors, the role of drought and other climatic stressors on rusts, forest insects, and invasability of both native and exotic pests and pathogens. The discussion was stimulated by a interactions amongst speakers in a impromptu panel question, answer, and discussion at the end of the sessions.

#### G-04 The growing threat of Australian insect pests to world eucalyptus plantation forestry

**Organizers :** **Simon Lawson**, *Queensland Department of Employment, Economic Development and Innovation, Australia*; **Bernard Slippers**, *University of Pretoria-FABI, South Africa*

**Moderator :** **Bernard Slippers** (*South Africa*)

Eucalypt plantations are greatly expanding worldwide for production of high quality, fast growing fibre, solid timber, pulp and fuel wood. In recent years there has been a rapid increase in the number of Australian native insects invading eucalypt plantations around the world. This session addressed methods that have been used to combat this threat, both historically through classical biological control, and more recently through the use of molecular techniques that can help in determining the origin and spread of pests. The use of a pathway approach to reducing the risk of spread of these insects was also considered. The session objective was to (a) review the past movements of Australian eucalypt insect pests around the world and their impact on plantation productivity, (b) provide case examples focusing on some of the first of these insects to invade overseas (e.g. *Phoracantha semipunctata* & *P. recurva*, and *Gonipterus scutellatus*) and more recent movements (*Leptocybe invasa* and *Thaumastocoris peregrinus*), and (c) review the current insect pest situation

in eucalypt plantations in Australia and the potential threat these pose to eucalypts worldwide. Five oral presentations were included in the session: *Global patterns of Australian eucalypt insect movement* (Timothy Paine, USA); *Downwind from the source: 150 years of insect pests of eucalypts in New Zealand* (Lisa Berndt, New Zealand); *The Eucalyptus snout beetle: new perspectives on an old scourge* (Bernard Slippers, South Africa); *Rapid invasion of non-native Eucalyptus plantations by Thaumastocoris peregrines* (Ryan Nadel, South Africa); and *Insect pests of eucalypt plantations in Australia: the next wave?* (Timothy Paine, USA). The session also included two poster presentations.

\* The summary for this session was written by the COC.

#### • G-05 Synergy in forest threats: Symbiotic interactions and invasives

**Organizer :** **Kier Klepzig**, *USDA Forest Service, USA*

**Moderator :** **Kier Klepzig** (*USA*)

Symbiotic interactions are commonplace in nature. It is not surprising, then, that many forest pests are found to be harboring multiple symbionts. The overall purpose of this session was to consider the many different ways in which these organisms interact, and provide a forum for researchers to learn about other systems. In this well attended, diverse session, the audience heard from an international panel of experts on symbiotic interactions in world forests. Diana Six discussed current theory on the evolution of symbiotic associations between pests and symbionts. She emphasized considering the interests of both micro and macrosymbionts. Rich Hofstetter continued the discussion looking at the role of these interactions in forest pestilence. The possible contributions of symbionts to the evolution of pestilence was considered. Kier Klepzig reviewed the many ways in which microbes mediate interactions between bark beetles and trees. Included in his discussion was the growing recognition of the role of bacteria in these systems. Brett Hurley discussed the problems posed by using symbiotic systems as biocontrol agents (and the targets thereof), with particular reference to the *Sirex* woodwasp system. Hisashi Kajimura gave an excellent overview of the diversity of strategies utilized by

Asian ambrosia beetles. Finally, Bill Hargrove provided an in depth look at the use of satellite imagery to provide early warning of the types of forest disturbances mentioned above. The system he described is close to adoption and can provide near real time advance warning of insect outbreaks (for example). The talks all resulted in questions and the session ended in lively discussion.

## G-06 Alien invasive pathogens: threats to forest ecosystem integrity and services

**Organizers :** **Steve Woodward**, *University of Aberdeen, United Kingdom*; **Ned Klopfenstein**, *U.S. Forest Service, USA*; **Mee-Sook Kim**, *Kookmin University, Republic of Korea*

**Moderators :** **Steve Woodward** (*United Kingdom*), **Ned Klopfenstein** (*USA*) & **Mee-Sook Kim** (*Republic of Korea*)

The theme of invasive forest pathogens generated much interest and discussion during the session G-6. The six oral presentations addressed 1) high-profile invasive forest pathogens, and 2) risk assessment and prediction approaches to manage invasive forest pathogens.

The lead speaker (Phil Cannon, U.S. Forest Service, USA) provided a synopsis of guava rust that poses a serious threat to several hosts in the *Myrtaceae* including *Eucalyptus*, a genus native to Australia. Despite the potential threats to numerous world-wide forest ecosystems and the expanding geographic range of this disease, little is known about the genetic structure of pathogen populations, migratory routes, and sources of introductions. Efforts are currently underway to predict and manage this important alien invasive forest pathogen.

Mee-Sook Kim (Kookmin University, Republic of Korea) presented approaches to predict the potential invasiveness of *Armillaria solidipes*, a root pathogen of conifers. It was emphasized that an ability to predict potentially invasive forest pathogens could help avoid enormous environmental and economic impacts to forest ecosystems. Phylogeography, population genetics, and climate modeling can all contribute to predicting invasive potential

for exotic forest pathogens. The most powerful predictions will likely integrate biological, ecological, and geophysical information.

The genus *Phytophthora* includes a large number of important invasive forest pathogens. Two authors (Pierluigi Bonello, The Ohio State University, USA; Matteo Garbelotto, University of California-Berkeley, USA) presented disease biology, epidemiology, and management of *Phytophthora*-caused diseases.

Defining acceptable biosecurity risk caused by alien invasive species was addressed in a paper by Hugh Bigsby (Lincoln University, New Zealand). The Iso-Risk framework is based on a model for quantifying quarantine-related phytosanitary measures and suggests that the APHIS-USDA risk assessment system will not produce consistent assessments across a range of intermediate values for consequence or likelihood of occurrence.

Several papers were presented in the G-6 poster session. Potentially invasive forest pathogens are a threat to Eucalyptus forests in South Africa and Southeast Asia. Studies of basic biology (i.e., distribution) and genetics are required to characterize potentially invasive forest pathogens for reducing risks to worldwide forests in the future.

Brief discussions that followed the presentations should lead to increased collaboration amongst diverse forest research communities and regulatory sectors for minimizing risks from alien invasive forest pathogens.

## G-07 Impacts of interacting disturbances on forest health in the boreal zone

**Organizers :** **Douglas J. McRae**, *Canadian Forest Service, Canada*

**Moderator :** **Douglas J. McRae** (*Canada*)

Boreal forest health is at risk from changes in disturbance regimes associated with climate change, which is expected to be most rapid in the boreal and arctic regions. Different scenarios project increases in natural disturbances, such

as wildfires, insect, disease, wind damage, flooding, and winter damage, which may be expected to affect the health of these forests. It is important to understand the potential consequences of changing disturbance patterns for boreal forests, which are a valuable natural resource that provides habitat for many species while often at the same time supporting a forest industry for many countries. The focus of the session was to understand the current impacts of key disturbances on the boreal forest and to project their future impacts under a changing climate.

Jean-Noel Candau (Canadian Forest Service, Canada) opened the session exploring the evidence of how climate change will likely affect the interaction between forest insect defoliators and fire. He used results from the current relationship between spruce budworm (*Choristoneura fumiferana*) and forest fires in North America. The presentation was a good illustration of how often various disturbances are co-dependent on each other.

Using the PRECIS (Providing Regional Climates for Impact Studies) regional climate model's outputs to calculate the Canadian Forest Fire Weather Index (FWI) System components for northeastern China, Xiaorui Tian (Chinese Academy of Forestry, China) showed that under IPCC Scenarios A2 and B2 that the mean FWI value will increase. The peak fire season will advance a month to April. Higher fire danger will result in a 20% increase in burned area under Scenario B2. Results suggest that adapting to climate change will require improved fuel management and enhanced suppression abilities.

Sumeet Gairola (Garhwal University, India) explained how the impact of anthropogenic disturbances will severely affect natural forests types of the Garhwal Himalaya. Diameter classes and total basal cover were found to be less due to harvesting. For most forest types, regeneration (seedlings and saplings) was poor due to grazing and lopping pressures.

Using the decision support system "Forest and Climate Change," Oleg Panferov (University of Goettingen, Germany) showed that windthrow and forest management will destabilize future forest stands. While wind velocity plays an important factor, combination of increased

air and soil temperatures and seasonal redistribution of precipitation will affect tree anchorage as a result of decreases in soil freezing and increased soil water.

## G-08 Invasive alien species: economic and environmental impacts on forest ecosystems

**Organizers :** **David Langor**, *Natural Resources Canada, Canada*; **Hayato Masuya**, *Forestry and Forest Products Research Institute, Japan*

**Moderator :** **Andrew Liebhold** (*USA*)

The objective of the session is to share and discuss the newest knowledge concerning the economic and environmental impacts of Invasive Alien Species (IAS) in forests throughout the world. The speakers in this session used the most current research and science syntheses to illustrate the threat that IAS present to achieving forest ecosystem sustainability around the world. Some talks demonstrated the economic implications of forest invasions in terms of impacts on productivity, products and international trade. Other talks illustrated the impacts of IAS on the broader forest environment (e.g., biodiversity, functions). Five oral presentations were made in the session: *Estimating the economic impact of alien forest insects in the USA* (Andrew Liebhold, USA); *Impacts of invasive tree pathogens on forest ecosystems in Japan* (Hayato Masuya, Japan); *Social costs of invasive plant species in the interior northwestern United States* (Matter Wibbenmeyer, USA); *Imperata cylindrica, an invasive alien grass, alters biomass and nitrogen allocation in pine forests of the southern United States* (Shibu Jose, USA); and *Invasive alien plants in the western lower Indian Himalayas: biodiversity threat and management* (Ravinder Kohli, India). Four poster presentations were also given.

\* The summary for this session was written by the COC.

## G-09 Advances in forest pest surveillance and monitoring

**Organizers :** **Zhen Zhang**, *Chinese Academy of Forestry, China*; **Steven J. Seybold**, *U.S. Forest Service, USA*

**Moderators :** **Zhen Zhang** (*China*) & **Steven J. Seybold** (*USA*)

This technical session was a diverse and interesting contribution to the Congress. It had strong international representation with presentations from two European scientists, four Asian scientists, and three North American scientists. It covered a diversity of ecological systems such as invasive vs. native; agricultural, urban, and native forest stands; and illustrated the value of arboreta, parks, provenance plantings, and even golf courses as places to detect potentially invasive forest pests. The session also provided updates on a range of pest taxa, including primarily bark beetles and sawflies (Anderbrandt, Hofstetter, Seybold, Wang, Zhang), but also some data on sucking insects (Homoptera) (Choi); and broader surveys of forest insects and pathogens (Choi, Kirichenko, Lee, Rabaglia). The session also spanned a range of scales from molecular (e.g., Lee's presentation on mitochondrial DNA barcoding of Korean forest insect pests) to macroscopic (Anderbrandt's examples of conservation biology in Scandinavia and Hofstetter's examples of bark beetle population biology and comparisons of stand-level measurements in coniferous forests of the western U.S.). Also on the topic of scale in surveillance systems, the session revealed that bark beetles move or disperse on the scale of kilometers and can move across stands in native forests. In several cases (Hofstetter and Seybold), examples were given of the importance of timing of the surveillance procedures and the quality of the bait in the procedure. Rabaglia considered the use of a variety of baits in a large-scale national survey of bark beetles and woodborers in the U.S. The significance of trap type and trap response (i.e., trap catch saturation) were also discussed in the session.

A central and recurring question raised by the presenters was: How well do trap catches in semiochemical-baited traps reflect the true underlying population density of the

insect? This seems to be an eternal question in forest pest management and examples were given by Anderbrandt and Wang (sawflies); Zhang (red turpentine beetle); and Hofstetter (western and southern pine beetles). An ancillary question was: How well do trap catches predict damage levels to the host? The session provided nice examples of attempts to do this with both sawflies (Wang) and *Dendroctonus* pine bark beetles (Zhang). Finally, the presentations gave several examples of the value of mark-recapture studies (Anderbrandt, Seybold) to help to better understand our surveillance procedures. The participants enjoyed good camaraderie and scientific exchanges throughout the meeting and, as a prelude to the technical session, on the evening of Tuesday Aug. 24, the group had a nice social gathering to sample Korean cuisine organized by Dr. Zhang.

## G-10 Trends in wood and bark borer invasions and effects of policy

**Organizers :** **Eckehard Brockerhoff**, *Scion / NZ Forest Research Institute, New Zealand*; **Robert Haack**, *US Forest Service, USA*

**Moderators :** **Eckehard Brockerhoff** (*New Zealand*) & **Robert Haack** (*USA*)

This well-attended session featured nine oral presentations and one poster. The session began with several presentations providing an overview of invasions of wood borers and bark beetles in North America (Robert Haack, Robert Rabaglia), South America (Robert Rabaglia), Europe (Alain Roques), and China (Jianghua Sun). The presenters highlighted the considerable environmental and economic damage caused by such invasive species. The use in international trade of wood packaging materials such as pallets, case wood and dunnage has been shown to be an important pathway for the accidental introduction of such borers. Guidelines for regulating wood packaging material in international trade have been developed by the IPPC as an International Standard for Phytosanitary Measures (ISPM15) to reduce the risk of transporting live borers, by prescribing heat treatment or fumigation of wood packaging materials. The rationale and details about this internationally adopted policy were outlined in a paper by Robert Haack and Eric

Allen. Measures that have been implemented to reduce the risk of such biological invasions in India were summarised by Rema Devi. A contribution by Ryutaro Iwata provided information on the biology and ecology of borers in Japan. The remainder of the session was dedicated to two presentations that gave an overview of an ongoing research project at the National Centre for Ecological Analysis and Synthesis (University of California, Santa Barbara) to demonstrate the costs and benefits of ISPM 15 (James Turner), as an example of well-conceived phytosanitary regulation with considerable science input. The use of border interception records was shown to provide important information to estimate arrival rates of wood and bark borers (Eckehard Brockerhoff). This enabled the determination of relationships with establishment rates and the effectiveness of phytosanitary policy in reducing the rate of future invasions associated with international trade. This approach of developing a cost-benefit analysis for phytosanitary policy can also be applied to other relevant pathways such as the widespread movement of live plants in international trade (plants for planting) which has been identified as another important pathway for the introduction of invasive forest pests and diseases. The session concluded with a lively discussion, and it clearly succeeded in raising the awareness about the need to regulate pathways that cause the introduction of harmful invasive forest pests and diseases.

### G-11 Molecular ecological and evolutionary perspectives on changing populations of forest insects and their symbionts

**Organizer :** Bernard Slippers, *University of Pretoria-FABI, South Africa*

**Moderator :** Bernard Slippers (*South Africa*)

Rapid changes in ranges and dynamics of forest pest populations can have devastating effects on forest health. These changes are often driven by the increasing global movement of the insects by humans and global climate change. This session explored the important role of DNA sequencing, microsatellite markers and other molecular based techniques, applied to the insects or their symbionts, to understand the patterns of these changes, as well as

the factors that influence them. These tools are helping to characterize the species (often cryptic) diversity which forms the foundation for understanding these phenomena, and reveal the diversity and spatial structure, or the lack thereof, in introduced and native populations of pests, symbionts and biological control agents alike. These patterns of diversity are particularly useful to help elucidate the origins and introduction history of these populations, as well as to understand the evolutionary forces that act on them. This information is critical to support the growing need to manage these population changes through biological control and other management strategies. Four scientists gave an oral presentation in the session: *The fungus garden microbiome of leaf-cutter ants* (Cameron Currie, USA); *Genetic diversity and source of the invasive Eucalyptus pest, Thaumastocoris peregrinus, and its potential biological control agent, Cleruchoides noackae* (Ryan Nadel, South Africa); *Insect vector of pinewood nematode carries many Wolbachia genes on an autosome* (Takuya Aikawa, Japan); and *Diversity, symbiosis and control: A molecular case study of Sirex noctilio, Amylostereum areolatum and Deladenus siricidicola* (Bernard Slippers, South Africa). The session also included two poster presentations.

\* The summary for this session was written by the COC.

### G-12 Oak decline in the world

**Organizers :** Naoto Kamata, *University of Tokyo, Japan*;  
Kazuyoshi Futai, *Kyoto University, Japan*

**Moderator :** Naoto Kamata (*Japan*)

Thirteen papers (seven oral and five poster papers) in Session G-12 addressed various topics related to oak decline.

In the first paper, Kurt Gottschalk (USA) presented a review titled "Oak (*Quercus*) Decline around the World". Using the decline disease spiral model of Manion (1991), he stressed that predisposing factors, inciting factors, and contributing factors will be elucidated for these oak decline events. He also raises a question if this concept is applicable to JOW and KOW that were caused by ambrosia beetle / Raffaelea pest complexes, in which healthy trees are likely

to be killed by the diseases.

Jennifer Juzwik (USA) proposed urban area environment, the common root system, and abundance of red oak species as factors relating to epidemics of *Ceratocystis fagacearum* –caused oak wilt (OWD) in the United States. Regarding OWD, a poster paper showing anatomical features of *Quercus rubra* following propiconazole treatment and implications for OWD suppression was presented by the same author. Naoto Kamata (Japan) introduced forest diebacks caused by ambrosia beetle / *Raffaelea* pest complexes in Japan and Korea. He also introduced a novel type of oak decline found in Primorsky Krai, Russia. Seong Hwan Kim (South Korea) demonstrated microorganisms, including bacteria as well as fungi, associated with Korean oak wilt diseases. Steven Seybold (USA) presented the goldspotted oak borer (GSOB), *Agrilus coxalis*, as a primary mortality agent on oaks in southern California because of an absence of evolved host resistance in native oaks and/or an absence of natural enemies found in GSOB's native range. Gerardo Sanchez (Spain) presented a research on *Phytophthora cinnamomi*-caused oak decline disease (named “seca” in Spanish) in Spain. Matteo Garbelotto (USA) presented sudden oak death, another *Phytophthora* - caused oak decline, in California, USA, which is thought to be exotic and to be introduced multiple times into North America.

Three poster papers were presented relating to Korean oak wilt disease. Biology of its vector insect, *Platypus koryoensis*, was summarized by Dae-Sung Won (South Korea). Kwang-Sik Choi (South Korea) presented the number of the beetle attacks on *Quercus mongolica* trunk. Sung-Min Jeon (South Korea) demonstrated their trial to select antagonistic basidiomycetes strains against *Raffaelea quercus-mongolicae*, a causal agent of KOW. In addition to these KOW papers Andrew Liebhold (USA) presented population dynamics and range expansion of the gypsy moth. Sajad Ghanbari (Iran) presented a situation of oak trees in Iran.

### G-13 Atmospheric deposition and climate change impacts on forests

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**Organizers :** He Shang, *Chinese Academy of Forestry, China*; Andrzej Bytnerowicz, *USDA Forest Service, USA*

**Moderators :** He Shang (*China*) & Andrzej Bytnerowicz (*USA*)

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Four oral presentations and a poster illustrated how atmospheric deposition and climate change affect selected forest ecosystems in the northern hemisphere. Shang et al., discussed how three decades of sustained economic growth in China have been accompanied by increased emissions of air pollutants, especially nitrogen (N) and sulfur (S) oxides, from power generation, industry, agriculture, and motor vehicles. Such emission have resulted in widespread incidents of acid rain and elevated S and N deposition to forests in the southern and southwestern parts of the country. Negative effects to forests have been caused by acidification of soil and aluminum phytotoxicity. The authors recommend that large, regional surveys are conducted to better understand an extent of the occurring effects. Such surveys are needed for evaluation of negative effects of S and N deposition before any effective management countermeasures can be developed. Du provided additional information on the impacts of N deposition on essential ecological processes such as carbon sequestration, biodiversity loss, soil eutrophication, litter decomposition and soil acidification in forests in China. He synthesized information on wet N deposition in ~20 typical Chinese forest ecosystems. The author concluded that information on N dry deposition is limited and that there is a large uncertainty on the magnitude and potential ecological impacts of N deposition in forests in China. Similarly to Sheng et al., he recommended an establishment of long-term monitoring networks for N deposition in typical forest ecosystems. He also pointed out to a need for manipulated experiments and predictive modeling as a means of evaluating impacts of N deposition at the regional and national scales. Science-based strategies for N-deposition regulating strategies and effective tools for the forest management are needed to optimize beneficial role and minimize negative impacts of N deposition on

forest ecosystems in China.

In the 1970s, with occurrences of mass dieback of forests due to air pollution and acid rains in Europe, monitoring activities aimed at detecting effects of air pollution on forest ecosystems were initiated and eventually expanded to a comprehensive monitoring of forest ecosystems. Özel et al., reported on the effects of SO<sub>2</sub> emissions from a major power plant on forests in the Kaz Mountains, Turkey. Monitoring activities during 2002 – 2008 showed no significant differences in S soil concentrations between various localities and significant differences between individual years. At the same time significant effects of site location and year of collection were detected for foliar S concentrations. These results were used for evaluation of the effects of the power plant SO<sub>2</sub> emissions on the surrounding forest ecosystems.

Belyazid et al., described how changes in the composition of plant communities could be used to estimate critical loads (CL) of N deposition to terrestrial ecosystems under changing climate and land use. They estimated CLs with two methods: (1) the empirical CLs as fixed ecosystem specific values derived directly from empirical evidence of vegetation changes in response to N loading; and (2) dynamically derived CLs based on a ceiling for nutrient N concentrations in soil water. Both methods were successful in setting critical limits on N deposition, but also showed limitations. The expected changes in climate and land use put into question the stability of the assumptions underlying the classical CLs methods. With the help of the existing dynamic models for biogeochemistry and plant community composition, a method has been tested for linking N deposition to changes in plant communities and directly estimating CLs. The analysis of multiple driver effects showed that climate change and N deposition had comparable effects in magnitude on chemical and biological indicators, and that the effects of climate change were aggravated by the accumulated N within the ecosystems. Estimated ecosystem recovery measured as plant community composition was subject to long delays.

Kumar et al., described impacts of climatic factors on basic ecological processes and abundance of micro-fungi in forests in the drought-affected state of Manipur, India.

The rate of decomposition, concentrations of lignin, N and organic C were estimated in 2009 and compared with the 1999 study to evaluate climate change effects. Depletion in rainfall resulted in decreased decomposition rate that affected nutrient dynamics and micro-fungal occurrence. The authors concluded that forest productivity could be diminished if similar adverse climatic conditions prevailed.

The sessions also provided a venue for an interesting and constructive discussion. Recommendations regarding more focused monitoring and optimal use of models were made. The session also showed complexity of the interactive effects of atmospheric deposition and climate change on forest ecosystems and a need for a better integration of monitoring and research. That should result in the best science-based recommendations for air resources and land management.

#### G-14 Ecology and management of pine wood nematode in the face of climate change

**Organizers :** Yeong-jin Chung & Hyerim Han, Korea  
*Forest Research Institute, Republic of Korea*

**Moderator :** Yong jun Ahn (Korea)

The objective of this session is to discuss on the future aspects of pine wilt disease under the condition of climate change which accompanies various changes in host trees, nematode, insect vector and their inter-relationship.

A total of 36 papers by seven oral presentations and 29 posters were presented in this session. The first speaker, T. Ikeda (Kyoto Prefectural University, Japan) showed the hazard map of pine wilt disease in Kyoto to predict the spread of the disease related to climate change. Especially he focused on the elevation as an index to expect pine mortality because pine wilt disease decreased at 500 m elevation and above. The second speaker, C. K. Sung (Chungnam National University, Korea) introduced an endoparasitic fungus, *Esteya vermicola*, which has great potential as biocontrol agent to reduce pine wilt disease. The effect of *E.vermicola* was tested and evaluated in both green house and field experiments. The third speaker, I. K. Park (Korea Forest Research Institute, Korea)



presented about phytochemicals possessing nematicidal activity that could be alternatives to control pine wilt disease. He investigated and screened more effective phytochemicals under laboratory experiment. The fourth speaker, J. Pajares (University of Murcia, Spain) talked about chemical ecology and management potential for the pine sawyer *Monochamus galloprovincialis*, vector of pine wood nematode in Europe. He suggested that kairomone-pheromone bait showed high attraction to both male and female *Monochamus galloprovincialis*. H. Han (Korea Forest Research Institute, Korea), the fifth speaker, introduced unrecorded *Bursaphelenchus* species in Korea which were identified by both morphology and molecular biological characterization. She addressed that differentiation of closely related species of *Bursaphelenchus* is essential step for the accurate disease diagnosis. The sixth speaker, T. S. Kwon (Korea Forest Research Institute, Korea) discussed about silvicultural method as one of the successful way to prevent of spreading of pine wilt disease. According to his field studies, clear cutting of neighboring asymptomatic tree and removal of logs were effective to suppress the spread of pine wilt disease. The last speaker, M. H. Qian (Guangdong Academy of Forestry, China) talked about their research on mass rearing techniques of *Dastarcus helophoroides* which is a biocontrol agent of pine wilt disease. She showed successful experiment by showing lower mortality of *D. helophoroides* by using artificial diet.

Other contributions in poster sessions included information on ecological characteristics of insect vector of *Monochamus* spp., interactions among nematode, vectors, and hosts, characterization of useful genes from pine wood nematode, host resistance, and also various control methods for pine wilt disease.

## G-15 Cork oak forest degradation causes and sustainable development in western Mediterranean countries

**Organizers :** **Mohammed Nejib Rejeb**, *National Research Institute of Rural Engineering, Tunisia*; **Abdelhamid Khaldi**, *Ministry of Agriculture, Tunisia*; **Su-Young Woo**, *University of Seoul, Republic of Korea*

**Moderator :** **Mohammed Nejib Rejeb** (*Tunisia*)

30 TS were organized during the two sessions (morning and afternoon) of Friday 27 August 2010.

Tunisian participants attended especially to G-15 session. This session organized and proposed by Korean-Tunisian team project about cork oak degradation and entitled: cork oak forest degradations causes and sustainable development in western Mediterranean countries. Speakers put out several interesting ideas about this topic.

Dr. Ben Jemaa gave a presentation on the dynamics of gypsy moth (*Lymantria dispar* L.) and its historical injury on Cork oak in north Tunisia forest. Dr. Ben Jamma also introduced the new agent which threatens the Cork oak as detected by his team the “Tortrix Viridiana.”

Mr. Abid spoke about biodiversity as a key factor of Tunisian forest and especially the case of the cork oak. The speaker put out mainly the human factors affecting this biodiversity.

Dr. Khaldi spoke about genetic variation in Mediterranean provenance tests of *Quercus suber* L according to results from Tebaba experimental site. These provenances came from the 7 Mediterranean countries that possessing natural cork oak forest. He illustrated different growth and survive rates of these provenances. He also presented the behavior of these provenances face to fungi attacks.

In terms of climate change effect on cork oak, Dr. Nasr talk was about water relations of the specie and showed how the mechanisms developed by cork oak to avoid drought and its response to an increasing carbon dioxide.

Principal conclusions:

With Tunisian Korean research project on cork oak, it was the first time that Tunisian scientists attend the IUFRO Congress;

During this global event, Tunisian participants had a rare occasion to exchange scientific information with eminent scientists. The presented interesting data and results of the project and had some useful contacts;

It was an excellent opportunity to get more scientific knowledge on forest research in the world; and

Finally, the excellent relationship between Korean and Tunisian scientists (involved or not in the project) were strength and new perspectives were established.

## G-16 Climate factors and tree susceptibility / resistance to insects and pathogens

**Organizers :** **François Lieutier**, *University of Orleans, France*; **Daniel Herms**, *Ohio State University, USA*

**Moderator :** **François Lieutier** (*France*)

Climate change, including changes in temperature, precipitation and atmospheric composition is already affecting interactions between trees and their aggressors. Tree resistance/susceptibility is a basic component of these interactions and has consequences on population dynamics of the aggressors. The session focused on these aspects, while considering different guilds of aggressors, as well as relations with the aggressors' population dynamics. It was composed of five oral presentations and three posters.

The first two oral presentations presented an overview of the interactions between climate factors and tree resistance/susceptibility to insect and pathogens. Both presentations pointed out the necessity to separate the direct effects of climate on organisms from the indirect effects on tree resistance/susceptibility parameters.

The presentation by Tim Paine (University of Riverside, California) focused on boring insects and wood pathogens.

Changes in precipitation and temperature may lead to modifications of resources allocation by trees thus modifying their defense ability, while the active periods and survival of insects will change. Understanding how temperature and moisture stress can acts on trees preformed and induced mechanisms of resistance to bark beetle attacks will help in building predictions. It is also essential to understand the effects of climate, not only on the boring beetles, but on all organisms interacting during beetle attack and development (fungi facilitating beetle establishment or providing food to larvae, bacteria suppressing fungal growth ...).

The presentation by Andrea Battisti (Padova University, Italy) et al. was concerned with defoliating and sap-sucking insects and foliar pathogens. Referring to results from various field experiments, it was showed that effects on trees are based on alteration of tree physiology, resulting from temperature increased and/or precipitation decrease and that those effects depend on tree species. Regarding direct effect on organisms, because pests are generally limited by temperature, a general increase of damage may be expected, at least in temperate and boreal ecosystems. However, field experiments give various results depending on the guilds and localities. Consequently, it seems difficult to make predictions combining direct and indirect effects.

Then Ulfah Siregar (Bogor Agricultural University, Indonesia) presented results of investigations on *Pinus merkusii* resistance to the aphid *Pineus boernerii*, a new invasive pest in Jawa plantations where it causes extensive damage. Resin canals characteristics differed, possibly genetically, between resistant and susceptible trees. By inoculating *Pinus x rigitaeda* with *Pinus thunbergii* isolates of the pitch canker *Fusarium circinatum*, Kwan-Soo Woo (Korean Forest Research Institute) et al. presented results regarding variations in fungus pathogenicity and tree susceptibility. In experiments developed on seedlings and based on lesion length and seedling mortality, some isolates were more virulent than others. Length of lesions caused in 30-year-old trees different significantly between trees. Modhumita Dasgupta (Institute for Genetic and Tree Breeding, India) et al. developed a genomic bioprospecting for biotic and abiotic stress tolerance, on *Casuarina equisetifolia*. A class I chitinase was characterized and its

expression pattern was determined under biotic and abiotic stresses. Genetic distinctness of the sequences was revealed by phylogenetic analysis.

The poster by Nicola La Porta (FEM-IASMA, Italy) et al. dealt with *Heterobasidion* species diversity in primeval and plantation of fir and/or spruce stands in Carpathian Mountains. Results were discussed with regards to *H. abietinum* and *H. parviporum* distribution in relation to their climate requirements and type of stands. Sang Hyun Lee (Korean Forest Research Institute) et al. presented a poster on the world status of chestnut ink disease caused by *Phytophthora katsurae* and a screening of resistance/susceptibility of chestnut cultivars in Korea. Various cultivar seedlings *C. crenata*, *C. mollissima* and their hybrids were evaluated for their susceptibility to *P. katsurae*. The poster by Kwan-Soo Woo (Korean Forest Research Institute) et al. focused on effects of inoculations of *Pinus thunbergii*, *P. densiflora* and *P. rigida* seedlings with *Fusarium circinatum*, on disease development and gas exchange rate. Significant between tree species differences were observed regarding both parameters.

After the oral presentations, a general discussion concluded that more research is needed before understanding tree resistance/susceptibility in relation to climate factors and thus before proposing scenarios on effect of global change on pest damage to forests. Among various research fields, indicators of tree resistance, factors involved in tree and guild effects, and effect of stress intensity were cited. It was also underlined the necessity to work on well defined tree-pathogen systems and at the level of population dynamics. Taking into account interactions between climatic factors as well as interactions between biotic factors, especially in the context of associations between aggressive organisms, is also necessary.

## G-17 Managing cone and seed insects to preserve the regeneration of future forests

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**Organizer :** Jean-Noël Candau, *Natural Resources Canada, Canada*

**Moderator :** Jean-Noël Candau (*Canada*)

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Cone and seed insects are considered the most important seed predators during the pre-dispersal phase of seed development. Seed losses might result from damages caused by these insects to buds, flowers, cones or seeds themselves. Although they received little attention until recently, these insects are important factors in forest and tree health and their economic and ecological impact is a source of increasing concern to foresters. Damages have been particularly severe in seed orchards hindering genetic improvement programs and reforestation projects. As the need for improved seeds will likely increase to adapt to our changing world, the impact of these insects will continue to increase. This session discussed recent advances in cone and seed insect research and their impact on forest natural regeneration and seed orchards management. A special focus was given to genetic differences in cone and seed pest susceptibility and the exploitation of clonal differences for pest management. Topics also included the biology/ecology of a specific species or a group of species, invasive species, novel monitoring techniques and pest management. A total of five oral presentations were made: *Research on insect pest management in Swedish spruce seed orchards between 1996 and 2010* (Jan Weslien, Sweden); *Sex pheromones of *Dioryctria abietella* Den. et Schiff. (Lepidoptera: Pyralidae) and *Cydia strobilella* (Lepidoptera: Tortricidae) – serious pest species in seed orchards* (Olle Rosenberg, Sweden); *Monitoring of *Dioryctria abietella* Den. et Schiff. (Lepidoptera: Pyralidae) in northern Europe using pheromone traps* (Olle Rosenberg, Sweden); *How to invade a Mediterranean forest ecosystem? A lesson from seed insects in French *Cedrus atlantica* (Pinaceae) forests* (Thomas Boivin, France); and *Molecular phylogeny of *Megastigmus* seed chalcids (Hymenoptera: Torymidae) evidence of invasive species groups associated with host plant families* (Alain Roques, France). Three poster presentations were also

included in the session.

\* The summary for this session was written by the COC.

### G-18 Diseases and insects in pines threatening global forest health in the 21st century

**Organizer :** **Kyung Joon Lee**, *Seoul National University, Republic of Korea*; **Ho Duck Kang**, *Dongguk University, Republic of Korea*

**Moderator :** **Kyung Joon Lee** (*Republic of Korea*)

This technical session was organized to emphasize the importance of increased incidences of pine diseases and insects in recent years throughout the world. Particularly global climate change might have influenced the delicate balance between host resistance and pathogen virulence and insect phenology.

A total of 14 papers were presented at oral and poster sessions with seven papers each. Among the 14 papers, six papers dealt with diseases and eight papers with insects.

Various topics were covered in this session. Four papers dealt with pine saw fly belonging to *Diprion* (*Hymenoptera*), with two papers from Finland and two papers from Korea. *Diprion hani* was first introduced in Korea in 2007 and is now damaging *Pinus koraiensis* forest. Other papers talked about moth pheromone, needle gall midge, and pine caterpillar.

In pine disease area, five papers covered the twig or tip blight caused by *Cenangium* and *Diplodia* and pitch canker caused by *Fusarium*, indicating the wide spread of these diseases. Other papers dealt with blister rust and *Armillaria* root rot.

The oral session was held in Room 318C with a capacity of 50 seats. In addition about 10 extra seats were arranged instantly. The room was full of participants at the beginning of the session and electronic register indicated a total of 103 persons officially entered the room. The oral presentation was held on schedule of 15 minutes of presentation and discussion for each speaker.

### G-19 Forest dieback caused by novel ambrosia beetle/*Raffaelea* pest complexes

**Organizer :** **Kazuyoshi Futai**, *Kyoto University, Japan*;  
**Naoto Kamata**, *University of Tokyo, Japan*

**Moderator :** **Kazuyoshi Futai** (*Japan*)

This session was filled with a good number of papers both for oral (eight paper) and poster (eleven papers) sessions. This session was organized to address forest epidemics caused by novel pest association between ambrosia beetle and *Raffaelea* fungi. Randy Ploetz and his colleagues presented papers on Laurel wilt, an exotic disease in the southeastern USA and killing *Laureaceae* plants such as avocado trees. This disease is caused by *R. lauricola* and is spread by an Asian ambrosia beetle, *Xyleborus glabratus*. Host resistance, phylogenetic uniformity, and the movement of the vector were discussed in the light of pest control. The following four speakers introduced the Japanese Oak Wilt (JOW) that is devastating *Quercus* and other fagaceous species in Japan, from various viewpoints. Rikiya Endoh explained ecological roles of yeast species in association with the pathogen of JOW, *R. quercivora* and its vector *Platypus quercivorus*. Hagus Tarno observed the social behavior of *P. quercivorus* in its gallery system using frass amount as an index of its activity. He also used some experimental facilities to reveal its subsocial behavior. Masahide Kobayashi also described subsocial behavior of *P. quercivorus* after brief explanation of the reason why the JOW has become so prevalent in Japan. He attributed high reproductive ability of *P. quercivorus* to its subsociality. Michimasa Yamasaki studied on the host selection by *P. quercivorus* in forests. He suggested that *P. quercivorus* first flew to a cluster of host trees, and then chose thick trees as their attack target.

In Korea there is another forest epidemics, Korean Oak Wilt that is very similar to JOW, though the pathogen, vector beetle, and main host tree are very close to but different from Japanese ones. Junheon Kim and his colleagues reported several aspects of Korean Oak Wilt. They studied chemical ecology of *P. koryoensis* to develop semiochemical-based control method. In the session, J. Kim reported one of their results, aggregation

pheromone of the beetle. Sunisa Sanguansub studied the influence of JOW epidemics on the guild of ambrosia beetle associated with *Q. serrata* trees, and found the number of attacks on baited bolts markedly increased after JOW occurred. Interestingly, not only *P. quercivorus* but also three other *Xyleborus* beetles increased in their attack frequencies. René Alfaro reported a pest of fast growing poplar, an ambrosia beetle, *Megaplatypus mutatus*, that is native to the subtropical area of eastern South America, but extended its range in Argentina and was introduced to Italy due to global trade. This fact suggests that this beetle could threaten worldwide poplar cultivation planted to mitigate climate change. Yukiko Takahashi presented a paper entitled “Genetic diversity of the pathogen of Japanese oak wilt, *R. quercivora*” in the poster session, and won the best poster award. Shinichiro Ito and his colleagues presented some papers on JOW. They are especially interested in morphological characteristics of *R. quercivora* and its infection process into host wood.

## G-20 Frontiers in forest microbiology

**Organizer :** XuDong Zhou, *China Eucalypt Research Centre, Chinese Academy of Forestry, China*

**Moderator :** XuDong Zhou (*China*).

Seven persons from six different countries presented their talks in this session. All talks were relevant to forest microbiology, ranging from characterization of forest pathogenic microorganisms, application of ectomycorrhizal fungi, tree-breeding for disease resistance, and bio-control using microorganisms.

Two presentations dealt with ectomycorrhizal fungi. The one by Song R. from China discussed growth-promoting effects of the chosen fungi on the seedlings of various pines and *Picea korainesis* in Northeast China. Results from their study indicated that the fungi promote the growth of the seedlings. Wu B.Y. from Japan presented the talk on nutrient transfer within ectomycorrhizal networks. His results showed that no carbon transfer occurs between incompatible mycelia without hyphal fusion.

Bio-control using microorganisms were discussed from

another two talks. The teak defoliator, *Hyblaea puera*, causes extensive defoliation of teak in Southern India. Sasidharan T. O. from India reported that a virulent parasite (*Nosema* sp) had been isolated from the pest and it can be potentially used as the bio-control agent for the teak defoliator there. Widyastuti S. M. from Indonesia presented a general review on *Trichoderma* as a bio-control agent, providing case studies from that country.

The rest three talks focused on three different forest pathogenic microorganisms. Hattori T from Japan reported umbrella pine (*Sciadopitys verticillata*) dieback there. Comparison of microscopy and ITS sequences confirmed the pathogen residing in the genus of *Fomitiporia*. The health of *Eucalyptus camaldulensis* is heavily affected by leaf spot disease caused by *Cryptosporiopsis eucalypti* in Thailand. Five clones had been tested for their resistance to the disease by Sangwanit U. and three of them identified. Langer J from Germany discussed characterization of the global distributed cherry leaf roll virus (CLR) using molecular tools, giving the example of that from Finland.

## H-01 Income from smallholder forestry: can it be a driver of poverty alleviation?

**Organizer :** Verina Ingram, *CIFOR and University of Amsterdam, Indonesia*

**Moderators :** Verina Ingram & Patrice Levang (*Indonesia*)

This Session received 43 abstracts, which together with the IUFRO panel, were whittled down to nine presentations and four poster presentations. Over 50 people attended the nine oral presentations over the 2.5 hour period, more than the seating capacity. The thought-provoking presentations from around the globe made discussions between participants and presenters enthusiastic.

The key messages gleaned from the poster and presentation sessions were:

- Cases where provided where smallholder forestry has been able to alleviate poverty: most cases were not substantial, but provided a small and often gradual lift out of poverty;

- The benefits of working collectively and organising into groups or enterprises came across strongly from cases in Cameroon, Brazil, Indonesia, and Bangladesh;
- Many of the cases highlighted conditional factors such as management and organisational skills for the small holders and communities;
- Access to knowledge, technical skills, technology and critically, finance to valorise the forest and its products often supported by technical assistance and critically continuous or long term in nature;
- The level of value adding or vertical integration-influencing profitability of smallholders and ability to enter profitable markets;
- Tenure conditions and their effect on long-term motivation;
- Governance issues are critical in maintaining an equitable balance to ensure benefits of the poor; and
- A supportive regulatory and policy environment can provide a pro-poor support for small scale forestry.

The presentations, however, made clear that there are few guarantees that smallholder forestry is (environmentally) sustainable over the long term. Often increased income is equated with increased exploitation, and few cases demonstrated that the balance or knowledge of these limits was known except where a specific objective was sustainability. The exceptions were in the cases of certification, community forests and REDD schemes.

## H-02 Urban forestry: assessing and developing ecosystem services

**Organizers :** Cecil C. Konijnendijk *University of Copenhagen, Denmark*

**Moderator :** Cecil Konijnendijk *(Denmark)*

The session opened with a presentation by David W. MacFarlane (USA) on quantifying ecosystems provided by urban treed spaces. MacFarlane's research had focused on cities in Michigan, USA. His work shows that urban forests do also provide commodities in terms of biomass and timber.

The presentation by Salman Qureshi of Pakistan presented comprehensive framework for the assessment

of ecosystems services of urban forests. Qureshi applied this framework to the city of Karachi, illustrating the wide range of services provided by its urban forests, as well as the multitude of pressures faced by these ecosystems.

Social and cultural services of urban forests were the focus of the talk by Maija Faehnle of Finland. Faehnle's study has been looking at how urban forest services for intercultural communities can be promoted. Many cities are now hosting high cultural diversity due to past and ongoing immigration. This had led to changing use of many urban forests.

The final oral presentation of the session, by Min-Jun Lee of the Republic of Korea, discussed a planning model for urban forest management in the Republic. The model should help the ongoing national and local efforts in Korea to promote urban forestry and the ecosystem services it provides.

In addition to the four oral presentations, ten poster presentations were part of this Technical Session. The posters represented different parts of the world and a wide range of topics, including assessment tools for street tree populations, carbon sequestration by school forests, raising public awareness about urban forest services, as well as innovative city-wide urban forestry programmes.

## H-03 Global comparative analysis of local incomes from the forests

**Organizers :** Arild Angelsen, *Norwegian University of Life Sciences, Norway*; Nick Hogarth & Ronnie Babigumira, *CIFOR, Indonesia*

**Moderator :** Arild Angelsen *(Norway)*

The Poverty and Environment Network (PEN) is a global comparative analysis of the role of forests in household income and poverty alleviation in 25 countries, including over 40 case-studies. In this session, six of these case-studies were presented, followed by the most up-to-date preliminary results from the global analyses. While each partner case-study had unique elements, the results presented were standardised to facilitate comparisons

between sites. All case-studies showed the contribution of subsistence and cash sources of income; the absolute and relative forest income share by income quintiles (i.e. forest dependency); the main sources of forest income; and the seasonal variability of forest income.

Arild Angelsen (CIFOR Associate and Professor at the Norwegian University of Life Sciences) started the session by providing background of PEN, including the methods used and the project's status. In the first case-study presentation, Angelica Almeyda Zambrano (Stanford University, USA) presented results on development policies, socioeconomic conditions and forest use of smallholders in the tri-national border region of Southwestern Amazonia (Peru, Brazil and Bolivia). Next, Jamie Cotta (University of Copenhagen, Denmark) presented results from her socioeconomic analysis of the contribution of two palm species to household incomes in the Brazilian Amazon estuary. Professor Anders Roos (Swedish University of Agricultural Sciences) then gave a presentation on forest incomes and poverty alleviation in a participatory forest management arrangement in Southern Ethiopia (on behalf of Yemiru Tesfaye).

In the fourth case-study, the importance of forest income to the livelihoods of households adjoining protected areas in Cameroon was demonstrated by Ousseynou Ndoye (FAO Cameroon) on behalf of Julius Chupezy. Professor Carsten Smith-Hall (University of Copenhagen) then presented on forest income contributions to livelihoods in the western Democratic Republic of Congo on behalf of Riyong Bakkegaard. The final PEN partner presentation was by Nicholas Hogarth (Charles Darwin University, Australia), who presented results from his study in Guangxi Province, China, on the contribution of forest-related income to household economies and rural economic development.

The final presentation delivered by Ronnie Babigumira (CIFOR) and Arild Angelsen was called "Quantifying the role of forests in poverty alleviation - Preliminary results from the PEN dataset". The key messages from the preliminary global results were:

- Forest income matters; the forest contributes an average of 20-25 percent of total income in the 27 cases studies

currently included in the global dataset;

- The high reliance on forest income is linked to valuable cash crops;
- Subsistence forest income is generally for the poor, while cash is for the rich. But, in general, forest reliance does not vary as much across income groups as some earlier studies suggest;
- Forest's role as a safety net seems exaggerated; and
- In some, but not all cases, forest income serves as a seasonal gap-filler.

Approximately 80 participants attended the presentation, which ended with a fruitful question and answer session between the audience and panellists.

#### H-04 Linking forest based enterprises, collective action, and livelihoods in the African dry forests

**Organizer :** Davison Gumbo, *CIFOR, Zambia*

**Moderators :** Fiona Paumgarten (*Zambia*) & Partice Levang (*Indonesia*)

Africa's dry forests are home to almost 40% of Africans and cover over 43% of the lands surface, making them a unique and valuable resource on which many people's livelihoods are anchored. Sixty percent of the rural population in Africa's dry forest areas live on less than US\$1/day. With dry forest use characterised by low impact exploitation and minimal destructive harvesting the contribution of dry forests often goes unrecognised and is not captured in national level statistics. In the session, "Linking forest based enterprises, collective action, and livelihoods in the African dry forests," we examined the potential of dry forests to provide a sustainable livelihood, and in particular focused on what is needed to improve enterprise development.

Five presentations were accepted for the session including: i) Patterns of subsistence harvesting of woodland products at the household level (Isabelle Joos); ii) The contribution of beekeeping producer organization to poverty alleviation (Fiona Paumgarten); iii) The contribution of charcoal to rural livelihoods in the Miombo ecoregion (Jane Kwenye); iv) Co-management of natural forests and forest income in

the Adaba-Dodola area (Anders Roos) and v) Community-based forest management: a case study of Wuda-Taye Forest Reserve. Unfortunately two of the five presenters were unable to attend the conference, a fact that only became known during the week prior to the conference. The presentation by Isabelle Joos discussed the development and implementation of an agent-based model that integrates ecological and social aspects related to change in woodland use and woodland cover in rural villages in southern Africa. The model is developed with the objective of exploring woodland use behavior and corresponding human impacts on the relative woodland cover and the spatial distribution of woodlands within the landscape. Fiona Paumgarten's study considered beekeeping producer organizations and the challenges they face in achieving sustainability, and in participating equitably and effectively throughout all stages of the global value chain. Findings indicated the need for a shift from past production orientated interventions to a more holistic approach. Anders Roos described the main livelihood strategies and the role of forests for the subsistence in the Adaba-Dodola region (Ethiopia) in the context of a co-management regime. The study examined the impact of collective action on livelihood strategies and on forest utilization. There was a discussion session after the presentations however as the session was early on the last morning of the conference, the session was not as well attended as the organizers would have liked.

#### H-05 Can forest tenure reforms help achieve sustainable forest management and poverty alleviation?

**Organizers :** **Jinlong Liu**, *Renmin University of China, China*; **Eva Müller**, *FAO-Forestry, Italy*;  
**Jacek P. Siry**, *University of Georgia, USA*

**Moderator :** **Eva Müller** (*Italy*)

There were 11 oral presentations and 12 poster presentations on the issue of forestry tenure from China, Indonesia, Japan, Nepal, India, Bolivia, USA and the Philippines and from overall international experiences.

Dr. Bob Fisher examined case studies from the Forest Conservation Programme of IUCN, particularly the

Livelihoods and Landscapes Strategy and argued that in absence of full-scale tenure reform, more modest regulatory changes and local 'informal' arrangements can achieve significant results and can act as useful "policy experiments" to support more formal changes based on studies in Uganda, Ghana, Tanzania, Kenya and North Thailand. He argued that tenure reform may cause inequitable outcomes and suggests ways to avoid these. Dr. Pablo Pacheco discussed the institutional and economic factors including governance mechanisms, production capacities and the incentive structures, and marketing conditions that influence the outcomes of forest tenure reforms by examining the case of Bolivia. He also suggested policy options for redirecting the forest tenure reform in Bolivia, with possible applications to other countries in Latin America. Dr. Liu Jinlong examined the forest tenure transformation in the past decade in China finding that both forests and people are losers in the previous tenure reforms due to highly complex tenure issues, related to power structure, cultural heritage, conflicts of interest within communities and between the communities and outside stakeholders. He concluded that an integrated reform agenda, approaching reforms as a learning process and involving intensive social mobilization and debate are essential to the success of the forest tenure reform. Dr. Jacek Siry proposed new approaches for using ownership policies to solve persistent forest management problems by assessing and quantifying the impact of ownership on forest production, management and protection worldwide and evaluating recent forest ownership changes.

Dr. Gopinath Reddy assessed the implementation of a new forest law, which recognized the rights of forest dwelling people. He examined the law's dynamics and likely impacts on the livelihoods of the indigenous communities in the South Indian State of Andhra Pradesh. Mr. Dhananjaya Lamichhane discussed forest management and poverty reduction consequences of the evolution of forest tenure with the case studies of forest user groups in Nepal. Mr. Takahiro Fujiwara presented a study from Japan focusing on decentralizing forest policy and transforming forest property rights. He concluded, however, that in order to enhance the participation of local residences, benefit sharing mechanisms among the central government, local government and local people must be reformed.



Dr. Yi Runsheng argued that to attract private interest and engagement in forest management, China must adopt a broader framework and more effective approaches in transitioning to a truly market-based forest economy. Dr. Zhang Hongxiao presented a life story of collective forest reform in Fujian province Southeast China, and argued that the removal of administrative barriers is necessary in order to sue farmers' enthusiasm for forestry investment, for developing forest cooperatives, and for overcoming of forest land fragmentation. Dr. Xie Yi presented farmers' forest production behaviors after acquiring forest properties in Jiangxi province in Southeast China. He discovered that forestry governance, non-timber forest production, and characteristic of households are the major factors to effect farmers' forest production behaviors. Dr. Zhu Hongge presented a case study from Heilongjiang province at state owned forests in China about contracting out the state forests to individual households. He discovered that land conditions, nature of households, and sources of income resource of households were the major factors influencing investment in contracted forests.

We had a poster session, and poster authors presented their posters in five minutes. These posters covered a wide range of issues related to forest tenure, including community forestry, transferability of forest land and forests, legislative norms to support the tenure reform, multifunctional forest management, forest farmers' cooperatives, etc.

## H-06 Human dimension solutions to difficult forest problems

**Organizer :** Taylor Stein, *University of Florida, USA*

**Moderator :** Taylor Stein (*USA*)

Directly addressing humans' role in forest management decision-making was the umbrella topic for 11 presentations and six posters in the H-06 session. The session was divided into two sub-sessions; with the morning session including a wide range of socially relevant topics and the afternoon session focusing more on forest recreation management.

The five morning presentation topics addressed key stakeholder groups and residents who were either impacted

or directly influence by forest management. Marleen Buizer discussed the complexity of involving volunteers in restoration ecology while simultaneously attempting to understand the effects of climate change on that area. Communicating the goals of restoration, and whether restoration ecologists are creating "historical" landscapes or "novel" landscapes underlies and complicates the interaction between managers and volunteers. Brett Hurley highlighted the complexity of working with the public. His research showed that the public can become more aware of forest pests with an education campaign, but it is difficult for people to understand more specific scientific information related to pests. James Johnson also emphasized the difficulties in educating the public, but he did show success in educating U.S. landowners about wildlife management practices. Lynn Palmer's investigation of the economic effects of the forest industry crisis in Canada showed the need to understand the differences between forest stakeholders and what they demand from forests. Finally, Erlinda Rebugio described how a successful partnership in the Philippines has helped to ensure the sustainability of an important forest resource.

Most afternoon presentations discussed forest recreation; with a particular emphasis on visitors' attachment to place. Taylor Stein discussed U.S. recreation users and linked visitors' attachment to place with the types of benefits they hope to attain from their recreation experience. Jinhee Jun expanded on place attachment and explored the important role place identity has on sense of place constructs. Finally, Jee In Yoon addressed the role place bonding has on visitors' willingness to substitute recreation sites. Ya-Chieh Li moved beyond place attachment research and investigated recreation visitors' relationship with forests in China and found behavioral intentions are influenced by people's values, service quality, health benefits, and past experiences. Stanley Asah specifically focused on U.S. motorized recreation using Q methodology to better understand how stakeholders discuss and conceptualize the controversial topic of motorized recreation. Leoncio Ugarte-Guerra ended the session with a discussion of the economic contribution of forestry activities in Peru and found that the lack of tangible products produced from these activities makes it difficult to measure their economic contributions.

Poster presentations also presented a wealth of diverse

topics. Three posters focused on forest recreation – examining wildlife recreation in Denmark, the economic impacts of motorized recreation in the U.S., and the provision of recreational services on small forest holders in Slovakia. Other posters examined the benefits of management eidos of nature reserves in China, the impacts of community forestry in Nepal, and the attitudes of stakeholders on the forestry profession in the Philippines.

### H-07 International developments in the administration of publicly-funded forest research: challenges and opportunities

**Organizer :** Gordon M. Hickey, *McGill University, Canada*

**Moderator :** Gordon M. Hickey (*Canada*)

This session examined the natural tension that exists between the ‘purchaser’ (the decision-maker) and ‘provider’ (the researcher) of publicly funded forest-related scientific research in different jurisdictions. Presenting the results of recent empirical research, this session revealed some of the contemporary opportunities and challenges facing publicly funded scientific research programmes at different levels of government internationally. More specifically, this session offered diverse organizational perspectives on the following issues: Funding pathways (including public and private partnerships) that enable forest research; Managing decision-maker and researcher satisfaction in publicly-funded forest research contexts; Measures of research success and relevance (i.e., scientific versus public impact factor); Demand for inter- and trans-boundary governance and research; External pressures on setting forest research directions; and Information pathways for improving knowledge transfer. This session involved eight oral presentations: *International developments in the administration of publicly-funded forest research* (Gordon Hickey, Canada); *When peer-reviewed publications just won't do! Meeting the information needs of today's natural resource managers* (Ann Bartuska, USA); *Creative forest research: relevance at a time of global crisis* (James Pendlebury, United Kingdom); *First experiences of the Chilean Native Forest Research Fund* (Alejandra

Real, Chile); *Canadian Wood Fibre Centre: a national innovation pilot for forest sector transformation* (Guy K.M. Smith, Canada); *Do the beneficial impacts of Australian Cooperative Research Centres outweigh the transaction costs? Reflections on two decades of triumphs and trials for the CRC for forestry* (Gordon Duff, Australia); *Canada's Sustainable Forest Management Centre of Excellence: a 15-year experiment in publicly financed research partnership* (James Fyles, Canada); and *Strengthening forest research networking and cooperation in Europe: challenges and opportunities* (Risto Päivinen, Finland).

\* The summary for this session was written by the COC.

### H-08 Contribution of political theory to policies for sustainable use of forest resources.

**Organizers :** Dodik Ridho Nurrochmat, *Bogor Agricultural University, Indonesia*; Maria Brockhaus, *CIFOR, Indonesia*

**Moderators :** Dodik Ridho Nurrochmat & Maria Brockhaus (*Indonesia*)

The six presentations in Session H-08 discussed about the contribution of political theory to policies for sustainable use of forest resources. Bas van Arts (Wageningen University, The Netherlands) presented a paper about the theories for forest policy analysis – a systematic and longitudinal overview. He gave an overview of political and policy theories which are currently used in the sub-discipline of forest policy analysis, as well as trends over time in theory use are followed. His presentation also offers a systematic overview of theories applied in forest policy analysis. Wil de Jong (Kyoto University, Japan) spoke about the strangers among trees: policies and politics for foreign residents in northern Bolivian forests. The paper provided analyses that while border crossing in tropical forest regions is quite common, its implication for forest policies has yet little been explored. It relies on a number of theoretical concepts, the most important of which are territorialisation and frontier development theories. The third paper dealt with the administrative forestry investment and its impact on activity in Japan (Mitsuhiro Nose; Research Institute for Humanity and Nature, Japan).

He stated that the historical trend of administrative forestry investment should be traced to establish the future strategy of forest policy. He summarized that the investment has not been effective for economic aspect. Dodik Ridho Nurrochmat (Bogor Agricultural University, Indonesia) presented a paper, green fiscal policy in Indonesian forestry sector: options to transform political theories into practice. The paper discussed that sustainable forest management does not relate only to the technical aspects, but also needs to be supported and could be achieved among other by green fiscal policies. Therefore, it is a pivotal task to formulate green fiscal policy schemes to address sustainable forest management through synchronizing legal basis, income accounting system, and tariffs in forestry sector. The importance of cultures in the development and implementation of forest policy management was addressed by Bruno Ramamonjisoa Salomon (University of Antananarivo, Madagascar). According to his paper, the evaluation of associative and community capacity by social scientists has concluded to the efficiency of community management model because of their predisposition to the conservation of natural resources including forests. However, within the culturalist approach this theory could now be refuted. Forest use is not only because of economic or social matter but also cultural incentives related to the religion of their ancestors. The last presentation was given by Olofunso Somorin (CIFOR, Cameroon) who discussed about the Congo basin forests and climate change: between discourse and institutional analysis. This paper seeks to theorize and analyze the current policy discourse and institutional dynamics around the Congo Basin forests under the changing climate. The discussion in Session H-08 concluded that the political theories are highly important to understand the ways to achieve sustainable use of forest resources and to give alternatives in decision making process.

## H-09 Future of forests – responding to global changes

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**Organizer :** Gerardo Mery, *Finnish Forest Research Institute/IUFRO, Finland*

**Moderator :** Gerardo Mery (*Finland*)

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The first presentation was introduced by Gerardo Mery, Coordinator of IUFRO-WFSE, who briefly addressed the main findings of the new book produced in 2010 by the IUFRO-WFSE, namely *Forests and Society – Responding to Global Drivers of Change*. The book explains that many of the world's forests and forestry in general are undergoing far reaching changes stemming from human activities. The book focuses on the main global drivers of change and the challenges and opportunities they create. It also deal with the ability of institutions to cope with these changes, proposes ways to reduce the adverse effects of these drivers and to take advantage of the new opportunities they may bring.

The second presentation Global drivers of change and new challenges affecting forests were introduced by Pia Katila (from METLA, Finland), who summarized the main drivers of change affecting forestry: environmental changes, changes in technology, markets, and investments, and societal changes. Climate change is another important driver of change affecting forests and thus livelihoods and sustainable development. The interactions and complexities between and within the different drivers of changes create considerable challenges. To address them requires more holistic and intersectoral approaches at local, regional and global levels.

The third presentation entitled *Forests and Adaptation to Climate Change: Challenges and Opportunities* by Ian Thompson (Canadian Forest Service) focused on impact of climate change on forests. He said that as many forests are likely to be affected by climate change and its associated disturbances and many forest-dependent societies may be consequently affected, adaptation is needed for reducing the vulnerability of forests and people.

The fourth presentation was *Forest Health in a Changing*

*Environment* by Rene Alfaro (Canadian Forest Service) who explains that changes in the earth's atmosphere will have profound effects on future forest distribution and composition. Trees will become more susceptible to insects and diseases. Changes in temperature and precipitation will cause alterations in the life cycle of insects and diseases -increasing their host range and virulence- and making them important drivers of change in forest ecosystems. In addition, forest health is threatened by invasive species and accelerated global trade will increase the likelihood of cross-continental introduction of insects and diseases.

The fifth presentation entitled *The Amazon Forests at the Crossroads: Pressures, Responses and Challenges* by Wil De Jong (Kyoto University), emphasized the strong debate on the natural treasures of this region and its potential for economic development. He pointed out some of the dominant key social, occupational and political dynamics. Reviews a number of the threats that affect forests and forest related livelihoods: cattle ranching, soy bean production, logging, infrastructure expansion, and the oil and gas industry remain the major culprits. The presentation subsequently reviews the responses over the last years to address those threats.

The sixth presentation was introduced by Benjamin Cashore (Yale University) and dealt with the *Ability of Institutions to Address New Challenges*. He reviews the most promising institutional configurations with which to addressing new and enduring forestry challenges. Two conceptual distinctions were made: understanding when and how institutions might earn long term support from a range of forest stakeholders and civil society; and governance/political science conceptions of institutions that must be expanded to include more explicitly educational and scientific institutions that create knowledge and produce the technical expertise critical for policy implementation and problem amelioration. Integration is a prerequisite for promoting capacity.

The seventh and final presentation entitled *New Strategies and Approaches* was introduced by Glenn Galloway (CATIE). He introduced new strategies and approaches to respond to global drivers of change. Response to these drivers of change requires innovation at the policy level and proactive participation by a diverse array of institutions and

stakeholders in collaborative policy implementation. Of particular importance is the collective ability of institutions to create an enabling environment that favours sustainable forest management and that is capable of adapting to change over time. The complexity of these challenges, demands integrative and systemic approaches that bring together organizations and stakeholders from different sectors. These approaches require leadership and technical support of professionals with new skills.

## H-10 Wood and forest culture: yesterday's lessons and today's impact

**Organizers :** **Howard Rosen**, *U.S. Forest Service, USA;*  
**Young Woo Chun**, *Kookmin University,*  
*Republic of Korea*

**Moderators :** **Howard Rosen (USA) &**  
**Young Woo Chun (Republic of Korea)**

### Session Objectives

The objective of the session was to better understand the historical, religious, artistic and other social values of wood and forest culture. The talks emphasized the economic, environmental, and scientific impacts to different regions or countries in the world as a result of these social values. Forests were shown to have provided a rich heritage to many parts of the world, as reflected in the ancient and modern wood trade, contemporary art and literature, and the wide use of forests and forest products. Different regions of the world have developed distinct forest cultural traditions and the utilization of various products from the forest.

### Scientific Program

Our program consisted primarily of inputs from two Working Parties in IUFRO, 5.10.01 – Wood Culture and 6.07.03 – Forest Culture and Cultural Forestry. We had two sessions with 14 papers, as well as 6 posters. The presenters were from 10 different countries. As an excellent supplement to our sessions, IUFRO 6.07.03 Forest Culture 6.07.03 and the Forest Culture Committee of Korea sponsored a Forest Culture Tour to the Korean East Midland, an Exhibition for Korean Forest and Wood Culture, and a Forest Culture Conference and Cultural Performance. (Details are in the Proceedings of Cultural

Forestry and Forest Culture 2010, edited by Cheong-Ho Yi and Young Woo Chun)

Oral session 1 – in the first paper, Yi Cheong-Ho (Korea University, Republic of Korea) talked about trees and forests being the best providers of “cultural” ecosystem services to humanity. He stressed the importance of retaining these historic values in the present age where the end products of forests today are pursued primarily for economic value. Then, Mario Tomazello (University of Sao Paulo, Brazil) reviewed the history of wood and forest culture in Brazil, followed by Mauro Agnoletti (University of Florence, Italy), who discussed the role of cultural values in forests of northeast Italy that have been managed for timber production over many centuries. Victoria Asensi Amorós (Xylodata SARL, France) described how to use wood anatomy to detect imitation artefacts in museums around the world. Klaus Seeland (ETH Zurich, Switzerland) talked about whether India can solve the dilemma between economic development and the preservation of natural resources and cultural values. Several suggestions were made for forest management in the future. Taisuke Miyauchi (Hokkaido University, Japan) presented a case study of the Solomon Islands and a model to show the interaction between forest resources and social systems. The last paper was given by R. L Trosper (University of British Columbia, Canada) on the stability of fundamental cultural values among indigenous people of Canada using the Q method to elicit opinions.

Oral session 2 – Kwang-Hee Lee, (Chungbuk National University, Republic of Korea) started the session with a perspective in changes of species of wood used in Korean architecture from prehistoric to more recent times. Howard Rosen ( U.S. Forest Service, USA) discussed how wood culture has changed during the history of the United States and Yang Ping (Kumamoto University, Japan) discussed how wood culture is being stressed in China and wood culture is being brought into the educational system of Japan. Won-Kyu Park (Chungbuk University, Republic of Korea) discussed manufacturing methods for wooden coffins in the Joseion Dynasty, Jiri Woitsch, Czech Academy of Sciences, Czech Republic), talked about methods in the documentation of memorable trees in the Czech Republic, and Juanwen Yuan (Guizhou College

of Finance and Economics, China) presented the forest management practices of the Dong community based on the need for the 18-year “daughter” fir trees. The final talk by Miyuki Matsuo (Kyoto University, Japan) described a method of heat treatment to shorten the time for color changes in wood and paper products and thus analyze these changes more quickly than natural changes with time.

The posters were from the Republic of Korea except for one from Japan. The posters focused on forest resource management, forest restoration, village groves, village site modifications, and forest culture for ceremonies and religious observations.

## H-11 Improving forestry education: innovative views of students and teaching staff

**Organizers :** **Michaël Rivoire**, *International Forestry Students' Association, France*; **Siegfried Lewark**, *University of Freiburg, Germany*

**Moderators :** **Michaël Rivoire** (*France*) & **Siegfried Lewark** (*Germany*)

Jointly organized by the International Forestry Students' Association (IFSA) and IUFRO division on education (6.15.00) on two slots on 27 August, this session allowed a total of twelve people to present their work, as well as fourteen posters displayed in the main hall.

In the morning, Febri Bari (IFSA, Indonesia) presented a successful experience for combining formal forestry education and extracurricular to improve students' knowledge and skills. Then, Hugh Bigsby (Lincoln University, New Zealand) showed the Sarawak experience in educating managers for sustainable tropical forestry. Then we got experiences on e-learning thanks to Michal Vanco (National Forestry Center, Slovakia) with E-learning tools and blended learning approach in continuing forestry education and knowledge transfer, and Siegfried Lewark (University of Freiburg, Germany) with a presentation of WELAN – the new World-Wide E-Learning Academy for Natural Resources, Forestry & Wood Science. Then Maria Catalina (Universidad Distrital Francisco Jose De Caldas,

Colombia) presented a comparison of students and teachers point of view thanks to a diagnosis of pedagogy preparation level of teachers of forest engineering in Colombia. The morning ended with a presentation of the structure and functioning of IFSA by Michaël Rivoire and other French students (IFSA, France) with no use of PowerPoint®.

The afternoon session began with Lina Karlinasari (Bogor Agricultural University, Indonesia) showing an experience in Strengthening Academic Atmosphere of Undergraduate Education at Department of Forest Products, Faculty of Forestry, Bogor Agricultural University: Lessons Learned and Good Practices of a Six Year Academic Improvement Project. Then Yasemin Öztürk (IFSA, Turkey) explained why is important Internships, Traineeships, Ph.D. for students who are foresters? Third, Suvama Chandrappagari (Andhra Pradesh Forestry Academy, India) presented Enhancing the capacities of the cutting edge forest staff through training: Policy and Implementation initiatives. German Correa (Amazon National University Madre de Dios, Peru) followed with Linking research and teaching in forest engineer formation in his university. Then, Kirsi Kettula-Konttas (University of Helsinki, Finland) presented the interest of using drama for Furthering professional development in higher education of forestry and marketing. Finally, Eva Ortvad Erichsen (IFSA, Denmark) presented New inputs on the Global Action Plan for Forestry Education. Discussions brought very interesting views on curricula (length, content, experiences) as well as on innovative approaches (drama, e-learning). Participants were unanimous on the fact that useful examples exist to improve forestry education. Most of them left the room with ideas for their own university, courses or relation between teachers and students, that are incentive for further collaborative work on these topics, for example between IFSA and IUFRO.

## H-12 Cultural values and sustainable forest management: strategies and actions

**Organizers :** **Mauro Agnoletti**, *University of Florence, Italy*; **John Innes**, *University of British Columbia, Canada*

**Moderators :** **Mauro Agnoletti** (*Italy*) & **Elisabeth Johann** (*Austria*) & **John Innes** (*Canada*)

The issue of cultural and social values is slowly passing from theoretical discussions to political initiatives developing strategies and actions for their incorporation in forest polices, planning and management. While there have been important activities in this direction, particularly in Europe, the issue has not received the same attention in other parts of the world. In most developing countries, for example, there are significant contradictions between official forestry, nature protection strategies and local culture, especially traditional practices related to the life of indigenous populations. In developed countries there is a need to recognize and maintain cultural values as part of cultural identity, for economic values of wood and non wood products, for the quality of life of people and biodiversity connected to traditional forest landscapes. This session considered the major political initiatives related to the incorporation of cultural values in sustainable forest management, as well as issues and challenges associated with transferring cultural values in different parts of the world into forest management, including those related to criteria and indicators for sustainable forest management and certification standards. The session was divided into three sub-sessions including session 1, session 2 and session 3. A total of 19 oral presentations were involved in the tree sub-sessions and seven poster presentations were also included.

\* The summary for this session was written by the COC.

## H-14 Forest ethics and conflict

**Organizers :** **Christian Gamborg**, *University of Copenhagen, Denmark*; **Olli Saastamoinen**, *University of Eastern Finland, Finland*

**Moderator :** **Christian Gamborg** (*Denmark*)

The aim of this session was to gain a better understanding of the role of forest ethics in suggesting ways to handle conflict situations arising in forest and nature management. The seven papers presented in this session described and examined varying views and norms among stakeholders through a number of case studies, discussed key concepts (such as corporate responsibility) and critically reflected on concerns and values related to forest and nature management.

In the first paper, Martin Herbert (Université Laval) discussed Aboriginal forest ethics in relation to the shaping of the Laurentides Park (Canada). He presented a longitudinal analysis of institutional access and decision-making dynamics, documenting important shifts that have occurred in this process of social construction, as well as the specific ethical frameworks and actors that have influenced these institutional shifts.

The second case, reported by Marion Karmann (FSC International), concerning conflict issues in the Congo Basin, focused on the need for free, prior and informed consent (FPIC) in relation to sustainable forest management. The paper showed how FPIC can be used as a tool for preventing and resolving conflicts and for defining and constructively regulating contractual relationships between forest companies and local populations.

The relationship between value orientations ('Traditionalist', 'Mutualist', 'Pluralist', 'Distanced'), and wildlife management schemes was explored by Frank Søndergaard Jensen (University of Copenhagen). He showed the results of a Danish survey, concluding that a deeper understanding of the underlying values will help to clarify in what direction to change wildlife management strategies.

A historical case concerning a common forest management practice in Sweden 1960 – 2009; forest fertilization, analysing conflicting ideas of various interest groups, was presented by Anna Lindkvist (Umea University) in the fourth paper of the session. She ascribed parts of the differences in outlook on fertilization to a tension between an anthropocentric conservationist view and a biocentric preservationist view.

The (in)ability of natural resource management (NRM) planners to handle conflicts often involving deep value differences was explored by Cathy Brown (University of Copenhagen). She argued that if NRM planners are to simultaneously manage demands for effective public involvement and the 'messy' dimensions of participatory NRM processes, the gap between theory and practice in how NRM participatory processes are planned much be bridged.

Anne Toppinen (University of Helsinki) looked at the

conflicting demands for corporate responsibility (CR) and financial performance in the forest industry. She presented the results of a quantitative analysis based on the Global Reporting Initiative frame, concluding that the lack of customer driven pressures to CR partially explains the slow diffusion of responsible business orientation in the forest industry.

Finally, Olli Sasatamoinen (University of Eastern Finland) examined the notions of moral diversity and universalism in the world of forests. He concluded that forest policy processes and institutions can benefit from ethical considerations, fostering moral communities (professional ethics) and morally reflective organizations (corporate social responsibility).

## H-15 Sustainable Forest Management (SFM) through innovative forest laws and environmental legislation

**Organizer :** Peter Herbst, *Forest Lawyer, Austria*

**Moderators :** Rastislav Sulek (*Slovakia*) & Peter Herbst (*Austria*)

Two sessions were held to elaborate on the thesis that there is no Sustainability in Forest Management in the absence of a sound, applicable and enforceable legal basis. The Sessions were based on the work of the IUFRO Research Group 9.06.00 (former 6.13.00) on "Experiences with new forest and environmental laws in European countries with economies in transition." Its work has led to the collection and analysis of a vast number of case studies, from more than 40 countries over more than 10 years, and resulted in a broad range of experiences and proposals in the SFM context. The presenters in Sessions H-15 by focused on positive as well as negative effects of specific forest and other environmental legislation on sustainable forest management practices and the state of forests, broadening the so far European-oriented view.

Daowei Zhang (Auburn University, USA) explained that all government forest policy and forest practice/landowner ethics are about defining, enhancing or limiting private or public property rights. He provided examples of success

and failure in forest policy around the world and suggested that modifying property rights can lead to sustainable forest management practices. Maria Cristina Puente Salinas (Corporacion ECOLEX, Ecuador) presented an analysis of legal elements that distinguish various types of property and their related features in selected South American countries.

Rastislav Sulek (Technical University of Zvolen, Slovakia) demonstrated forest legislation to be an important tool for sustainable forest management in Central Europe. Ioan Vasile Abrudan (Transilvania University of Brasov, Romania) elaborated in his presentation on causes of and solutions for conflicts resulting in partnerships between forestry and nature protection in Eastern Europe. Czech experiences with forest and environmental law developments during the era of transition towards market economy were discussed by Jaromir Vasicek (Forest Management Institute, Czech Republic). Liga Mengele-Stillere (State Forest Service, Latvia) informed about the importance of public participation in environment-related decision-making, and showed what Latvia has done to secure implementation of these rights at national level. An analysis of forest legislation in Turkey was presented by Aynur Aydın Coşkun (Istanbul University, Turkey).

The FLEGT Voluntary Partnership Agreement in Ghana and its implications on forest communities' livelihoods and poverty alleviation were presented by Sabaheta Ramcilovic-Suominen (European Forest Institute, Finland) in her address opening the second session. Clara Maria Minaverry (Universidad Nacional de Lujan and Universidad de Buenos Aires, Argentina) introduced an analysis of recent forest legislation and its stipulations concerning protection of native forests in the Republic of Argentina. Forests are now categorized according to their "environmental value" and to the "environmental services" they provide. The research conducted by Liubov Poliakova (State Forestry Committee, Ukraine) on main tendencies in forest legislation development in selected Eastern European countries was presented by Peter Herbst (Forest Lawyer, Austria). Vitalie Gulca (State Agricultural University, Republic of Moldova) introduced his research comparing both poor and rich counties with respect to different effects of forest policy measures. He made specific

suggestions for improving sustainable forest management and to the application of resulting approaches in developing countries.

Papers presented in these sessions will be published by IUFRO RG 9.06.00 under the auspices of Franz Schmithüsen who had substantially contributed to make Session H-15 a success.

## H-16 Towards sustainable forest management and rural development in Latin America through appropriate forest policy instruments.

**Organizers :** **Santiago Barros**, *INFOR, Chile*; **Vitor Hoeflich**, *Universidade Federal do Paraná, Brazil*

**Moderators :** **Heinrich Schmutzenhofer** (*Austria*) & **María C. Puente Salinas** (*Ecuador*)

The Session programme foresaw five papers, but only four were presented. The extended Abstract of "Critical paths for local capacity building in community forestry, the BOLFOR project experience in Bolivia, by Rudy Guzman G. and Z., Lehm, (Bolivia)" can be found in the Congress DVD and in "the *International Forestry Review*", Vol. 12 (5), 2010, p 458, ISSN 1465 5489. Abstracts of the XXIII IUFRO World Congress, 23-28 August 2010, Seoul, Rep. Korea, Editors: John A. Parrotta and Mary A. Carr, published by the Commonwealth Forestry Association. Abstracts of the other 4 papers presented are also available at the same site.

An average of 20 scientists were always present during the two hours Session. Vivid discussions over 5 to 10 minutes after every presentation permitted a better understanding of details as requested from participants of different continents to compare with different local possibilities or facilities to check possibilities of implementations of projects and programmes to improve policy instruments as brought forward. This showed the big interest in the Session theme and the individual contributions.



Two papers focused on dry-land forestry development. One demonstrated a model for establishing a multidimensional strategy to approach sustainable forestry development. The other generated policy recommendations to support a development of national land-use planning strategies incorporating dry-land forest restoration.

Concepción Lujan (University of Chihuahua, Mexico) explained a participatory model applied for sustainable forestry development based on community forestry in Chihuahua State, Mexico. An area of 600.000 ha, common property resources and forest “ejidos”, mostly degraded land not able to cover public needs, was target of the study. A hierarchical system of criteria and indicators to evaluate a sustainable development, including participatory elements and strategy plan was applied to lead into a bottom up decision process. The flexible and versatile model allows promotion of a development policy responding to peoples’ needs. It can be replicated in diverse environments.

Ignacio Schiappacasse et al. (Universidad de Concepción, Chile) referred to the heavy loss, fragmentation and degradation of dry-land forests in Central Chile during the last 4 decades causing local poverty and negative livelihood development, due to urbanization processes. The answer was the start of the “REFORLAN” project (Restoration of Dry-land Forests in Latin America) to develop, based on multi disciplinary research, stakeholders contributions and participatory principles, political guidelines for a land-use strategy plan.

María Cristina Puente Salinas (SEDEFA, Sociedad Ecuatoriana de Derecho Forestal y Ambiental, Ecuador) referred to the new Political Constitution of Ecuador applying public policies as a contribution to forestry governance. That means the concept of planning has become an obligatory standard for Ecuador. New standards and policies working together are necessary to reach the goal of “good life”. There are two examples linked with the support of forest governance: The “Forest Partner Programme” and the “Yasunii ITT” initiative. The first one focuses on promoting a payment scheme for the conservation of forests, accompanied by sustainable management. The second refers to the non exploitation of petrol in forest zones. The two examples are still a vision as

financiation is open.

Alexander C. Vibrans (Universidade Regional de Blumenau, Brazil) presented for the co-authors the last paper of the Session informing on the Genesis of the Santa Catarina State Floristic and Forest Inventory (IFFSC) in southern Brazil and the role of stakeholders. Preparations started in 2003 to legitimize forest conservation and land-use policies and to review State’s Red Lists, develop in a participatory process, scopes and methodologies of inventories, etc. Start of the inventory was in 2007, in a five year rotation of 20 % of state’s forests measured each year. The inventory is a result of a long term process to create awareness of forests as a strategic policy issue.

H-16 was in the Poster Session represented with one poster by C. Lujan et al. (University of Chihuahua, Mexico): Sustainable community forestry in Mexico, changes, challenges and opportunities.

## H-17 Globalization and its impact on the forest sector

**Organizer :** **Piotr Paschalis-Jakubowicz**, *Warsaw*

*University of Life Sciences – SGGW, Poland*

**Moderator :** **Piotr Paschalis-Jakubowicz** (*Poland*)

The basic premise and purpose of this session was to present, in a structured way selected factors affecting forests and forestry on a global. We analyzed role, place and importance of forests and forestry, and changes in forest resources in terms of their degree of naturalness and biological diversity of forests, changes in forest resources due to the introduction of forest plantations and fast growing tree plantations, climate change and the importance of forests in mitigating the impact of these changes, changes in the ownership structure of forests of the world and the labour market in the forestry sector, changes in the intensity of the functions performed by forests of the world. In the first paper (Piotr Paschalis-Jakubowicz, Poland) presented analysis of selected factors in the processes of globalisation and their impact on global trends in forestry, illustrating the development trends of forests and forestry in the changing conditions of civilization. In the second

paper, (Karin Beland Lindahl, Sweden) presented future forests in the making: global trends affecting Swedish forest area, focusing on both the current situation on the Swedish forestry and analyzing trends of use of forests in Sweden in the future, identify and taking into account some global trends. In the third paper, (Diana Mizaraite, Lithuania) emphasized the role of the study of the effects of globalisation on the economic viability of Lithuanian forestry. In the final discussion, in which a dozen people took up the voice, highlighting the importance of a multifaceted approach to the presented problems and high levels of presentation. It was concluded on the need to take such discussions during plenary sessions of Congress.

## I-01 Healthy urban forests: healthy people

**Organizer :** William Manning, *University of Massachusetts, USA*

**Moderator :** William Manning (*USA*)

The objectives of this session are: (a) to bring together researchers in urban forest health and function and researchers in the human health community; (b) to explore relationships between healthy urban forests and the health and well-being of people in urban areas, and (c) to identify common research goals for urban forest and human health researchers. The session involved five oral presentations: *Environmental impacts of urban trees and their effect on human health* (David Nowak, USA); *Urban air pollution: role of tree response in air quality* (Elena Paoletti, Italy); *Nitrogen dioxide levels in urban tree canopies* (William Manning, USA); *The effects of fragmentation on recreational experiences in urban woodlands* (Kaisa Hauru, Finland); and *Nearby nature and human health: stress, social cohesion and physical activity as possible mediators* (Sjerp De Vries, Netherlands). Five poster presentations were also included in the session.

\* The summary for this session was written by the COC.

## I-02(1) Health benefits of forests

**Organizers :** Eeva Karjalainen, *Finnish Forest Research Institute, Finland*; Won Sop Shin, *Chungbuk National University, Republic of Korea*; Kjell Nilsson, *Danish Centre for Forest, Landscape and Planning, University of Copenhagen, Denmark*

**Moderators :** Hannu Raitio (*Finland*) & Won Sop Shin (*Republic of Korea*)

The sessions aimed at raising awareness of the health benefits of forests by presenting latest scientific research results.

The first session focused on the positive influences of forests visits on mental and physical health. Prof. Terry Hartig (Uppsala University, Sweden) presented experimental findings from US and Europe showing natural environments to induce beneficial changes in emotion, physiology, and performance on attention-demanding tasks compared to urban public settings. Longitudinal epidemiological studies suggest that access to nature might reduce likelihood of depression and early death. Dr. Sjerp de Vries (Wageningen University and Research Center, Netherlands) suggested causal explanations for the beneficial health effects of nature; improvement of air quality, reduction of stress and concentration problems, stimulation of physical activity and facilitation of social cohesion in the neighbourhood. The last three presentations highlighted the findings of Japanese research. Dr. Yuko Tsunetsugu (Forestry and Forest Products Research Institute) presented the physiological measurement methods used in Japanese studies, such as salivary cortisol concentration, heart rate variability, blood pressure, and pulse rate, and the preconditions to these measurements. She also highlighted the large individual differences in the physiological responses to forest environments. Dr. Bum-Jin Park (Chiba University) presented the findings concerning physiological effects of forest visits at 35 sites in Japan. Compared to city areas, walking in forest and viewing forest landscapes decreased concentration of salivary cortisol, blood pressure, pulse rate and sympathetic nervous activity and increased parasympathetic nervous

activity. Prof. Qing Li (Nippon Medical School) presented findings indicating that a day trip to the forest park can enhance human immune function, and that this effect may last for 7 days after the trip. Natural killer (NK) activity and the numbers of NK as well as anti-cancer protein-expressing lymphocytes were increased. These effects may be caused by phytoncides detected in the forest air.

The second session included five presentations. The importance of serotonin in forest healing was discussed by Dr. Si Hyung Lee (Medical College of National University of Kyung-Buk, Korea). Prof. Kjell Nilsson (University of Copenhagen) presented the major research results of COST Action E39 “Forests, Trees and Human Health and Wellbeing” which explored the relationships between health, natural environments in general, and forests in particular. Dr. Tatsuya Kushida (NalaPro Technologies, Inc, Japan) discussed the multifunctionality of flavonoids and elucidation of their functions by means of text mining methods. Dr. Nor Azah Mohamad Ali (Forest Research Institute, Malaysia) discussed about potential of utilizing the Malaysian biodiversity in health care product development. She described the effects of plant terpenoids, flavonoids and phytosteroids extracted from five plant families common in Malaysian forests. Dr. Julius Adebayo John (Forestry Research Institute of Nigeria) showed evidence that majority of Nigerian households use self-made as well as locally and internationally made herbal medicines to treat various ailments. The results of questionnaires indicated that local people need help for right prescription and preservation of herbal medicines.

## I-02(2) Health benefits of forests

**Organizers :** **Eeva Karjalainen**, *Finnish Forest Research Institute, Finland*; **Won Sop Shin**, *Chungbuk National University, Republic of Korea*; **Kjell Nilsson**, *University of Copenhagen, Denmark*

**Moderator :** **Won Sop Shin** (*Republic of Korea*)

Health or therapeutic benefits from direct/indirect uses of forest are emerging issues in research and practical areas in forestry and many other fields as well. To combat this

increasing demand, we suggested and developed the session titled “Health benefits of forest” at the World IUFRO Congress in Seoul. As we expected many abstracts were submitted and accepted for the session. Therefore the session was divided into two slots. This is the summary of second slot of the session.

There were five oral presentations. In the first presentation, Dr. Si Hyung Lee introduce the importance of serotonin in forest healing. Serotonin is a brain neurotransmitter that has many important functions. His presentation was to explore and stressed the effects of forest use or experience on serotonin level.

Professor Nilsson presented the major research results of COST Action E39 “Forests, Trees and Human Health and Wellbeing.” Through his presentation, he suggested evidence of substantial economic benefits arising from lower rates of illness and a reduced requirement for medical interventions.

At third presentation, Dr. Kushida from Japan reported the medical effects of the alleviation of atopic dermatitis from many biological functions of flavonoids to elucidate the molecular mechanism. Dr. Nor Azah Mohamad Ali from Malaysia also reported herbal health benefits and aromatherapy products based on plant oil and plant extracts. She presented the importance of scientific research findings in providing basis to the use of aromatic plants in traditional knowledge as well as new applications as personal and health care ingredients for human health.

In the last presentation, Dr John from Nigeria presented assessment of the demand and consumption of herbal medicines in Ido and northwest Ibadan, Nigeria. He reported people’s responses to demand and consumption of herbal medicine and people’s evaluation of the effectiveness of the existing medicines on the treatment of ailments in Nigeria. He stressed the encouraging forest products utilization for greener future in terms of health care delivery.

A discussion followed the presentations in which a numbers of issues of clinical applications of forest use and evidence-based research in forest and human health.

## I-04 Knowledge systems, societal participation and sustainable forestry for human wellbeing

**Organizers :** **P.S. Ramakrishnan**, *Jawaharlal Nehru University, India*; **John Parrotta**, *U.S. Forest Service, USA*

**Moderator :** **Ronald Trosper** (*Canada*)

Technical Session I-04, “Knowledge Systems, societal participation and sustainable forestry for human wellbeing,” had two sessions, one in the morning and one in the afternoon.

The morning session began with Enrique Tolentino’s presentation of the success of the Upland Peoples’ Organization of the Phillipines in using both formal silviculture and local knowledge to identify species appropriate for rehabilitating denuded grasslands. Then Willam Mala reported on the selection of tree species to retain when forests are cleared in southern Cameroon; they found that farmers domesticated trees with multiple uses. Sylvestre Djagoun of Benin reported on the habitat use of Bushbuck (*Tragelaphus scriptus*) and Red-flaked-duiker (*Cephalophus rufilatus*) in Pendjari Biosphere Reserve (Northern Benin); indigenous and scientific knowledge combined provides direction regarding the habitats that need protection. Harri Siiskonen reported a similar utilization of both scientific and traditional knowledge in Finland and Sweden. In those countries, a complex relationship developed in which local peoples’ goals and those of the forest authorities affected the use of knowledge. Stanley Asah reported on the extensive efforts of the Pacific Northwest Research Station of the United States Forest Service to document the cultural values and benefits people get from the Deschutes National Forest. They found important ways in which sense of place is expressed among the public living and using the forest. The morning session concluded with Fergus Sinclair describing how, in coffee production, acquisition of local ranking for different attributes and knowledge of tree phenology can complement science and underpin development of decision support tools that promote retention of tree diversity rather than focus on one or two best species.

The afternoon session consisted of both oral and poster presentations. Martin Hebert of the University of Laval, Quebec, began with an examination of some difficulties in applying the economic concept of “capital” to other contexts, particularly the idea of “social capital.” Chin-shien Wu of the Taiwan Forestry Research Institute reported on the use of TEK by aboriginal peoples of Taiwan. Giridhar Kinhal of the International Centre for Integrated Mountain Development in Nepal reported on efforts to build on existing indigenous knowledge systems for developing community rewarding systems for ecosystem services in the Hindu Kush-Himalayan mountain ranges. After those three presentations the session moved to the hall to discuss poster presentations. Leni Camacho presented a poster on surveying the various traditional knowledge systems in the Cordillera of the Northern Philippines. Fergus Sinclair reported on the traditional societal rules regarding the maintenance of appropriate ratios of male to female marula trees (*Sclerocarya birrea*). Cooperation regarding maintenance of the non-fruit producing but necessary male trees is required; but precise knowledge of the proper ratios is missing in both traditional and scientific knowledge systems. John Stanturf reported on a pilot project to involve communities in carbon monitoring in Ghana. The session concluded with an animated and thorough discussion of issues relating to the validation of traditional knowledge; we learned that validation is a complicated topic, making scientific scepticism subject to scepticism itself. Another topic of discussion that cross-cut a number of papers in the afternoon was the question of how to develop incentive systems for sharing traditional knowledge that do not turn such knowledge into a commodity.

## I-05 Non-timber forest resources and human welfare

**Organizers :** **Carsten Smith-Hall**, *University of Copenhagen, Denmark*; **Jim Chamberlain** & **Susan Alexander**, *U.S. Forest Service, USA*

**Moderator :** **Carsten Smith-Hall** (*Denmark*)

This session examined the role of non-timber forest resources in maintaining and improving human welfare in

developing countries. Presentations focused on how and to what degree non-timber forest resources contribute to urban or rural livelihoods, including their contribution to current consumption, safety net functions and pathways out of poverty. Specific topics included, for example, the role of forest gathered edible forest products to supplement food security and diversification of diets; the importance of medicinal plants for maintaining and improving health; or the potential of non-timber forest product based small-scale enterprises to contribute to poverty alleviation. All presentations should clearly contribute to our improved understanding of the linkages between non-timber forest produce and livelihoods. The session involved six oral presentations: *Forest-human health linkages: empirical evidence from the Himalayas* (Øystein Nielsen, Denmark); *The role of traditional medicine in the health care provision of households in central Burkina Faso* (Mariève Pouliot, Denmark); *Contribution of non wood forest products to poverty reduction and food security in central Africa* (Juliane Masuch, Cameroon); *Motives, benefits and challenges of collective action to promote sustainable production and marketing of products from Africa's dry forests and woodlands* (Fiona Paumgarten, Zambia); *Potential of *Buchanania lanzan*, an edible forest product for enhancing livelihood of rural communities in Madhya Pradesh, India* (Pratibha Bhatnagar, India); and *Managing forests for edible plants: understanding demand and production of forest onions to conserve a globally important species and way of life* (James L. Chamberlain, USA). Seven poster presentations were included in the session.

\* The summary for this session was written by the COC.

## I-06 Healthy forests, healthy people – gender perspectives on climate change

**Organizers :** **Gun Lidestav**, *Swedish University of Agricultural Sciences, Sweden*; **Carol Colfer**, *CIFOR, USA* **Maureen Reed**, *University of Saskatchewan, Canada*; **Siegfried Lewark**, *University of Freiburg, Germany*; **Ann Merete Furuberg**, *Gjedtjernnet Furuberget, Norway*

**Moderator :** **Gun Lidestav** (*Sweden*)

The session covered a broad range of different approaches to research on gender and the use of our forests. Thus, illustrating how gender is interwoven in most of our everyday life, and the structures of our societies. Also, illustrating that within the field of “gender in forestry”, the proportion of research is still small and scattered, although expanding. In this respect the deficit of studies on masculinity is most evident but also highly needed. The session, therefore, was aimed at filling some gaps and taking advantage of bringing researchers together from different parts of the world and different research traditions to develop the field as such. More specifically, some implications of gender differences in access to information and decision-making processes related to climate change in forestry, were presented and discussed.

By reviewing the existing literature on the subject of climate change and gender, Seema Arora Jonsson (Swedish University of Agricultural Sciences) examined the claims that women in the South will be affected much more adversely than men in those countries and that men in the North pollute much more than their female counterparts. Her critical examination unmasked some examples of how certain figures have been uncritically used and repeated in the debate, although the evidence was, in some cases, weak or beyond the limits of reason. In the paper presented by Carina Keskitalo (Umeå University) it was concluded that institutional conflicts between forestry, reindeer husbandry and mainly small-scale winter tourism (in northern Sweden) have a large impact on possibilities for both present and future adaptation to change. Further, from the paper presented by Nicole Klenk (at the Universities of Waterloo and Saskatchewan) the relationship between gender and adaptive capacity were demonstrated. Her conclusion was that gender and adaptive capacity shape one another and inform our understanding of adaptation in forestry communities.

The fourth paper, presented by Noriko Sato (Kyushu University), and the poster by Gun Lidestav (Swedish University of Agricultural Sciences) explored the impact of gender on traditional forestry and new businesses based on family forestry farming. The second poster, presented by Siegfried Lewark (University of Freiburg) emphasized the need for gender competence for professionals in forestry by developing international e-learning courses.

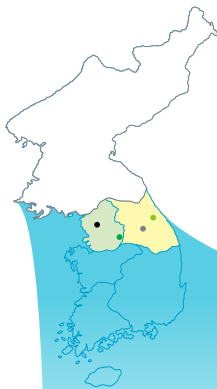
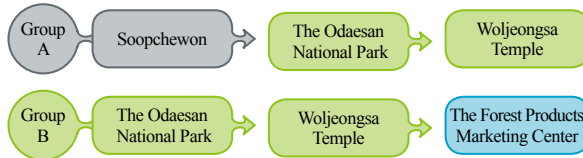
XXIII IUFRO WORLD CONGRESS ▶ 23-28 August 2010, COEX, Seoul, Korea

# IC-01

## Protected Area for Biological Diversity

Forests for the Future: Sustaining Society and the Environment

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- \* Soopchewon is a forest education facility.
- \* The Odaesan National Park has a total of 3,097 animal or plant species.
- \* Woljeongs Temple, the head temple of the Jogye Order in the northeastern region of Korea
- \* The Forest Products Marketing Center produces various kinds of wood products.





## The Odaesan National Park with Biodiversity

### Biodiversity & Geography of Korea

Korea lies within the temperate zone and biodiversity is relatively higher than other countries in the temperate zone. The reason for this high biodiversity could be found in the unique environment of Korea. Korea is a peninsula located in the far east of the Eurasian continent (latitude: 33°07'N - 43°1'N, longitude: 124°11'E - 131°53'E). It extends for approximately 1,000km in length from north to south, but only 170km in width from east to west. Korea was relatively less influenced by the Ice Age, but quite influenced by the continental and oceanic climates. There are four distinct seasons with hot and humid summer, and cold and dry winter. This unique environment provides various types of habitats for many species. As a result, a total of 33,253 species were confirmed in Korea: 21,168 species of animals, 4,130 species of plants, 2,078 types of fungi, 4,657 kinds of protists and 1,219 kinds of prokaryotes.

### Efforts for Conservation of Biodiversity in Korea

During the last 50 years, biodiversity declined around the world, accelerated by industrialization, urbanization and other anthropogenic activities (i.e. annual loss of 1.29 million hectares of forests). Decreased biodiversity deteriorated the functions of ecosystem, causing many ecological problems. Major threats to biodiversity include: 1) land use changes, 2) expansion of invasive alien species, 3) climate change including global warming, 4) reckless or unreasonable use of natural resources, and 5) overflow of nutrients caused by pollution. If no actions are taken for preventing these issues, we will confront serious environmental or economic damage in the near future.

To conserve biodiversity, many countries have taken aggressive actions. In 1993, the Convention on Biological Diversity, an international legally binding treaty, was signed to achieve three goals: 1) conservation of biodiversity, 2) sustainable use of bio-resources, and 3) fair and equitable sharing of benefits. Korea also joined the convention and has implemented adequate actions required from the convention.

Since June 1997, when the very first national action for conservation of biodiversity was initiated, the Korean government realized the need to carry out comprehensive and systemic policy-making for conservation of biodiversity. *In-situ* and *ex-situ* preservation have been applied in Korea. *In-situ* preservation has been done by designating protection areas throughout the country. With the effort exerted since the early 1990s, there are 1,297 protection areas (19 percent of

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the total land area) in Korea. The national parks; the Baekdudaegan areas; forest genetic resources reserves; and areas of ecological and landscape protection are great examples of the mountainous protection areas. *Ex-situ* preservation also has been done through genetic research in arboretums and research institutes.

### Biodiversity in the Odaesan National Park

National parks are the most accessible among the protected areas. Today, we have 20 national parks (7.8% of the national land). The Odaesan (“Odae” means five peaks; “san” means a mountain in Korean) National Park is located in the middle east of the Korean Peninsula (Latitude: 37°40’~37°51’N, Longitude: 128°28’~128°46’E). The park is one of the Baekdudaegan areas, which are core regions of forest biodiversity in Korea. The well-known rich biodiversity lies in unique topography, climate, and less anthropogenic disturbances of the park. The Odaesan National Park consists of steep slopes around the mountain ridge. For climatic conditions, much snowfall in the region results from encounters of the cold air current and the warm air of the East Sea of which benefits are significant help in tree growth as well as wildfire suppression in winter. The park was less affected by man-made disturbances such as agricultural or forestry activities in the mountainous terrain. In addition, lots of temples in the region help to conserve adjacent forests and protect the various kinds of plant and animal species.

In the Odaesan National Park, there are 555 species of plants, 19 kinds of mammals, 67 species of birds, 20 species of amphibians and reptiles, 26 species of fish, 2,160 types of insects and 250 types of higher fungi.

Thirty Korean endemic plants such as *Viola diamantiaca* were identified in the national park. The 17 rare and endangered plants such as *Silene koreana*, *Aristolochia manshuriensis* and *Syringa wolfii* were observed in the park. Mt. Odaesan was also confirmed to be home to some endangered mammals (*Lutra lutra* in the stream and *Nemorhaedus goral* on the ridge-slope) and some protected species (*Martes flavigula* and *Pteromys volansaluco*). In total, 14 bird species live in the national park: protected bird species (*Dryocopus martius*) and certain species (e.g. *Aix galericulata*, *Falco tinnunculus*, *Cuculus micropterus*). The 10 fish species in the upper stream require prior approval for export (ex. *Coreoleuciscus splendidus*, *Rhynchocypris kumganensis*, *Brachymystax lenok tsinlingensis*, *Koreocobitis rotundicaudata*).





*Schizopepon bryoniaefolius*

*Dryocopus martius*



*Cimicifuga foetida*

*Patrina saniculaefolia*

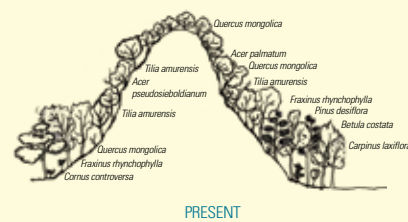
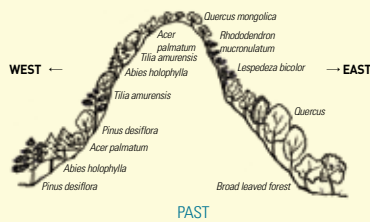
*Aristolochia manshuriensis*

*Nemorhaedus goral*

### Vegetation by Slope and Altitude

The vegetation in the Odaesan National Park varies depending on topography and height above sea level. At the altitude from 400m to 600m, mixed forests including *Quercus variabilis*, *Quercus mongolica* and *Pinus densiflora* are found. *Carpinus laxiflora* is commonly found in the valleys of the area in which *Populus koreana* makes a pure stand, or both *Populus koreana* and *Pinus densiflora* form a mixed forest. A small forest of *Abies holophylla* and *Quercus mongolica* is easily found on the slopes or places adjacent to valleys at 800m to 1,100m. *Quercus mongolica* and *Tilia amurensis* are predominant on the top of the slope at 900m to 1,100m slope along with *Acer pseudosieboldianum* and *Betula costata* in the same community. The *Quercus mongolica* stand is appeared on the upper slope at above 1,200m from sea level or the tree species lives with *Betula costata*. *Taxus cuspidata* and *Abies nephrolepis*. They are distributed along the summit and the ridges, but they rarely make up of a pure stand.

Today's forest vegetation by slope and altitude differs from that of the 1970s (see the figures). Since then, *Stephanandra incisa*, *Tripterygium regelii*, *Acer pseudosieboldianum*, *Symplocos sawafutagi* and *Sasa borealis* have become dominant on the shrub layer and *Quercus mongolica*, *Fraxinus nigra* var. *mandshurica*, *Betula schmidtii*, *Carpinus laxiflora*, and *Cornus controversa* in the upper layer. Based on vegetation composition, the regions were ecologically restored to stay stable temperate forests after designation as national park in 1975.



## IC-01

## “Soopchewon” and Forest Education

Many city dwellers become increasingly interested in visiting forests, emphasizing field learning. Forests are drawing huge attention as a tool for on-the-ground learning in rising demand. The forests which covered about 64 percent of land are highly accessible compared with the seashore or the mud flat. It serves as a major destination for outdoor programs on the environment. People are also familiar with forests, home to infinite natural resources.

Soopchewon, which means a unity of forest and human body, was established in 2007 for social responsibility on green culture experiences of visitors. It aims to contribute to the society by wholistic education forests and health promotion based on forests, both of which lay the groundwork for low-carbon green growth. The Korea's first place for forest education for teenagers can accommodate about 400 students from elementary, middle and high schools.





Soopchewon (39,832m<sup>2</sup>) is located in the middle eastern part of Korea (longitude 128° 29', latitude 37° 53') in the mountainous area at 400m to 800m above sea level. This region, previously used as an area of slash-and-burn farming in the 1940s, has been designated as a demonstration forest, and a reforestation project was initiated. The target species for reforestation was *Larix kaempferi*. The area has been managed since its establishment. At the moment, planted *Larix kaempferi* and *Betula platyphylla* var. *japonica* occupy a large dimension of upper woodland. As a natural vegetation, *Cornus controversa* and *Fraxinus mandshurica* are sighted in valleys whereas *Quercus mongolica* are abundant in general slope area. In spite of the simplicity of forest stands, there are 47 families 117 species of higher plants. Two endangered species (*Anemone umbrosa* and *Gentiana triflora* var. *japonica*) and one endemic species (*Heloniopsis koreana*) are also distributed.

## The Forest Products Marketing Center

The Forest Products Marketing Center was founded for several goals. They include: 1) promotion of economic forest in Korea, and inspiration of morale for forest management and income increase of forest owners, by utilizing domestic thinned timbers, 2) improvement of self-sufficiency of wood products and leadership in the development of the domestic wood industry, 3) production and supply of good quality and high value-added domestic wood products, and 4) establishment of stabilized wood supply system by supporting the forest resources policies.

The Center houses some 30 types of wood processing facilities such as sawing systems, wood drying systems, cylindering machine and precut processing system for structural members, etc. and pellet production facility. Main products of the Center are building materials, treated woods, landscape woods and glued laminated boards and timbers, which are mostly processed from domestic Larch, White Pine, and Cypress. The amount of wood products produced annually is 20,000m<sup>3</sup>. In the meantime, the branch in the East Sea region produces similar wood products of domestic Red Pine amounting to 16,000m<sup>3</sup> every year.



## IC-01



The precut processing system for structural members (K2), introduced first in Korea, is based on computer-aided design and manufacturing (CAD/CAM). It is also considered essential for commercialization of industrial wood-framed construction. This automated processing system to utilize domestic timbers as building members is expected to improve both economic efficiency and quality of timber buildings by reducing labor cost and construction period, and by improving construction precision.

Wood pellet production facility, taking advantage of forest biomass and byproducts of sawing process, is in operation in efforts to secure optimal use of forest resources and to address environmental issues through forest biomass production. These facilities are fully automated with a capacity of three tons of wood pellet per hour. Wood pellet is a type of wood fuel generally made from sawdust. The fuel is considered a low-cost high-efficient fuel, which can cut greenhouse gas emissions significantly.



### Woljeongsa Temple

Located in a thick forest east of Mt. Odaesan, Woljeongsa Temple is the head temple of the Jogye Order for the northeastern region of Korea, supervising 60 other temples and 8 hermitages in the area. The Jogye Order is the representative order of traditional Korean Buddhism. Woljeongsa Temple was founded in 643 during the Shilla Dynasty (57 BC-935 AD) by Buddhist monk Ja Jang, but it is well-known for preserving an array of relics of the Goryeo Dynasty (918-1392) including the Octagon shaped 9-story pagoda (National Treasure No.48) and the Stone Seated Buddha Figure (National Treasure No.139). In particular, the 9-story pagoda also called as the Sari-pagoda (relic pagoda) is usually considered the most beautiful pagoda on the Korean peninsula. At this temple, there are also the Seongbo Museum containing several paintings and artifacts related to Goryeo Buddhism and the Jeokmyeolbogung preserving Buddha's bones.



XXIII IUFRO World Congress Organizing Committee  
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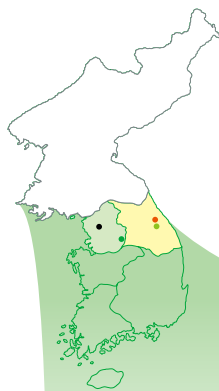
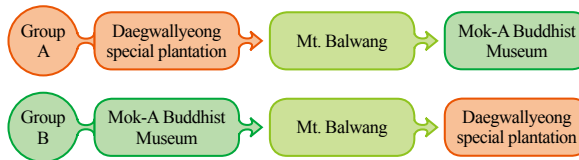
# IC-02

XXIII IUFRO WORLD CONGRESS ▶ 23-28 August 2010, COEX, Seoul, Korea

## IC-02 Landscape Restoration & Sub-alpine Forest

Forests for the Future: Sustaining Society and the Environment

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- \*Rehabilitation area of the devastated forests in Daegwallyeong special plantation
- \*Mt. Balwang is a part of Baekdudaegan where you can observe a typical sub-alpine forest in Korea.
- \*In Mok-A Buddhist Museum, you can enjoy over 6,000 Buddhist works.





## Daegwallyeong: Special Plantation

Daegwallyeong special plantation is located in Pyeongchang County, Gangwon Province (northeastern part of Republic of Korea). This forest area was reclaimed for cultivation after years-long devastation by slash-and-burn farmers from 1968. Reforestation of this barren site was conducted from 1976 to 1986 under the National Greening Plan started with the opening of the Yeongdong Expressway in 1975.

This site (total 618ha) is comprised of artificial forest (311ha), natural forest (226ha) and rent area (81ha). The elevation of this site is about 850m and the annual average temperature is about 6.5°C (low: -32°C, high: 33°C). The average winter snowfall is 187cm, and the mean precipitation is about 1,270mm (national average: 1,344mm). The maximum wind speed is 28.3m/s and the maximum instantaneous wind speed is 45m/s.

After failing the first attempt to reforest the region, a specialized reforestation campaign was launched. About 843,000 seedlings of nine different tree species including *Abies holophylla*, *Pinus koraiensis*, *Larix kaempferi*, *Picea abies*, *Betula platyphylla* var. *japonica*, *Alnus japonica* and *Corylus sieboldiana* var. *mandshurica* have been planted and managed for 11 years. Most of them have ectomycorrhizae, which play an important role in harsh environments like the subalpine areas.

## IC-02



Early stage of the reforestation



Present Status

The planting density was 2,000 seedlings/ha (2.0×2.5m) for *Abies holophylla* and *Pinus koraiensis* and 3,000 seedlings/ha (1.8×1.8m) for *Larix kaempferi*.

All seedlings were planted in consideration of the prevailing wind direction to prevent damage caused by the harsh wind. Within 20m from the wooden fences, the seedling showed favorable growth. Right now, the mean stand density is 1,110 stems/ha after tending operations of the entire plantations in 2006.

The amazing success in reforestation resulted from strong human volition and specially-devised equipment such as wooden fences (height: 3m, length: 20m, total length: 4.8km, interval: 50m), protection weir for seedlings (diameter: 50cm, height: 70cm, laying depth: 30cm) and wood pole (triangle shaped for large seedlings, T shaped for medium seedlings and bolt shaped for *Larix kaempferi*).

Daegwallyeong special plantation has been widely known both domestically and internationally as a reforested plantation model that overcame unfavorable natural conditions by continuous effort. Therefore, many students, private-sector groups and trainees from abroad have visited this site as a field trip course. We will continue to manage these valuable forests and successful reforestation models in an eco-friendly way.



Protective weir for medium seedling



Wooden fence for large seedlings



Overview of the plantation site at an early stage





Protection from wind and harmful wildlife

## Landscape Restoration of 'Baekdudaegan Ridge'

Baekdudaegan Ridge is near the summit of Daegwallyeong in Pyeongchang County, Gangwon Province. In this area, a reforestation project was launched to preserve landscape. The region had been severely damaged by strong wind and other human factors such as military buildings made of concrete scattered around the ridge. Despite a series of failure and the topographic and climatic limitations, reforestation is still ongoing. Throughout the year, strong wind, heavy fog, and cloudy weather are common due to the marine climate of the eastern coastline and the continental climate of the western mountainous area. There are frequent westerly and snow in winter.

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The principles for restoration were 1) early restoration of neighboring ecosystem using spontaneous trees and flowers to increase biodiversity, 2) prevention of against degrading mountain trails by building wooden stairs, and 3) use of native plant seeds for early greening in the post-restoration period. The restoration project between 1999 and 2002 covered 13ha with 27,000 seedlings such as *Abies holophylla*, *Abies nephrolepis* and *Rhododendron yedoense* var. *poukhanense*.

The 600m-long wooden fence was built against wind. 5,700 triangular nets with three wooden stakes were installed facing their vertices toward the most prevailing wind direction while in consideration of the crown width. Seeding of native plants and *Lespedeza cyrtobotrya* ("soil improving tree") was conducted for the understory greening and soil fertility restoration. In order to increase the survival rate of the seedlings, the holes in which the trees would be planted were filled up with a different type of soil. The empty spaces around the mountain trails were reforested with *Rhododendron yedoense* var. *poukhanense*.

The forest management in the site includes tending operations for tree vitality and soil condition and stand density control by thinning. Weeding for small seedlings, for instance, was performed only in the round of seedlings to increase the effect of wind interception. In addition, fertilizing and installing wooden fence have been steadily executed across the entire site.



Protection from wind and harmful wildlife



## Mt. Balwang and Baekdudaegan Mountain Range



### Mt. Balwang

Forests cover 65% of the total land in Korea. Most of them are located in mountainous regions, which are characterized by rugged and elevated terrain. Due to the geographical complexity and temperate climate condition, Korea has a high biodiversity and large spatial heterogeneity (the total number of plant species in Korea is estimated to be about 4,500).

Mt. Balwang is located in Yongpyong Gangwon province, Republic of Korea (latitude 37° 36' 29" N, longitude 128° 40' 12" E), one of very few alpine areas in Korea. The mountain shows the influence of topography and microclimate on spatial patterns of tree species distribution. The terrain around Mt. Balwang is rugged and the elevation ranges from 700 to 1,458 m. The climate is "northern cool-temperate," which has warm, wet summers and cold, dry winters. The temperature in Yongpyong, at 800m of elevation, ranges from 19.1°C in July to -7.6°C in January. Average annual precipitation is 1,717 mm, 70% of which falls between May and September as rain.

Soils in Mt. Balwang are derived from sedimentary and granitic bedrock, and soil depth varies depending on local site conditions. Forests in Mt. Balwang area are inhabited by various deciduous and coniferous species along altitudinal gradients from the lower valley to the ridge.

Japanese white oak (*Quercus serrata* Thunb.), Japanese pine (*Pinus densiflora* Sieb. & Zucc.), Mongolian oak (*Quercus mongolica* Fisch.), Korean ash (*Fraxinus rhynchophylla* Hance), Amur lime (*Tilia amurensis* Rupr.), Costata birch (*Betula costata* Trautv.), Manchurian fir (*Abies holophylla*), Eastern siberian fir (*Abies nephrolepis*), Erman's birch (*Betula ermanii*), Japanese yew (*Taxus cuspidata*) dominate the canopy layers along the altitudinal gradients. Painted maple (*Acer pictum* Thunb. Ex Murray), Korean mountain ash (*Sorbus alnifolia* Sieb & Zucc), Sargent cherry (*Prunus sargentii* Rehder), Korean maple (*Acer pseudosieboldianum* (Pax) Kom.), Amur maackia (*Maackia amurensis* Rupr. &



## IC-02

Maxim.), Tree aralia (*Kalopanax septemlobus* Thunb. Koidz.), Schmidt's birch (*Betula Schmidtii* Regel.) sometimes co-occur and share dominance.

Since 1912, Korean climate has gotten hotter for about 1.5°C, which is higher than the global average increase. With changes in climatic conditions that shape the ranges and distribution of species, a shift of climate sensitive plant species are expected to be affected heavily. It is reported that since 1971, the temperature in the European alpine area has increased three times faster than the global trend. In high mountain areas such as Mt. Balwang where species have already reached the top of the mountains and an altitudinal shift towards higher areas is not an option, climate change may imply losses in available habitats. The Korea Forest Research Institute (KFRI) undertakes research on climate change impacts, adaptation strategies, and mitigation options in forest ecosystems.

### Baekdudaegan Mountain Range

In Korea, there has been a traditional concept related to connecting geography and geomancy. In this context, Korean people call high mountain chains in the Korean Peninsula *Baekdudaegan*. Baekdudaegan is a mountain range and watershed-crestline that runs through most of the length of the Korean Peninsula from Mt. Baekdu in the north (North Korea) to Mt. Jiri in the south (South Korea). It is often referred to as the "spine" of the Korean Peninsula in various historic artworks. The magical qualities of the Baekdudaegan were "proven" by the 8<sup>th</sup> century master Doseon-daesa (master) whom traveled widely around the Korean Peninsula sourcing its energies. The concept that the Baekdudaegan is the energy of the Korean Peninsula is a result of his research and subsequent introduction of Geomancy to the Korean people.

Recreational hikers in Korea now seek that energy as they through-hike or section-hike the 750km long Baekdudaegan in South Korea annually. In South Korea there are also nine other ridges that "transmit the peninsula's energies throughout the regions." They are called *Jeong-maeks*. Including Baekdu-daegan, there are about 2,500km mountain ridges to walk and investigate that contain the peninsula's magical allusions. You can see the ridges marked on the below map. Many people dream of walking the entire trail along the crest of the range, which runs across the militarized border formed along the stalemate line in 1953. The region that belongs to South Korea was designated as a national nature-preservation area in 2006 by the South Korean government. Even though Mt. Balwang is not part of the Baekdudaegan Crestline, its highest point offers a panoramic view of some Baekdudaegan mountains.



(Clockwise from left) Location of Mt. Balwang in Korea (Satellite image), an old map (1864) and Baekdudaegan crestline, a painting comparing the Korean Peninsula to a tiger roaring towards the Manchurian field, Scenic view of Mt. Balwang



### Mok-A Buddhist Museum

The Mok-A Buddhist Museum was established in 1993 by wood sculptor Park Chan-su with the purpose of handing down traditional Buddhism art and traditional woodcraft techniques.

Mok-A means the bud of a tree, which is also the pen name of Mr. Park (Intangible Cultural Asset No.108). The four-story museum showcases numerous wooden works of Buddhist art, including the Statue of Bud, 500 Disciples of Buddha, tools for wood carving and over 5,000 other items related to Buddhism.

The museum also contains an outdoor sculpture park displaying Buddhist statues such as Mireuksamjondaebul, Birojanabul, Baeuigwaneum and a three-story pagoda.



### Dragon Plaza in the Yongpyong Resort

Take the Yongpyong cable car from Dragon Plaza and 17 minutes of appreciating nature later, you will arrive at a 2-story Swiss style building at the peak of Mt. Balwang (1,459m). This is the same peak that could be seen on the popular KBS TV series 'Winter Sonata'.



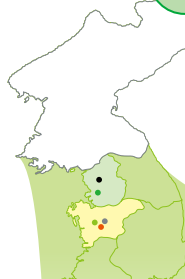
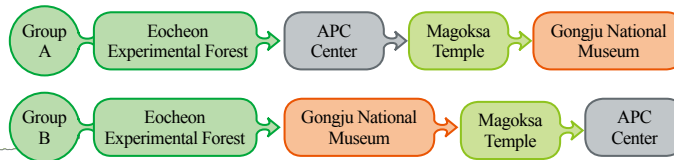
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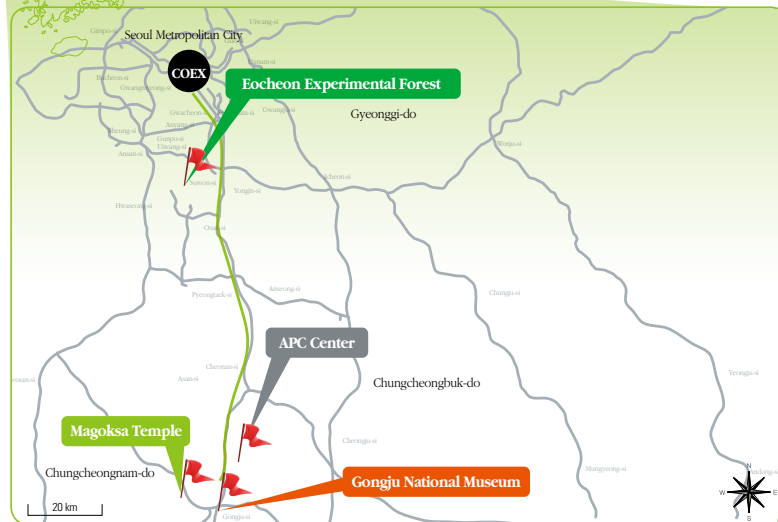
# IC-03 Non-Timber Forest Products

Forests for the Future: Sustaining Society and the Environment

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- \*Chestnut Orchard of Yocheon Experimental Forest
- \*Jeonganbam Chestnut Agricultural Product Processing Center (APC)
- \*Magoksa Temple is one of the most famous temples with the beauty of the surrounding mountains and rivers curving a yin-yang shape.
- \*The Gongju National Museum that showcases historic artifacts in the Baekje Kingdom





Non-timber forest products (NTFPs) are by definition the products of biological origin other than wood derived from forests, other wooded land and trees outside forests. The typical NTFPs in Korea are 1) fruits such as chestnuts and hardy kiwifruits, 2) mushrooms such as shiitake and pine mushroom, and 3) edible and medicinal items such as Korean black raspberry and Korean raisin tree. In Korea, the total amount of NTFP production is about US\$839 million, which is 57.4% of the total amount of wood production (US\$1,461 million). These are very important income sources for farmers in Korea.

The Korea Forest Research Institute (KFRI) is developing new high-quality commercial NTFPs and their cultivation technique to help local farmers. They will strengthen competitiveness of domestic products against the impact of global liberalization of forest products. Among these NTFPs, the chestnut is the most important forest products in Korea.

The main topic of today's trip is chestnut. We will see the new chestnut cultivars, their cultivation techniques and chestnut processing technology during this trip.

## Historical Notes on Chestnut Cultivation

Chestnut has been cultivated for more than 2,000 years in Korea, and now it is one of the most economically important nut crops cultivated across rural and mountainous areas. Chestnut is familiar to Koreans not only as a wholesome food for its nutritional value but also as a food needed for ancestor-memorial services. Koreans prefer to eat raw chestnuts and over 40 percent of chestnuts produced in Korea are consumed as fresh nuts. This consumption pattern is closely related to the tradition of preparing freshly peeled chestnuts in memorial services as an ancestor worship.

Korean native chestnuts (*C. crenata* var. *dulcis* Nakai, and *C. bungeana* Blume) have been considered as a variety of Japanese chestnuts (*C. crenata* Sieb. & Zucc.) due to differences in morphological characteristics. They typically show a high variability in nut traits including shape, size, sweetness, and removability of inner skin. In 1958, chestnut gall wasp (*Dryocosmus kuriphylus* Yasumatsu) which

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causes fatal damage to chestnut trees, appeared for the first time in Korea, and then spread rapidly all over the country. As a result, almost all Korean indigenous chestnut trees of the orchards and natural chestnut stands were heavily damaged. Thereafter, gall-wasp-resistant cultivars introduced from Japan have been planted for the establishment of new orchards under mostly governmental support. Most chestnut producing areas had been built up from the late 1960s to the mid-1970s by 15,000-35,000 ha per year.

Today, Korea is the second largest producer of chestnuts worldwide following China. The total chestnut orchard area is estimated at about 40,000 hectares. Annual production is about 78,000 tons. More than 60% of the total production is produced from Gongju, Gwangyang, Hadong, and Chungju areas. Despite the average yield per hectare is still less than two tons, leading growers produce over four tons of chestnuts per hectare every year. Up to six tons of yields per hectare have been reported.

The chestnut cultivars grown commercially in Korea are usually Japanese and Japanese-Chinese hybrids with resistance to gall wasp and chestnut blight. The currently prevailing cultivars are “Okkwang,” “Daebo,” “Tanzawa,” “Arima,” “Riheiguri” and “Tsukuba.” Both “Okkwang” and “Daebo” were released by the Korea Forest Research Institute in 1965 and 1998, respectively. The others were introduced from Japan between the late 1960s and the early 1970s.

## Chestnut Breeding Programs

Chestnut breeding programs have a wide range of specific objectives such as improved nut quality, high productivity and increased resistance to insects and diseases. In Korea, KFRI began its chestnut breeding program in 1961. At that time, severe infestation of chestnut gall wasp made it difficult to cultivate chestnuts. Thereafter, breeding activities focused mainly on resistance to chestnut gall wasp, large-sized nut, and high nut productivity. “Okkwang,” one of the prevailing cultivars was developed by mass selection from indigenous chestnut trees in 1965. Japanese cultivars such as “Tanzawa,” “Arima,” “Riheiguri,” “Tsukuba,” and “Ginyose” were also selected as suitable cultivars for cultivation through the local adaptability test.

Now nut quality is obviously becoming more important to contribute to the increase of growers’ income and to meet diverse demands of consumers. Breeders need to provide alternatives to meet consumer needs. KFRI has been conducting a nut breeding program with breeding goals that meet the diverse demand of





Daebo



Mipung (right)



Jahong

consumers and growers. Crosses have been made between different cultivars with superior traits. The nut quality and productivity of hybrids of different combinations have been evaluated by independent culling with the selection criteria of major nut traits, and then by index selection .


This resulted in several successful new cultivars Firstly, “Daebo” suitable for both roasted and fresh chestnuts was released in 1998. Secondly, “Daehan” and “Mipung” with large nut for processing and fresh chestnut were released in 2004 and 2005, respectively, and thirdly “Jahong” and “Jangwon” were released for pollinator from indigenous chestnut trees in 2009.

The Korean germplasm collection of chestnuts is housed at KFRI National Chestnut Gene Bank in Hwasung, Gyeonggi Province. It contains many cultivars (genotypes) with good nut quality, blight resistance, gall wasp resistance, good growth performance, etc. The collection includes 202 clonal accessions (or cultivars) of Korean native chestnut, and 97 cultivars introduced from Japan, and 37 cultivars from five other countries. From a total of 336 germplasm collections, morphological traits of 98 commercially or academically important cultivars have been investigated for the construction of database.

## Chestnut Orchard Management

One of the challenges facing us is proper management of chestnut orchards. Major obstacles include scarcity of labor, the aging of growers, and the decline of chestnut trees. Some 53% of chestnut trees in orchards all over the country are over 25 years old, resulting in smaller nut size and lower nut productivity. To ensure high nut quality and high yield, intensive management of chestnut orchards is needed. Thus, tree-size control has become more important than ever. Leading Korean chestnut growers have concentrated on controlling the crown architecture of chestnut trees through pruning and thinning regimes like those used for apples and pears.


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Chestnut orchard established on hillside

A good crop of well-trained chestnut tree with low tree-form

A low tree-form training system has been introduced into the commercial chestnut industry due to its efficiency for both fruit quality and cultural care. Under this system, chestnut trees are maintained at 4-5 meters in height through pruning, including thinning-out cuts and heading-back cuts. The pruning of central leaders and erect branches is preferred for lowering tree height and expanding the crown width. Growers control annually the canopy of chestnut trees through this training system in late winter or very early spring. Pruning allows sunlight into the canopy and stimulates the formation of nut-bearing flower buds.




Chestnut blight canker

One of the most notorious chestnut diseases is the chestnut blight (*Cryphonectria parasitica*). This fungal disease has devastated most of the American chestnut trees. Although it is also present in Korea, the symptoms do not appear much except for some susceptible cultivars.

The worst insect problems in Korea are caused by the chestnut gall wasp, the peach pyramid moth (*Dichocrocis punctiferalis*), and chestnut weevils (*Curculio* spp.). The chestnut gall wasp is currently one of the most serious insect pests in the southern region. Thus, cultivars with resistance to the gall wasp are planted widely in new orchards. At present, researches on biological control by parasitoid of the chestnut gall wasp are in progress.

The peach pyramid moth sometimes causes huge economic loss to chestnut orchards. Nut damage by the larvae occurs at harvesting time from mid-August to mid-September. Like all orchard crops, diligent pest monitoring is important during the entire chestnut growing season. Sex pheromone traps are recommended for biological control of the peach pyramid moth. Chestnut weevil, another nut damaging insect, arrives following the peach pyramid moth from mid-September to early October. Insecticide is applied with air-blast sprayers.



Gall wasps infestation in twig

Nut damage by peach pyramid moth

Chestnut weevil larvae



## Researches on Special-purpose Trees (SPTs)

The research program for special-purpose trees aims at developing new high yielding cultivars and cultivation techniques. Accordingly, our research involves investigation, collection, and conservation of the high value trees with edible, medical or industrially useful traits. Many of these cultivars were screened from hundreds of thousands of individual trees in natural populations. One of the examples may be five high yielding cultivars of Korean black raspberry (*Rubus coreanus* Miq.) with high antioxidant activity and cold hardiness. They are so popular that they are replacing the exotic raspberry currently in cultivation. Another example is Korean raisin tree (*Hovenia dulcis* var. *koreana* Nakai) that produces a value-added honey as well as some potent liver protecting substances. Just to name a few, “Chungsong,” non-thorn Carstor Aralia (*Kalopanax septemlobus* Koidz), was released as high-priced fresh spring vegetable, Asian pears (*Pyrus* spp.) for medical and edible purposes, and both lacquer tree (*Rhus verniciflua* Stokes) and Korean dendropanax (*Dendropanax morbiferus* Lev.) for varnish.

The new cultivars and cultivation techniques are immediately transferred to growers and their feedbacks are gathered to improve the quality of the cultivars and the techniques. Both the growers and consumers will benefit from this practice.



Korean black raspberry cultivar “Jungkeum 1”



Non-thorn Carstor Aralia cultivar “Chungsong”



Pear “Beak-un” one of the Asian pear varieties



Fructification of Korean raisin tree

## IC-03

## Jeonganbam Chestnut APC

The Agricultural Product Processing Center (APC) is a marketing facility whose functions lie in assembling, washing, sorting, standardizing, processing, packaging, and marketing of fruits and vegetables. Large-scale APCs have been needed in order to meet the needs of consumers and agricultural producers. Modern consumers want fresh fruits and vegetables safe to eat, and producers want to enhance their competitiveness against imported produces. Large-scale APCs, equipped with modernized machines and facilities, are expected to fulfill the needs of both consumers and producers in the modern society.

The construction of the Jeonganbam Chestnut Agricultural Product Processing Center was completed in 2009 whose major facilities consist of the screening workplace, cold storehouse and peeling workshop. This Center contributes to income growth of the Jeonganbam Chestnut Producer Organization (JCPO) by supplying safe and clean products to consumers. JCPO established in 2003 unites 470 members, promoting outstanding characteristics of chestnuts produced in Jeongan branded as "Jeonganbam." The organization maximizes the benefit of farmers and provides affordable and safe food to consumers with an annual turnover of over 1.2 billion won.





### Gongju National Museum

Opened in 1940, the Gongju National Museum manages and preserves about 10,000 artifacts including 19 national treasures and 3 treasures excavated in Chungcheongnam-do, a province in the west of Korea. The museum showcases some of the most amazing artifacts discovered in the tomb of King Muryeong (501-523) of the Baekje Dynasty (18 BC -660 AD) as well as various relics found elsewhere in the area. The artifacts on display include beautiful jewellery, silver cups with a saucer, bronze bowls, and Chinese porcelain.

### Magoksa Temple

Magoksa Temple was founded by Monk Jajangyulsa in 640, a representative temple of the Chungcheongnam-do Province. Magoksa is surrounded by a mountain and rivers curving a yin-yang shape. Perhaps because of such a shape, this temple was never damaged by any major wars during the Joseon Dynasty (1392-1910). As much as the temple's fame, the beauty of the surrounding mountains is renowned especially the area surrounded by Mt. Taehwasan, where Taegukcheon River flows in the shape of the yin-yang. It is most beautiful during the spring time, when the cherry blossoms, sansuyu, and magnolias fill the whole area. One eye-catching sight at Magoksa Temple are the Ocheung Stone pagoda and the Chinese juniper trees scholar Kim-Gu (Korean politician and freedom activist) is said to have planted.



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# IC-04

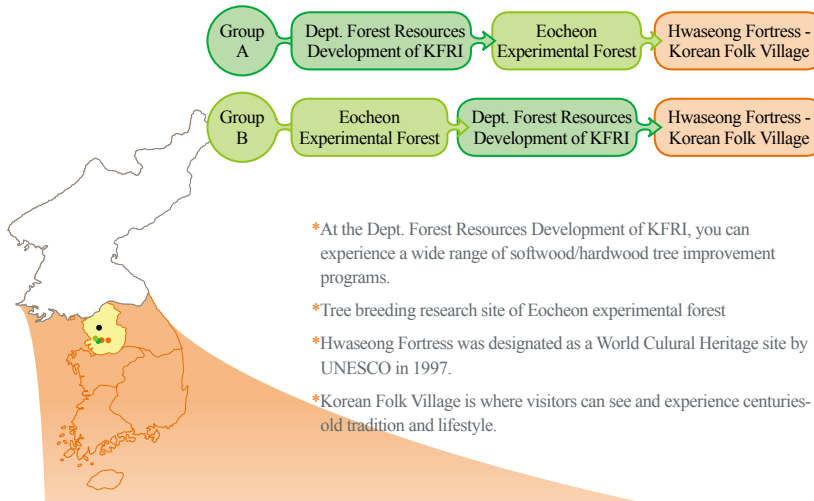
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## IC-04

# Conservation & Utilization of Forest Genetic Resources

Forests for the Future: Sustaining Society and the Environment

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- \*At the Dept. Forest Resources Development of KFRI, you can experience a wide range of softwood/hardwood tree improvement programs.
- \*Tree breeding research site of Eocheon experimental forest
- \*Hwaseong Fortress was designated as a World Cultural Heritage site by UNESCO in 1997.
- \*Korean Folk Village is where visitors can see and experience centuries-old tradition and lifestyle.





## Forest Genetics and Tree Breeding in Korea

In Korea, forest genetics and tree breeding research was conducted when most of the forest lands were recklessly devastated by preparing firewood and timber during the period of Japanese occupation and the Korean War. Korean government determined to restore the forests since the early 1960s and inaugurated a series of national reforestation projects for covering on denuded land mainly with greening species such as pitch pine and poplar species.

In 1956, the Institute of Forest Genetics was established to develop tree varieties that could be used as reforestation materials. Pitch-loblolly hybrid pines may be one of the most impressive works in worldwide tree breeding history. It grows faster and more straight compared to pitch pine and also shows greater cold tolerance compared to loblolly pine. A best known hybrid poplar was also developed from the controlled cross between *Populus alba* and *Populus glandulosa*. The hybrid poplar showed drought tolerance and rooted well from cuttings.

As another breeding program to improve our native tree species, we selected plus trees from countrywide natural populations since the late 1950s. In 1968, the first seed orchard was established and more have been added to the list since then. Now, seed orchards occupying over 700 ha are providing improved seeds enough for annual forestation supply of Korea.

In addition to supplying forestation materials, we have been working on breeding edible fruit trees as well as medicinal plants which include chestnuts, walnuts, and other wild fruit species.

While utilizing trees taken from natural population, we have paid a great deal of attention on the conservation of forest resources assessing genetic diversity and genetic relationship of natural populations for our future generations.

We have also taken biotechnological approaches to improvement of forest resources. Tissue culture, genetic transformation, genomics, and metabolomics are the tools that we are using to understand physiological and molecular basis of tree growth. The Knowledge obtained from biotechnological approaches enable us to capitalize on the results of our conventional breeding works.

### Selection

In Korea, a breeding program was initiated in 1956 with selection of plus trees that were selected phenotypically from natural stands or artificial plantations. A total of 2,724 plus-trees from 29 tree species have been selected. Major target species of selection and genetic test are *Pinus densiflora*, *P. thunbergii*, *P. koraiensis*, *Abies holophylla*,

## IC-04



Plus tree

Clone bank

Genetically-improved seeds

and *Larix kaempferi*. The selected trees were propagated to be tested in progeny trials and to establish seed orchards. Since 1968, a total of 702 ha of seed orchard have been established with 56 tree species in six different regions. At the initial stage of seed orchard, a need for the improved seeds was so urgent that the selection of plus tree, and the production of graft stocks for clonal seed orchards and clone archives were carried out at the same time. Some time after this, open-pollinated progeny tests began instead of clone tests. The seed orchards have produced 190 tons of genetically improved seeds since 1976. We are now applying modern options, such as selective harvest and genetic thinning, to increase genetic gain and to maintain genetic diversity in the seed orchard management. Since 1972, genetic tests have been conducted by means of open- and control-pollinated progeny tests to form a base population for the future generations and to estimate genetic parameters such as variance components, heritability and genetic gain. We are establishing the second generation seed orchards based on the genetic information from the tests.

### Hybridization

Pine hybridization project may be the pioneering tree breeding program in Korea. Pitch-loblolly hybrid pines were especially superior at its seedling stage compared with pitch pine as well as any other native pine species. The volume growth per hectare of pitch-loblolly pine is 353m<sup>3</sup> at age 40, which is 1.4 times greater than that of pitch pine. It showed high adaptability and growth performance in mid- and southern part of Korea. Large quantity of F<sub>1</sub> seeds of the hybrid pines were produced through mass controlled pollination in the 1960s. The method is no longer practical since labor costs soared these days. Recently, supplemental mass pollination protocol is routinely used to produce hybrid F<sub>1</sub> seeds in a large greenhouse.

Hybrid aspen is another example of hybridization breeding with trees. Korean hybrid aspen "Hyun-sashi (*Populus alba* × *P. glandulosa* F<sub>1</sub>)" was named after Dr. Hyun who made it first, and it was developed for planting hillsides. A series of the hybrid clones were developed through subsequent selection programs.





The late Dr. Hyun




Pitch-loblolly hybrid pine


Hyun-sashi No. 4  
(*Populus alba* × *P. glandulosa*)



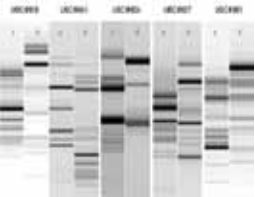





*In situ* conservation



*Ex situ* conservation



Genetic analysis

### Conservation of Forest Genetic Resources

In 1972, KFRI began exploring, evaluating, and conserving natural stands of some commercially important tree species. However, these efforts were not systemic and emphasis was placed on securing breeding materials rather than on conserving genetic diversity. KFRI developed a new strategy for the systemic conservation of forest genetic resources from 1994 to 1995. The new strategy combines *in situ* and *ex situ* conservation approaches and includes: 1) exploration and evaluation of species of concern, including determination of their ecological traits and genetic diversity, 2) selection and demarcation of *in situ* conservation stands, 3) field inspection, selection, and collection of reproductive materials for the establishment of *ex situ* conservation stands and conservation in a seed bank, and 4) establishment of database. So far, genetic variation on 353 populations of 50 species assessed using various genetic marker systems. A 2,745ha for 15 species have been designated as the protected areas for *in situ* conservation based on the results of genetic diversity studies. *Ex situ* conservation consists of the conservation gardens and the seed bank. The conservation gardens have been set up for 293 species including rare, endangered species or peculiar mutants. Also, 6,720 seedlots from 305 species, 153 genera and 64 families have been collected and stored in the KFRI Seed Bank. Cryopreservation techniques for the seeds of 33 species including the recalcitrant seeds of *Acer rubrum* var. *pycnanthum* have been developed for long-term conservation. Conservation programs are going to implement simultaneously extending the protected areas, collecting germplasms for *ex situ* conservation, and developing efficient conservation strategies and techniques.

### Biotechnology

With the advancement of biotechnology, it became possible to apply the technology to forest trees. In Korea, the biotechnology program with trees started in 1980. At the initial stage, the research focused mainly on clonal multiplication of superior trees via shoot tip culture. In the past 30 years, however, significant advances have been made in the field. Micropropagation through shoot tip culture system evolved into somatic embryogenesis system by which millions of somatic emblings could be produced within several months. Yellow poplar is one of the species we are working on for mass production of emblings

## IC-04

for forestation. Transgenic trees aiming at phytoremediation or biomass production have also been regenerated and are being tested in the field. To contain transgenes, a non-flowering poplar mutant and a fast growing triploid poplar clone are being used to develop transgenic trees. DNA microarray technology is being employed to monitor changes in gene expression of some tree species at different developmental stages or under different environmental conditions. Recently, a metabolomic research project started to shorten the breeding cycles of some tree species through early selection. Some of the fast-growing traits of *Pinus densiflora* appeared to be correlated with the levels of either gibberellin or phenylalanine during the seedling stage. More metabolic products are being analyzed to provide biochemical markers for the early selection.



Germinating somatic seedlings

Transgenic poplar development

Metabolomics for growth substances

### Special-Purpose Tree Breeding

The special-purpose tree improvement program covers non-timber species including fruit trees and ornamental trees. Some of the major species include chestnuts, walnuts, jujubes, *Actinidia arguta*, hawthorn trees, and *Hovenia dulcis*. In Korea, chestnut breeding program started in 1961, and as a result, a number of cultivars including “Mipung” and “Daebo” have been developed. Now, the KFRI National Chestnut Gene Bank conserves a total of 336 germplasm collections. Another examples of cash crop trees is Korean raisin tree (*Hovenia dulcis* var. *koreana* Nakai) that produces a value-added honey as well as some potent liver protecting substances. KFRI also has a collection of 165 varieties (about 600 individuals) of the rose of Sharon (*Hibiscus syriacus* L.), the national flower of Korea. Recently, they are developed for street trees and/or bonsai trees through artificial crossing between different varieties.



## Eocheon Experimental Forest

Eocheon Experimental Forest is located in Hwaseong city, Gyeonggi Province (37° 16' 36" N; 126° 55' 25" E, and Elev. 60~150m). This experimental forest was established in 1961 as a mid-temperate region experimental forest in the system to conduct long-term tree breeding researches. The annual average temperature and precipitation are about 11.7°C and 1,319mm, respectively. This experimental forest (total 123ha) serves as a triple function plantation including seed orchards for superior timber species, test plantations for native and introduction species, and *ex situ* conservation plantations of various forest genetic resources including cash crop trees.



New chestnut variety "Mipung"



"Poong-sung 1" (*Hovenia dulcis*)



"Rose of Sharon" (*Hibiscus syriacus*)

### Seed Orchard for Broad-leaved Tree Species

Since 1992, seed orchards for broad-leaved tree species such as *Quercus acutissima*, *Q. variabilis*, *Fraxinus rhynchophylla*, *Tilia amurensis*, etc. have been established to produce genetically improved seeds and to conserve genetic resources. Breeding seed orchard (BSO) was devised to combine the conventional hierarchy of sequential testing, selection and seed production in a single plantation. To produce the moderate balance between genetic gain and diversity, the development of genetic thinning



A distance view of the experimental forest



Gene conservation (Chestnut)



Test plantation (Aspen)

## IC-04

scenarios has been under way. For *Q. serrata*, genetic gain and diversity were estimated under three selection methods such as individual selection, family selection and family plus within family selection. The estimated genetic gain for tree volume ranged from 4.0% to 9.1% for three selection methods under 50% selection intensity with which maximized gain and diversity occurred.

*Quercus serrata**Quercus acutissima**Fraxinus rhynchophylla**Tilia amurensis*

### Provenance Test for Exotic Tree Species

Breeding program for exotic tree species started in 1924. By 1945, a total of 370 tree species were introduced from 30 countries. However, the plantation and test data were lost during the Korean War. From 1956 to 1995, total 415 tree species were re-introduced from 38 countries and tested.

Three hundred tree species such as *Pinus glauca*, *P. jeffreyi*, *Eucalyptus* have been rejected due to the poor adaptation at nursery stage. Ninety-two tree species such as *Abies* spp. *Larix* spp. *Pinus ellioti*, *P. monticola* and *P. sylvestris* have also been rejected due to the poor growth compared with native tree species in Korea. Finally, seven tree species such as *Pinus taeda*, *P. strobus*, and *Liriodendron tulipifera* were selected and recommended as a reforestation tree species.



Italian poplar

Loblolly pine

Yellow poplar

Scots pine



### Hwaseong Fortress

Hwaseong Fortress, the wall surrounding the center of Suwon, the provincial capital of Gyeonggi-do, was built over two and a half years from 1794 to 1796 by King Jeongjo of the the Joseon Dynasty to honor and house the remains of his father Jangheonseja (often called as Sadoseja), who had been murdered by being locked alive inside a rice chest by his own father King Yeongjo. The Suwoncheon, the main stream in Suwon, flows through the center of the fortress. Hwaseong Fortress was designated as Historical Site No.3 in January 1963 by the Korean government and registered as World Cultural Heritage Sites in December 1997 by UNESCO.

### Korean Folk Village

Set in a natural environment occupying approximately 243 acres, Korean Folk Village offers a unique glimpse into Korea's past as this folk village contains over 260 traditional houses reminiscent of the late Joseon Dynasty and various household goods from different regions. All these features have been relocated and restored to provide visitors with a broad understanding of Korean food, clothing, and housing style of the past. Here in a reconstructed farmhouse, residences of the nobility and other buildings of several centuries ago, a flourishing community of potters, millers, blacksmiths, pipe-makers and other craftsmen continue to work as Korean ancestors did. Korean Folk Village is also a well-known filming location for the Korean historical drama "Daejanggeum," gaining huge popularity in Asia and other parts of the world.



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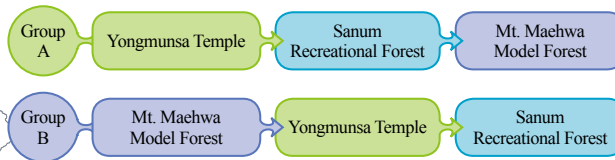
# IC-05

XXIII IUFRO WORLD CONGRESS ▶ 23-28 August 2010, COEX, Seoul, Korea

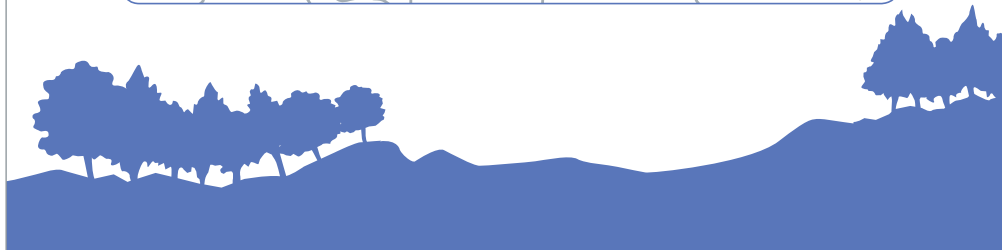
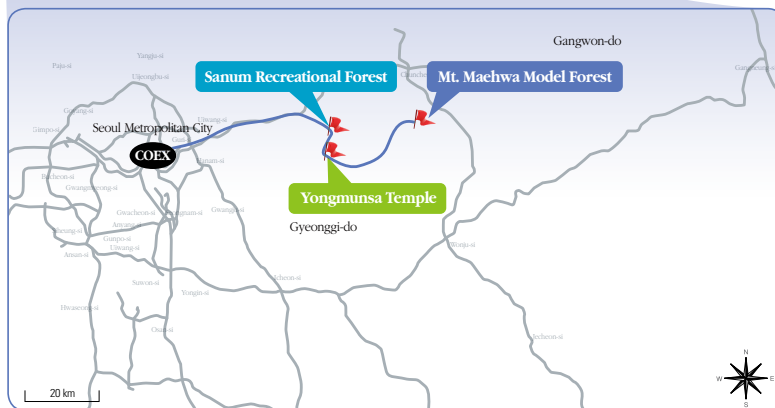
## IC-05 Forest & Human Health

Forests for the Future: Sustaining Society and the Environment

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- \*Yongmunsa Temple was built in 802 and is being famous for having Korea's tallest ginkgo tree.
- \*Sanum Recreational Forest is where you can take part in various kinds of "forest therapy" programs.
- \*Mt. Maehwa Model Forest can be used not only as a forest education center but also as a place for the general public to engage in leisure and cultural activities.





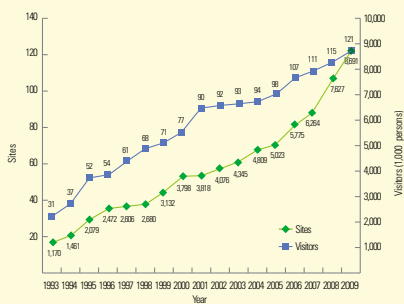
## Sanum Recreational Forest

Industrialization and urbanization made our lives plentiful and convenient, but they also brought about various troubles such as environmental pollution and damage to living conditions. These social changes made people look for ways to live more eco-friendly. In particular, Korea entered an aging society in 2000, and is now becoming an aged society where more than seven percent of its population is over 65 years old and now only at a faster pace than any other country. Measures are thus urgently needed to cope with these public needs and demographic trend.

Under such circumstances, the public is now taking interest not just in how to lead their lives but in how to improve their quality of life. As a solution to improve health and prevent diseases, forests are taking center stage in the public's mind among others. With increasing environmental diseases such as atopy and asthma, and stress-related ailments such as hypertension and depression, social demand for forest resources is also rising to alleviate and treat these symptoms.

### Forest Recreation and Forest Healing

To offer various recreational opportunities, a number of forests have been managed for recreational purposes in Korea: for example, national parks and recreational forests. A forest could be designated as a recreational forest if the forest has a convenient location from urbanized areas and high potential of recreational or educational opportunities. Since 1988 when the first three recreational forests were established, the number of recreational forests has steadily increased (see the below graph).



Number of Recreational Forests and Visitors

In addition, “forest bathing” (taking a stroll or spending time in the forest) has been one of the popular activities to enhance the quality of life and human health in Korea. In line with this, research on recreation forests and forest bathing has been conducted with a focus on the interaction between forests and human health.

So far, research has focused on the effects of the forest on human health mainly based on empirical and/or psychological indicators. More recently, however, research focus has been shifted to a more objective and scientifically reliable way by use of

## IC-05

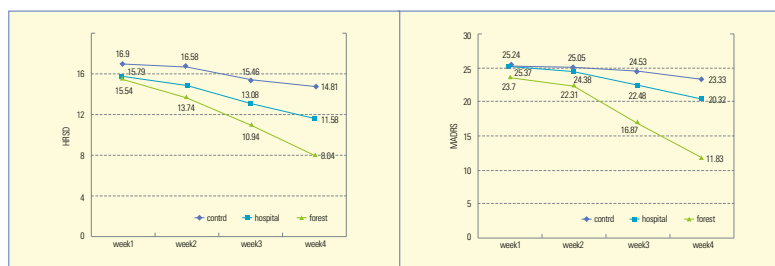
physiological indicators associated with incretion and central/autonomic nervous systems. For example, studies on physiological effects of forest bathing or other activities in the forest were performed by the Korea Forest Research Institute (KFRI) in cooperation with Chungbuk University and Inje University Seoul Paik Hospital in 2008. The results showed that forests help increase alpha brain waves that are usually produced when people feel relaxed and maintain recommended blood pressure levels. Furthermore, a clinical test on patients with symptoms of mild depression revealed that forest therapy is much more effective in alleviating depression symptoms compared with psychiatric treatment programs at clinics (see the below graphs). Namely, scores of the Hamilton Rating Scale for Depression (HRSD: a 21-question multiple choice questionnaire that clinicians use to rate the severity of a patient's major depression) and the Montgomery-Asberg Depression Rating Scale (MADRS: a 10-item diagnostic questionnaire which psychiatrists use to measure the severity of depressive episodes in patients with mood disorders) decreased dramatically from 15.54 and 23.70 to 8.04 and 11.83 respectively after a four-week forest therapy program.



Forest-air Bathing

As described above, more efforts have been made to improve the reliability of the healing effects of the forest through clinical tests on patients as well as healthy people. Beneficial effects of forest recreation and forest bathing have already proven through experiments with people who have suffered from depression and hypertension. Such studies in forests and human health have evolved into the categories of so-called "forest healing" or "forest therapy" in Korea and are being developed into evidence-based medicine (EBM).

In the meantime, the Korea Forest Service (hereinafter KFS) includes the establishment of "healing forests" in the 5<sup>th</sup> National Forest Plan (2008-2017), a 10-year plan that provides the strategic direction for guiding KFS in delivering on its mission, as a means to increase social benefits of the forest. Healing forests are the forests established to enhance physical and mental health benefits of the forest. In accordance with the Plan, KFS opened a "healing forest" to the public in January 2009 for the first time.



&lt; Comparison of HRSD Scores &gt;

&lt; Comparison of MADRS Scores &gt;

## Psychiatric Effects of Forest Recreation Activities





Water Therapy Pool



Taeguk Zen, a Forest Healing Program

### Sanum Healing Forest

In 2009, KFS initiated a pilot project on forest healing, in which a number of forest therapy programs were developed and their healing effects on human health were tested. The Sanum Recreation Forest was selected for the study site of this project. Several forest healing programs and relevant facilities were developed. For example, forest healing center, water therapy pool and forest healing trails were built in the forest. Visitors to the Sanum Healing Forest are able to check their fitness and attend a number of forest healing programs under professional therapists' assistance.

The forest healing project contributed to making the Sanum Recreational Forest a more attractive and more desirable place to visit. Based on the results of this pilot project, KFS will extend the healing forest project to other national forests that could offer the excellent natural environment or amenities. Further, the type of healing forests could be diversified in consideration of local conditions such as recreational healing forests or agricultural healing forests.



Tour Route of the Sanum Recreational Forest

## IC-05



## Mt. Maehwa Model Forest

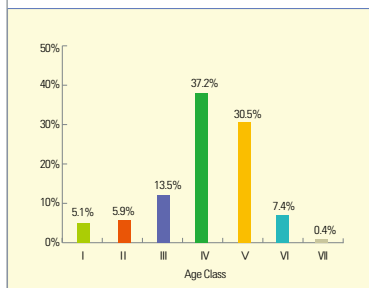
Korean forests were extremely devastated after the Japanese colonial period (1910-1945) and the Korean War (1950-1953), but they have been successfully restored since the 1970s when extensive reforestation efforts were initiated. Since the 1960s, frequent landslides have taken place in every rainy season, resulting in a number of casualties. In 1973, the 1<sup>st</sup> National Forest Plan was launched by the Korea Forest Service and reforestation projects were implemented across the entire nation. Approximately 3.5 million hectares of forest were restored and the growing stock increased to 624 million m<sup>3</sup> in 2007 from 100 million m<sup>3</sup> in the 1970s. This successful reforestation in Korea is widely recognized by the international community as one of the best forest rehabilitation programs.

Mt. Maehwa is one of the typical forests restored by the national reforestation efforts during the 1970s. This forest is now innovated as a model forest where visitors can learn how much endeavor has been made into the reforestation project in Korea and how to make this forest a healthier and more valuable place for future generations.

### Status and Environment of the Mt. Maehwa Model Forest

Totally 4,070ha area, managed by Hongcheon national forest station, was designated as the Mt. Maehwa model forest in 2008. Established in the 1970s, plantations account for 64 percent of the total area (about 2,601ha). Meanwhile, 36 percent (1,469ha) is natural forests. Most of the areas (81%) were occupied by the age class IV and V, ranging from 31 to 50 years old. In terms of the forest cover, coniferous forests occupied 3,134ha, accounting for 77 percent of the total area, whereas deciduous and mixed forests occupied 244ha (6%) and 692ha (17%), respectively. Average forest stock was estimated 98 m<sup>3</sup> per hectare.

The highest peak of the model forest was 747 meter in altitude with plain top but steep slopes. Dominant species are Japanese larch (*Larix kaempferi*) and oak trees (*Quercus* spp.), but the model forest shows a diverse species composition with Korean white pine (*Pinus koraiensis*), eastern white pine (*Pinus strobus*), white birch (*Betula platyphylla*), Korean red pine (*Pinus densiflora*), Korean fir (*Abies holophylla*), and so on. According to the ecological classification of the Ministry of Environment in Korea, most of the model forest was classified into Level 2 or 3, which means there is no rare, threatened, or endangered



Age Distribution of the Mt. Maehwa Model Forest



species, but healthy and diverse ecosystem. From the field monitoring, 146 flora species were found in this forest.

Thinning Followed by Under-story Plantation

### Model Forest for Sustainable Forest Management

Established in the 1970s, a majority of Korean forests (about 67%) were occupied by Age Class IV or V (31 to 50 years old). This unstable age distribution has been a serious concern for sustainable forest management (SFM) in Korea. Clear cutting has been an option to modify the age distribution, but it was feared for several ecological issues. Several efforts are on-going in the Mt. Maehwa model forest to find more ecologically acceptable management prescriptions. For example, thinning treatment followed by under-story plantation or sprouting were examined to find the most adequate treatment to facilitate regeneration. These efforts are expected to provide valuable outputs that could help many foresters in Korea to achieve the SFM in their forests.

### Cooperation with Local Communities for Non-Wood Forest Products

As of public interest in well-being and healthy food, the demand for non-wood forest products has steadily increased during the last few decades. According to the “National Report on Sustainable Forest Management in Korea 2009” by KFS in 2009, there was a dramatic increase in the consumption of non-wood products between 1980 and 2007. For example, consumption of chestnuts increased 1.5 times during that period (78 thousand tons in 2007), whereas eight-fold increase in pine nuts (4.2 thousand tons), 13 times increase in jujubes (8.1 thousand tons), and five-fold increase in walnuts (10.8 thousand tons). Especially oak mushrooms were consumed seven thousand tons in 2007, which is 24 times larger than that in 1985 (286 tons). Non-wood forest products now become one of the most profitable sources for forest or rural communities.

Native Bee Farm

Mushroom Farm



IC-05

The local communities of the Mt. Maehwa model forest were allowed to cultivate non-wood forest products such as oak mushrooms and honey bees or to collect wild vegetables under permission. Moreover, a portion of wood-products harvested from thinning treatments will be presented to local communities for their use of bioenergy fuels. This cooperative relationship will increase their economic benefits and encourage their interests and supports on the forest management.

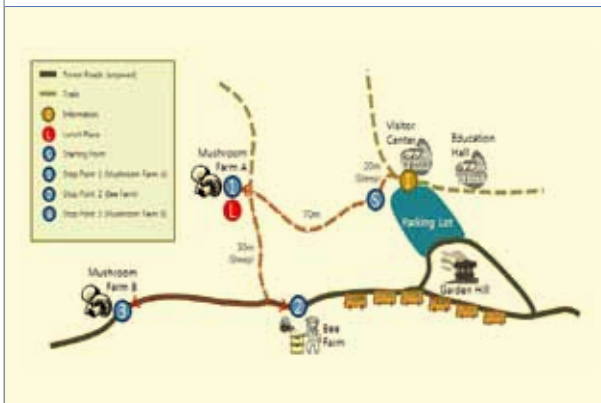
Recreational Opportunities

There has been dramatically growing public demand for forest recreation during the last few decades in Korea. Unlike most other national forests, where conservative management strategies were mainly implemented, the Mt. Maehwa model forest was designed for providing various recreation opportunities to the public.

To present various recreation and education opportunities to visitors, a number of recreational facilities and programs are under construction in the model forest. A visitor center, a vista tower, an education hall, and deck-roads were already built. Therapy trails and wetland garden will be developed in the near future.



Soong-rim Vista Tower



Tour Route of the Mt. Maehwa Model Forest



Visitor Center



### Yongmunsa Temple

Yongmunsa Temple was built during the Silla Dynasty and reconstructed during the reign of King Sejong of the Joseon Dynasty. It was badly damaged during the Korean War, but was restored and now consists of three buildings: the main hall, Daeungjeon, and the bell tower. Its courtyard contains the largest ginkgo tree in the East, which is 1,100 years old, measures 60m in height and 14m in circumference and has been designated and protected as Natural Monument No. 30. Legend says the great Buddhist monk Uisang, who lived during the Silla Dynasty, thrust his staff into the earth, and the tree grew out of the simple staff.



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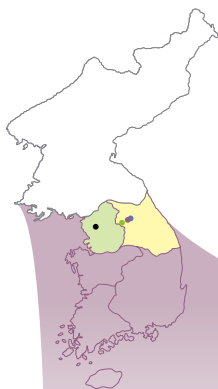
# IC-06

XXIII IUFRO WORLD CONGRESS 23-28 August 2010, COEX, Seoul, Korea

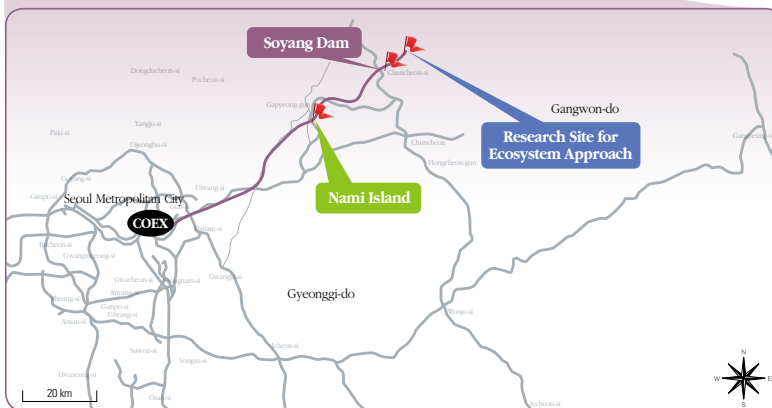
## IC-06 SFM & the Ecosystem Approach

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- \*A Research Site for Ecosystem Approach in a Korean pine plantation where you can experience most developed technique for the ecosystem approach.
- \*Soyang Dam is the largest rock-filled dam in Asia.
- \*Nami Island is famous for a beautiful street lined with metasequoia trees.





Black woodpecker

## Efforts to Implement Sustainable Forest Management in Korea

The Forest Principles, adopted at the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro, Brazil in 1992, described the Sustainable Forest Management (SFM) as follows: forest resources and forest land should be sustainably managed to meet the social, economic, ecological, cultural and spiritual needs of present and future generations.

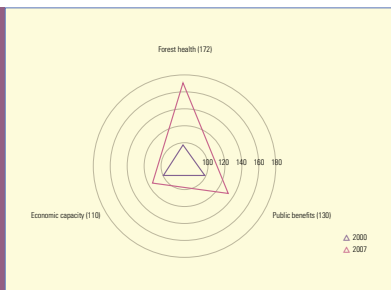
Korea has been continuously endeavoring to implement SFM by conducting intensive R&D. Laws relating to SFM were promulgated to develop from 1994 to 2006. The Fifth National Forest Plan (2008~2017) aims to implement the effective performance of SFM. As a result, approximately 121,000 hectares of national forests had been certified by the Forest Stewardship Council (FSC) to facilitate the forest management certification (FMC) system in the end of 2008.

We made efforts to develop the criteria and indicators (C&I) of SFM suitable for the Korea system. After examination of C&I of the Montreal Process and Pan-European Process, seven criteria and 28 indicators were developed and announced at the national level by the Korea Forest Service (KFS) in 2005. National level C&I can provide the implementing guideline of SFM, but actually implementing of SFM demands executing program at the local level based on the deep comprehension of forest ecosystem and local community. To accomplish the SFM at the local level, it requires to develop C&I applicable to local regions accompanied by the characteristics of social, economical, and ecological aspects.

The visiting place, named as Artificial Thinning and Biodiversity study area (AFTB) is located in neighboring Lake Soyang where the water and mountain interact with each other, and do possess large patches of plantation forest, Korean pine (*Pinus koreiensis*) and the typical habitat including keystone species, Black woodpecker (*Dryocopus martius*). Therefore, we have focused on the timber production in terms of biodiversity. We treated three kinds of thinning methods and monitored the reaction of biodiversity including flora and fauna. Also, we should consider the change of microclimate factors, physiological response of tree and soil nutrients because of the site characteristics neighboring Lake

Soyang. The approach of integrated ecosystem will be represented and quantified as Forest Sustainability Index (FSI) at the local level.

At the national level, KFS proclaimed the national Forest Sustainability Index (FSI) in 2007. The FSI is a score used to measure the overall quality and status of SFM. There are 19 indicators in three categories: forest health, economic capacity, and public benefits. Forest sustainability had steadily increased, showing an average annual increase of 4.82%. The graph



Trend of the Forest Sustainability Index by category

## IC-06

shows that forest health (172) of FSI has the higher score than public benefits (130) and the economic capacity (110) in Korean forest. Ecosystem approach in the AFTB area will contribute to the application of SFM at the other area of Korea, and provide the fundamental data in quantifying the FSI in the near future.

### Bukhan River & Watershed Management

Our tour sites--Korean pine plantation (a case study site for ecological approach), Soyang Dam, and Nami Island--are all located at the mid-upper stream region of Bukhan River(371 km, total 10,718.5 km<sup>2</sup>). The river is a big branch of the Han River together with the Namhan River that rises from Mt. Geumgang, through Chuncheon City to meet Namhan River around Seoul, the capital of Korea.

The watershed area is characterized by steep topography. These are many eroded basins in the branches of this river such as the Soyang River, the Chuncheon River and the Hongchun River. Also, many gorges by deep process are found in the piedmont district of watershed area.

The mid-upper stream region of the river is characterized by the coldest weather in winter with the second largest amount of precipitation in South Korea. The mean annual air temperature is 1 °C lower than Seoul and the mean minimum temperature is -10 °C in January. The annual precipitation is 1,200~1,300 mm and about 60% of which falls on from June to August.

Due to natural topography and frequent flows in this region, many dams such as Soyang Dam were built to supply water resources, to prevent flood and to generate electricity. Many efforts are poised to protect water resources though ecosystem conservation and ecological management of the forest watershed as opposed to damage to the ecosystem caused by dam construction including changed weather conditions. It is the watershed conservation forest that is managed to improve and enhance water storage capacity and water purification function. Some 19,000 ha land assigned to watershed conservation forests in Gangwon Province, including the Bukhan River, is under management to transform into a multi-storied, mixed forest.



Sustainable Forest Management at Jeju Experimental Forests (The First FSC-certified Forest in Korea in 2006)





### A Case Study on the Ecosystem Approach (AFTB Study)

The Artificial Forest Thinning and Biodiversity Study (AFTB study) was designed to determine if different thinning treatments could enhance biological diversity in Korean pine (*Pinus koraiensis*) plantation in Korea. Conceived in 2004 by scientists from Korea Forest Research Institutes (KFRI), the study aimed to develop ecologically managing technique improving various forest benefits such as timber value, carbon storage, and diversity of flora and fauna while enhancing sustainability and health of man-made forest ecosystem.

Perspectives on the man-made forest or plantation have changed. Not as a substitute for natural forests, plantations still contribute to biodiversity conservation in many ways. Most directly, plantations can contain substantial components of biodiversity across many taxa, including rare species in some cases, and can help restore native biota to degraded sites by stabilizing soil and creating site conditions favorable of native plants and animals. Plantation are most likely to contribute biodiversity conservation when used to reforest degraded areas. In addition, plantation can benefit landscape composition. Some ecological processes such as avian nest predation rates, are related to large-scale factors such as the proportion of a landscape that is forested. Plantation can buffer edges between natural forest and non-forest lands, and improve connectivity among forest patches. Finally forests of any type play a role in reducing global warming by acting as carbon sinks. So new forest management for plantation need the ways to gain various forest benefits such as biodiversity, water resources, carbon storage, fiber products under the forest ecosystem sustainability.

Korean pine (*Pinus koraiensis*) having five needle leaves, was naturally distributed in the northeast of China, Siberia, Korea and some parts of Japan. In South Korea, it was broadly planted to improve timber production and to yield pine nut during national afforestation campaign period from the 1970s to the 1980s. Total plantation area of Korean pine was 340 thousand hectare, 18.8% of total plantation area in South Korea.

The study area is located at Chuncheon city, Gangwon Province on middle-mountainous zone in the middle-eastern part of the Korean Peninsula and is composed of Korean pine plantation of 118ha in the area. The plantations are classified into three stands; pre-thinned, 35-year-old stand (Type A: 18ha), pre-thinned, 54-year-old stand (Type B: 52ha), and non-thinned, 54-year-old stand (Type C: 48ha). The pre-thinning was performed between 1998 and 2000 to promote tree growth by the Korea Northern Regional Forest Service.

For monitoring changes on structure, function and biodiversity of plantation ecosystem, many and multiple-sized plots containing twelve permanent plots (four plots by stand types, 40m X 40m), were delineated to determine vegetation and stand structure in 2005.

Silvicultural treatments began in 2007 and complete at the end of 2008. These treatments consist of three thinning treatments (heavy thinning, light thinning, light thinning with four gaps) with control for four districts on three stand types. First of all, we suggested the constraints as follows;

- Preserving hardwood tree, small hardwood patch to maintain diversity
- Preserving snag & remove or crushing of debris to enhance habitat condition
- Applying cable yarding to protect forest soil
- Implementing pruning to improve timber quality of remaining tree

Pinenut and needle



## IC-06

Panorama of the study area



Location map of study area



Chuncheon

The Korean peninsula

Layout of study sites

- Heavy thinned Zone (HT)
- Gap+Light thinned Zone (GT)
- Light thinned Zone (LT)
- Control Zone (CT)

Stand Type A (Pre-thinned, 35 years old)

Stand Type B (Pre-thinned, 54 years old)

Stand Type C (No-thinned, 54 years old)

*Heavy Thinning Treatment*

- Objective: to enhance habitat
- Treatment: maintaining 5–6m, distance-between stems & removing relative bad-quality stem
- Cutting rate: 54–58% (stand volume)



*Light Thinning Treatment*

- Objective: to promote vegetation-development & to improve timber value
- Treatment: maintaining 3–4m, distance-between stems & removing relative bad-quality stem
- Cutting rate: 30–36% (stand volume)



*Gap+Light Thinning Treatment*

- Objective: to maximize horizon & vertical-diversity,
- Treatment: building 400, 800, 1,200, 1,600 m<sup>2</sup> radius Gap & light thinning in the other area
- Cutting rate: 37–43% (stand volume)



*Control*

- Objective: baseline
- Cutting: None





*Weigela subsessilis*



*Apodemus agrarius*



*Phoenicurus aureoreus*

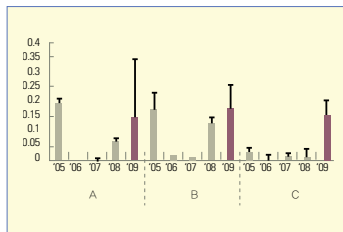


Trap for insect investigation

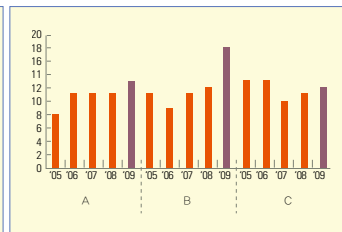
### Biological Diversity

Composition, density and distribution of understory vegetation, bird & animal, arthropod are being monitored to evaluate the changes by thinning in the study area. The major results are as follows:

- **Vegetation:** Many understory vegetation traits significantly changed after thinning and the changes were often proportional to thinning intensity.
  - On herb layer, species richness and coverage continuously increased from the first growing season, while species evenness increased in the second growing season.
  - Species richness and coverage on shrub layer increased in the first growing season but decreased in the second growing season.
  - Species composition dramatically changed during the first growing season due to invasion and flourish of exotic species and non-local native species.
- **Animals:** Density of rodents increased after thinning but did not show a significant difference by thinning treatments. The distribution of rodents showed the high relationship by coverage of vegetation and debris. After thinning, the number of birds increased but the edge species were added. So species composition of birds changed.



Density of Rodents (Individuals/Trap)



Number of Birds

### The Family Cemetery as Forest Biotop

The family cemetery not only provides space for tombs but also forms a “biotop,” a biological network of plants and animals.

As home to rich biodiversity, the family cemetery reinvigorates the degrading ecosystem and the open space serves as a thermal cover for wildlife. Snakes can visit the family cemetery to dry their body in wet summer, and leopard cat (*Felis bengalensis*) can warm up their body in winter and early mornings. Many field signs of feces and skin of wildlife are found in the area.



## IC-06

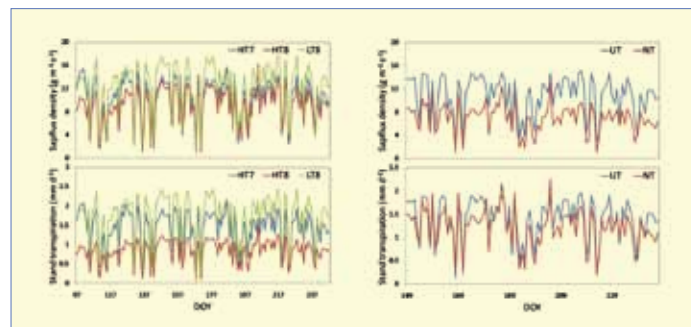


### Forest Ecosystem Functions

Decomposition rate, soil temperature and moisture, soil respiration rate, microclimate, and transpiration are being monitored to evaluate the effects of thinning on forest ecosystem function. Thinning means partial removal of trees from forest, and it is conducted to reduce competition between remaining trees, to improve timber production, to prevent wildfires and mainly to maintain healthy forest. However, the effects of thinning on forest ecosystem function like productivity, nutrient cycling, or water budgeting vary depending on species composition, growing conditions or locations.

Thinning can change the microclimatic or physiological conditions, and thus alter the transpiration. Transpiration can be estimated from direct measurements of sapflow within tree stem. Sapflow is being measured by hand-made thermal dissipation probes, which was originally designed by Granier. Trees on low intensive thinning plot (LT8) transpired more than trees on high intensive thinning plots (HT7, HT8). This result is different from common expectation that transpiration would increase by thinning. One possible explanation of this is thinning-induced photoinhibition. Stand transpiration is the highest in LT8 and the lowest in HT7. Trees on the continuously managed plot (UT) have a higher transpiration rate than trees on the unmanaged plot (NT). However, stand transpiration of UT is higher than that of NT due to larger sapwood area of NT.

The ecosystem model is widely used to describe and to predict the complex processes of material cycle and their interactions and changes. One of the ecosystem model, Regional Hydro-Ecological Simulation System (RHESSys) is GIS-based hydro-ecological model to simulate integrated carbon, water and nutrients cycling over various spatial scale. RHESSys models hydrological processes like precipitation, evapotranspiration, lateral water flow within soil, the feedbacks between hydrology and ecosystem carbon cycling including vegetation growth. Thus, this model can show the connection between ecosystem structure and function, and estimate the effect of structural changes on the functional changes of ecosystem. We are trying to reveal the effect of forest managements, which cause the structural changes of forest cover, on the function of forest with RHESSys modeling and field researches.





### Soyang Dam

Soyang Dam, the largest rock-filled dam in Asia. Built in 1973, the dam is an impressive sight, and the ride to the top - along a winding road that runs up the side of a scenic gorge - is breathtaking. The dam's massive sluice gates look like they'd put on quite a show if opened, but don't count on it happening during your visit - the gates have been opened only seven times since the dam was built.

The dam is surrounded by numerous restaurants and a cafe that boasts panoramic views of the lake. A wintertime specialty is icefish tempura-grab a bag for 10,000won. If you're so inclined, you can take a boat from the dam to Yanggu County in the heart of Gangwon-do.



### Nami Island

Nami Island was formed as a result of the construction of the Cheongpyeong Dam. It is a half-moon-shaped isle, and on it is the grave of General Nami, who led a great victory against the rebels in the 13<sup>th</sup> year of King Sejo's reign of the Joseon Dynasty.

Covered with more than 300 species of trees, Nami Island had long been frequented by those who appreciate its serene and idyllic setting, but when the Korean TV drama "Winter Sonata" became a mega-hit in Japan, Japanese tourists flocked there to walk amid the same scenes as the drama's stars Bae Yong-joon and Choi Ji-woo. Although the drama's fame has subsided, the island is still a popular spot.



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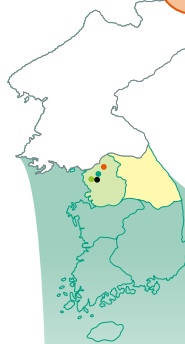
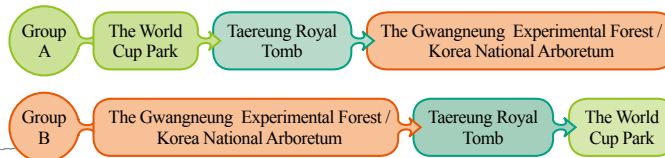
IC-07

XXIII IUFRO WORLD CONGRESS ▶ 23-28 August 2010, COEX, Seoul, Korea

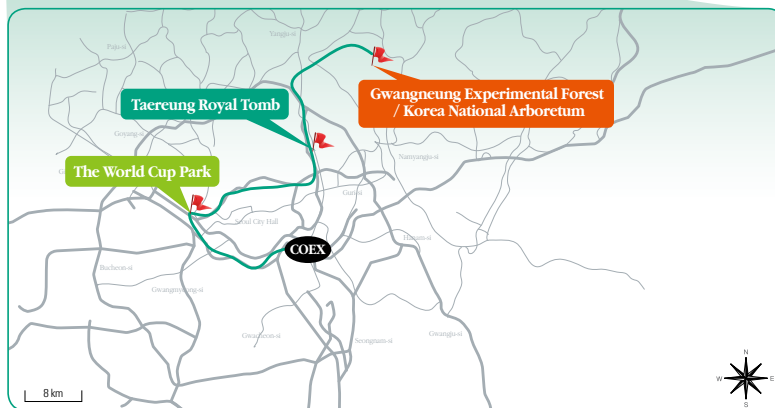
# IC-07 Old-aged Natural Forests & Landfill Restoration

Forests for the Future: Sustaining Society and the Environment

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- \*The World Cup Park was a landfill at first, but has transformed into an environmentally friendly park.
- \*Taereung Royal Tomb is the burial mound of Queen Munjeong(1501-1565), the second consort of the 11<sup>th</sup> King Jungjong of the Joseon Dynasty.
- \*The KNA is the first national arboretum in Korea.
- \*The Gwangneung Experimental Forest was also registered as one of the international Long-Term Ecological Research site for biodiversity studies in 1998.





## Birth of Forest Research in Korea: Gwangneung Forest

The Gwangneung Forest is a Royal Forest which has been strictly reserved for more than 500 years since its designation as the Royal Tomb of King Sejo, the 7<sup>th</sup> King of Joseon Dynasty in 1468. The king realized the importance of preserving this natural sanctuary close to Seoul, the national capital, and established a fire station and protected this region to be chosen to his burial site.

The Royal Tombs of the Joseon Dynasty are one of the most unique cultural heritages because of their unique historical consistency, natural landscape and Confucian funeral tradition. The historic and cultural value of the Royal Tombs of the Joseon Dynasty was recognized as one of the UNESCO Cultural Heritage sites on June 30, 2009.

The Gwangneung Forest is located in central Korea about 40 km northeast of Seoul with latitude of 37° 45' north and longitude of 127° 1' east. It is a mountainous basin surrounded by Mt. Jukyeop (600m) and Mt. Soribong (536m). At Mt. Soribong, the final phase of natural succession so called climax forest is found, unique in the warm temperate zone of the Korean Peninsula, and the dominant species of climax vegetation are Red-leaved hornbeam (*Carpinus laxiflora*) and other deciduous tree species. Japanese Red Pine (*Pinus densiflora*), Needle Fir (*Abies holophylla*) and Korean Pine (*Pinus koraiensis*) were planted in the areas surrounding the tomb and of the entry to the Gwangneung Forest area. The Gwangneung Forest covers about 2,200 hectares. Half of that is managed by the Forest Practice Research Center (FPRC) of the Korea Forest Research Institute (KFRI) and the other half by the Korea National Arboretum (KNA). Per ha growing stock of the forest reaches about 310m<sup>3</sup>, three times higher than the whole nation's average. As well, this beautiful forest is home to 17 endemic plant species including Gwangneung Skullcap (*Scutellaria insignis*) and Korean

## IC-07

Ash (*Fraxinus rhynchophylla*) and 983 botanical species, and serves as a habitat for 4,376 fauna species including 20 Natural Monuments such as White-bellied woodpecker (*Dryocopus javensis*) and Korean relict long-horned beetle (*Callipogon relictus*). Due to its abundant biodiversity, The Gwangneung Forest was designated as a world Biosphere Reserve by UNESCO Man and the Biosphere (MAB) Programme in 2010.



The forest around the Royal Tomb area was designated as the Gwangneung Experimental Forest in 1913. The Gwangneung Forest has been playing an important role as a treasure of forest biodiversity as well as the cradle of forest experimental study for almost 100 years of history as the Gwangneung Experimental Forest of the FPRC under the KFRI.

The FPRC is conducting researches on silvicultural practices from producing seedlings to planting and tending, and on forest roads and forest mechanization for less impact harvesting. At the moment, silvicultural researches are being undertaken on standardization of nursery practice and forest practice regimes to increase carbon sequestration. The forest engineering fields are focusing on environmentally friendly timber harvesting and forest road building technology in mountainous terrain. The Gwangneung Experimental Forest was also registered as one of the international Long-term Ecological Research site for biodiversity studies in 1998. So far, *in-situ* experimental research projects have been conducted in the areas of silvicultural practices and ecosystem monitoring.



The KNA is the first national arboretum in Korea, which was separated from the KFRI in 1999 since its establishment in 1987. The aim of KNA is to promote *in-situ* and *ex-situ* conservation of forest flora and public awareness of forests. It is carrying out the missions such as collection and classification of forest species;







conservation and restoration of rare and endemic forest species; management of specialized gardens; public education on forest environment, forest culture and forest species; preservation of the historical records on forests.

KNA consists of 1,018 hectares of forests and 100 hectares of exhibition areas and facilities including the Specialized Gardens, the Forest Museum, the Herbarium and Seed Bank, the Forest Zoo, the Conservatory and Tropical Plant Resources Research Center. There are 15 specialized gardens, including Bog Garden, Twiner Garden, Aroma and Touch Garden, Blossom Tree Garden and Aquatic Garden. The Forest Museum opened on April 5, 1987 and displays 11,000 pieces of forest historical evidence, remains and wood products with regard to the past, present and future of the Korean forests and forestry. The Forest Zoo accommodates a total of 16 wild animal species including Siberian tigers, Asiatic black bears and wolves. The Herbarium and Seed Bank houses about 500,000 samples of plants, insects, wild animals and plant seeds. The Tropical Plant Resources Research Center is introducing about 3,000 tropical plants growing in the greenhouse for research activities. Moreover, KNA runs the Korea Biodiversity Information System, a national web database that allows users to search biological resources collected from KNA, universities, research institutes, arboretums and herbariums nationwide.



## IC-07



## Miracle of Waste Landfill into Eco-Park

The World Cup Park is an ecological park built on the restored Nanjido landfill, which was once a habitat of flora and fauna, including orchids, living in clean water down the stream. Especially in winter, migratory birds such as swans and wild ducks used to enjoy a wonderful stay there. Nanjido was converted into a landfill in the middle of the rapid urbanization of Seoul in 1978. From that time to 1993, 92 million tons of garbage including household wastes and constructional and industrial wastes were dumped on the island, resulting in two massive mountains of garbage measuring over 90 meters in height.

Nobody expected life to spring up here because leachate and methane gas continued to seep out after the landfill was closed. After closing the Nanjido landfill in 1993, the Seoul Metropolitan Government covered the waste with a 1-meter layer of soil mainly in order to block the odors. But a miracle took place. Slowly at first, but steadily, small lives began to spring up. The speed of rejuvenation would later become amazing. The first creatures which came to the Nanjido landfill were naturalized plants. Naturalized plants that were moved from foreign countries to our country by the people and increased and lived by themselves for several generations played the role of pioneer in abandoned lands or developed areas. The reason why the variety of naturalized plants were grown up in Nanjido was seeds in waste which held the characteristics of being grown well in dry soils like the ones in there.

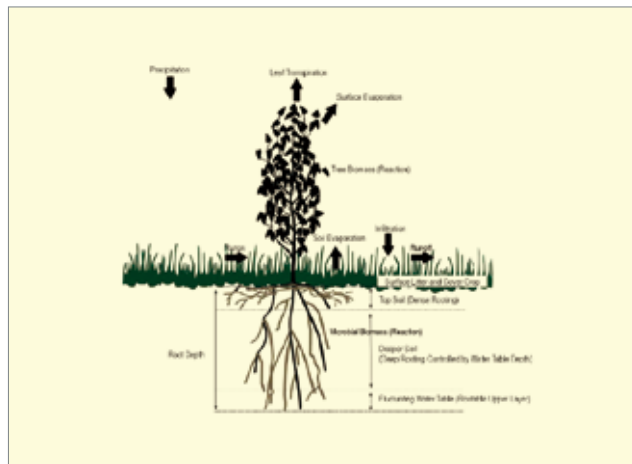
The Nanjido landfill transformed into the World Cup Park today is home to 450 kinds of plants and 460 species of birds, insects, amphibians, fish and mammals as of 2008. In the park, around 100 plant species were planted while the other 350 species were naturally grown. The animals living in the landfill site were naturally introduced from neighboring mountains, fields and Han River.





## Landfill Capping with Poplars

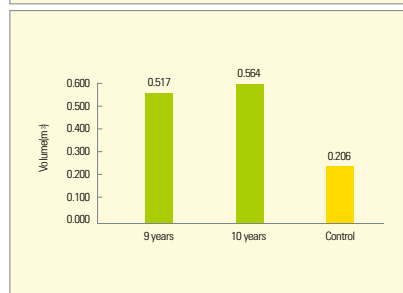
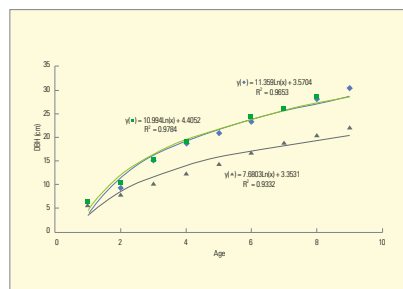
Phytoremediation is using plants to clean up polluted soils and water. Usually plants clean up various kinds of pollutants like heavy metals, pesticides, explosives and oil, etc. Poplars over 30 species inhabiting worldwide are the best candidate species for phytoremediation because of rapid growth, high water and nutrient uptake ability. ET (Evapotranspiration) cap is one of phytoremediation systems that use the properties of fast growing and deep rooting trees to cover landfills and contaminated soils quickly. Poplars are applied for the ET cap to reduce volume of landfill leachate by evapotranspiration of precipitation and direct absorption of leachate.



## IC-07

### Growth of Poplars on the Nanjido Landfill

After closing the Nanjido landfill in 1993, there was no vegetation, and leachate continued to seep out in many places. Korea Forest Research Institute(KFRI) has established a demonstration forest by planting some 1,000 one-year-old cuttings of Italian poplars(*Populus euramericana*) in the base of the Nanjido landfill during the years of 1994 and 1995. Growth pattern of the poplar trees from 1<sup>st</sup> year to 9<sup>th</sup> year after planting suggested that as the poplar got older, the poplars showed much bigger diameter at breast height(DBH) growth when compared to poplars at ordinary site. Also average stem volume growth of the 8-year-old poplars was 0.517 m<sup>3</sup>, which was 2.5 times higher than that of poplars at ordinary site. After fifteen years of growing seasons, DBH and height of the biggest one were over 57cm and 22m, respectively. Nutrients including nitrogen and phosphorous from organics and leachate at the landfill might be contributed to the growth of the poplar trees.



### Taereung Royal Tomb

Taereung Royal Tomb houses the burial mound of Queen Munjeong (1501-1565), the second consort of the 11<sup>th</sup> King Jungjong of the Joseon Dynasty. King Jungjong and Queen Munjeong had one son and four daughters, including King Myeongjong. When King Myeongjong ascended the throne at the age of 12, Queen Munjeong ruled as regent for eight years and executed many scholars as her political adversaries. Indeed, Queen Munjeong was a remarkable personality in Korean history as she held absolute power when gender inequality and sexual discrimination were the order of the day during the Joseon Dynasty. The royal tomb of such an intriguing character is a fascinating site to visit. The Korean pine tree forest with a long history is dense and lush enough to be considered as a mysterious forest, while providing valuable ecological and cultural resources you cannot easily obtain from the city.



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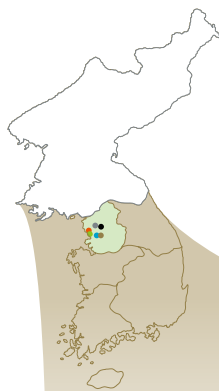
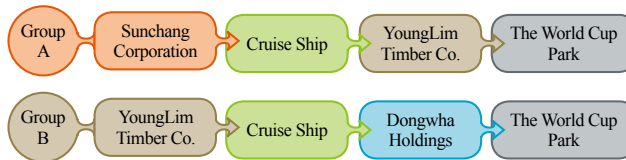
# IC-08

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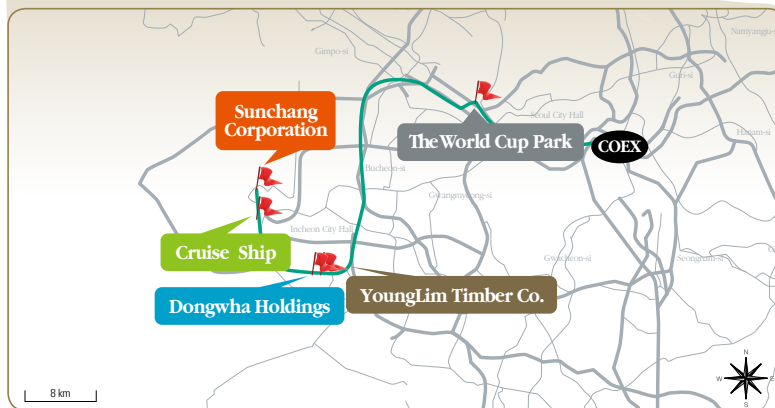
## IC-08 Wood Processing Industry

Forests for the Future: Sustaining Society and the Environment

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- \*Several factories manufacture wood products such as plywood, flooring, furniture, etc.
- \*You can have a wonderful view of city of Incheon on a cruise ship.
- \*The World Cup Park was a landfill at first, but has transformed into an environmentally friendly park.





## Wood Industry in Korea

Wood is a valuable material to produce sawn timber, wood-based material, furniture and paper. It is essential for the construction or civil engineering sector as well. Recently, wood is considered as an effective material in addressing climate change and spurring low-carbon green growth. The environmentally-friendly material contains CO<sub>2</sub> for a long time and emits carbon less than concrete or other materials in production.

Wood industry is a value-added business using forest resources. Low quality and small-diameter logs are used for the board and pulp industry using wood waste and sawdust as raw materials. Meanwhile, comparatively large diameter logs are used for plywood and building material manufacturers.

In Korea, plywood industry was recorded as No. 1 exporting items for eight years in the 1970s and Korea was the world's top plywood exporter from 1968 to 1981. Incheon has been a hub city for wood industry including plywood. In 2008, the value-added amount of the forest sector totaled around 8.1 trillion won, accounting for 2.2 percent of all manufacturing value added and 0.8 percent of the Korean GDP. The forest sector covers forestry and timber processing industries. Recently wood industry in Korea faces new opportunity for jumping up to create green business using renewable forest resources.

Korea still imports about 90 percent of the total annual wood consumption (27 million m<sup>3</sup>) in spite of the global fame of successful afforestation history in Korea. Wood industry in Korea started from local small-scale lumber mills and extended to produce plywood, boards, lumber, wooden houses, pulp and paper. And the industry has advanced to the carbon-neutral bioenergy using wood as part of efforts to weather the recent energy crisis. Wood demand will increase for various purposes newly created because of its environmentally-friendly characteristics.

Self-sufficiency for wood demand in Korea has increased up to 11.6 percent in 2009 four to five percent during the mid-1990s. Domestic wood supply is expected to increase up to 16 percent of total supply by 2020. To enhance competitiveness of wood industry, efforts will be made to secure supply of wood resources, to raise self-sufficiency of wood supply, and to strengthen legal and institutional supports for advanced wood industry.

### Sawmill Industry

Sawmill industry produces standard lumbers and boards. Most of the sawmills used to be located in the forests. Today, about 600 sawmills are operating and some of them are running in regional hub cities for industrial convenience, and they are fully automated.



## IC-08



### Plywood & Board Industry

Plywood & board industry produces materials for furniture, construction and civil engineering. Veneer resources for plywood industry using mid- to large-diameter logs changed from tropical hardwood to both hardwood and softwood, in the mid-1990s. Small-diameter thinned logs are used for Medium Density Fiberboard (MDF) industry. Wood waste is used for particle board manufacturing as wood material recycling industry. In 2009, production of plywood and boards is estimated to be 3.08 million m<sup>3</sup>, accounting for 16 percent of plywood, 53.7 percent of MDF, and 30.3 percent of particle board. The plywood industry shrank, while the MDF industry showed robust growth in the global market.

### Wood Construction Industry

Recently, the wood construction market has been growing gradually up to 11,000 housing permits in 2009 (4.7-fold increase from 2005) in Korea. The market met the preference of people to wood construction built with sustainable building materials and suitable for Lifestyles of Health and Sustainability (LOHAS) concept. The market is growing for not only residential wood house but also value-added commercial wood buildings. Most wood products for wood construction has been imported from abroad. Recently, traditional Korean houses, Hanok including structural members have been built as well. Precut members are supplied for post and beam construction, such as Hanok and Hangreen being developed from the Korea Forest Research Institute. The post and beam construction market creates new market for domestic and imported wood products for building.

### Wood Chips & Sawdust Industry

Small-diameter hardwood logs are suitable for wood chips and sawdust industry. Sawdust of 2.09 million m<sup>3</sup> was used for treating waste water from livestock farm and other environmentally-friendly purposes in 2008. Wood chips of 292,000 BDT were produced and supplied for pulping to two major pulp-makers in 2008. According to recent forest bioenergy supply policy from government, sawdust as a forest biomass becomes important resources for the growing bioenergy market.





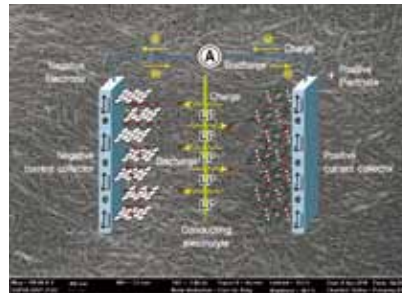


### Pulp & Paper Industry

Paper industry consumes 2.9 million tons of pulp every year in Korea. Annual pulp production is 500,000 tons, accounting for 17 percent of the total supply. Major pulp makers are Moorim P&P with capacity of 400,000 tons of chemical pulp and Jeonju Paper with a total production of 100,000 tons of chemi-thermo mechanical pulp (CTMP). Korea ranked the eighth in the world's paper market by producing 10.6 million tons, exporting 2.7 million tons, and importing 800,000 tons of paper. Recycling ratio of used paper is 83.3 percent about 60 from over 100 through restructuring and M&A.

### New Demand for Value-added Functional Biomaterials

Properties of cellulose including good mechanical properties, low density, biodegradability, and availability from renewable resources have become increasingly important and have contributed to a rising interest in this material. Nanocellulose reinforcements in the polymer matrix are predicted to provide the value-added materials with superior performance and extensive applications for the next generation. Amalgamation of forest products technology with nanotechnology may shine a new light on the development of nanocomposites, nanopapers, and lithium ion battery separator.



### Dongwha Holdings



*A Large-scale Board Industry for Mass Production through Primary Processing*

Since its founding in April 1948, Dongwha Holdings has evolved into a leading company

## IC-08

of wood materials. Based on their technological expertise in producing wood boards, they went on to develop surface, flooring and interior decorative materials into high value-added products, thus elevating the status of the wood industry. In 2003, Dongwha became a holding company and expanded its business areas to include nature-and human-friendly living solutions. Based on their business philosophy, which pursues the coexistence of humans and nature, they strive to improve the quality of living and fulfill social responsibility.



### Dongwha Enterprise

Dongwha Enterprise is the leading producer of particleboards, medium density fiberboards and processed wood boards (MFC, MFM). Medium density fiberboards made from wood fiber as well as eco-friendly particleboards made from recycled wood have made Dongwha Enterprise an unrivaled manufacturer of wood boards in Korea. Dongwha Enterprise has maintained the largest share in the domestic furniture wood market. Apart from wood products, it also produces resin for furniture and interior decorating wood boards, as well as flooring materials and eco-friendly low pressure melamine (LPM).

### Dongwha Nature Flooring

Dongwha Nature Flooring produces a wide range of products using its technological expertise that has been accumulated over half a century. It is a top manufacturer of interior decorative products, which include flooring materials, system windows and doors. It holds the largest share in the domestic laminate flooring market at the forefront of developing innovative flooring products. It was Korea's first to launch the production of laminate flooring in 1996, and it has ever since focused on the development of environmentally-friendly flooring products. In 2002, the company became the first in Korea to apply the adhesive-free "click" installation method to laminate flooring.

Dongwha Nature Flooring holds an unrivaled status in the areas of wood windows, doors and flooring products for construction companies. Recently it has expanded its business areas to wall panels by releasing the innovative product "Dizainwall" and sound-absorbing panels for commercial space.

### Global Network

Founded in 2004 in Hong Kong to help Dongwha expand its presence overseas in Malaysia, New Zealand, Australia, Vietnam and the U.S.A. Specialized in overseas investment and trade, the company plans to step up its overseas operations in the future. DWHK will lay the foundation for joining the ranks of top global companies by investing vigorously in Asia and Oceania.



## Sunchang Corporation



### *A Large-scale Board Industry for Mass Production through Primary Processing*

Sunchang Corporation established in 1959, is Korea's largest wood-processing company that sells internationally-certified products including timbers (ISO 9001-2001 in 2007), plywood (ISO 9001-2001 in 2008), MDF (JIS by Japan in 2008), and FSC-CoC in 2009 for the first time in Korea. Pending the ISO-14000 certification. Major products from Sunchang include:

### Plywood Division

Sunchang Corp always pursues differentiated selection of logs with the mind that quality of logs tells everything. The company of its kind successfully replaced softwood by hardwood, once majority of the plywood, and transformed plywood from softwood into hardwood ones. With timely responses to changes in the industrial environment and technological know-how, plywood made by Sunchang has led the industry for fifty years. To satisfy various demand from customers, we are manufacturing products ranging from 2.4mm plywood, 50mm laminated veneer lumber to plywood for the interior and packing. Sunchang self-supplies formalin, main ingredient of adhesives, with its own equipment. We are also developing new types of adhesive through tie-up with advanced technologies. We at Sunchang use such sophisticated technologies to produce quality plywood enough to satisfy the needs of our customers.

### MDF Division

Amid the global shortage of timbers and deteriorating supply of timbers due to rising timber prices and shipping charges, Sunchang produces Sunboard, a fiberboard replacement of wood products, using its technological prowess of the past five decades. As leading producer of medium density fiberboard (MDF) used for furniture and buildings, Sunchang has posted rapid growth by Korea's first production of high density fiberboard (HDF). Our product line-up covers fiber boards in various colors and patterns printed with pollution-free water paint, the first try in Korea. The recently developed adhesive has allowed us to produce advanced fiberboards for more comfortable living environment for people by producing Super-E0 boards with less formaldehyde adhesive. The boards are produced based on the technology transferred from the Korea Forest Research Institute (KFRI).

### Sawmill Division

By importing quality lumbers at competitive prices, Sunchang fully automated the Chipping Canter Profiling Line for high-quality products for construction and industrial sites. We do our best to satisfy customers' demand with on-time delivery and reasonable prices. Our sawmill lines--classification, sawing, packing to preservative treatment processes--are automated with annual production of 150,000m<sup>3</sup>, leading industrial standardization.

## IC-08

## YoungLim Timber Co., Ltd.



### *A Medium- and Small-scale Industry for High-Value Added Production through Secondary Processing*

Founded in 1969 in Incheon, the hub of Korean wood industry, YoungLim Timber Co., Ltd. started with manufacturing wooden boxes and pallets for packing materials. We launched distribution business of various wood species from all over the world. To meet customers' demand for multi-purposes, we are doing business with 120 wood species for special purposes. We are one of the leading medium- and small-scale wood manufacturers grown by combining a timeless customer-centered philosophy with customers R&D for 41 years in Korea.

The business includes all the process needed for wood products: importing logs, sawing, drying, wood processing and producing finished products. There are seven divisions: distribution, valuable timber, wood preservation, sawmill, wood processing, furniture, interior material.

We develop and manufacture wood materials as well as plastics and steel materials. We are expanding our business not only in Korea and but also in Asia. We produce lumber and board in primary processing with tropical log from Southeast Asia.

As the wood building market is growing the demand for wood rapidly increased. We play a role in wood building industry by supplying high-quality wood materials to the construction market.

We produce exterior materials using wood preservation treatment to extend service life of wood products as well as manufacture a variety of interior materials including flooring and furniture.

We produce laminated timber and various types of furniture and household goods. Our own high-class brand, "e-library" is mostly manufactured with solid wood, not from MDF or PB. The European style furniture gained much attention from customers because of eco-friendly property and beautiful outlook.





### The World Cup Park

The World Cup Park was built to commemorate the 17<sup>th</sup> FIFA World Cup. Opened on May 1, 2002, the park was once a 15-year-old landfill that held over 92 million tons of garbage. It took six years to stabilize the waste (measures were taken to prevent the garbage runoff from contaminating the environment) and an additional year to build the actual park itself.

### Incheon Coastline Cruise Boat

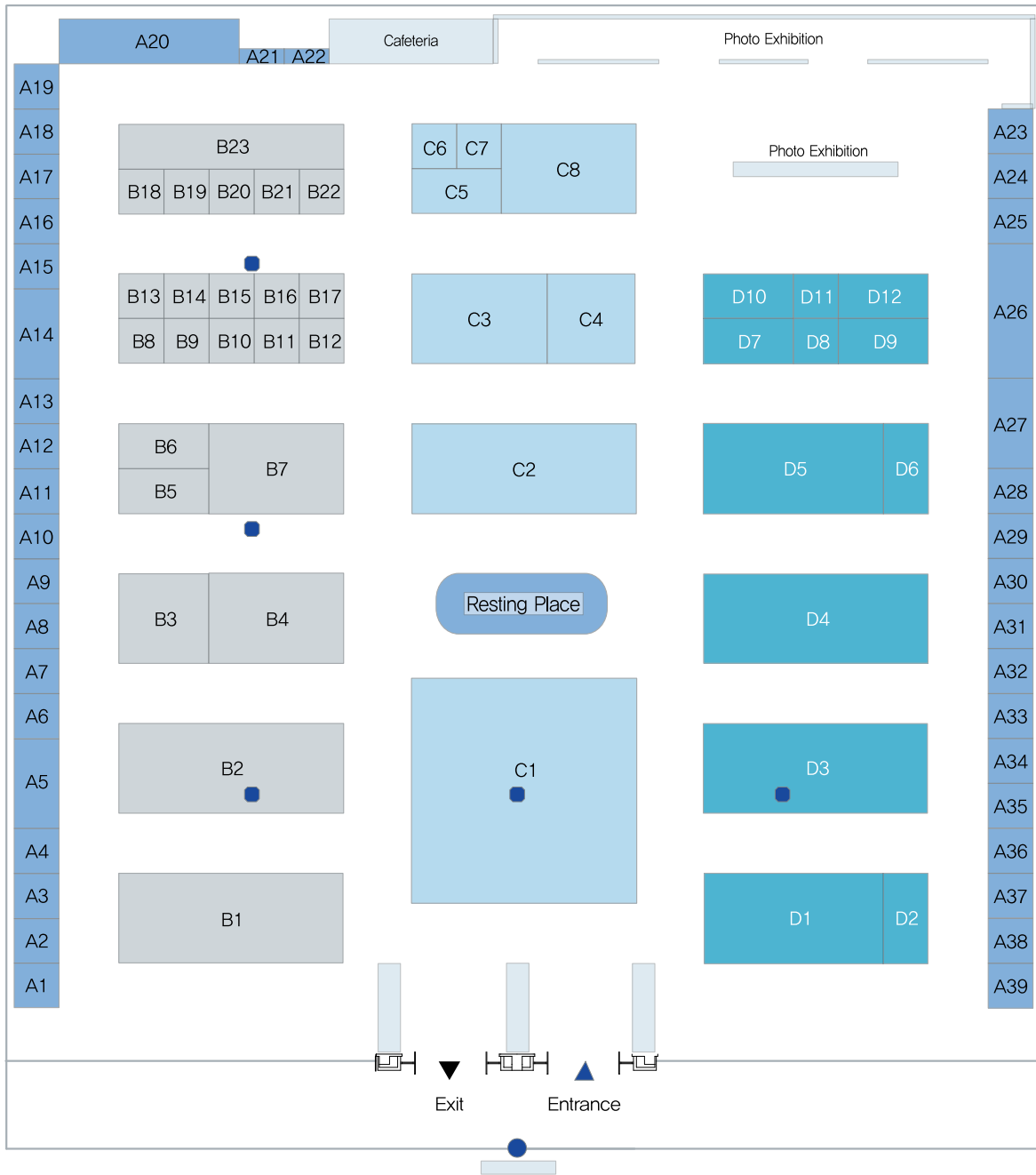
The best way to appreciate Incheon's fantastic coastline views is riding an Incheon cruise boat. This cruise ship takes you to Incheon Bridge sailing from Wolmido Island. You can also enjoy a superb lunch as well as various shows, while experiencing the magnificence of Incheon's coastline on this one-and-a-half-hour cruise.



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# Exhibition

## Booths Layout



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Haies Soft Co., Ltd.	A6	Sungwon Wood Co., Ltd.	A27
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# Exhibitor Directory

## Hanjin Information Systems & Telecommunication Co., Ltd. (A1)

653-25, Deungchon-dong, Gangseo-gu, Seoul, Korea

**Tel** +82-2-3660-6510      **Fax** +82-2-2166-7299

**E-mail** Jhlee01@hist.co.kr      **Website** www.hist.co.kr

We aim at developing spatial information updating system for different users. The coverage of spatial information is very wide and should be frequently updated to meet the needs of different industries. After reviewing the needs from various areas, we will be able to get a good understanding to achieve effective results in the forestry area.

Forest spatial information is updated every 5 years, but the results achieved are not satisfactory due to many factors such as global warming which makes that data useless. Thus, it is very important to conduct frequent updating of the forest information.

We intend to make a useful system rather than to research problems and resolutions. So, our strategy is to release the system early in all the stages within this project to make subsequent progress with practical feedbacks from the sites.

We focus on a specific area rather than making a wide-range solution. After making a remarkable output in the forestry industry, we will proceed to the next industry such as urban area.

## Kweather (A2)

4F Ace High-End Tower, 235-2 Guro-dong, Guro-gu, Seoul, 152-053, Korea

**Tel** +82-2-360-2265      **Fax** +82-2-360-2288

**E-mail** psk@kweather.co.kr      **Website** www.kweather.co.kr

Providing Superior and High Value-Added Weather Service with Customization Kweather provides total weather-related service for clients from a variety of fields including mass media, private and public industries, government organizations, etc.

Kweather mainly focuses on weather contents business, weather solution business, high value added business and continuously makes investments in R&D to provide high quality service.

## Korea Geomatics Co., Ltd. (A3)

685 Gasan Digital empire B/D, Gasan-dong, Geumcheon-gu, Seoul, Korea

**Tel** +82-2-2624-2000      **Fax** +82-2-392-5063

**E-mail** swpark@koreagm.co.kr

**Website** www.koreageomatics.com/en

Korea Geomatics provides the best products to our customers by using many experiences and technologies in the industry of various GIS business-Digital Photogrammetry, GIS software development, etc. We've specialized in creating application data from Aerial Photo and Satellite Imagery by one of the best image processing solutions, Pixel Factory™. Additionally, we are developing various solutions for spatial image information such as Image Solution, GIS & Mapping, System Solution, Golf Solution, etc. as G-Technology leader.

## TAEEN Co., Ltd. (A4)

Yukryong Bldg., 791-47, Yongjeong-ri, Jingeon-eup, Namyangju, Gyeonggi-do, 472-835, Korea

**Tel** +82-31-529-4363      **Fax** +82-31-529-4362

**E-mail** tolan@nate.com      **Website** www.tefm.co.kr

It is TAEEUN Co., Ltd. professional business company that can build better forest environment information such as in forest survey and GIS database in the time at the Ubiquitous. The Republic of Korea has a good record of outstanding achievements in GIS technology in the forestry sector. Now, it is time for us to compile more accurate forest information database with advanced GIS tools for analyses of spatial environment data.

Here at TAEEUN Co., Ltd., we can carry out precise forest environment survey and provide GIS database construction! TAEEUN Co., Ltd. will be a stepping-stone to success by building accurate forest environment spatial information in the digital environment era.

### Main Business Area:

- Forest Survey and Development of Forest Environment Database
- Forest Engineering (Survey, Design and Superintendence)
- Development of Techniques and Analysis of Forest Spatial Information
- Consultation on Forest Management Techniques

### GEO C&I Co., Ltd. (A5)

#2202/2204 Embedded Center, Gyeongbuk Technopark 300  
Sampung-dong, Gyongsan, Gyeongbuk, 712-210, Korea

**Tel** +82-53-857-7312      **Fax** +82-53-857-7313

**E-mail** geocni@geocni.com    **Website** www.geocni.com

#### ► GIS-RS-GPS Integration Technology

The total geographic information application system by combining GIS analysis and GPS survey and high resolution images processing technology

#### ► 3D Image-based in Geographic Information application system

- The technology to implement real 3D world using spatial data such as digital map, aerial photograph, high resolution satellite images, 3D object modeling, etc.
- The network, UI, geo-UCC contents, interactive map technology, Offering information to implement geographic information system
- Familiar to users by using various web-based multimedia Spatial analysis modeling technology for adjacency, prospect, land prices, a right to enjoy sunshine, scenery, photography, damage, reiteration, network, and minimum distance analysis by 3D image based analysis modeling implementation.

### Haies Soft Co., Ltd. (A6)

#302, 109-11 Bangi-dong, Songpa-gu, Seoul, 138-050, Korea

**Tel** +82-2-421-0522      **Fax** +82-2-421-0528

**E-mail** web2d@his-soft.com

**Website** www.his-soft.com

Haies Soft Co., Ltd. (Haies Soft) was founded in May 2008. Our company is specialized in providing IT Service in areas of forest/environment/disaster prevention. We have successfully helped companies, organizations and local governments in the following service areas:

1. GIS solution and IT Service
2. Information consultation in Forest/Environment/Disaster Prevention
3. Development and Technical services in overseas and in forest resources
4. Climate Change Response Projects Since its establishment, Haies Soft has accomplished in providing countless services and possessed the best technology in the field of information technology. Presently, Haies Soft is considered as the leading company in Korea in the service

areas we offer. Haies Soft's goal is to be the world's leading company in IT Service and Information Consulting in Forest/Environment /Disaster Prevention.

### Eco Services Consulting Co., Ltd. (A7)

#302, 109-11 Bangi-dong, Songpa-gu, Seoul, 138-050, Korea

**Tel** +82-2-413-0880      **Fax** +82-2-421-0528

**E-mail** kyungseoky@his-soft.com

Eco Services Consulting (ESC) is an environmental consulting company specialized in the forest sector.

The company, headquartered in Songpa-gu, Seoul Korea, was established in 2008.

Major business areas of Eco Services consultation are:

1. Research projects for climate change such as AR-CDM, REDD, and carbon credit trading and investment
2. Product life-cycle assessment, carbon footprint, and eco-design
3. Overseas forest plantation project design and feasibility study
4. Forest certification (FSC, PEFC) consulting and market analysis
5. GIS-based forest resources assessment and monitoring system development, etc.

ESC has conducted overseas forest investment consulting in several countries, product LCA studies including wooden building, and assessment of forest environmental services. ESC supports sustainable forest management by integrating and maximizing economic, environmental and social values of forest resources. The goal of ESC is to be an internationally renowned top-level environmental specialist group in forestry, supporting sustainable development for the client company and for the society.

### GEOMania Co., Ltd. (A8)

Kyungsan Bldg., 119-9 Samsung-dong, Gangnam-gu, Seoul, Korea

**Tel** +82-2-523-0900 (#844)    **Fax** +82-2-523-0906

**E-mail** hjnam@geomania.com

**Website** www.GEOMania.com

- GIS Engine Software Development & Sales
  - GDK (GEOMania Development Kit)
  - GEOMania/EasyMap, GEOMania Pro (Vector Data Editing Tool)
  - RealZ Builder (Raster Data Editing Tool)

- RealZ 3D Viewer (3D Tool)
- GEOMania/Web (Web GIS)
- GMS 4G (include Spatial RDBMS)
- RealZ Server (Raster Service Server)
- GIS application development & consultation
- Digital map construction/manufacture
- System Integration Business
- Korean/English/Japanese/Chinese-supported systems
- We conduct about 70~80% GIS Projects of Korea Forest Service (1995-2009):
  - Development of forestry-related database
  - Development of various GIS programs applicable to the database developed using Egomania Products.

### **Panasia Engineering Co., Ltd. (A9)**

Wooduk B/D #1014-5, Gwonsun-dong, Gwonsun-gu, Suwon, Gyeonggi-do, 441-822, Korea

**Tel** +82-31-220-3732      **Fax** +82-31-239-9132

**E-mail** ilkim@panasia.co.kr    **Website** www.panasia.co.kr

Panasia Engineering provides services such as aerial photography, remote sensing, Orthophoto image, LiDAR, GPS surveying, marine surveying.

Underground facilities Surveying, plant surveying, DEM/DSM and topographical map.

### **Haglof Sweden (A10)**

BOX 28, Langsele, SE-88221, Sweden

**Tel** +46-620-25580      **Fax** +46-620-20581

**E-mail** gabriella.haglof@haglofsweden.com

**Website** www.haglofsweden.com

Haglof Sweden is the leading manufacturer of precision field measuring instrument solutions.

The company has a solid tradition of workshop technology and production of rugged and user friendly instruments for everyday field use.

Our product range includes increment borers in the largest variety of lengths, models and sizes, precision calipers, computer calipers, patented diameter measuring innovations, electronic height and distance measuring instruments and software systems for field computers and PC.

We offer and build efficient solutions for complete forest survey and management, positioning, cruising and land evaluation; for single private land owners up to entire state forest management bureaus.

We also provide extended service with on-site custom system training with our experienced experts. Haglof Sweden has a worldwide distribution of products through an independent web of distributors and global reference users in leading research institutes, universities, and international forestry industry and forest companies.

### **ICL Performance Products - Phos-Chek (A11)**

19755 Morgan Lane, Frenchtown, Montana, 59834, USA

**Tel** +1-406-626-5743      **Fax** +1-406-626-5743

**E-mail** cwgeorge@hughes.net

**Website** www.phos-chek.com

Phos-Chek® long-term fire retardants, Class A foams, and water enhancing gels are the world's leading chemical solutions for managing wild land, industrial and municipal fires.

In 1962, the Phos-Chek Name was born and an era of innovation and partnership began.

For several years before and four decades since, the Phos-Chek Group has worked side-by-side with fire management agencies in North America and across the world to provide safe and effective fire fighting chemicals to meet the needs and desires of fire management personnel.

### **Decagon Devices, Inc. (A12)**

2365 NE Hopkins Ct. Pullman, WA, 99163, USA

**Tel** +1-509-332-2756      **Fax** +1-509-332-5158

**E-mail** tradeshows@decagon.com

**Website** www.decagon.com

Decagon will be exhibiting instrumentation that measures leaf area index, PAR interception, and stomatal conductance of tree canopies, as well soil moisture sensors for monitoring forest soil moisture. The LP-80 ceptometer can be used to assess the light environment and carbon biomass sequestration, and the SC-1 porometer helps to detect tree stress and health.

Decagon's well-established soil moisture sensors for measuring volumetric soil water content allow you to accurately monitor several locations at many depths at a low cost. Also on display will be other micro-environment sensors for monitoring relative humidity, temperature, precipitation, and other parameters of forest and understory microclimates.

### Ahlborn Korea (A13)

#522, Daechung Tower, 13-3 Gaepo-dong, Gangnam-gu, Seoul, Korea

**Tel** +82-2-3431-2931      **Fax** +82-2-3431-2932

**E-mail** ahlborn@naver.com

**Website** www.almemo.co.kr

AHLBORN stands for innovative development, quality, and measuring accuracy.

For more than 30 years, we have been developing, manufacturing, and selling high-quality measuring technology for research, industry, and trade.

Products

1. Data Logger
2. Data Acquisition System
3. Wireless Network Technology
4. Sensors - Temp., Humidity, Dew point, Heat Flow, Auto, Weather System, Soil Water, pH, DO, EC, ORP, Turbidity, Pressure, Differential Pressure, Flow, Thermoelectric Flow, Thermo-anemometer, RPM, Load Cell, Radiometric, Photosynthesis, Luminance, Light Flux, UV, Global Radiation, Star Pyranometer, Probe, Wind Direction, Wind Velocity, Rainfall, Barometric, Gas (CO, CO<sub>2</sub>, O<sub>2</sub>, O<sub>3</sub>, NH<sub>3</sub>, HCHO, TVOC), etc.

### Ildobiotech Co., Ltd. (A14)

296-2, Daeja-dong, Deokyang-gu, Goyang, Gyeonggi-do, Korea

**Tel** +82-2-1588-9484      **Fax** +82-31-962-4114

**E-mail** kby8003@naver.com

**Website** www.ildobiotech.com

ILDO Pellet boiler is a product with above 90% efficiency product and ILDO is the only company that develops and supplies pellet boiler-use controller in Korea.

Using the controller, the amount of fuel input and oxygen supply can be optimized by the installation field and it maintains high efficiency with attached lead-pipe cleaning equipment.

'Low grade fuel (4th class) perfect combustion burner' that is developed in ILDO can do perfect combustion with 4th class low grade fuel.

It also has the function of removing ash and sludge automatically and thus maximizing the efficiency of the boiler and customer's convenience.

### Kisanbiotech (A15)

2F. Kisan B/D., 86-2 Yangjae-dong, Seocho-gu, Seoul, 137-890, Korea

**Tel** +82-2-529-2282      **Fax** +82-2-529-2287

**E-mail** kisan@kisanbio.com

**Website** www.kisanbio.com

Kisanbiotech supplies various kinds of instruments for forest environment studies.

We provided monitoring solutions for soil, plant and environmental researches since 1999.

All the products are from Regent, RINNTECH and ICT. These companies are very famous companies providing instruments for forest environment studies. Regent provides image analysis measurement systems for plant science.

RINNTECH is associated with devices that precisely detect the inner condition of trees and wood while ICT provides solutions for soil, plant and environmental monitoring.

The greatest advantage of this company's products is that the instruments are very convenient and simple to use. We believe in good order and will give you complete satisfaction of your purchase.

Our main concern is to provide quality customer service.

### Dai-Yang Ind., Co. (A16)

405-3, JangAm-ri, MaJang-myun, Ichon, 467-813, Korea

**Tel** +82-31-907-8833      **Fax** +82-31-907-8842

**E-mail** dir@sic-cdrbon.com

**Website** www.sic-carbon.com

Dai Yang Ind., Co. is providing mechanical seals and ceramic components by carbon, graphite, silicon-carbide (SiC) and nitride-carbide (Si<sub>3</sub>N<sub>4</sub>).

Various kinds of ceramic components for the electronics, semiconductors and LCD/LED, machineries, steel, chemical, energy & power, aerospace. Dai-Yang focuses on meeting the demand of customers. The company is also producing a carbonized board using wood-based panels like medium density fiberboard (MDF).

The conversion of wood-based panels into crack-free, monolithic, porous hard carbons is of significant interest due to their ability to perform in a multi-functional capacity. One current interest is to explore the potential utility of carbonized boards for artistic and building applications.

The carbonized board can adjust humidity, protect electromagnetic wave, and adsorb harmful volatile organic

compounds (VOC) like wood charcoals.

We are introducing some calligraphy-carving artworks using the charcoal board.

These kinds of calligraphy-carving artworks might be employed in visual art area.

### ALTORI (A17)

608-1 Obang-ri, Micheon-myeon, Jinju, Gyeongsangnam-do, 660-941, Korea

**Tel** +82-55-761-7266 **Fax** +82-55-761-8766

**E-mail** altori@altori.co.kr

**Website** www.altori.co.kr

- Licebsed Organic Chestnut
- Products: Fresh in-shell, Peeled, Processed (Diced, Tinned)
- Self-produced (25ha) + Contract produced (100ha)
- Distribute 300-ton products per year
- Supply with organic markets and school lunch

### Dongbu Hannong Co., Ltd. (A18)

19F Dongbu Financial Center, 891-10, Daechi-dong, Gangnam-gu, Seoul, 135-523, Korea

**Tel** +82-2-3484-1518 **Fax** +82-2-3484-1588

**E-mail** lifeseeds@dongbu.com

**Website** www.agriculture.co.kr/eng

DONGBU HANNONG has made the foundation of the Korean agricultural industry as the first mover and the leader in the area of crop protectants since 1953. Meanwhile, the company has expanded the business portfolio into fertilizers (1965), seeds (1981), veterinary pharmaceuticals (1986) and other areas.

DONGBU HANNONG has always been on the first rank of the market share for the last half of the recent century. We will focus more on the development of better products and services in order to increase the company's competitive advantages. Moreover, we will contribute to building the sustainability of the farms and the agriculture in the near future.

DONGBU HANNONG, the great partner of farmers, will be a frontier for the globalization of the Korean agriculture and the healthy and abundant future of human life.

### Good Feel Korea Co., Ltd. (A19)

#501, Gunpo Je-il Industrial Complex 323-1, Dangjung-dong,

Gunpo, Gyeonggi-do, Korea

**Tel** +82-31-427-8114 **Fax** +82-31-427-8115

**E-mail** park1838@empal.com

**Website** www.greenfeel.co.kr

Good Feel Korea has developed an Eco-Friendly Colored Paper Pencil, the 'Zebra', through the use of recycled materials. Our products prevent desertification, global warming and resources depletion just to list a few.

1. Green Feel Zebra Paper Pencil The World's First Colored-Body Paper Pencil features a unique design at the tip and offers a smooth writing feeling.
2. Green Feel Corn-Starch Rulers, Pencil Cases Our environmentally friendly rulers are made from bio-degradable corn starch rather than PVC (polyvinyl chloride).  
These Eco-Friendly Rulers reduce permanent waste by utilizing re-useable materials.
3. Green Feel Recycled Paper Notebooks. We promote the use of Eco-friendly products in our schools through our Green Feel Stationery Series.
4. Green Feel Natural Resource Crayons Green Feel crayons are made from natural botanic oils, having no harmful effects on our children, unlike other crayons.
5. Green feel Corn-Starch Erasers Green Feel Corn Starch Erasers are made from bio-degradable materials, without using any toxic chemicals

### SUPULLIM (A20)

774-5 Beondo-ri, Neungseo-myeon, Yeonju-gun, Gyeonggi-do, 627-822, Korea

**Tel** +82-31-889-9943 **Fax** +82-31-889-9943

**E-mail** kukbukarma@hanmail.net

#### Introducing our product:

SUPULLIM Charcoal Bed

SUPULLIM Traditional Furniture is made of solid pine wood, using the traditional piecing-together' technique.

The SUPULLIM Charcoal Bed is an eco-friendly, healthy bed.

We created this innovational bed by making use of charcoal forming material technology, a technology developed by the Korea Forest Research Institute (KFRI). As we seek harmony between tradition and nature, all products of SUPULLIM are produced by applying our traditional technology, the fruit of the wisdom of our ancestors, to pure materials coming from

nature. The SUPULLIM Furniture is made with great care and will change your space of life into a healthy and classy cultural space!

### Earthscan (A21)

Dunstan House 14a St. Cross Street, London, EC1N 8XA, UK

**Tel** +44-20-7841-1930

**E-mail** Emma.Barnes@earthscan.co.uk

**Website** www.earthscan.co.uk

Earthscan is the world's leading publisher on climate change, sustainable development and environmental technology. We aim to publish original, reliable and significant work that helps to foster the conditions for genuine sustainability by providing the means for understanding and analyzing the issues and the tools for resolving them.

### GFIS.net

#### (Global Forest Information Service) (A22)

IUFRO Headquarters, Vienna, Mariabrunn (BFW), A-1140, Austria

**Tel** +358-50-3912140 **Fax** +43-1877-015150

**E-mail** mikkola@iufro.org **Website** www.gfis.net

GFIS Quiz – Test your knowledge and win \$600, \$300 or \$100!

In light of the 2010 IUFRO World Congress, the Global forest Information Service (GFIS) has introduced an updated gateway at [www.gfis.net](http://www.gfis.net) to enhance forest-related information sharing for both current and prospective users. As of August, new and improved GFIS features will allow unique users from around the world to share and access data in a simple and comprehensive way.

You are welcome to participate in the GFIS quiz. Correctly answer at least six questions for a chance to win a price 1. \$600, 2. \$300 or 3. \$100.

### Green House (A23)

6F Uri Venture Town, Deungchan 3-dong, Gangseo-gu,

Seoul, 157-754, Korea

**Tel** +82-2-2664-7114 **Fax** +82-2-2662-0847

**E-mail** binson@netsgo.com

**Website** www.uujj.co.kr

The first issue in February 1999 (Republic of Korea's Power house magazine) has the longest history in the green-friendly house/Hanok/landscapes/rural life-related magazine.

Many people are practicing green lifestyle as green-friendly

guidelines have touched the lives of families. This has led to the construction of houses with interior design and materials selection that adopt the green-friendly concept.

The knowledge of gardening, for instance, cannot be passed on to the general public without proper knowledge dissemination. Therefore, thematic experts and the publication of various books are essential to communicate these knowledge.

In addition, public awareness will take a big leap in the future with the promotion of green-living in residential housing areas by the media.

### Future Forest (A24)

#201 Hyundai Plaza, Muak-dong 82, Jongro-gu,

Seoul, 110-080, Korea

**Tel** +82-2-737-091 **Fax** +82-2-737-0918

**E-mail** dallas7804@gmail.com

**Website** www.futureforest.org/english

Future Forest is a non-governmental organization which aims to raise public awareness on combating desertification and yellow dust storms, to promote participation of youths in environmental activities, and to contribute to the establishment of ingenuous friendship among young people all over the world. Every spring since its establishment in 2002, Future Forest has dispatched a voluntary team consisting of some 100 youths to plant trees in the desert areas of China to combat desertification. In collaboration with the All-China Youth Federation, Future Forest has planted more than four million trees in the Kubuqi desert in Inner Mongolia, China in order to stop desertification and restore degraded land. May On 15, 2009, Future Forest launched <Billion Trees in Desert> campaign with the UNCCD in the Kubuqi desert, planting a tree donated by UN Secretary General Ban, Ki-Moon as the campaign's first tree. In 2010 in recognition of his services, Kwon, Byonghyon, the founder and president of Future Forest was designated the first Sustainable Land Management Champion of the UNCCD.

### Mungyeong City (A25)

270-10 Mojeon-dong, Mungyeong, Gyeongsangbuk-do, Korea

**Tel** +82-54-550-6277 **Fax** +82-54-550-6279

**E-mail** misteli@korea.kr **Website** english.gbmng.go.kr

Mungyeong is a city known for its various historic and

scenic tourist attractions.

In particular, Mungyeongsaejae Provincial Park is one of must-visit places for tourists. Our booth is aimed at promoting Mungyeong City having a lengthy history. Shiitake mushrooms, known as one of the city's special products, will be a main display item during this exhibition.

### **Korea Wood Recycling Association (A26)**

903 Preelim Bldg., 461-1 Samsan-dong, Bupyeong-gu, Incheon, Korea

**Tel** +82-32-330-0808      **Fax** +82-32-330-0016

**E-mail** kwra@hanmail.net

**Website** www.woodrecycling.or.kr

1. Recycled Wood Chip: Recycled Wood Chips are made of wasted wood from construction field, business field and forest residual. It could use recycled material such as particle board.
2. PB (Particle Board): Particle boards are manufactured by converting sawdust, bush branches and other kinds of waste wood into particles, or small wood chips, and by applying environmentally friendly adhesives to particles before they pass through an extraction machine.
3. MDF (Medium Density Fiberboard): Medium-density fiber board is manufactured by breaking softwood into fine wood fiber to forming panels by pressure.
4. Pallet: Pallet is made of recycled wood or wooded by-product and is used to make Green Pallet. In environmental respect, Green Pallet has higher quality than plastic pallet.

### **Sungwon Wood Co., Ltd. (A27)**

1019-5, Daeyeok-li, Daegot-myeon, Kimpo, Gyeonggi-do, Korea

**Tel** +82-31-981-4208      **Fax** +82-31-981-4209

**E-mail** sooill5016@yahoo.co.kr

**Website** www.sungwonwood.com

Well-being bed, desk equipped with adjustable weight structure for classroom, wooden wall sheet for interior, wooden wall sheet for interior attached carbon, collapsible bed.

### **YoungLim Timber Co., Ltd. (A28)**

740-1 Gojan-dong, Namdong-gu, Incheon, 405-822, Korea

**Tel** +82-32-811-9331      **Fax** +82-32-816-8944

**E-mail** domestic@younglim.com

**Website** www.younglim.co.kr

Founded in 1969 in Incheon, the hub of Korean wood industry, YoungLim Timber Co., Ltd. started with manufacturing wooded box and pallet for food companies. Inspired by the fact that most of the demands in the country for wooded products are covered by the imported wood species from overseas, we launched distribution business of various kinds of wood species from all over the world. To comply with a variety of customers' demand suitable for their different uses our company has been trying to develop many species from all over the world. Now we deal with approximately one hundred twenty species.

All the time the only thing that we focus on is meeting customers' demands based upon R&D activity.

Now having been 41 years in the wood industry we do all the process necessary for wooded products from importing log, sawing, drying, wood processing to making finished products. Consisting of seven business divisions, we are proud of promoting wooded products, one of precious gifts from the nature.

### **Joong Dong Co., Ltd. (A29)**

557-2, Sibjeong1-dong, Bupyeong-gu, Incheon, Korea

**Tel** +82-31-357-6280      **Fax** +82-31-357-6287

**E-mail** chojs@joongdong.co.kr

**Website** www.joongdong.co.kr

Established in 1981, Joong Dong is growing to develop and provide top end quality materials for production, supply and construction in various areas such as lumber, material wood, drying, preservation, lamination wood, board-plywood, interior architecture, scenic planting, landscape and many more.

Joong Dong's strongly dedicated research and development has made it become one of the top suppliers in preservative wood.

Based on many experiences and technologies, we have a patent, certificate of Trademark registration and Design registration. Furthermore, we are pouring much effort on research and development in supplying domestic wood and fire retardant treated wood (dricon), CUAZ-3 (eco-friendly wood preservative), revetment installation with domestic pitch pine.

We will continue to put our utmost effort to attain the highest level of customer satisfaction by improving our products and

services as a response to your support.

### Elf (A30)

277-58, Seongsu Bldg. Seongsu-2ga, Seongdong-gu, Seoul, Korea

**Tel** +82-2-463-0001 **Fax** +82-2-463-1913

**E-mail** bw.jung@elfair.co.kr

**Website** www.elfair.co.kr

Elf offers fresh oxygen and phytoncides, the airborne chemicals that plants emit to protect them from rotting and insects, at once.

Using a convenient size can which easily fits in purses, you can take Elf anywhere to get fresh air from the forest.

Whether you're a child who needs clean air, a student who needs to fresh minds, or an office worker who needs a break, Elf will make you feel refreshed and energized as you just walked into the forest.

Elf is consisted of 95% pure oxygen in a can and a natural pulp mat which has 0.3ml of 100% natural phytoncides. For an effective use, please inhale for 2 seconds. Each can provides up to 30 shots.

The phytoncides pulp is manufactured with support from the Korea Forest Research Institute.

The phytoncides pulp is in the process of acquiring patent right from the Korean Intellectual Property Office (#10-2010-002514).

### eCorea (A31)

#717, Keuman-ri, Osu-myun, Imsil-kun, Jeollabuk-do, 566-892, Korea

**Tel** +82-63-644-9398 **Fax** +82-63-644-9396

**E-mail** nolte@paran.com

**Website** www.ecorea.biz

<Woodpellet Boiler>

- Energy Efficiency: Over 90%
- Absolute Reduction of Harmful Discharge of Gases (below CO 51ppm)
- Through almost Perfect Combustion (99%)

### Jeonnam Forest Resources Research Institute (A32)

Mt. 23-7, Sanje-ri, Sanpo-myeon, Naju, Jeonnam, Korea

**Tel** +82-61-336-6300 **E-mail** ohye@korea.kr

**Website** jnforest.jeonnam.go.kr

Jeollanamdo Forest Resources Research Institute researched on the making of natural perfume, natural body wash and hand wash from trees.

Functional mushrooms are: (*Sparassis crispa*, *Mycoleptodonoides aitchisonii*) and their finishing products.

3 kinds of functional salt add by: *L. edodes*, *P. ostreatus*, *A. Polytricha* and etc.

### Institute of Environmental Resource Jeju Special Self-Governing Province (A33)

40 Sumokwon-gil, Jeju, Korea

**Tel** +82-64-710-7594 **Fax** +82-64-710-7599

**E-mail** sch9089@jeju.go.kr **Website** Sumokwon.jeju.go.kr

Opportunity to promote various forest resources in Jeju Island. Halla arboretum information booklet, shiitake mushrooms, sanghwang mushrooms, fern specimen, environment-friendly agricultural products and olregil brochure etc.

### Gyeongsangbuk-do Forest

#### Environment Research Institute (A34)

367, Tongil-ro, Gyeongju, Gyeongsangbuk-do, 780-936, Korea

**Tel** +82-54-778-3831 **Fax** +82-54-741-4917

**E-mail** biho93@korea.kr **Website** www.kbfoa.go.kr

▶ Aseptic seedlings infected by pine mushroom mycelia (*Tricholoma matsutake*), one of three Korean mushrooms and ectomyorrhiza is not artificially propagated and is the most expensive in domestic market. The picking of this mushroom has decreased annually due to severe forest fires, forest wood diseases and other reasons.

The development of a technology for massive production of aseptic seedlings of pine trees is one of main tasks of the Forest Environment Research Institute of Gyeongsangbuk-do, in particular. This task contributes not only to the increased production of pine mushroom but also establishing a foundation for restoration of its genetic resources in the place where genetic resources were lost due to fires and other natural disasters.

▶ Cauliflower mushroom (*Sparassis crispa*)

The cauliflower mushroom has beta-glucan which plays a major role in the body's immune system.

This mushroom is considered as a medicinal mushroom and contributes to the body's immune system. Therefore, it is important to increase the production of cauliflower mushroom which is also one of the precious forest resources.



### Gyeongsangnam-do Forest Environment Research Institute (A35)

386 Sumogwon-gil, Ibanseong-myeon, Jinju,  
Gyeongsangnam-do, 660-871, Korea

**Tel** +82-55-771-6534      **Fax** +82-55-771-6539

**E-mail** sagamotoroo@korea.kr

**Website** tree.gndo.kr

1. Overview of Gyeongsangnam-do: Forest event, Primary forest species, etc.
2. Natural environment
  - Changnyeong Upo wetland
  - National parks (Jiri, Gaya, Deogyu-mountain)
3. Main event
  - 293 World oriental medicine expo
  - 2011 UNCCD
  - Jinju Namgang Yudeung Festival
4. Forest Products: herbs, traditional liquor, foods etc.
5. Overview of Gyeongsangnam-do Arboretum
6. Topic products:
  - Product using Chamaecyparis obtusa
  - Product using Zamthoxylum schianifoliuon
7. Debris barrier and maintain presentation:
  - National Grand Prize Award: Milyang Jaeyak mountain

### Chungcheongnam-do Forest Environment Research Institute (A36)

12-2, Donam-ri, Banpo-myun, Gongju, Chungcheongnam-do,  
314-922, Korea

**Tel** +82-41-850-2632      **Fax** +82-41-850-2696

**E-mail** foreykr@korea.kr

**Website** www.keumkang.go.kr

We take charge of the creative and practical research and development of in the forestry.

And we also try to make the pleasant recreational forest facilities and present the models of the sustainable forest management in Chungcheongnam-do Forest Environment Research Institute.

Especially, we steadily carry out various projects to promote the chestnut industry to stand high as the main chestnut producing districts in Korea.

There are the major facilities, such as, Keumkang Recreational Forest, Keumkang Arboretum, the Forest Museum, and the Tropical Greenhouse in Chungcheongnam-do Forest Environment Research Institute in Gongju. And also,

there are Anmyondo Recreational Forest and Anmyondo Arboretum in Taean. For the near future, we make efforts to concentrate all kinds of wisdom and capability on holding the important position as the forestal and cultural place harmonizing the forest with a human being as the main institute of forest research in the central district in Korea.

### Gyeonggi-do Forestry Environment Research Center (A37)

332-4, Sucheong-dong, Osan, Gyeonggi-do, 447-290, Korea

**Tel** +82-31-8008-6655      **Fax** +82-31-374-2492

**E-mail** seedchoi@gg.go.kr

**Website** forest.gg.go.kr

1. Research to develop forest resources and increase income
2. Introduction of the provincial arboretum
3. Introduction of the provincial natural recreation forests
4. Local production, Pine nuts

### Blessed Land, Breathing Land, Gangwon-do (A38)

218-5 Sang-dong, Chuncheon, Gangwon-do, 200-140, Korea

**Tel** +82-33-248-6731      **Fax** +82-33-248-6709

**E-mail** jwchoi8334@korea.kr

**Website** eng.gwd.go.kr

The booth will introduce the beautiful natural environment that is only found in Gangwon Province.

Besides this, the Pyugchang International Olympic Winter Games will also be given a brief publicity.

The booth also aims to introduce the organization and the business of the forest research institute, and degree in which public relations are especially strengthened in the research.

### Korea Forest EXPO 2010 (A39)

77 Cheongong-no, Cheongok-dong 806, Gangwon-do,  
240-701, Korea

**Tel** +82-33-530-2550      **Fax** +82-33-530-2837

**E-mail** okdonghae@korea.kr

**Website** www.forestexpo.or.kr

Our booth is mainly focused on the 'Korea Forest EXPO 2010' which will be held in Dong-hae, Gangwon Province, 27~31 August 2010.

During the exhibition, its main purpose, programs and related festivals will be presented to improve public awareness of the role of forest as a driver of Green Growth of Korea and as a key factor to tackle global warming. Especially, this EXPO

will provide visitors with great opportunities to experience a wide array of forest products.

Landscape scenery and attractions of Donghae City will make this EXPO more charming and enjoyable. For further details on the Korea Forest EXPO 2010, please visit our booth.

### The Presidential Committee on Green Growth (B1)

14th Fl. Seoul Central Bldg., 136 Seolin-dong, Jongno-gu, Seoul, 110-729, Korea

**Tel** +82-2-735-2406 **Fax** +82-2-735-2162

**E-mail** kwkim@korea.kr

**Website** www.greengrowth.go.kr/english

The Presidential Committee on Green Growth was established under the auspices of the President to implement the national project on 'Low-Carbon, Green Growth'. This committee is a national version by President Lee Myung-bak during his address on 15 August 2008.

- 2010. 07. 13: Inauguration of the 2nd Chairperson, Dr. Yang Soogil and launching of the 2nd-phase Presidential Committee on Green Growth
- 2010. 07. 13: The 8th Meeting of PCGG was held and drafted comprehensive measures to foster and support green SMEs.
- 2010. 06. 16: Launching of Global Green Growth Institute
- 2010. 05. 24: Opening of renovated EGG Hall
- 2010. 04. 14: Enforcement of 'Framework Act on Low Carbon, Green Growth'
- 2010. 03. 26: The 2nd prior announcement of legislation of 'Enforcement Decree of the Framework Act on Low Carbon, Green Growth'
- 2010. 02. 17: Prior announcement of legislation of 'Enforcement Decree of the Framework Act on Low Carbon, Green Growth'
- 2010. 02. 03: The 7th Meeting of PCGG was held and selected the 7 action tasks for 2010.
- 2010. 01. 14: President Lee Myung-bak signed the bill of 'Framework Act on Low Carbon, Green Growth'.
- 2009. 12. 29: The National Assembly passed the draft of 'Framework Act on Low Carbon, Green Growth'.

### Ministry for Food, Agriculture, Forestry and Fisheries (B2)

Government Complex Gwachon, Jungang-dong, Gwacheon,

Gyeonggi-do, Korea

**Tel** +82-2-500-2439

**Fax** +82-2-503-7214

**E-mail** cnjung@korea.kr

**Website** english.mifaff.go.kr

Our booth, visualizing "Green Bird Nest", represents the Green Growth vision of MIFAFF. A nest is a place where newly born lives hatch, grow, and prepare themselves for the future.

Likewise, MIFAFF is a nest for Korea's Green Growth future.

Come and Join with us into the variety world of Green Growth of MIFAFF, which narrating, in particular, marine and agricultural environment, climate change, recycling, biomass energy, and green technology.

### Food and Agriculture Organization (FAO) of the United Nations (B3)

Maliwan Mansion, 39, Pra Atit Road, Bangkok, 10200, Thailand

**Tel** +662-697-4000

**Fax** +662-697-4445

**E-mail** Sverre.tvinnereim@fao.org

**Website** www.fao.org

We aim to promote particularly FAO related forestry activities, using different kind of visual materials such as posters, photos, publications, brochures, and CDs.

### Korea National Arboretum (B4)

415 Gwangneung Soomokwon-ro, Soheul-eup, Pocheon, Gyeonggi-do, 487-821, Korea

**Tel** +82-31-540-2032

**Fax** +82-31-540-2040

**E-mail** Kim9999@forest.go.kr

**Website** www.kna.go.kr

It is exhibited to four kinds of important mission of Korea National Arboretum.

It is widely known to 571 species rear plants and 328 species of endemic plants of Korea.

Korea National Arboretum makes special study of distribution, conservation, science of classification to rear and endemic plants of Korea.

Korea National Arboretum is constructed to set up a foundation for sustainable use of biological resources and the Herbarium holds a collection of more than 500,000 specimens.

Also, Korea National Arboretum is give service information to biological resources KNA.

Biodiversity information system is representative of biological

resources to plants and insect specimen and biological image. Korea National Arboretum is located in Gwangneung Forest. The Gwangneung Forest has been protected for over 540 years without humane disturbances. This temperate deciduous forest is one of the most beautiful forests and its scientific values in diversity and conservation has collected many interests of scientists even from abroad.

## Environmental Systems

### Research Institute (ESRI) (B5)

380 Newyork Street, Redlands, CA, 92373, USA

**Tel** +1-909-793-2853      **E-mail** [jmccormic@esri.com](mailto:jmccormic@esri.com)

**Website** [www.esri.com](http://www.esri.com)

ESRI® develops geographic information system (GIS) software solutions that function as an integral component in forestry organizations around the world. More than a million people use ArcGIS®, an integrated family of products used to make better forestry and land management decisions. ArcGIS® improve the way they create, visualize, manage, and analyze information for use in the field, on desktops, servers, or over the Web.

Forestry and land management research organizations use GIS to analyze complex integrated land management challenges, visualize problems, and create sustainable forest management plans and solutions. They are also increasing efficiency, reducing costs, and helping foresters and researchers make faster and better decisions. GIS improves the processes of communication and collaboration for better coordination across organizations to create strategic, operational and tactical plans.

These hundreds of thousands of individual GIS efforts contribute towards better management of our forests.

### Center for International Forestry Research (CIFOR) (B6)

Jalan CIFOR, Situ Gede, Bogor Barat, Bogor, 16115, Indonesia

**Tel** +62-251-8622622 (ext.638)

**Fax** +62-251-8622100

**E-mail** [K.PRAWIRANEGARA@CGIAR.ORG](mailto:K.PRAWIRANEGARA@CGIAR.ORG)

**Website** [www.cifor.cgiar.org](http://www.cifor.cgiar.org)

CIFOR advances human wellbeing, environmental conservation and equity by conducting research to inform policies and practices that affect forests in developing countries. CIFOR is one of 15 centres within the Consultative Group on International Agricultural Research (CGIAR).

### USDA Forest Service (B7)

333 Broadway SE, Suite 115, Albuquerque, NM, 87102, USA

**Tel** +1-505-724-3683      **Fax** +1-505-724-3688

**E-mail** [dbanegas@fs.fed.us](mailto:dbanegas@fs.fed.us)

**Website** [www.fs.fed.us](http://www.fs.fed.us)

The vision of the USDA Forest Service is to: restore and sustain forest landscapes; be resilient to climate change; and improve watershed health.

### International Tropical Timber

#### Organization (ITTO) (B8)

International Organization Center, 5th Floor, Pacific-Yokohama, 1-1-1, Minato-Mirai, Nishi-ku, Yokohama, Kanagawa, 220-0012, Japan

**Tel** +81-45-223-110      **Fax** +81-45-223-1111

**E-mail** [arai@itto.int](mailto:arai@itto.int)

**Website** [www.itto.int](http://www.itto.int)

ITTO activities and projects are aimed to promote the sustainable management of tropical forests.

### World Agroforestry Centre (ICRAF) (B9)

P.O.BOX 30677, Nairobi, 00100, Kenya

**Tel** +254-20-7224000      **Fax** +254-20-7224001

**E-mail** [N.KANYUGO@CGIAR.ORG](mailto:N.KANYUGO@CGIAR.ORG)

**Website** [www.worldagroforestry.org](http://www.worldagroforestry.org)

There will be Agroforestry publications, posters, DVDs. The Centre's products are on research whose vision is a rural transformation in the developing world where small holder households strategically increase the use of trees in agricultural landscape to improve their food security, nutrition, income, health, shelter, energy, resources and environmental sustainability.

The Centre generates science-based knowledge about the diverse role that trees play in agricultural landscapes and uses its research to advance policies and practices that benefit the poor and the environment.

### Forest Stewardship Council (FSC) (B10)

Charles-de-Gaulle-Strasse 5, Bonn, NW, 53113, Germany

**Tel** +49-228-367-6663      **Fax** +49-228-367-6630

**E-mail** [a.perezorojeza@fsc.org](mailto:a.perezorojeza@fsc.org)

**Website** [www.fsc.org](http://www.fsc.org)

FSC is an independent, non-governmental, not-for-profit organization established to promote the responsible

management of the world's forests.

Established in 1993 as a response to concerns over global deforestation, FSC's vision is that the world's forests meet the social, ecological, and economic rights and needs of the present generation without compromising those of future generations.

FSC provides internationally recognized standard-setting, trademark assurance and accreditation services to companies, organizations, and communities interested in responsible forestry.

### European Forest Institute (EFI) (B11)

Torikatu 34, Joensuu, 80100, Finland

**Tel** +358-10-773-4344      **Fax** +358-10-773-4377

**E-mail** [statu.ikonen-williams@efi.int](mailto:statu.ikonen-williams@efi.int)

**Website** [www.efi.int](http://www.efi.int)

The European Forest Institute (EFI) is the leading forest research network in Europe. EFI is an international organization established by European states to conduct and advocate for forest research, and to enhance forest research networking throughout Europe. EFI is also widely recognized as a valuable source of unbiased, policy-relevant information on forests and forestry. At the EFI stand you will find information about EFI in general, its networking, research, information and policy service activities.

### Asia Pacific Association of Forestry Research Institutions (APAFRI) (B12)

c/o Forest Research Institute Malaysia, Kepong, 52109, Malaysia

**Tel** +6-03-6272-2516      **Fax** +6-03-6277-3249

**E-mail** [secretariat@apafri.org](mailto:secretariat@apafri.org)

**Website** [www.apafri.org](http://www.apafri.org)

National posters of seven participating countries in ITTO funded project on forest genetic resources conservation and management.

Posters about APAFRI. publications, pamphlets and other printed materials produced by APAFRI.

### Asia-Pacific Network for Global Change Research (APN) (B13)

East Building 4F, Wakinojima Kaigan-Dori, Chuo-ku, Kobe, Hyogo-ken, 651-0073, Japan

**Tel** +81-78-30-8017      **Fax** +81-78-230-8018

**E-mail** [loralde@apn-gcr.org](mailto:loralde@apn-gcr.org)

**Website** [www.apn-gcr.org](http://www.apn-gcr.org)

The Asia-Pacific Network for Global Change Research (APN), established in 1996, is an inter-governmental network of 22 member countries that promotes global change research in the region, increases developing country involvement in that research, and strengthens interactions between the science community and policy-makers. The APN strives to enable the developing countries of the region to participate increasingly in, and to benefit fully from, cooperative research in the region. It assures that the research results contribute to the development of a sound science-based adaptation strategies, policy-and decision-making processes, and developing scientific capacity to address these important issues. Recognizing the interactive role of regional processes in the overall earth system, the APN also aims to link the initiatives it sponsors with related projects conducted in other regions and under the aegis of global-scale programmes.

### Wood Concrete Research, University of Northern British Columbia (B14)

3333 University Way, Prince George, British Columbia, V2N 4Z9, Canada

**Tel** +250-960-5107      **Fax** +250-960-6763

**E-mail** [schoi@unbc.ca](mailto:schoi@unbc.ca)

**Website** [www.unbc.ca/commerce](http://www.unbc.ca/commerce)

This Canadian University and Federal government sponsored exhibit showcases a novel green building material: wood concrete. Still in its product development stages, this Exhibit intends to stimulate industry interest towards commercialization. Wood concrete is composed of pine wood chips, cement, and water, and it provides significant economic, environment and social advantages versus traditional lumber and concrete building materials. This exhibit will feature: samples of wood concrete applications such as countertops, floor tiles, garden blocks and others. This Exhibit will also provide market research to inform industry of the market acceptance of this potential product.

### Forestry and Forest Products Research Institute, Japan (B15)

1 Matsunosato, Tsukuba, Ibaraki, 305-8687, Japan

**Tel** +81-29-829-8326      **Fax** +81-29-873-3797

**E-mail** [tgotoh@affrc.go.jp](mailto:tgotoh@affrc.go.jp)

**Website** [www.ffpri.affrc.go.jp](http://www.ffpri.affrc.go.jp)

The research activities of the institute are introduced by DVD

and posters. The institute brochure and research pamphlets are distributed to visitors.

### **Future Forests, Swedish University of Agricultural Sciences (B16)**

SLU, Umea, 901 83, Sweden

**Tel** +46-76-7645918

**E-mail** Annika.Nordin@genfys.slu.se

**Website** www.futureforests.se

Welcome to Future Forests, a research programme and a multi-stakeholder platform taking on challenges of tomorrow's forests and forestry.

Our stand will have posters describing our projects on forest biodiversity, on water and soil, on governance and water laws, plus on the history of forest use and controversies and more. There will also be information about Future Forests and our side event on 24 August.

We are always on the lookout for talented researchers to join our programme, so if you are one, come to see us. There will be information for you and meetings can be arranged with some of our senior researchers. There will also be information on our side event which will feature some of our best projects and speakers. Housed at the University of Agricultural Sciences and Umea University, we play host to researchers from a number of countries. Please go to [www.futureforests.se](http://www.futureforests.se).

### **Chinese Academy of Forestry (CAF) (B17)**

P.O. Box 38, CAF, Xiang Shang Road, Beijing, 100091, China

**Tel** +86-10-6288-9727      **Fax** +86-10-6288-4229

**E-mail** luwenming@caf.ac.cn

**Website** www.caf.ac.cn

CAF has made remarkable achievements as to providing scientific and technological support in line with the overall forestry development situation and key forestry programs. 60% of the research results have been applied in forest production, achieving outstanding social, ecological and economic effects, the key achievements will be display in the Exhibition.

### **Asia-Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet) (B18)**

16 North Street Hepingli, Beijing, 100013, China

**Tel** +86-10-8421-8108      **Fax** +86-10-8421-6958

**E-mail** wang\_qian@apfnet.cn

**Website** www.APFNet.com

APFNet is an open regional organization promoting and improving sustainable forest management and rehabilitation in the Asia-Pacific region. Since the establishment, influential conferences, workshops and regional policy dialogues have been held and three pilot projects are ongoing to build the capacity of sustainable forest management and lift people out of poverty in the region.

APFNet is willing to collaborate with all regional forest initiatives to promote and improve sustainable forest management and rehabilitation in the Asia-Pacific region through capacity-building, information-sharing, regional policy dialogues and pilot projects.

### **Government of Canada / Resources Canada (CFS) (B19)**

580 Booth Street, 12th Floor, Ottawa, Ontario, K1A 0E4, Canada

**Tel** +613-943-079      **Fax** +613-947-1208

**E-mail** clseguin@nrca.gc.ca

**Website** www.nrca-nrcan.gc.ca

Canada's forest policies and management practices are designed to evolve over time to reflect changing societal values and a changing environment. Canadian forest policy makers and forest managers draw from comprehensive forest research to apply new knowledge in such areas as the generation of renewable energy from forest biomass, the optimization of fibre quality and supply, and the development of next-generation wood construction products and systems. In response to climate change, Canada is developing options for improving the resilience of its forests to habitat impacts and to increased frequency of natural disturbances such as fire and forest pest outbreaks. Please visit Booth (B19) to explore innovative approaches, technologies and tools the Government of Canada is using to ensure the sustainable management of the nation's forests and the economic well-being of its forest communities.

### **International Forestry Students' Association (IFSA) (B20)**

Tennenbacherstarsse 4, Freiburg im Breisgau,

Baden-Wurttemberg, 79106, Germany

**Tel** +49-172-4525395      **Fax** +49-761-2033819

**E-mail** secretariat@ifsa.net

**Website** www.ifsa.net

The IFSA booth stand will provide an excellent opportunity for IFSA to give its sponsors, friends and all interested people an overview on what IFSA has done in the past and intends to do in the future.

The IFSA booth will not only hold the possibility to strengthen the bonds between IFSA and its professional partners, it will also be a meeting point where students and professionals can gather and discuss forest related topics, thus the IFSA booth attempts to encourage cooperation between forest students and international partner organizations. Through its booth IFSA hopes to enable participation in scientific debates and the involvement of youth in decision making processes and international forest and environmental policy.

At the booth IFSA students from all over the world will showcase IFSA's work and structure to the public.

### Elsevier B.V. (B21)

Radarweg 29, Amsterdam, 1043 NX, The Netherlands

**Tel** +31-20-485-3798 **Fax** +31-20-485-3809

**E-mail** j.grondman@elsevier.com

**Website** www.elsevier.com

Elsevier brings together the best research tools for the scientific community through a combination of journals, books, major reference works, scientific search engines and databases. Top-level journals such as Forest Ecology and Management, Forest Policy and Economics and Agricultural and Forest Meteorology demonstrate important and exciting researches published through Elsevier.

Science Direct When you publish with Elsevier, your article is also included in ScienceDirect, the world's leading provider of Scientific, Technical and Medical information-reaching over 11 million scientists and researchers worldwide.

Inquiries may be directed to Gilles Jonker, Executive Publisher at g.jonker@elsevier.com.

### Springer-Verlag GmbH (B22)

Tiergartenstrasse 17, Heidelberg, 69121, Germany

**Tel** +49-6221-487-8994 **Fax** +49-6221-487-8366

**E-mail** lothar.minicka@springer.com

**Website** www.springer.com

Springer is a major publisher of books and journals in Life Sciences. Please stop by our booth to order books at a special conference discount and take a closer look at sample issues of journals. Staff will be on hand to answer any questions you might have about publishing with Springer.

### College of Forest and Environmental Sciences / Kangwon National University (B23)

192-1, Hyoja 2-dong, Chuncheon, Gangwon-do, 200-701, Korea

**Tel** +82-33-250-8300 **Fax** +82-254-1998

**E-mail** dscha@kangwon.ac.kr

**Website** www.kangwon.ac.kr/~forest

Our products are introduced about the various activity by the college of forest and environmental sciences (CFES) at Kangwon National University (KNU).

The CFES consists of 34 faculties and the six departments: forest resource, forest biomaterials engineering, forest management, landscape architecture, paper science & engineering, forest environmental protection.

In the CFES the two institutes (Institute of Forest Science, Changgang Institute of Paper Science & Technology) and research forest (3,146ha) assist in the forest related researches. Particularly Tree Diagnostic Center and Forest Ginseng R&D Center belong to the institute of Forest Science.

Besides a business cooperation, Eco-Forest, is launched to generate profits from the products in the research forest. UNEP Eco-Peace Leadership Center (EPLC) is located in the CFES to collaborate on strengthening the capacity building of GOs/NGOs in Asia-Pacific Region.

The two R&D centers (Innovative Forest Disaster Prevention, The Baekdudaegan Mountains Forest Biodiversity) are conducting with the financial support (USD 130 mil./yr) of Korea Forest Service.

### Korea Forest Service & Korea Forest Research Institute (C1)

57, Hoegi-ro, dongdaemun-gu, Seoul, 130-712, Korea

**Tel** +82-2-961-2682 **Fax** +82-2-961-2699

**E-mail** mkkim@forest.go.kr

**Website** www.kfri.go.kr/eng

Exhibition of forest history and policies by era and results of forest researches Introduction of forest and forestry by section A, B, C, D, E Section A consists of reforestation and restoration field (part), and showing forest development by era Section B consists of sustainable forest management through forest survey, utilization of wood and production of byproduct in forest Section C consists of climate change and influence of climate change, prevention of forest fire and landslide and healthy forest against disease and

insects Section D exhibits mockup of forest carbon cycle community, forest and life and forest and education tools for children Section E explains the meaning and importance the “Baedudaegan” and green growth Korea and role of the Korea Forest Service Section F is a rest area for visitors.

### Forest Aviation Headquarters (C2)

244 Ogok-dong, Gangseo-gu, Seoul, 157-260, Korea

**Tel** +82-2-2166-4507      **Fax** +82-2-2665-8153

**E-mail** yong7210006@kgpa.or.kr

**Website** www.fao.go.kr

- Helicopter (AS-350)/Aerial spray, Wild fire

- Movie Clip DVD Title

- Brochure & Leaflet

- Panel of HQ's introduction

- Emergency Air Medical Rescue Equipment

### Sancheong County Hall (C3)

1 San & Cheong-ro, Sancheong-eup, Sancheong County, Gyeongnam, Korea

**Tel** +82-55-970-6931      **Fax** +82-55-970-7709

**E-mail** sinhy@korea.kr

**Website** eng.sancheong.ne.kr

2013 World Traditional Herbal Medicine Expo. (public information)

The herbal medicine industry of Sancheong County and research and development products.

The herbs of Jiri-mountain and herbal medicine heritage.

The dried persimon of Sancheong County and wild edible greens etc.

### Korea Green Promotion Agency (C4)

206 Honorsville Bldg., 1380-1 Dunsan-dong, Seo-gu, Daejeon, 302-121, Korea

**Tel** +82-42-603-7302      **Fax** +82-42-603-7310

**E-mail** junjh@kgpa.or.kr

**Website** www.kgpa.or.kr/eng

Korea Green Promotion Agency (KGPA) has been established by Korea Forest Service according to ‘The law for establishment and management of forest resources’ to manage Green Fund efficiently and to look after Overseas Forest Projects.

KGPA is promoting green health and welfare of people domestically with Green Growth paradigm and is developing overseas pilot projects and supporting overseas plantation

companies by securing appropriate lands and collecting information for investment, as well as consulting them. International forest cooperation with other countries is also important of us.

We are transferring the greening skill to developing countries and supporting international students through scholarships to bring up professional man power.

Korea Big Tree Project is an ambitious project to search for champion trees in Korea. KBT Project is to remind people of the pride and dignity of the Korean Green History and success in the greening history to be passed on to the next generation.

### Korea University (C5)

Korea University, Anam-dong, Seongbuk-gu,

Seoul, 136-701, Korea

**Tel** +82-2-3290-3469

**E-mail** yooseunghye@korea.ac.kr

**Website** www.korea.edu

The Department of Climate Environment of Korea University is putting emphasis on assessing global warming impact on ecosystem and seeking adaptation policies and strategies by using interdisciplinary education system of social and science.

The department has designated a special graduate school with financial aid for scholarship program and research activities from the Ministry of Environment.

### Korea Aerospace Research Institute (C6)

115 Gwahang-no, Yuseong-gu, Daejeon, Korea

**Tel** +82-42-860-2952      **Fax** +82-42-860-2605

**E-mail** kyh@kari.re.kr

**Website** new.kari.re.kr/english

The Korea Aerospace Research Institute (KARI), since its establishment in 1989, has been the driving force behind aerospace research and development in Korea as the leading national R&D institute in this field. The 21st century is an age of competition among countries in exploring the skies and outer space.

Korea hopes to strengthen its capacity in the aerospace field in accordance with its position as one of the top 10 economies in the world.

To this end, KARI is devoted to improving technological competitiveness in aerospace, contributing to technological independence and public well-being, and advancement into a world leading aerospace research institute.

### Department of Environment & Forest Resources, Chungnam National University (C7)

79 Daehangno, Yuseong-gu, Daejeon, Korea

**Tel** +82-42-821-5013      **Fax** +82-42-825-7850

**E-mail** Sangjin78@gmail.com

**Website** www.keumkang.go.kr

Chungnam National University, a major national university in Korea, is about to have a new beginning. With its 58 years of distinctive and proud heritage, continuous support and interest from the community, the generosity of 170,000 alumni and friends, and ceaseless endeavors in pursuit of excellence by 900 faculty members, 18,000 undergraduates, 5,000 graduate students, Chungnam National University will be leading the trend in the internationalization of higher education.

And the Department of Environment & Forest Resources educates students to learn knowledge needed for forestation and administration & management of forest environment and gives them ability to creatively apply related knowledge to their job after the graduation, aiming at sustainable development, use and conservation.

Department of Environment & Forest Resources eventually aims at fostering knowledge worker who are able to serve in biotech industries as well as resolve environmental problems in forest field which has become most important issue in the 21st Century.

### Seoul National University (C8)

599 Gwanak-ro, Gwanak-gu, Seoul, 151-742, Korea

**Tel** +82-2-880-4952      **Fax** +82-2-880-4836

**E-mail** leedk@snu.ac.kr

**Website** www.useoul.edu

Seoul National University (SNU), as a leading university in the Republic of Korea and ranked as the 47th Best University in the world in 2009, has been recognized for its leading role in Korean academia and research. SNU is committed to diversifying its student body and faculty, fostering global exchange, and promoting path-breaking research in all fields of knowledge. SNU now holds 16 Colleges, 1 Graduate School and 9 Professional Schools with 3,165 full-time faculty members, 15,976 undergraduate students and 10,054 graduate students. The mission of SNU in the 21st century is to create a vibrant intellectual community where students and scholars join together in building the future.

For 64 years, SNU has continued to produce graduates who will make crucial contributions in Korea's rapid economic development and global political system. SNU is also strengthening international collaboration on educational programs and research activities to meet the changing needs of national and international communities.

### Korea Forest Seed and Variety Center (D1)

670-4, Suhoe-ri, Suanbo-myeon, Chungju,

Chungcheongbuk-do, Korea

**Tel** +82-43-850-3331      **Fax** +82-43-850-3390

**E-mail** kks5122@forest.go.kr

**Website** www.kfsv.co.kr

The Korea Forest Seed and Variety Center (KFSVC) has been established in August 12, 2008 to aid the development of new varieties originated from the forest by providing clear guidelines to breeders and developers. KFSVC consist of two departments, one team and three branch offices, managing 702ha seed orchards. As a new government organization affiliated with Korea Forest Service, KFSVC will make every effort to make the current variety management system better so that it can be compatible to international standard. In the future, we are focusing on the following areas: 1) encouraging the development of new forest varieties through variety protection system; 2) establishment of the national management system of seed & seedling and improvement of productivity; and 3) establishment of the management system of forest genetic resources and activation of application.

### Forest Human Resources Development Institute (D2)

465-2 Janghyun-ri, Jinjeop-eup, Namyangju,

Gyeonggi-do, Korea

**Tel** +82-31-570-7321      **Fax** +82-31-570-7317

**E-mail** as0314@forest.go.kr

**Website** www.fhi.go.kr

- Panel (Curriculum Introduction)

- Brochure (Agency Information)

- Books (Published by FHRDI)

### Office of National River Restoration (D3)

88 Gwanmun-ro, Gwacheon, Gyeonggi-do, 427-712, Korea

**Tel** +82-2-2110-6347      **Fax** +82-2-504-1325

**E-mail** piaocj@korea.kr

**Website** www.4rivers.go.kr/new/eng



The Four Major Rivers Restoration Project of South Korea is to restore the Han, Nakdong, Geum and Yeongsan River, to provide water security, flood control and ecosystem vitality. It is intended to fundamentally prevent natural disasters like floods and droughts, protect the environment, especially the ecosystem, and promote history and cultural tourism. The project will help to create jobs and further economic growth, thereby broadening the horizon of country's green growth.

#### **National Forestry Cooperative Federation (D4)**

166 Seokchonhosu-gil, Songpa-gu, Seoul, 138-880, Korea

**Tel** +82-2-3434-7340      **Fax** +82-2-3434-7309

**E-mail** jgjang@nfcf.or.kr

**Website** www.nfcf.or.kr

The National Forestry Cooperative Federation (NFCF) was initiated in 1962 to protect the rights and welfare of forest owners and cooperative members as well as to promote the sustainable forest management practices.

Our members are comprised of 142 local cooperatives. The NFCF is structured into 5 divisions, 8 departments, 1 team, 9 provincial offices, 6 business centers, 3 training centers, and 2 overseas branches.

Our zone contains several sectors, such as History, Private Forest Management, Forest Products, Mutual Financing, Overseas Forest Development, Wood Pellet, Forest Mushroom R&D, Forest Engineering, Forest Resources Inventory, and Wooden House. In particular, the NFCF will take a leadership role in securing overseas forest resources on a long term and sustainable basis and at the same time will join international efforts to cope with climate change issues. You will see the future of forest and forestry in our exhibition zone.

#### **Northeast Asian Forest Forum (D5)**

2F, Poonsung Bldg., 133-110 Seongsudong-1ga, Seongdong-gu, Seoul, 656-1693, Korea

**Tel** +82-2-960-6114      **Fax** +82-2-960-6005

**E-mail** forester75@empal.com

**Website** www.neaff.org

Photo Exhibition on reforestation project conducted by Korea's forest NGOs (Forest For Life, Forest For Peace, Forest Community Foundation, Green Ranger, Seoul Green Trust, Northeast Asian Forest Forum, UNEP Eco-peace Leadership Center)

Information desk to share experiences of Korea's forest NGOs.

Forest environmental education programs and rest place.

#### **EAGON Industrial Co., Ltd. (D6)**

967-3, Dowha-dong, Nam-gu, Incheon, 402-060, Korea

**Tel** +82-32-866-0177      **Fax** +82-32-760-0955

**E-mail** hyoslee@eagon.com

**Website** www.eagon.com

EAGON Industrial Co., Ltd is now producing plywood and engineered wood flooring. EAGON provides high-quality building materials including structural wood, engineering wood, interior/exterior materials, special wood, and molding material from the world market through international corporations and branches and sells them in the Korean market. EAGON produces environmental-friendly products that are not restricted by the plant Quarantine law.

Particularly, we provide help to exporting companies seeking to establish competitive distribution.

For example, we make green Pallet, Cilp lok, C-box, and wooden pallets.

EAGON will also support the prosperous society by utilizing timber as a renewable resource.

Our basic goal is to protect our natural resource. So, we carried out reforestation in Solomon Islands. With many years of experience in tropical silviculture, EAGON has inextinguishable resources provided by the forest and nature. EAGON will ultimately contribute to the society through vigorous pursuit of our business operation in harmony with conservation principles.

EAGON will strive to preserve regional and global environments to leave valuable environmental assets for the next generation.

#### **IUFRO 6.07.03 Forest Culture and Cultural Forestry (D7)**

861-1 Jeongneung-dong, Seongbuk-gu,

Kookmin University, Seoul, 136-702, Korea

**Tel** +82-2-910-4811      **Fax** +82-2-910-4809

**E-mail** kwkim@kookmin.ac.kr

- ▶ Photos of cultural treasures of forest and wood culture in Korea
- Photos of mural picture of the universal tree of Koguryo
- Traditional Korean forest and mountain maps
- Rubbed copies and prohibited photos of landmarks of protected forest
- Photos of Tripitaka koreana (collection of Buddhist canons)

and literature)

- The first woodlock printed materials
- Lacquered wood crafts
- Photos of 8000-year-old pinewood boat, Koryo and Joseon ships
- Porcelain production and forests
- Edible salt production and firewood
- ▶ Wood samples of indigenous tree species of Korea
- ▶ Woodlock printing experience (woodlock objects and materials)
- ▶ Woodlock print experience (woodlock objects and materials)

### The Korean Society of Wood Science & Technology (D8)

#200 room 6205, Seoul National University, 599 Gwanank-gu, Seoul, 151-921, Korea

**Tel** +82-2-877-4781      **Fax** +82-877-4780

**E-mail** kswst@plaza.snu.ac.kr

**Website** www.kswst.or.kr

### Objectives

- Cooperation between wood science related academia, industry and government organization
- Development of wood science research and technology
- Forming friendships between members and enhancing rights of members Activity
- Conferences: Holding a conference once a year (about 200 presentations)
- Journal: Publishing scholarly journal, 'Korean Wood Science and Technology's, six times a year (about 80 papers a year)
- Others: Holding symposiums, Publishing education materials, Promoting Industry-University-Government Cooperation
- Introducing new technology to industrial field
- Proposing new policy to promote wood industry
- Holding workshops and seminars
- Training technicians
- Enactment of fundamental law for wood industry promotion
- Reformation of national professional accreditation system
- Standardization of wood products quality
- Training technicians in wood processing
- Reinforcement of international cooperation
- Holding International Symposiums
- Finance increasing
- Spreading wood culture

### Forest Nurseryman Association of Korea (D9)

689-5 Anyeong-dong, Jung-gu, Daejeon, 301-213, Korea

**Tel** +82-42-585-4676/7      **Fax** +82-42-585-4662

**E-mail** cs2020@hanmail.net

**Website** www.fnakorea.net

Our display items include Pine tree, Oak tree, Larch and seedling materials for the tree planting project.

### College of Forest Science, Kookmin University (D10)

861-1 Jeongneung-dong, Seongbuk-gu, Seoul, 136-702, Korea

**Tel** +82-2-910-4825      **Fax** +82-2-910-4809

**E-mail** ykkim@kookmin.ac.kr

**Website** forest.kookmin.ac.kr/en

Introduction of: College of Forest Sciences, Kookmin University.

Department of Forestry, Environment, and Systems.

Forest Products and Biotechnology Institute of Forest Science

### The Korean Forest Society (D11)

57, Hoegi-ro, Dongdaemun-gu, Seoul, 130-712, Korea

**Tel** +82-2-965-0454      **Fax** +82-2-965-0455

**E-mail** Kfs21@hanmail.net      **Website** www.kfs21.or.kr

We display and distribute the hard copies of journals from the society (Journal of Korean Forest Society, Forest Science and Technology).

This booth has been (designed and) established to introduce the history and organization of the Korean Forest Society (KFS), forestry-related administration and research institutes, the performance of major projects of the KFS, and the projects that the KFS is currently carrying out. Also, in this booth, we provide information on Korean traditional village groves, characteristics of the traditional Korean timber building, and bamboo products in the southern region. In addition, the well-known mountains in Korea as well as the forestry and trees designated as natural monuments are introduced in this booth.

### International Garden Exposition Suncheon Bay Korea 2013 (D12)

92 Jangmyoung-ro, Suncheon, Jellanam-do, Korea

**Tel** +82-61-749-4229      **Fax** +82-61-749-3263

**E-mail** jaetwin@korea.kr

**Website** www.2013expo.or.kr

International Garden Expo Suncheon Bay Korea 2013 For the first time in Korea, an international garden expo will be held in Suncheon City.

Lasting for a period of six months (20 April – 20 October , 2013), this festival will offer spectacular gardens full of stunning beauty for people from all around the world.

Covering over 152 ha, the International Garden Expo Suncheon Bay Korea 2013 will offer outstanding recreational facilities, world gardens, ecological theme parks, exhibition halls, and Suncheon Bay, one of the world's top 5 wetlands.

The exhibition area can effectively be re-used by the community without the need for remodeling or removal.

The Expo will create a new model for urban development by preserving the natural habitat of Suncheon Bay and prevention of flood.

Harmonizing with nature and environment is the goal of International Garden Expo Suncheon Bay Korea 2013.

This dream will come true in Suncheon. We invite you to experience the harmony and beauty of Suncheon.



The Congress Daily (23 August 2010)



## Delegates stream into Seoul

An impressive 1,168 participants from 100 countries streamed in to Seoul through Incheon International Airport on Sunday en route to attending the XXIII IUFRO World Congress - only the third to be held in Asia in its 117-year history. Meanwhile, the nearly 600 Korean participants turned to trains, buses, cars, and subways for their shorter journeys.

Participants poured in from six continents. By far the most (57%) hailed from Asia, followed by Europe (20%) and North America (11%). From South America (sending 2.5% of attendees), four Uruguayans flew a record 19,594 km from Carrasco International Airport to notch the farthest distance traveled. After tiring flights, they were greeted at the airport by smiling Congress staffers, who whisked them onto limousine buses for the ride to Seoul.



Sunday's registration process went smoothly thanks to hard-working staffers operating the computerized sign-up system.

Later in the day, another treat was in store for first-time participants. At an introductory session, leaders from IUFRO and the Congress Organizing Committee and Congress Scientific Committee shared insiders' tips on making the most of every minute, raising anticipation a

few notches. They shared "best practices" for exchanging information, making contacts with fellow researchers, and building partnerships on research projects through involvement in IUFRO activities.

## Welcome to IUFRO 2010!



### Greetings, IUFRO delegates!

On behalf of the XXIII IUFRO World Congress Organizing Committee, and as director general of the Korea Forest Research Institute, the host organization, it is a sincere privilege and a pleasure to extend my gratitude toward all participants of this IUFRO World Congress.

The title of this Congress is "Forests for the Future: Sustaining Society and the Environment." As a key forum for international cooperation on forest science, this Congress will present a crucial opportunity to promote understanding of the contribution of forests and forest science to the Earth's sustainability.

This Congress will include a number of social events to ensure that you also experience the culture and traditions of Korea and Seoul. In addition, the In-Congress Tours will allow you to see firsthand as much of Korea's landscapes, culture, forests, and forestry as time allows.

The Congress Organizing Committee will do everything within its capacity to ensure that you not only experience an outstanding Congress, but also that you experience a Korean adventure that will last a lifetime!

Forests are life; forests are hope; forests are the future. It is our sincere hope that all participants in the XXIII IUFRO World Congress will find new hope for a greener future in Seoul, Korea.

**Choi Wan-Yong**  
Director General, Korea Forest Research Institute



## Spotlight: Korea's forests



**With 65% of its land area under forest cover, Korea boasts a long history of its people living in close harmony with forests.**

Forests have always been at the heart of Koreans' traditions, culture, and environment. However, during the turbulent parts of the 20th century and the Korean War, forests across the nation were denuded by illegal cutting and overcutting. In the 1950s, the growing stock volume per hectare was 5.7 m<sup>3</sup>, only 5.5% of today's figure.

To re-green the country, the country initiated the Rehabilitation Project with the launch of the First National Forest Plan of 1973-78. During these years, more than one million hectares of denuded lands were restored.

Since the late 1960s, over one billion trees have been planted, backed by strong public involvement. Recently, as Korea emerged as a leading world economy, one of the key growth engines driving the breathless pace of economic growth has been reforestation and sustainable forest management.

Lester Brown, author of the bestsellers *Plan B 2.0* and *Plan B 3.0*, applauded Korea's successful achievement in reforestation, saying, "South Korea is a reforestation model for the world. We can reforest the Earth!"

## Cultural tip: Name cards

**If you forgot to bring a couple of boxes of business cards to Seoul, don't fret: it's not too late to track down a printing house and order some up!**

Koreans are fond of exchanging cards when they meet somebody new, so it always pays to keep a handful (or better yet, a couple of dozen) at your fingertips when you're moving about Korea in business, professional, and social circles.

The custom here is to present your card using two hands and inspect any card you receive. Try and present your card before asking for one.

When receiving a card, you may nod your head as a gesture of respect (especially toward people who are your senior) and thank the person for the opportunity to meet with them. Finally, never write on someone's card in their presence!

## Keynote presentation

**Presenter:** Ko Un **Country:** Republic of Korea

**Title:** An Act of Grace from the Forest:  
How Is Absolution Possible?

**Time & Place:** 11 a.m. to 12 p.m. in Hall D2, third floor



A renowned Korean poet, Ko Un is the author of more than 150 books of poems, novels, and literary criticism, at least 60 of which have been translated into 25 languages. His best-known works include *Mount Baekdu*, an epic poem; *Maninbo* (Ten Thousand Lives); and *Collected Literary Works of Ko Un*.

Ko Un lectured as a visiting professor at Seoul National University from 2007, and since 2009 he has served as chair professor at Dankook University in Seoul.

Previously, Ko Un gave a series of lectures on modern Korean poetry at the University of California at Berkeley, in 1998, and was a Visiting Research Scholar at the Yenching Institute of Harvard University. The same year, he was invited to the World Academy of Poetry in Verona, Italy, representing Korea.

## What's going on . . .

- There's no cooler way to start things off today than attending the Opening Ceremony, held in Hall D2 on the third floor from 9:30 a.m. sharp. Arrive as early as possible to find a good seat! You'll be welcomed by IUFRO President Don Koo Lee and other invited Korean dignitaries, and feted with a colorful Korean performance. The 11 winners of Scientific Achievement Awards and one Host Scientific Award will also be announced.
- The Trade Exhibition revs into action today in Halls C3 and C4. Check out the latest products and technologies that companies and research bodies have been developing in and for the forestry sector.
- IUFRO Business Sessions for Research Groups, Working Parties, and Task Forces begin today. Today's meetings run from 3 p.m. to 3:30 p.m., sandwiched between the Sub-plenary and Technical sessions. These sessions are meant to address the administrative and business issues of respective IUFRO units.
- Are you wiped out after long first day? Shake off your jet lag for this not-to-miss event. The Welcome Reception runs from 6:30 p.m. to 9 p.m. in Hall D1. Come and join this entertaining "ice-breaker" to catch up with old forestry pals and make new friends while enjoying some delicious foods and refreshing beverages.

## Congress News



Monday 23 August 2010  
www.iufro2010.com

### The transcript

182 participants from developing countries are benefiting from IUFRO's Scientist Assistance Program (SAP), which supports their attendance at the Congress and Pre-Congress Training Workshops. We spoke with SAP recipient Floribel Paras, a lecturer at the University of the Philippines with research interests in community forestry and development communications.

#### Did you find the Forests and Human Health workshop useful?

I found it extremely helpful. We did not only talk about human health. We also had other aspects not only useful for research but communication of research. We had sessions with GFIS, and science-policy interface, so all in all the collaborative teaching style was very good. What I appreciate most is the intercultural perspective I have gained from my workshop mates and other participants.

#### What are you looking forward to the most this week?

I am very interested in the themes related to impacts of climate change. And I want to go to sessions regarding forestry education, because I'm a teacher and I want to know about new techniques. Certainly it's going to be interesting, that I know.

#### What are you doing research on these days?

I did a study on attitudes and perceptions of selected publics toward the forestry profession. I used the Implicit Association Test, which has a social psychological background.

#### You've been in Korea about a week already. How are you adapting to Korean food?

"It's very similar to our food [in the Philippines]. It's not so much a departure from where I come from. I love it."

### Korea Post issues stamp



Korea's postal agency issues a new commemorative stamp today to celebrate Korea's historic hosting of the XXIII IUFRO World Congress.

The seven-color octagonal stamp shows people and animals set among trees of varying shades of green to illustrate the stamp's theme, "Trees and Life."

The Korean War and other hardships of the 20<sup>th</sup> century left Korea's landscape stripped bare. This stamp celebrates the successful reforestation efforts since those times, during which time more than 10 billion trees were planted.

A full 16-stamp sheet of these lovely stamps has been included in every delegate's registration packet!

### Tree planting ceremony



Seoul Forest just became a little greener after eight indigenous pines were planted.

Observing a long-held International Union of Forest Research Organizations tradition, a tree-planting ceremony launched the XXIII Congress yesterday at Seoul Forest, just ahead of this morning's Opening Ceremony.

A high point was the planting of an offspring of one of Korea's most beloved pine trees, the 15-meter-tall, 600-year-old "Jeongipum" red pine located at Songnisan National Park.

This achievement is the product of hard-won efforts by Korean forestry scientists to breed the revered Jeongipum pine - a registered National Monument - with a mother tree to propagate it.

In his remarks, Choi Wan-Yong, KFRI's director general, explained the origin of the tree's name. "According to legend, King Sejo was on a road, and a *sonamu* [pine tree] bowed in courtesy. The king praised it and granted the tree the high-ranking position of 'Jeongipum.'

IUFRO President Don Koo Lee and Seoul Vice Mayor Kwon Young-Kyu also addressed the crowd of 100, which sat sheltered from the sun beneath a white tent.

Participants also planted eight Geumgang pine saplings in Seoul Forest, a grand new urban park fronting the Han River. The city opened the park in 2005 on land that once hosted a water treatment facility, a golf course, and a horse race track.

The group was regaled with music by the Rainbow Children's Choir, who were joined by delegates in digging up soil and planting the trees.

### Pre-Congress workshops



Forestry scientists from 28 countries including Brazil, Ghana, Thailand, and the Philippines converged on the campus of the Forest Human Resources Development Institute east of

Seoul last week for a training program aimed at boosting research capacity in developing countries.

During the five-day pre-Congress workshops, 21 trainers led sessions in four areas that IUFRO has worked on intensively: forests and climate change, forest-water interactions, traditional forest knowledge, and forests and human health. Participants also learned or reinforced skills in information management and science-policy interfacing.



## Congress footprints



Park Jung-Hwan, the chair of the Congress Organizing Committee, welcomes first-timers at Sunday's Introductory Session.



The Rainbow Children's Choir added music and color to the Tree Planting Ceremony.

Buckling down for studies in the traditional forest knowledge section of the Pre-Congress Training Workshops held last week in Namyangju.



It's all smiles for Malaysian participants in the Pre-Congress workshops. (clockwise from top, L-r) Nazratul Raudzah Abd Rahman, Nor Azni Jafar, Syuquiyah Abdul Hamid, and staffers Megan Park and Leah Shim.



Congress staffers stayed busy on Sunday as participants lined up in Hall C1 to register and pick up a Congress kit.



Korea Forest Research Institute Director General Choi Wan-Yong greets participants at the Tree Planting Ceremony.

## IUFRO Board shapes future direction



**IUFRO Board members had touched down and were hard at work in Seoul for close to a week before most delegates had arrived.**

Members charted out the strategies that will guide IUFRO in the near and long term over three days of Board and Management Council meetings last week.

"The five-year strategy we discussed will cover six focal areas, which are forests for people, biodiversity, forests and water,

forests and climate change, bio-energy, and resources for the future," said Peter Mayer, IUFRO's executive director.

They also discussed support for conventions and institutions related to forestry, including the UN CBD in October and the UNFCCC in December; strategy for IUFRO's eight divisions; progress made over the past five years; and the organization's scientific priorities.

At a Friday dinner of Korean cuisine attended by Minister Chung Kwang-Soo of the Korea Forest Service and Choi Wan-Yong, the director general of the Korea Forest Research Institute, Board members thanked KFRI and the Korea Forest Service for their excellent support to IUFRO over the past five years. "The Board also thanked Professor Don Koo Lee for his leadership of IUFRO over the last five years," noted Mayer.

## Did you know?

Within the modest area of 99,000 sq. km, Korea boasts a rich diversity of animal and plant life. Some 33,253 species have been identified to date, divided among 21,168 animals, 4,130 plants, 2,078 fungi, 4,657 protists, and 1,219 prokaryotes.

Several factors have contributed to Korea's diversity, beginning with the peninsula's geographical position, stretching from Northeast Asia out toward Japan, and the fact that mountains and hills occupy fully 70% of its land area.

The presence of a major north-south mountain range (the Baekdu-daegan), and several sub-ranges branching off them, and the existence of 3,400 islands, provide a range of habitats for varied flora. Different climatic zones, ranging from warm temperate to boreal climate, also provide conditions for diverse plants to grow. Another contributing factor is the low frequency of earthquakes and volcanic activity.

Tuesday August 24, 2010 [www.iufro2010.com](http://www.iufro2010.com)

## The Congress Daily



### A truly presidential welcome

Five onstage drummers boomed the message out clearly yesterday: It's time to savor the fruits of five years of hard work!

Thousands of participants who filled a colossal hall to witness the XXIII IUFRO World Congress Opening Ceremony heard that message. None other than Korean President Lee Myung-Bak also turned out to mark the occasion.

First, welcoming the crowd in several languages, IUFRO President Don Koo Lee urged on green-growth practices to address climate change and a decline in forest cover worldwide.

President Lee, who in 2008 established "low-carbon green growth" as a national vision, then took to the stage. Noting that in only two generations his country's once-barren landscape had been reforested, he called Korea "one example of how we can attain economic growth and protect the environment at the same time."

Eduardo Rojas-Briales, an assistant director-general at the Food and Agriculture Organization, called forests a "major variable in managing climate change" while also cautioning that forestry was at a crossroads amid declining revenue and increasing demands.

Although invited, UN Secretary-General Ban Ki-Moon could not attend. His message was conveyed through Jan McAlpine, the director of the UN Forum on Forests Secretariat. The UN has declared 2011 the International Year of Forests, and Ban encouraged all IUFRO members to help observe it.

No party is ever complete without prizes and entertainment. Fitted into the morning lineup were an awards ceremony, a traditional Korean dance, and a touching children's rendition of the Congress title.



Top, above: Korean President Lee Myung-Bak addressing delegates, and a children's perspective on the Congress title.

### Forestry leaders lay out an ambitious 'to do' list



Given the thickness of its program book, you'd be hard-pressed to imagine that the Congress's breadth could grow further. Well, guess again! IUFRO officers and Congress organizers intend to push the envelope much, much further.

Their shortlist of "things to do," as outlined

to the press yesterday, calls for expanding the global public's perception of forestry, getting foresters interfacing with more professions, and sharing Korea's successful reforestation efforts with other countries.

In the past, the IUFRO Congress was a forum mostly for foresters, said KFRI Director General Choi Wan-Yong. "But now, the discussion includes not only foresters but other scientists, economists, and environmental researchers."

And given the growing focus on quality of life and recreation, he continued, the Seoul Congress will work to move forestry's identity beyond that of a primary industry to highlight its role as an "environmental service

industry" while also tackling urgent issues like deforestation and illegal logging.

Peter Mayer, IUFRO's executive director, asserted that the organization's "three key goals" will all be advanced in Seoul. High-quality research will be promoted through nearly 3,000 scientists, partnerships forged with regional and global organizations, and scientific findings communicated to global decision makers.

Some 70 press agencies from six countries have registered their credentials at the Congress so far. That's one indication that the messages delivered here will be spread well beyond COEX's walls.





## Keynote presentation

**Presenter:** Frances Seymour **Country:** Indonesia

**Title:** Forests, Climate Change, and Communities:

Making progress up the learning curve

**Time & Place:** 11 a.m. to 12 p.m. in Hall D2, third floor



As director general of the Center for International Forestry Research, based in Indonesia, Frances Seymour has laid out the plans for and established a new organizational strategy focused on six priority research areas. She is a co-author of the CIFOR report, *Do Trees Grow on Money?*, and a contributor to *Moving Ahead with REDD and Realising REDD+*.

Before taking the helm at CIFOR, Ms. Seymour directed the Institutions and Governance Program at the World Resources Institute in Washington, D.C., where she guided the launch of a global coalition promoting citizen participation in environment-related decisions. She also critically examined the role of public and private international financial institutions in promoting sustainable development. Earlier, she spent five years in Indonesia with the Ford Foundation focusing on community forestry and human rights. She has written or contributed to numerous publications on forestry, environmental, and development issues in Asia, Africa, and Latin America.

## What's going on . . .

- The first International Council Meeting will run from 4:30-6:30 p.m. today in the Grand Ballroom (103), in parallel with the Technical Sessions. Attendance is by invitation.
- The Trade Exhibition continues today in Halls C3 and C4 from 10 a.m. to 6 p.m. While there, it's hard to miss the "Big Korean Trees" photo exhibit and an 80-photo display of fantastic Korean landscapes entitled "Colors of Korea."
- Poster viewing officially kicks off at noon today in Hall C2, part of C1, and between Rooms 307 and 308 for In-Session Poster Presentations. Learn about your colleagues' research while viewing some of the 1,148 mounted posters. What's more, a free lunch is on offer! Sandwiches and drinks (2,000 per day) along with desserts will be provided on a first-come basis.
- Business Sessions will be held today from 3:30-4 p.m. immediately after the Sub-Plenary Sessions. These sessions are intended for administrative and business issues of the respective IUFRO units.

## The transcript

*As chair of the Congress Scientific Committee, John Parrotta can be compared to a ship's captain charting a course for the Plenary, Sub-Plenary, and Technical sessions. Despite his work demands, Parrotta spared a few minutes to speak with us.*



### What principles guided the selection of this Congress's theme?

Forest scientists as a community are always looking forward; it's the nature of our work. We do it to enhance sustainability, and we're also working for the people, whose lives, economy, and daily needs depend on the forests. There's been more balance over time between the biophysical and the social sciences as relates to forests. So this [theme] is kind of a philosophical statement about our profession as forest scientists.

### How is the scientific program here different from the one five years ago in Brisbane?

There are many similarities, but I'd say two themes very strongly emphasized compared with the previous Congress are climate change, a very fast-developing area of forest science, and biodiversity. This is the International Year of Biodiversity, and we want to highlight that at this Congress. The number and variety of sessions that deal with biodiversity, both conservation and sustainable utilization, show its importance.

### Did the Congress's location in Asia influence the scientific program?

We selected Asia as one of nine main themes for the Congress. Since we're in Korea, there's tremendous involvement of scientists from Korea. The three big countries represented on the program are Korea, China, and Japan. The involvement of obviously Korea and also China is much greater. That's great news.

A lot of excellent proposals had an Asian focus and that's great. You'll see Korean, Japanese, Chinese, Indian, and Malay scientists giving presentations in all the themes. The location of the Congress influences people's ability to attend. Among the presenters, by my count we have participants from 20 countries in Asia and 1,200 presentations. That's more than half the total. There are Asian scientists involved in all the sessions.

### What has it been like putting this together?

It required a lot of organization to handle all the details and variables. But it's been a good experience that required a lot of coordination with people here in Korea. It was a huge amount of work since the beginning of January. I learned a lot about fields I haven't been involved in before.

## The Congress Daily (24 August 2010)

### The Congress Daily



Tuesday August 24, 2010  
www.iufro2010.com

## Hats off to the winners!

Eleven forestry scientists enjoyed a special moment in the spotlight on Monday as they walked onstage to accept a Scientific Achievement Award at the Opening Ceremony. IUFRO's Honours and Awards Committee selected them from a large pool of excellent candidates for their distinguished research in fields covered by IUFRO. The single Host Scientific Award went to Korean tree physiologist Hong Sung-Gak, a member of Korea's National Academy of Sciences since 1995.



Top, above: HSA winner Hong Sung-Gak and the 11 SPA winners.

## The inside scoop

If you missed a Technical Session you were hoping to attend, all hope isn't lost. To the rescue comes the International Institute of Sustainable Development Reporting Services, whose Web site supplies reports and summaries of each day's scientific program in real time. Visit <http://www.iisd.ca/ymb/forest/iufro/iufroxxiii>.

As the sun sets, a full lineup of 21 side events begins. Most of the 6:30-8:30 p.m. events are open to all, including tonight's IFSA students' charity event in Room 307BC. Refer to your program book for rooms, times, and contact details.

IUFRO has new members! The Board accepted 10 new organizational and seven new associate members at its annual meeting last week, including the South Africa-based Forestry and Agricultural Biotechnology Institute. With its latest additions, IUFRO boasts 641 organizational and 149 associate members.

The Tour Desk is proving to be very popular. But it should cool down today, as the deadline for changes and reservations has passed. Those who've secured a seat should gather in front of the Tour Desk in Hall C1 at the time listed in the program book. For anyone with special dietary requirements, vegetarian and glucose-free lunch boxes are available.

Is jet lag plaguing you? While no foolproof cure exists, experts say that getting outdoor exercise and eating protein- and carbohydrate-rich foods can speed up recovery. Avoid coffee and alcohol. Vitamin supplements are said to help, along with one local remedy: Korean red ginseng.

Do you want to go wireless? Head to the SK Broadband booth in 1F, where you can purchase vouchers for four-hour or daylong wireless Internet service throughout the COEX complex.

## Trade Exhibition launched

Those itching to learn about the latest products and innovations in the forestry sector need venture no farther than our own convention halls!

A weeklong Trade Exhibition opened yesterday in Halls C3 and C4, where 82 Korean and overseas companies and organizations are displaying their products and technologies in 242 booths.

Korea Forest Service Minister Chung Kwang-Soo led a get-acquainted tour for 13 delegates including Minister for Food,

Agriculture, Forestry and Fisheries Chang Tae-Pyong.

"This exhibition, linked with the XXIII IUFRO Congress, will be a great opportunity to show the know-how and technologies our country has implemented," said Kim Myung-Kil of KFRI. "It will also be a great opportunity to understand valuable information and recent trends of forests in their role in dealing with climate change and achieving low-carbon, green growth."

Interactive booths let visitors take a virtual "forest tour." Woodsy paths scented with phytoncide add to the forest ambience. And if that's not enough, have a peek at the Photo Gallery's "Colors of Korea" exhibit by acclaimed Korean photographer Lee Tae-Hoon.





## Congress footprints



IUFRO President Don Koo Lee shows his appreciation to Korean poet Ko Un at Monday's Plenary Session.

A lovely Korean traditional dance troupe capped off the Opening Ceremony.



Students rest weary legs at the International Forestry Students' Association booth in the Trade Exhibition. Seated (3rd, 4th from U): IFSA President Catherine Pater and former President Florent Kaiser.



Korea's Food, Agriculture, Forestry and Fisheries Minister Chang Tae-Pyong (right) and Korea Forest Service Minister Chung Kwang-Soo (left) inspect a wooden bed with charcoal inside at the Trade Exhibition.



It's standing room only at Monday's Silviculture and global change Technical Session organized by Kevin O'Hara of the United States and Jürgen Bauhus of Germany.



At yesterday's Plenary Session led by Korean poet Ko Un.

Documents laid out by the Food and Agriculture Organization at the Trade Exhibition provided much food for thought among passing delegates.



## Venue going green



Within the vast COEX complex serving as Congress venue you'll find over 100 restaurants, two deluxe hotels, an aquarium, and even a kimchi museum!

Behind the scenes, the management is working hard to paint COEX "green."

Special software analyzes gas, electrical, and water use to calculate the most efficient ways to maintain the facilities. Gray water is recycled for re-use in toilets, cutting carbon emissions by 83 tons a year. Alternative energy experiments are also under way, including the use of solar energy generators, solar-powered streetlamps, and a wind turbine.

In addition, more than 1,490 fluorescent and incandescent lights have been replaced with LED lighting, cutting CO<sup>2</sup> emissions by 52 tons a year.

Three green spaces have also been carved out: the ASEM garden, the Piano Fountain garden, and the Exhibition Hall roof garden. To find one, refer to a COEX map or consult with a green-shirted helper.

Be sure and check out one of the gardens in your spare time!

## GFIS quiz

Enter the GFIS Quiz for a chance to win up to US\$600 in future business trip expenses! Just swing by the GFIS booth in Hall C1 and complete the 10-question survey.

The Global Forest Information Service is a IUFRO-led partnership of 14 major forest-related organizations serving as a one-stop Web gateway linking users to forestry-related news and resources from around the world.

Friday is the entry deadline. Winners of the three prizes – \$600, \$300, and \$100 – will be announced on August 31 at [www.GFIS.net](http://www.GFIS.net).

## The Congress Daily (25 August 2010)

Wednesday August 25, 2010

www.iufro2010.com

# The Congress Daily



## Posters proving to be a feast for the eyes



More than 1,100 posters add splashes of color - and reams of scientific knowledge - to the main Congress hall after delegates hung them for viewing yesterday. They will remain up all week long.

Fantastic-looking posters - not to mention a free lunch - proved to be crowd-pleaser.

At noon yesterday, you couldn't miss the line of delegates snaking from the poster viewing area in the middle of Hall C1 out the entrance and down the hallways. A half hour later, however, the situation had quieted down somewhat as yellow lunch boxes found their way to hungry participants.

A total of 1,148 posters were registered and grouped into eight themes including "Forests and Climate Change" and "Asia's

Forests for the Future." Poster presenters stayed on their feet, busily explaining their research to interested visitors. Some posters were an eye-ful, drawing 10 or more viewers at a time.

"I think it is one of the best sessions," said Janet Ohmann of the United States. "It has the best layout, good lighting, fun rooms, and [it's] well organized."

Fitri Nurfatriani of Indonesia said: "Through this session I can see results related to my specific interest, update additional information,

methodology, objectives, et cetera. It is very fruitful for the reach of my knowledge in preparing for my next research."

Visitors who gathered in groups for lunch and chitchat later dispersed hither and yonder for the viewing. Some found a spot to sit down and eat first while others just dived headfirst into the maze of flashy posters.

The best posters in each theme will be announced on Friday by the IUFRO Board. Winning delegates will find a traditional Korean ribbon attached to their poster.

## 'Make the best use of this moment,' urges Frances Seymour



Frances Seymour proposes three strategies for foresters to capitalize on their profession's radically changed agenda.

Forestry stands at a critical juncture in history, says Frances Seymour. Now is a time when a whole body of research on forests and communities is reaching maturity and a new agenda focused on carbon sequestration has been thrust upon the profession.

And Seymour, the director general of the Center for International Forestry Research who was the Congress's keynote speaker Tuesday, wants the profession to make the best use of this moment. To speed up the progress of research, she proposes three key strategies. The first is to communicate what is known to policy makers and practitioners in the climate change arena. "What seems like conventional wisdom to us may be fresh insights to them," she told reporters yesterday.

She also urges fellow scientists to be more deliberate about research design by building in data collection efforts at an early stage with the people designing projects. And finally, she challenged the forestry community, saying: "Be brave and ambitious enough to

think about launching big science on forest communities and climate change across many countries and many sites." By doing so, scientists can develop the metadata sets from which to conclude what works and under what conditions.

Asked whether the REDD agenda can be effective at preserving forests, she explained that it acts as a "Rorschach test" in that some see disaster and others see huge potential. "REDD will do the research and find out."

"We're proud we were able to get Frances Seymour to come here to Seoul Korea," said Niels Elers Koch, IUFRO vice-president, noting that climate change will be one of the organization's cross-cutting themes for the 2010-2014 strategic period.



## Keynote presentation

**Presenter:** Jose Joaquin Campos Arce    **Country:** Costa Rica  
**Title:** Integrating scales and sectors to foster sustainable livelihoods, landscapes and forests  
**Time & Place:** 11 a.m. to 12 p.m. in Hall D2, third floor



Jose Joaquin Campos Arce is director general of the Tropical Agriculture Research and Higher Education Center (CATIE), a Costa-Rica based international organization which oversees about 100 research and development projects across Latin America. He is also an adjunct professor at Laval University in

Canada and a member of the External Advisory Group (forestry) at the World Bank. His presentation will discuss recent advances and emerging issues in forest genetic resources.

Previously, Campos served in a variety of positions at CATIE including director general and director of the Department of Natural Resources and Environment. During his 30 years of professional experience, he has published more than 100 papers. He holds a Ph.D in forest sciences from the University of Oxford, U.K.

## President invites all comers

*Wednesday's President's Discussion has been opened to all delegates – for the first time in IUFRO World Congress history.*

As climate change and renewable energy emerge as hot-button issues, the demand for forestry education is growing. But it's certainly not a priority everywhere, and forestry education faces declining numbers in some locations.

President Don Koo Lee plans to discuss the needs and elements required for effective forestry education by answering questions like "What constitutes modern forest education?", "Is traditional forest education still relevant?", and "Should the forest sector include more specialists from outside the sector?"

The session in Room 401 (fourth floor) will last two hours and include statements by the IUFRO president, presentations by three panelists, and time for comments and responses by additional panelists. Those planning to attend are encouraged to find a seat by 3:30 p.m. Don't miss this opportunity!

## Side Events packing a punch



At left, participants in the Forest culture conference and cultural performance and (right) forestry students whoop it up at the IFSA students' charity evening.

*A rewarding, but perhaps overlooked, route to having your voice heard by the scientific community and being updated on the latest projects is to attend an evening Side Event.*

"They aim to provide a slot for a diverse range of stakeholders and international partners of IUFRO to inform about their activities and interact with the forestry science community gathered at this Congress," said Alexander Buck, IUFRO's deputy executive director.

After opening on Tuesday, Side Events continue this evening, with 21 planned for 6:30 to 8:30 p.m. All room numbers are listed on page 44 of the program book, and include e-mail contact addresses.

The offerings are myriad. A German forestry certification body will present global strategy, and seek feedback. A sub-Saharan forestry research network will share its policy brief with the curious. The Chinese Academy of Forestry will take on law enforcement issues. And the International Forestry Students Association (IFSA) will discuss the value of Ph.D student workshops.

Side Events "also provide an opportunity for some social events," explained Buck. "IUFRO and IFSA have close collaboration. IFSA has been instrumental at organizing at the Congress and many students support our local host at booths or in doing surveys."

## What's going on . . .

- Today's Trade Exhibition will begin with a 15-minute *bibimbap* event at noon. What is *bibimbap*, you ask? It's a popular Korean dish consisting of boiled rice with assorted vegetables and herbs mixed in. About 15 IUFRO officers including President Don Koo Lee will mix all the ingredients together in a super-sized *bibimbap* bowl. Of course, it will be followed by an opportunity to taste this healthful dish.
- The official Poster Viewing Session runs from noon to 1:30 p.m. today. The free lunch boxes proved to be highly popular on Tuesday, so there's good news: another round of 2,000 lunch sets will also be offered today.

## The Congress Daily (25 August 2010)

The Congress Daily



Wednesday August 25, 2010  
www.iufro2010.com

### A spicy Seoul tour

Though Congress activity has heated up, 25 delegates and their guests couldn't refuse the chance to learn a time-honored Korean custom: making kimchi.

A pickled cabbage dish eaten at nearly every Korean meal, kimchi is normally prepared by families once a year just before winter. Tour participants first traveled to a traditional-style home near Changdeokgung Palace in northern Seoul. They began by donning a Korean outfit called *hanbok* and being photographed in the vibrantly colored dress.

Then came the long-awaited kimchi-making moment. Seated on the floor in usual Korean fashion, the group, guided by an expert, set about stuffing a concoction of red-pepper paste, mashed garlic, and spices into the opened cabbage leaves. Because of the spicy whiff of garlic and hot peppers, some started to cry.

After an hour of tears and squeals of delight, participants had finished making their very own kimchi. They had enjoyed a uniquely Korean experience that they could eat!



Some delegates and their guests on a special cultural experience tour learned how to prepare kimchi, Korea's fiery, pickled-cabbage side dish.

### The inside scoop

Attention oral presenters! Presentation materials are due at the Speaker's Room (301) four hours before a presentation.

Please note the following important room changes:

- All Plenary and Sub-Plenary Sessions have been relocated to **Hall D2**.
- The Closing Ceremony will be held in **Hall D2**.
- The Farewell Gala Event has been moved to **Hall D1**.

Several years in the making, the IUFRO-WFSE book, *Future of Forests - Responding to Global Changes* was launched yesterday here at the Seoul Congress. The project reflects the combined efforts of over 100 scientists on six continents to "identify and analyze significant drivers of change" affecting forests globally, and recommend steps forward. WFSE refers to the Special Project on World Forests, Society and Environment, one of IUFRO's two policy initiatives. Free book copies are available at the IUFRO booth.

The Poster Viewing Session officially ends at lunchtime today, but will stay open for the duration of the Congress. The best poster in each IUFRO division will be announced on Friday. To be eligible, presenters must be under age 35 and a IUFRO member.

Delegates with a visual appetite will enjoy perusing a large online gallery of Congress photos at <http://www.iufro2010.com> (click on the "Photo Gallery" icon). Photos are organized by event.

### Top doctoral researchers named in 8 IUFRO divisions

The forestry community raised a glass to the next generation of leading forestry scholars yesterday by honoring eight exemplary doctoral researchers with the IUFRO Outstanding Doctoral Research Award, and three top master's-level students with its Student Award for Excellence in Forest Sciences.

But before each winner could take home their engraved clear-glass trophy, one more task remained: to deliver a summary of their academic work for the audience in the COEX Auditorium.

They also took questions posed by moderators Su See Lee of Malaysia and Michael Rivoire of France on subjects ranging from exciting research experiences and research motivations to benefits gained through their work and their views on the future of forestry.

The opportunity to network with scientists and to travel were cited as benefits, while one downside mentioned was the possibility of being "left out" of a research project in one's field.

Marieka Gryzenhout, a South African winner who studies the phylogeny of fungi associated with certain forestry trees, said she was "gratified and honored" by the prize but it wasn't hers alone.

"To have a best Ph.D in a division in the world is a great honor. But it would not have been possible without my supervisor."



A moment in the spotlight for Chinese-Canadian awardee Fiona Yang.



## Congress footprints



The opening day of Poster Viewing was accompanied by a free lunch box, which proved very popular.



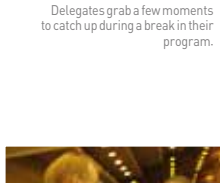
An attentive crowd at a Technical Session on climate change's effect on drought-induced forest die-off.



A sea of faces from about 100 countries filled the Congress Welcome Reception hall on Monday.



Korean traditional attire added splashes of local color to Monday's Welcome Reception.



Delegates grab a few moments to catch up during a break in their program.



Discussion moves into the hall after an urban forestry Technical Session ends Tuesday.



Zhang Sha of China does her best to imitate Udori and Usooni, the Congress mascots.



## Cultural tip: Tipping

Tipping is neither customary nor expected in Korea. That's right: even if your cabbie played your favorite songs and weaved through traffic with the skill of a race car driver, he won't expect a tip. And if you leave a few bills on the restaurant table, the waiter may run after you to try and return your "forgotten" money. That said, a 10% service charge is often tacked onto bills at tourist hotels and restaurants. And certain service staff, including hotel maids, tour bus drivers, bellhops, and bartenders at Western bars normally appreciate a tip. As a rule of thumb, if you feel the service was a cut above the pack, show your appreciation.

## Preparing for tours

### Ready, get set, go!

Pre-registered delegates can look forward to enjoying some fresh air and recharging their batteries during Thursday's In-Congress trips, which will explore Korea's forests, forestry, and the local wood products industry.

The eight tours are headed to one of four regions: Seoul and its outskirts (IC-04, 05, 06, 07); central Korea (IC-03); the eastern mountains (IC-01, 02); and the West Sea area (IC-08). Each tour is unique but all provide delegates and their guests with a valuable chance to appreciate local forestry-related sites while also enjoying Korea's culture, nature, and beautiful landscapes (and seascapes, in the case of IC-08's Incheon harbor cruise!)

Set your alarm clock, though, because shuttle buses will transfer delegates from official Congress hotels and COEX to the central departure lot at 7 a.m. Coach buses depart for tours beginning at 7:30 a.m.

Comfortable walking shoes (not sandals), sensible clothes, and sun block are recommended. Bring an umbrella, too, because light rain is forecast. Please also wear your nametag and keep your In-Congress Tour Card on you at all times! Happy trails!

**Note: Persons registered for a tour who need last-minute assistance should contact Han Jung-Mi of Grace Travel at 010-3112-4581.**

## Did you know?

Archaeologists have found through the study of paintings and carvings in Aztec ruins that the Aztecs associated a newborn's life with that of a newly planted tree. This belief is still carried out by the people of many nations. Koreans have a similar custom. They plant a paulownia tree when a girl is born. When she grows up and marries, her father gives a chest of drawers made from the same paulownia planted upon her birth as a wedding gift. When a boy is born the family plants a pine tree, whose wood will be used to make the coffin in which he will someday be laid to rest.

## The Congress Daily (27 August 2010)

Friday August 27, 2010

www.iufro2010.com

# The Congress Daily



## Time out for a taste of the great outdoors

Braving thick fog and rain that varied from drizzle to downpour, delegates kept their chins up yesterday as they rolled out of Seoul on dozens of buses to learn about Korea's forests and forestry from just about all angles.

Over 1,350 delegates on eight tours fanned out across three provinces, to explore a biodiversity area, an experimental forest, a tree breeding facility, a forest education center, an ancient royal forest preserve, a chestnut plantation, a recreational forest, and a once-ravaged, high-altitude area that has been successfully replanted.

"We were shocked to see such different forests from Canada," said Claire McCarthy of Canada, who toured the Sanum Recreational Forest and Mount Maehwa model forest on Tour 5, adding that their tour hosts served them honey and pine-nut juice.

In fact, one theme that cut across tours (besides the rain) was a chance to enjoy some local foods and a traditional Korean rice wine called *makgeolli*: Tour 6 participants enjoyed a few sips of the milky liquor thanks to the kindness of Chuncheon foresters, while on Tour 3 of the Eocheon chestnut research forest, chestnuts – raw, cooked, baked – ruled the day.



"It was a wonderful experience, despite the rain," opined Richard Vlosky, a forest products marketing professor at Louisiana State University, U.S.A. "I mean, the natural beauty of Korea and the nice walks in the forest."

Tour guides, many of them scientists from the Korea Forest Research Institute, led technical sessions on subjects representing a cross-section of issues touching on IUFRO and Congress themes.

Curiosity was another common theme. Hwang Hae-Jong, who guided Tour 2, which journeyed into rugged Gangwon Province, fielded many questions about the windbreaks positioned high on Daegwallyeong ridge. And on Tour 6 to the



mountainous region surrounding Lake Soyang, delegates were reportedly "very focused on the lecturer." Meanwhile, on Tour 7, the rain did not deter people from trekking through the National Arboretum for over an hour – and this came at the tail end of the day.

Several tours skirted the rain with visits to indoor production sites, including a furniture factory, a sawmill, and a chestnut processor. Tours kept to tight schedules to expose delegates to famous cultural sites like Woljeongsang, a Buddhist temple, and the Gongju National Museum. Those on the wood processing industry Tour 8 enjoyed feeding the seagulls aboard a cruise!

## Campos calls for system approach



The urgency of the world's environmental problems demands a radical change in mindset, said Jose Joaquin Campos Arce, Wednesday's keynote speaker.

To successfully tackle immense challenges like climate change, environmental degradation, and forest security, the forestry community must "abandon the old way of thinking" – the reductionist approach of breaking challenges into small units and

understanding only a small part of a problem.

Instead, Campos told reporters after his keynote speech, we must think in terms of whole systems: "We need to integrate different sectors and scales in order to foster sustainable livelihoods, landscapes, and forests. "Dealing with complexity can be overwhelming... and a way to deal with those challenges is to work on complete and real systems, like a landscape."

This approach must account for what he terms the "five capitals" – natural, financial, human, social, and political capital. "We need to think of these capitals as complex systems and we need to manage them in an appropriate way," he said.

Campos's paradigm calls for more productive systems of forestry, agriculture, and agroforestry that would balance higher yields with conservation goals, such as "payment for service systems" that give farmers incentives to adopt conservation measures.

Such incentives can be created, he explained, by assigning a value to positive externalities like keeping waters clean and preserving forestland. They can also emerge by getting rid of disincentives like bureaucracy, which increases transaction costs and the cost of pursuing sustainable activities.

To bring about significant change on a global level, however, significant numbers of people must be enlisted to embrace the new paradigm.

"We need to bring millions of people in, taking care of the planet, and the only way is through collective action. Creating the platforms, creating the governance, so local people in each town, in a watershed, in a province, will take care of their own landscape."

The XXIII IUFRO World Congress marked the first visit to Korea by Campos, the director general of CATIE, a Costa Rica-based research organization. Amid his profound message, he took time to mention that he found Korea's reforestation achievement inspiring, saying it "gives us hope that we humans can make the right decisions and the right changes."





## Spotlight on: forest therapy

Korea's rapid urbanization, aging population, and growing leisure time have raised the public's interest in the environment and quality of life. And with stress-induced ailments on the rise, society's demand for forest resources to alleviate these symptoms and improve health is increasing.

To tap into these rich forest resources, Korea introduced the "recreational forest" system in 1988. As of late 2008, 115 such forests had been established. Research on the connections between forests and human health has followed.

So far, research has focused on forests' effects on human health based mainly on empirical and/or psychological indicators. Recently, the focus has shifted to a more objective method using physiological indicators associated with incretion and central/autonomic nervous systems. Studies show that forests increase the alpha brain waves produced when people feel relaxed. A clinical test on mildly depressed patients revealed that forest therapy is more effective at alleviating depressive symptoms than psychiatric treatment. Meanwhile, Korean studies on forests and human health have been evolving into categories of so-called "forest healing" or "forest therapy" and are being developed into evidence-based medicine.

The Korea Forest Service included the establishment of healing forests designed to enhance a forest's physical and mental benefits in its 5th National Forest Plan (2008-2017). And from 2010, the KFS will establish 3,000 hectares a year of "forest therapy complexes" for five years.

To meet the demand for forest therapy, reliable scientific data is crucial. The Korea Forest Research Institute plays a key role here by developing related sciences, technologies, and policies. KFRI is also conducting several projects on forests and human health, including the development of high-quality, high-yield fruit and nut tree species, improvement of new mushroom strains, development of pharmaceuticals from forest resources, and enhancing the recreational and environmental benefits of urban forests.

## Keynote presentation

**Presenter:** Elinor Ostrom **Country:** USA

**Title:** The potential role of communities in sustainable forest resources

**Time & Place:** 11 a.m. to 12 p.m. in Hall D2, third floor



Elinor Ostrom is the Arthur F. Bentley Professor of Political Science and a senior research director in the Workshop in Political Theory and Policy Analysis at Indiana University, Bloomington. She is a prolific author with more than nine titles under her name. Her notable recent publications include *Understanding Knowledge as a Commons: From Theory to Practice*, and she is currently working on *Collective Action, the Commons, and Multiple Methods in Practice* together with two colleagues.

Ostrom has been granted numerous awards, among them the 2009 Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel.

## The transcript

*Yurdi Yasmi's role as a senior program officer with the Center for People and Forests, in Bangkok, places him at the heart of forestry's conflict management/governance arena. At the Seoul Congress, he's been busy coordinating a Side Event on forest conflict in Asia. We managed to corner him for a quick interview:*



### How did you get interested in forestry?

I grew up in Sumatra. My grandparents had a farming area and my father was a biologist. I got interested in forestry when he took me for a camping trip and introduced a number of plants and butterfly species [to me]."

### What is the focus of your work at the Center for People and Forests?

My interest is how to bring the voice of local communities, indigenous people, disadvantaged groups, on the table, because they are important elements of forests and forest management.

### How does the center try to tackle this?

It's often difficult to translate this [scientific] language for laypeople in the local community so you need a bridge between science and local action and this is particularly what my group is trying to do. My organization will have to link the research findings into a more meaningful, practical application.

### Can you share a success story with us?

My center, together with a local university in Sulawesi, has been working with the Ford Foundation to help local communities establish village forests. And we are proud that the second village forest was established with the support of my center.

### You're serving on two IUFRO expert panels. What has that been like?

For me, it's not only contributing to IUFRO initiatives, but also a learning experience, because in these expert panels you have experts from Europe, America, Australia, Asia, and you exchange views, and for me this is very enriching.

## What's going on ...

- The second International Council Meeting will be held from 4:30-6:30 p.m. today in the Grand Ballroom. Among others, the council will approve new Board members and the next World Congress host city. Attendance is by invitation.
- Nine IUFRO Division Meetings will be held from 6:30-8:30 p.m. Please see page 41 in the program book for room locations.
- IUFRO Business Sessions will take place from 12-12:30 p.m., after the Plenary Session. These sessions cover administrative and business issues rather than research issues.

## The Congress Daily (27 August 2010)

The Congress Daily



Friday August 27, 2010  
www.iufro2010.com

### In-Congress Tours unveil Korea's forests, cultural riches

After three days of meetings and discussions at the COEX center, many delegates welcomed a break and an opportunity to see Korea's forests and forest sector with their own eyes – even if it was raining cats and dogs! Boarding 96 buses, more than 1,300 delegates and 100 staff fanned out across Korea's northern tier for carefully prepared tours that you might call “edutainment” – a perfect blend of forestry education and fun!

**TOUR 1** The Landscape Restoration tour headed due east to the high-altitude ridge of Daegwallyeong (right), whose forests had been devastated by slash-and-burn agriculture and whose exposure, altitude, and strong winds made replanting difficult. As the group sliced through the fog, guides showed the tour windbreaks that enabled young firs to take root and the hardy pines that grow only 30 cm in 30 years. In the afternoon, the crew got to rest tired legs as gondolas whisked them to the summit of 1,458-m Mount Balwangan (far right).



**TOUR 3** Delegates on Tour 3 certainly had their fill of chestnuts! Korea is the world's second-largest chestnut grower, and the group witnessed the entire processing line at the Jeonganbam plant (far left). They also toured a chestnut breeding site at Eocheon. Before the day was up, they had also visited Magoksa (left), a Buddhist temple, and peered at ancient artifacts in the Gongju National Museum.

**TOUR 8** The only group that headed west also was the only one to get out on the water. Tour 8 of the Wood Processing Industry first visited Sunchang Corp.'s plywood and fiberboard plant in Incheon before boarding a ship for a leisurely cruise of the harbor (right). Afterward, they squeezed in a visit to Younglim Timber (far right), a maker of furnishings and laminated timber, and enjoyed a ride up to Haneul Park (Sky Park), a former landfill converted to a park.



Delegates on the Odaesan tour faced downpours at times, but found ways to cope with the elements, as seen here at the Soopchewon forest education center.



Tastings of Korean rice wine called *makgeolli* and pine nuts were fit into the itinerary of Tour 6 to the Soyang Lake region of Gangwon Province.

### Wear 'em proudly!

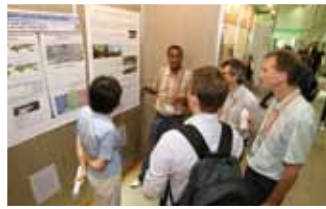
An assortment of IUFRO souvenirs are for sale at their booth in the main hall. The navy-blue Slazenger polo shirt has sold out in some smaller sizes, but plenty of baseball caps (8,000 won), belts, and cotton tote bags (a bargain at 1,000 won!) remain. Beach sandals are another hot item whose incised soles let you leave your imprint in the sand. What's more, all profits are returned to IUFRO, and a free flash memory drive is included with every purchase.



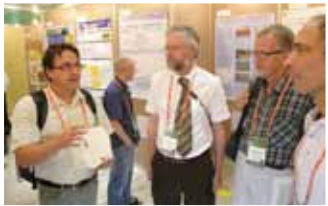
## Congress footprints



Hall D2 was packed to the gills Wednesday for the morning's keynote speech by Jose Joaquin Campos Arce. At bottom left, the previous day's keynote speaker, Frances Seymour.



A rapt audience listens to Demissew Sertse Desta of Ethiopia discuss his poster, "Woody invader in a wood deficit country," on Wednesday, the final day of the Poster Viewing period.



The Poster-Viewing area provided plenty of food for thought on Wednesday. From left, Matthias Dobbertin of Switzerland, E.H. "Ted" Hogg of Canada, and Kari Mielikainen of Finland.



That's not any old stamp on those letters being mailed at the COEX post office by IUFRO staffer Judith Stoeger-Goiser of Austria! The green stamps at left were issued Monday to commemorate the Seoul Congress.



Ben Chikamei of the Kenya Forestry Research Institute, one of six panelists at Wednesday's IUFRO Director's Forum on forest monitoring in times of climate change.



Time for a question in the Q&A portion of Wednesday's President's Discussion. From left, Kim Yoon-Soo of Korea, Hosny El-Lakany of Canada, IUFRO President Don Koo Lee, Peter Mayer of Austria, and Emmanuel Ze Meka of Japan.



The Internet can't compete with a column in the main hall as a channel for sharing information on Congress happenings: upcoming Side Events, new publications, and even attempts to reconnect with old friends and colleagues.



Mmm, mmm... delicious! Delegates, volunteers, mascots, and KFRI Director General Choi Wan-Yong (4th from left) pose holding oversized spatulas before a gigantic bowl of bibimbap. The Korean dish was prepared Wednesday in the Trade Exhibition hall.

## The inside scoop

Attention poster presenters: All posters should remain displayed until Saturday but be removed by 5 p.m.

And the winner is... Best Poster Award winners are announced today. The winner in each division will find a blue *norigae* – a traditional Korean ornament – attached to their poster. Awardees will also be honored at their respective Division Meeting, held at 6:30 p.m. tonight.

Delegates are reminded not to pack it in right after the Closing Ceremony, because a spectacular Farewell Gala is lined up for Saturday night. A wide selection of foods, drinks, and entertainment will be on offer to close out the Congress in high style. All delegates are invited to wear their traditional national dress, but a smart-casual outfit will also do the trick. Doors swing open at 6:30 p.m. for the two-hour extravaganza in Hall D1.

At tomorrow's Closing Ceremony, IUFRO will issue The Seoul Resolution outlining its six key research areas and leading commitments in line with the 2010 International Year of Biodiversity and the 2011 International Year of Forests.

## Did you know?

In the past, Koreans believed that denuded forests had an adverse effect on the Earth's energy. Earth energy was considered critical to the maintenance of social stability and prosperity. During the Joseon period (1392-1910), the government designated some pine tree stands (*Pinus densiflora*) as protected forests known as Bongsan to manage them in a sustainable way. In Bongsan, illegal cutting, slash-and-burn farming, and burials were prohibited by law. For example, a person who illegally cut 10 mature pine trees was sent to the gallows. In such forests, the government planted pine seedlings and cultivated them to support sustainable forests.



## IUFRO aims to embrace a broader range of scientists



From left, IUFRO Executive Director Peter Mayer, incumbent President Don Koo Lee, and President-elect Niels Elers Koch.

Niels Elers Koch describes the first IUFRO World Congress he attended in 1976, in Oslo, Norway, as a life-changing experience that linked him to a worldwide network of top researchers in his field, people who would later become priceless assets for his career.

As IUFRO's next president, Koch, of Copenhagen, Denmark, says he will strive to give the same opportunity to more forestry researchers, in more parts of the world. To do this, he aims to broaden the organization's network, placing special emphasis on representing more researchers in Latin America and Africa while also shoring up membership numbers in Europe.

"I shall work so that all forest researchers in the world get the same excellent opportunities that I got through IUFRO," said Koch at yesterday's International Council Meeting, after being elected to a four-year term running through 2014.

As director general of the Danish Centre for Forest, Landscape and Planning for 19 years and as IUFRO vice president for five years, Koch, 59, is well-traveled. By his estimate, he has visited 47 countries. His new post will likely see him logging even more air miles.

"It'll be a busy time," he told *The Congress Daily*. "If I'm allowed to use two words: I'm humbled and excited."

He stressed the need to strengthen IUFRO's scientific capacity where needed and raise its profile in the international policy arena, in order to establish it "as an important source of high-quality scientific information on issues of global concern."

Meanwhile, the Council also adopted a five-year strategy which sets out three institutional themes and, for the first time in history, six thematic areas based on the overarching vision of being a global forestry organization serving the needs of all forest researchers and decision makers.

Officials expect the six themes – Forests for people, Climate change and forestry, Forest biodiversity, Forest bio-energy, Forest and water interactions, and Resources for the future – to boost cooperation among scientists.

"These and other major challenges regarding forests and trees are highly cross-sectoral and require us to think outside the forest box," said Koch, who also called for diversifying the fields in IUFRO's scientific network. "Some excellent examples of interdisciplinary collaboration exist already, ranging from medical science to bioengineering. We need more such success stories in the future."

Another key decision to emerge Friday was the selection of Salt Lake City, USA, as host of the XXIV World Congress. Several cities vied for the honor, but "SLC" – the capital and largest city in Utah – prevailed.

Besides Koch, the Council elected 16 other board members: Su See Lee of Malaysia and Michael Wingfield of South Africa as vice presidents; Jose Campos of Costa Rica, Ben Chikamai of Kenya, Elena Kulikova of Russia, Shirong Liu of China, and Ulrike Probstl of Austria as President's Nominees, tasked with carrying out special assignments; and, as Division Coordinators (in ascending order 1-9) Bjorn Hanell of Sweden, Yousry El-Kassaby of Canada, Hans Heinmann of Switzerland, Margarida Tome of Portugal, Andrew Wong of Malaysia, Tuija Sievanen of Finland, Andrew Liebhold of USA, Jean-Michel Carnus of France and Daniela Kleinschmit of Sweden/Germany.

## Give forest users a voice: Ostrom



Where some people see local forest users as hindrances to forest preservation, Elinor Ostrom sees opportunity.

In fact, in areas where forest users play an active role in monitoring forest lands, she says, forest density is statistically higher.

So when designing governance systems to ensure that preservation works over time, such forest users must be embraced.

"We're finding that when the users that live nearby have some rights to harvesting, frequently non-timber forests products, they have a much greater interest in the long-run preservation of a forest," Ostrom told reporters Friday after her keynote speech.

"They monitor and pay a lot of attention. Government forests, combined with very effective users, or user organizations, do appear to be far more sustainable over time."

In short, policy makers must not focus on formal ownership systems as the sole factor affecting forest

sustainability, but rather on how to ensure local participation in forest planning.

She also advocated greater mutual respect for researchers across disciplines, which involves learning and understanding the languages of other fields.

"I'm not talking about just indigenous versus formal, I'm talking about interdisciplinary."

"Can we, slowly but surely, develop a nested language that is able to address the complexity both on the ecological side and on the social side? We're slowly but surely changing it and making progress. I'm sure the young people who are taking college work now will move that ahead."

Ostrom, an Indiana University-Bloomington professor who first visited Korea in 1997, noted that while in Seoul she had many opportunities to reconnect with former Korean IU graduate students.



## The inside scoop

For delegates registered for Post-Congress tours, the adventure continues. Eight post-Congress tours head for Korea's subtropical island of Jeju and neighboring countries like Japan and Mongolia. Most tours depart on August 29, but to reconfirm dates and times check with Ms. Han Jung-Mi of Grace Travel (010-3112-4581).

Peter Mayer, IUFRO's executive director since 2003, has been appointed the director of the Austrian Federal Research and Training Centre for Forests, Natural Hazards and Landscape. IUFRO welcomes applications to fill this important post beginning November 1. For the complete job announcement, visit the IUFRO Web site, [www.iufro.org](http://www.iufro.org).

Oops! KFRI technical guide Hwang Jae-Hong's name was misspelled in yesterday's page 1 article about tours. Our sincere apologies.

The Forestry Research Network for Sub-Saharan Africa has just launched an online information service. FORNIS ([www.fornis.net](http://www.fornis.net)) lets users obtain scientific information about forests and trees prepared by forest research institutions across Africa. It is designed to further information exchange and dissemination to the public.

## Keynote presentation

**Name:** Peter Shaw Ashton **Country:** Britain

**Title:** The disastrous trajectory of the rain forests: research imperatives

**Time & Venue:** 11 a.m. to 12 p.m. Hall D2 on the third floor



The Charles Bullard Professor Emeritus of Forestry at Harvard University, Ashton is the author of six books including *World Checklist of Myrtaceae* and numerous papers on the trees and forests of tropical Asia. He is also a faculty fellow at the Center for International Development

at Harvard's Kennedy School of Government, and a senior research associate for the Royal Botanic Gardens, Kew.

Previously, he served as president of the International Association of Botanic Gardens and Arboreta and as director of The Arnold Arboretum of Harvard University.

Among many awards received, notable ones include the Environmental Merit Award from the U.S. Environmental Protection Agency and the Fourth Sultan Qaboos Prize for Environmental Preservation by UNESCO.

## Congress fun facts



**Number of countries represented:** 92

**Number of registered participants:** 2,675

**Countries with the largest representation:**

- Republic of Korea: 878      - United States: 164

- Japan: 272                      - Indonesia: 99

- China: 214

**Number of countries with one delegate:** 20

**Delegates who traveled the farthest:** Uruguay (19,594 km)

**Number of sessions:** 170

**Number of oral presentations (in Technical Sessions):** 916

**Number of mounted posters:** 1,054

**Number of lunch boxes distributed:** 4,750 (est.)

**Number of buses used in In-Congress Tours:** 96

**Rainfall during the Congress (Mon-Fri., in Seoul):** 183.5 mm

## The envelope, please

*Winners of the Best Poster Awards were announced at yesterday's Division Meetings. Below are the seven awardees recognized in their respective divisions.*



**Division 1 (Silviculture):** Pifeng Lei, University of Freiburg, Germany

**Division 2 (Physiology and Genetics):** Yoshihiro Hosoo, Shinshu University, Japan

**Division 4 (Forest Assessment, Modelling and Management):** Choi Sung-Ho, Korea University, Korea

**Division 5 (Forest Products):** Lee Su-Yeon, Seoul National University, Korea

**Division 6 (Social Aspects of Forests and Forestry):** Maija Faehnle, Finnish Forest Research Institute, Finland

**Division 7 (Forest Health):** Takahashi Yukiko, The University of Tokyo, Japan

**Division 8 (Forest Environment):** Ahn Young-Sang, Korea Forest Research Institute, Korea

A hearty round of applause goes out to all the awardees. Spectacular work!

## The Congress Daily (28 August 2010)

The Congress Daily



Saturday August 28, 2010  
www.iufro2010.com

### The transcript

*The future of forestry lies in the hands of today's students. And few better represent the hope and promise of the field than Cathrine Pater, the newly elected president of the International Forestry Students Association. Pater sat down with The Congress Daily for a chat.*



#### How did you get interested in forestry?

I really enjoy spending time outdoors and doing outdoor sports, just being in nature. When choosing an education, I thought I needed an education where I can combine educational knowledge with outdoor experiences.

#### You're entering your senior year at the University of Copenhagen. What are you studying?

My studies are quite broad. It's called forest and landscape engineering. We focus on forests and landscapes and urban green spaces. I can focus on one of those three, which I can gain more insight in. My interest will be on urban forestry.

#### Why does urban forestry appeal to you?

Because many countries are facing great urbanization I think we need to approach these megacities in a green way, working on sustainable and healthy cities, focusing on bringing nature into the city.

#### This is your first IUFRO Congress. Has it been rewarding?

There's a lot of formal, technical learning, a lot of people with a lot of knowledge coming and sharing it with everyone else, but mostly it's been networking and communicating with different people from different parts of the world.

#### As IFSA's new president, have you set any priorities?

The whole basis of IFSA is local communities all over the world. This is what carries IFSA and we're all members in our local communities. Motivating and encouraging local IFSA communities is a great job that has to be done, as well as activating some local communities that have been less active over some years.

#### Is there any other area you plan to focus on?

The whole of forestry education has weight at IFSA this year. And this is something I will work on. As students, communicating what it is students want from forestry education and how we can contribute on forestry.

#### You've been in Korea for three weeks when including the IFSA symposium that ran August 7<sup>th</sup> to 21<sup>st</sup>. How are you finding it here?

I'm a vegetarian and I really enjoyed the *bibimbap*, because it's a lot of mixed vegetables and rice. . . . The first two weeks we were having our symposium, organized by students from the host country. They took good care of us, knowing that some of us are vegetarians and some Muslims. We could fully rely on them.

### 'Green shirts' gave their all



Student staffers working at the registration desk.

*If it weren't for the 133 green-shirted Korean staffers and volunteers, the Seoul Congress wouldn't have been as smooth as beech tree bark.*

Performing a range of roles, from helping presenters operate slide shows to manning information desks, setting up the Poster Viewing area – and serving in just about every other corner of COEX – the 50 volunteers and 83 young workers sweated hard to keep things moving.

Despite logging long hours, the mainly student-powered crews say they have few regrets because they gained valuable experiences.

"I was able to see a lot of foreign professors in my field of study," said Kwon So-Min, 20, a forest resources student who manned the conference halls.

Han Kyu-Ree, another forestry student who helped set up the Poster Viewing area said, "I was able to upgrade my knowledge from mere theories and book materials to real, practical knowledge."

So before you leave town, if you bump into a green-shirted Congress staffer just say, "*Kamsa-hapnida!*" (That's "Thank you" in Korean.)

### Toast your achievements!

Have you caught a case of the post-Congress blues? The Farewell Gala offers a cure. Doors open at 6:30 p.m. in Hall D2 for the two-hour fest.

A beef dinner is served (or a vegetarian option for those who reserved one). A special dinner for delegates observing Ramadan will be served at 7:10 p.m.

Be sure to grab a lucky draw coupon as you enter for a chance to win some classy souvenirs, including porcelain crafts, a wooden silverware set, silk pencil cases, and a Samsung net book.

Still not exciting enough? A local percussion group will crank up the energy from 7:40 p.m., and the Little Angels will delight delegates with choral music, traditional Korean puppetry, and other traditional performances.

Be there to bid farewell to old and new friends and celebrate IUFRO's accomplishments. Traditional costume is more than welcome!



# Congress footprints



Delegates stream into the cavernous Hall D2 minutes before Elinor Ostrom was scheduled to deliver her Plenary speech on Friday.



The venue's Internet lounges were rarely empty as delegates far from home logged onto the Web. Pictured above, a computer bank in the Poster Viewing area.



A meeting room was not always necessary when delegates talked shop; often, the tables and chairs arranged in the hallways sufficed.



The creative shapes and designs of booths in the Trade Exhibition added to the show's appeal. Pictured above, the Korea Forest Research Institute's booth.



To work all day, Congress staffers need to fuel up! This trio was about to dig into their lunches in the COEX food court. From left, Kim Kyoung-Nam, Lee Seung-Bo, and Yi Su-Hee.



The Secretariat of the International Union of Forest Research Organizations, in addition to taking care of a myriad of administrative tasks, the team operated a popular exhibition booth in the main lobby.



Each Plenary presenter held a press conference after their keynote speech.



Four delegates lunch on *bokumbap* – Korean-style fried rice – at the COEX mall's food court. The COEX mall attached to the Congress venue contains more than 80 restaurants, giving delegates many kinds of cuisine to choose from.



Members of the Congress Organizing Committee worked late into the night to ensure that programs ran smoothly. Pictured at rear, second from left, is COC Chair Park Jung-Hwan.

## On the calendar

If you shudder at the thought of waiting until 2014 to attend another forestry conference, take heart: events (though much smaller ones) are nipping at the heels of the World Congress in the weeks and months ahead.

Before this Congress's halls empty out, Beijing hosts the International conference for urban forestry in challenging environments from Aug. 29-Sept. 1. From Sept. 7-10, Lugo and Santiago de Compostela, Spain host ForestSat 2010: Operational tools in forestry using remote sensing techniques, and Syktyvkar, Russia hosts Larix 2010: International symposium of the IUFRO Working Party 2.02.07

The week after, Germany hosts two forestry symposiums: IUFRO's Population dynamics, biological control, and integrated management of forest insects in Eberswalde from Sept. 12-16; and Silvilaser 2010: the 10th international conference on LiDAR applications for assessing forest ecosystems in Freiburg, from Sept. 14-17.

Moving into autumn, the Twentieth Session of the Committee on Forestry, an FAO instrument to advise the UN on forestry issues, runs from Oct. 4-8 in Rome, Italy, coinciding with World Forestry Week 2.

Finally, you may return to Korea sooner than you think. The UN Convention to Combat Desertification (UNCCD) Conference of Parties 10 comes to Korea's southern coastal city of Changwon in 2011. Have a safe and pleasant trip home!

## IUFRO World Congress Bulletin (24 August 2010)



# IUFRO World Congress Bulletin

## A Daily Report of the XXIII IUFRO World Congress

Published by the International Institute for Sustainable Development (IISD) in collaboration with the International Union of Forest Research Organizations

ONLINE AT [HTTP://WWW.IISD.CA/YIMB/FOREST/IUFRO/IUFROXXIII/](http://www.iisd.ca/yimb/forest/iufro/iufroxiii/)  
ISSUE #1, VOLUME 178, NUMBER 1, TUESDAY, 24 AUGUST 2010



### XXIII IUFRO WORLD CONGRESS HIGHLIGHTS: MONDAY, 23 AUGUST 2010

The XXIII International Union of Forest Research Organizations (IUFRO) World Congress, "Forests for the Future, Sustaining Society and the Environment," co-organized by IUFRO and the Korea Forest Research Institute, opened on Monday 23 August in Seoul, Republic of Korea. Over 2700 participants from international organizations, governments, academia, the private sector and civil society, heard an opening speech by the President of the Republic of Korea Lee Myung-Bak and discussed forest research issues in an opening ceremony, plenary, three sub-plenaries, 12 IUFRO business sessions, 19 technical sessions, and poster sessions.



Lee Myung-Bak, President of the Republic of Korea, giving his opening address.

### OPENING CEREMONY

The XXIII International Union of Forest Research Organizations (IUFRO) World Congress opened on Monday 23 August 2010 with a drum performance and film presentation on the Republic of Korea's work promoting green growth.

Don Koo Lee, IUFRO President, highlighted IUFRO's history of advancing global cooperation on forest science through activities of its member organizations and stressed the importance of the IUFRO World Congress given the magnitude of ecological and social challenges facing the world. He said that only through cooperation and sustainable development can we tackle challenges such as climate change, desertification and poverty, and the need for new strategies for green growth. He then declared the Congress officially open.

Eduardo Rojas-Briales, FAO, stressed difficulties faced by simultaneous increases in financial constraints on the forest sector and demand for forest environmental services (FES). He emphasized that the world cannot mitigate or adapt to climate change without paying central attention to forests, and called for: not reducing forests to just carbon; Reducing Emissions from Deforestation and Forest Degradation in developing countries (REDD) mechanisms that cooperate with national forest programmes; a comprehensive global forest carbon model; and more forest-related education.

Jan McAlpine, UN Forum on Forests (UNFF), for Ban Ki-moon, UN Secretary General, said IUFRO plays an essential role in promoting sustainable forest management (SFM) through collaborations on forest research activities and in generating knowledge and assistance for improving forest governance.



Performance of a traditional Korean dance called the "Lotus Flower".

The *IUFRO World Congress Bulletin* is a publication of the International Institute for Sustainable Development (IISD) <[info@iisd.ca](mailto:info@iisd.ca)>, publishers of the *Earth Negotiations Bulletin* © <[enb@iisd.org](mailto:enb@iisd.org)>. This issue was written and edited by Graeme Auld, Aaron Leopold, Liz Willetts, and Kunbao Xia. The Digital Editor is Francis Dejon. The Editor is Robynne Boyd <[robyne@iisd.org](mailto:robyne@iisd.org)>. The Director of IISD Reporting Services is Langston James "Kimo" Goree VI <[kimo@iisd.org](mailto:kimo@iisd.org)>. Funding for coverage of this meeting has been provided by the International Union of Forest Research Organizations (IUFRO). IISD can be contacted at 161 Portage Avenue East, 6th Floor, Winnipeg, Manitoba R3B 0Y4, Canada; tel: +1-204-958-7700; fax: +1-204-958-7710. The opinions expressed in the *Bulletin* are those of the authors and do not necessarily reflect the views of IISD. Excerpts from the *Bulletin* may be used in other publications with appropriate academic citation. Electronic versions of the *Bulletin* are sent to e-mail distribution lists (in HTML and PDF format) and can be found on the Linkages WWW-server at <<http://www.iisd.ca/>>. For information on the *Bulletin*, including requests to provide reporting services, contact the Director of IISD Reporting Services at <[kimo@iisd.org](mailto:kimo@iisd.org)>, +1-646-536-7556 or 300 East 56th St., 11A, New York, New York 10022, United States of America. The IISD team at the XXIII IUFRO World Congress can be contacted by e-mail at <[aaron@iisd.org](mailto:aaron@iisd.org)>.





Don Koo Lee, IUFRO President, and Su-Se Lee, IUFRO, presented the Scientific Achievement Awards.

Don Koo Lee and Su-Se Lee, IUFRO, presented the host scientific award to Sung Gak Hong, the National Academy of Sciences, Republic of Korea, recognizing his work in elevating the profile of forest science and research, and scientific achievement awards to eleven other recipients in recognition of their work advancing forest research.

Lee Myung-Bak, President of the Republic of Korea, discussed his country's efforts to restore its once barren lands, noting that forests are the foundation of our lives and the source of our basic needs. Calling climate change humanity's biggest challenge, he urged UN climate delegates to think to the future in their continuing negotiations. He said the Republic of Korea now ranks fourth in the OECD for its ratio of forests to total land area and said this can be an example of how to advance green growth, noting tree planting programmes and green space initiatives in Seoul.

The opening ceremony concluded with a presentation by children introducing the Congress theme of Forests for the Future: Sustaining Society and the Environment.

## OPENING PLENARY

The opening plenary was chaired by Jung-Hwan Park, Republic of Korea. Nobel Prize winning poet, Ko Un called for the development of a Human Charter for the Forest to prevent future atrocities committed against forests, referring to the "cumulative crime of forest destruction perpetrated over previous centuries by human avarice." He stressed that voluntary institutions are urgently needed to ensure that such a declaration does not become a mere slogan. He said that the future of the human race can only be guaranteed by making the forest spirit the very spirit of humanity. He made suggestions on: educating schoolchildren on the importance of forests; allocating some work hours as "forest time" in workplaces; planting a tree on occasions of birthdays and celebrations; and raising the rank of the Korean Forest Service and other relevant government administrations to that of top government agencies. He concluded by stating that the nations of tomorrow will succeed as nations only if they are nations of the forest.

## SUB-PLENARY SESSIONS

In the afternoon, three concurrent sub-plenaries took place on forest health in a changing environment, keeping Asia green, and perspectives of the Collaborative Partnership on Forests (CPF) on biodiversity, climate change and forestry.

**FOREST HEALTH IN A CHANGING ENVIRONMENT:** Elena Paoletti, National Research Council Plant Protection Institute, Italy, presented the compounding effects of air pollution on forest ecosystems given climate

change. She discussed how climate change exacerbates impacts of ozone and nitrogen on forest health, and reduces forest-carbon sequestration.

Nicola La Porta, Fondazione Edmund Mach Istituto Agrario di S. Michele All'Adige, said factors related to climate change, including temperature changes and altered precipitation patterns, may increase the effects of fungal diseases on forests. He said trees may be more susceptible due to higher stress levels or new threats may appear because of changing species composition and the arrival of new pathogens.

Andrew Liebhold, U.S. Forest Service, emphasized globalization as a key cause of invasive species and noted the US has about 400 non-native forest species, only some of which have negative economic consequences. He described varied impacts of invasions on natural, plantation, and urban forests, and said work to prevent arrivals can reduce control and eradication costs.

Martin Lorenz, Institute for World Forestry, presented on the International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests, describing its work monitoring forest ecosystem conditions and spatial and temporal variation of forest health. He said they are enhancing the system to capture interactions, coordinate with national forest inventory plots to measure forest growth, and increase measurement intensity to assess ecosystem functions.

William Orosina, U.S. Forest Service, described how land-use changes, including for fire suppression and agriculture, create sub-optimal conditions for certain species due to interactive effects with root pathogens which, need to be considered in restoration before silvicultural interventions are prescribed.

Andrea Battisti, Padova University, Italy, presented on the importance of climate change for the frequency and distribution of insect outbreaks, noting that direct and indirect effects of climate change will have a positive but varied effect on herbivorous insect activity. He said these positive effects, combined with expanded insect ranges will likely increase insect outbreaks.

**KEEP ASIA GREEN: REHABILITATING AND RESTORING FOREST ECOSYSTEMS IN ASIA:** The session was chaired by Michael Kleine, IUFRO. Don Koo Lee, IUFRO President, highlighted that the session would summarize the results of IUFRO's "Keep Asia Green" initiative.

Zhiqiang Zhang, Beijing Forestry University, presented on afforestation and ecological restoration in the East Asia region. He noted that despite dramatic forest land use changes resulting in deforestation and forest land degradation, extensive forest related land rehabilitation activities undertaken in the region have resulted in significant restoration of forest cover in some countries.



Ko Un, a famous Korean poet

## IUFRO World Congress Bulletin (24 August 2010)

IUFRO World Congress Bulletin, Issue #1, Volume 178, Number 1, Tuesday, 24 August 2010



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L-R: Ahmed Djoghlaif, CBD; Bill Jackson, IUCN; Jan McAlpine, UNFF; Peter Mayer, IUFRO; Eduardo Rojas-Briales, FAO; Tony Simons, World Agroforestry Centre; and Emmanuel Ze Meka, ITTO.

Victor Teplyakov, Seoul National University, discussed the Russian Federation's Far East forest use and rehabilitation, noting efforts on reforestation which have been made.

Lucrecio Rebugio, University of the Philippines, presented successful cases and lessons learned on rehabilitating degraded forest lands in Southeast Asia, noting that in spite of efforts, forest cover decline continues in most of the regions' countries.

Promode Kant, Institute of Green Economy, India, reported on rehabilitating forests and extending tree cover in South Asia, highlighting the importance of: forest law and policy; community-based forest management; and establishment of rehabilitation projects.

Khosro Sagheb-Talebi, Research Institute of Forests and Rangelands, presented on the forest landscape restoration and rehabilitation activities in West Asia, highlighting: survey and site-specific planning; application of participatory approaches; watershed rehabilitation in mountainous regions; combating desertification; flood-water spreading; and rain-water harvesting.

### **BIODIVERSITY, CLIMATE CHANGE AND FORESTRY – PERSPECTIVES OF THE COLLABORATIVE PARTNERSHIP ON FORESTS:**

The sub-plenary was facilitated by Peter Mayer, IUFRO, and highlighted key global forest activities, needs and ideas.

Eduardo Rojas-Briales, FAO, spoke on the goals and achievements of the CPF. He highlighted several CPF successes, including the Forest Days at the UNFCCC COPs, which formally put REDD on the climate agenda, and the CPF Strategic Framework on Climate Change. He also noted that 2011 will be the UN's International Year of Forests (IYF), to be organized by UNFF.

Bill Jackson, IUCN, discussed the landscape approach for linking climate change, forest biodiversity and the needs of people. He recommended "nature-based solutions," such as REDD, with an emphasis on all forest values. REDD, plus conservation (REDD+), he said, is the only cost-effective, proven way to scale up emissions reductions while alleviating poverty and vulnerability, and for which large-scale opportunities exist. Emphasizing the importance of connecting communities to forest management, he described IUCN's Livelihoods and Landscapes Strategy, which uses the landscape approach to forest management and in which the landscape is determined by the local social, economic, and geographic context.

On climate change and the 2010 International Year of Biodiversity, Ahmed Djoghlaif, Convention on Biological Diversity (CBD), described the importance of the upcoming CBD COP 10 to adopt a new global strategy for biodiversity, especially related to access and benefit sharing and conservation of genetic resources. He underlined his hope

that an agreement would include a legally-binding monetary evaluation mechanism. Djoghlaif closed by highlighting the CBD's global tree-planting initiative, Green Wave, which has expanded from 50 to 6000 schools in two years.

Emmanuel Ze Meka, International Tropical Timber Organization (ITTO), described reducing deforestation and forest degradation and enhancing environmental services in tropical forests (REDDES). He identified several REDDES research priorities and encouraged greater investment in financial incentives for SFM and functional markets.

Tony Simons, World Agroforestry Centre, referencing that neither the word "tree" nor "forest" was used in the 1972 Stockholm Declaration and that forestry was only marginally referenced in the 2001 Millennium Development Goals' indicators, stated that in 2010 "forestry has never had it so good." He emphasized the importance of good communication with the example that although the word "forestry" is now contained in 40 million internet URLs, while some much less inspiring searches bring up many times this number.

Jan McAlpine, UNFF, stressed the need to integrate multiple values of forests and to recognize that large populations depend on forests. She presented two John D. Liu films emphasizing connections between damaged environments and human poverty, and how restoration of wild vegetation can revitalize agricultural systems and local economies. On the issue of cross-sectoral connections, McAlpine described the UNFF 360 degree perspective as an initiative valuing and creating institutional partnerships beyond the forestry sector, including with several UN conventions and the ITTO.

### **TECHNICAL SESSIONS**

In the late afternoon, participants scattered throughout the massive COEX complex to attend 19 concurrent technical sessions spanning all nine conference themes. IISD Reporting Services was there to cover two of them, on income from smallholder forestry and economic valuation of forest ecosystem services.

**INCOME FROM SMALLHOLDER FORESTRY – CAN IT BE A DRIVER OF POVERTY ALLEVIATION?:** This session was chaired by Verina Ingram and Patrice Levang, Center for International Forest Research (CIFOR).

Divine Foundjem-Tita, Ghent University, discussed how creating institutional arrangements for informal non-timber forest product (NTFP) markets can improve livelihoods of farmers in Cameroon. Institutionalizing communication pathways and standards for measurement were found to increase: point of sale prices; market certainty; bargaining power; and competition amongst farmers.

Verina Ingram, CIFOR, elaborated on lessons learned from two case studies in Cameroon, finding only small financial benefits and even economic costs from moving to communal forest usage in some cases, but that estimated sustainability of projects increased 40%.

Dede Rohadi, CIFOR, discussed possibilities to improve incomes from teak harvesting, one being to introduce a standing tree valuation system to ensure smallholders receive fair market prices. He also found that although teak is financially feasible, it is often not the best source of income for smallholders.

Kazuhiro Harada, University of Hyogo, Japan, highlighted how small group timber certification can play a role in poverty alleviation in Indonesian smallholder communities by offering: financial support from the group to undertake extraction; income security of certification; halting of illegal logging due to improved income from certified products.

Aziza Rbivate, University of Johann Heinrich von Thünen-Institut, Germany, analyzed the Malagasy forest fringe as a basis for developing adaptive incentives in the context of REDD. She noted that the social and economic functions of deforestation and forest degradation are highly dependent on social and economic structures, and that these should form the basis of any REDD related incentives or alternatives.

Kazi Kamrul Islam, Kyushu University, talked about how participatory agroforestry in Bangladesh is hindered by bureaucracy, monopoly market structures, poor infrastructure, and exploitation by middlemen.



Verina Ingram and Patrice Levang, CIFOR

Shoana Humphries, University of Florida, expounded on the economic feasibility of community-based forest enterprises in Brazil. She found that although they can be successful, donors need to reconsider their definition of viability to incorporate options for continued support to alleviate poverty sustainably.

Sushila Kumari Thapa Magar, ForestAction, discussed community forest enterprises in Nepal, noting their success is a function of appropriate regulation, stakeholder participation in decision-making and project ownership.

Ousseynou Ndoye, FAO, discussed the need for regulatory policy reform for development of NTFP enterprises in Central Africa, highlighting that laws dealing with traditional use rights currently criminalize sale of NTFPs by smallholders. He also emphasized the effects of mid-level corruption, as its costs travel down the value chain to smallholders.

**ECONOMIC VALUATION OF FOREST ECOSYSTEM SERVICES:** Co-Chair Larry Mason, University of Washington, discussed the policy challenges of successfully valuing and compensating FES. Drawing on US examples, he lamented the numerous problems associated with approaches such as certification and carbon markets, and called for place-based approaches to forest management.

Co-chair Richard Yao, Scion and New Zealand Forest Research Institute, discussed research on non-market valuation of recreational use of New Zealand's Whakarewarewa forest. Describing user surveys and econometric techniques, he



View of the technical session on income from small holder forestry.

reviewed differences between how mountain bikers and walkers value forest attributes and their levels of satisfaction with the forest.

Peter Herbst, IUFRO, described a forest eco-compensation package seeking to offset forest habitat destruction in Georgia related to an international pipeline right-of-way. Rather than monetize forest services, he explained a scoring method used to assess habitat attributes and their change over time.

Robert Deal, US Forest Service, discussed work to value ecosystem services in the US, such as wetland banking under the Clean Water Act. On work to bundle ecosystem services, he described the challenge of coordinating across regulatory agencies, avoiding double counting and demonstrating additionality.

Shuirong Wu, Chinese Academy of Forestry, presented a meta-analysis of the valuation of FES in China. She highlighted that China's valuation standard differs from Costanza or the Millennium Ecosystem Assessment, and in the review of 50 studies concluded that there is great variation in FES values, and that uncertainty exists for predicting values based on previous studies.

Eduardo H. Ditt, Ecological Research Institute, Brazil, discussed valuation and policy in the context of the Atlantic Forest of Brazil, which supplies water for nine million people. He said the total value of its ecosystem services, differentiated by land use type and valuation method, provides a valuation range of \$49-60 million per year. He said this analysis offers a variety of practical policy options and prices.

In discussion, participants also considered the issue of high transaction costs for FES, the prospect of an ecosystem having infinite value, and the importance of economic analyses in giving weight to policy decisions.



Participant posing with IUFRO mascots.

## IUFRO World Congress Bulletin (25 August 2010)



# IUFRO World Congress Bulletin

## A Daily Report of the XXIII IUFRO World Congress

Published by the International Institute for Sustainable Development (IISD) in collaboration with the International Union of Forest Research Organizations

ONLINE AT [HTTP://WWW.IISD.CA/YWB/FOREST/IUFRO/IUFROXXIII/](http://www.iisd.ca/ywb/forest/iufro/iufroxiii/)  
ISSUE #2, VOLUME 178, NUMBER 2, WEDNESDAY, 25 AUGUST 2010



### XXIII IUFRO WORLD CONGRESS HIGHLIGHTS: TUESDAY, 24 AUGUST 2010

On Tuesday, participants continued discussing forestry issues of every hue, beginning with a plenary keynote speech by CIFOR Director General Frances Seymour on past and future challenges of forest research. The day continued with three sub-plenaries on urban forests, the next generation of forest research, and forests and climate mitigation. Additionally, 38 technical sessions met, covering all nine Congress themes, along with multiple side and business events, as well as the first of two official poster sessions.



IUFRO theme banners prominently displayed in the exhibition hall.

### PLENARY SESSION

Niels Elers Koch, Forest and Landscape Denmark, chaired the plenary and introduced keynote speaker, Frances Seymour.

Frances Seymour, CIFOR, began with a retrospective talk on forest and communities research aimed at gleaned lessons for the multiple challenges of integrating climate change into future research. After commending progress made on understanding effects of rights and market constraints, and highlighting the importance of institutions, she warned against the "tyranny" of the case study, the proliferation of which has created an excess of objectivity, allowing scientists to build scientifically supported arguments to corroborate any normative position on the effects of community-based forestry. To move away from the "it depends" conclusion on this effectiveness, Seymour

highlighted that the inclusion of a more open, political economy approach is needed to account for the multiple, often competing, interests involved in, and served by, forest policy-making.

Seymour then highlighted key aspects that must be included in future climate change-related forestry research. First, noting that communication with the "climate world" is imperative, what may be conventional wisdom to some is novel information to others. Second, she urged that new research agendas must build on what is already known about creating effective, efficient and equitable outcomes. Third, she called for forest scientists to commit to "big science," as too much "small think" can impede evidence-based rural policy-making. She stressed that much is to be gained by investing in global comparative



Frances Seymour, Center for International Forest Research (CIFOR),

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Frances Seymour, CIFOR Director General

studies, but because no single organization has the capacity to undertake such an operation on its own, collaborative research must be pursued now more than ever.

Responding to questions from Koch, Seymour noted that IUFRO will play a valuable role in the adaptation of big science through its promotion of interdisciplinarity and cooperation.

## SUB-PLenary SESSION

### PROMOTING URBAN FOREST SERVICES IN PARTNERSHIP BETWEEN SCIENTISTS AND COMMUNITIES:

Chair Cecil Konijnendijk, University of Copenhagen, summarized changing urban trends affecting urban forestry: demography, lifestyle, information and entertainment, urbanization, and changes in the wider environment. He continued by presenting characteristics urban forestry should embody, namely: integrative, strategic, inter- and multi-disciplinary, participatory, and adequate in meeting urban demands, since foresters' "customers today are primarily urban."

David Nowak, US Forest Service, discussed partnering with urban communities to secure data and promote urban management of forest services in the United States using the iTree tool. He described how this free software provides the US Forest Service with free data on urban forests and helps cities better understand the functions and needs of their urban forests.

Kjell Nilsson, University of Copenhagen, introduced the Peri-urban Land Use Relationships - Strategies and Sustainability Assessment Tools for Urban-Rural Linkages Project (PLUREL), which had the participation of 14 European countries and China, and analyzed challenges and consequences of urbanization. The results of the project recommended response strategies including: improved governance and integrated territorial policy approaches; urban containment; the creation of new urban landscapes and a green compact garden city; preservation of green infrastructure and green areas; better understanding the urban-rural interface; and strengthening public sector control over urban sprawl.

Jay Bolthouse, University of Tokyo, illustrated how forests can bridge the urban/rural divide and that managing urban forests can be treated not only as work, but a leisure activity as well. He presented the results of a study on a new Japanese urban forest paradigm characterized by volunteer management of urban and peri-urban woodlands, focusing on the role of scientists in establishing and strengthening community forestry networks that link disperse and fragmented volunteer groups.

Michelle Gautier, FAO, joined the panelists for the discussion. In contrast to panelists' focus on wealthy nations, she said requests are increasingly coming to the FAO from less wealthy countries to assist with rural-urban linkages primarily

related to chronic urban watershed mismanagement, leading to sinking water tables, desertification and landslides. Discussions focused on: the importance of partnerships; the need to develop internationally standardized assessment tools; the focus on matching policy to the needs and aspirations of the public; and integrating forestry issues into school education.

### CAN FORESTRY AND FOREST SECTOR ACTIVITIES CONTRIBUTE TO MITIGATING CLIMATE CHANGE?:

Werner Kurz, Natural Resources Canada, moderated the session and emphasized the importance of educating policy-makers about the forest sector's contributions to climate change mitigation. Additionally, he warned that oversaturating forest carbon sinks beyond tipping points could negate mitigation effects. He also highlighted the substitution benefits of using wood rather than energy-intensive materials.

Frank Werner, independent consultant, explained a model for effective long-term forest and wood management for GHG mitigation, emphasizing that an optimized life cycle of wood products should include a maximum but sustainable increment of harvestable wood, continuous downcycling through a use "cascade" terminating as fuel for bioenergy.

Reid Miner, National Council for Air and Stream Improvement, reviewed the global forest industry's impact on GHGs, highlighting that increasing the use of forest products can produce large benefits to society via GHG reductions. He lamented a lack of quantitative data on forest carbon stocks and landfill design and management.

Ben de Jong, El Colegio de la Frontera Sur, reported on the readiness of Mexico to begin carbon accounting based on REDD assessments. He revealed that a national REDD scenario and robust monitoring system are forthcoming, and concluded by elaborating on ten elements necessary to create Mexico's REDD profile and monitoring system.

Richard Harper, Murdoch University, spoke on bio-mitigation and, noting that forestry alone will not be able to solve carbon imbalances, he proposed research on using abandoned farmland for mitigation to avoid the problem of the food versus fuel debate.

William Keeton, University of Vermont, introduced a new study on the carbon storage potentials of temperate old growth forests based on an aggregated global dataset, saying there is a high potential for their conservation to increase carbon storage with a variety of ecosystem co-benefits, but that variability in stand structure must be noted.

### IUFRO AWARD WINNERS – THE NEXT

GENERATION: Co-chair Su See Lee, IUFRO, introduced this year's awardees, remarking that female and developing-country students were well represented. Co-chair, Michael Rivoire, International Forestry Students' Association, moderated a discussion on the students' research.



Kjell Nilsson, University of Copenhagen

## IUFRO World Congress Bulletin (25 August 2010)

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Winners of IUFRO's Student Award for Excellence in Forest Science and Outstanding Doctoral Research participated in a panel discussion on their motivations, challenges and experiences in conducting their research projects.

There were three recipients of the Student Award for Excellence in Forest Science. Lee Hong Tnah, Forest Research Institute Malaysia, won for her work on a DNA database designed to help stop illegal logging. Macro Contreras, University of Montana, won for using an innovative optimization technique to determine least-cost and environmentally friendly routes for wood transportation. Mahbuhul Alam, Ehime University, won for work characterizing the ecology and significance of "home gardens" in Bangladesh.

There were eight Outstanding Doctoral Research Award recipients. Guillermo Gea Izquierdo, Swiss Federal Research Institute, won for research advancing an ecosystem model in the silvopastoral system of West Iberian open woodlands. Finnvid Prescher, Svenska Skogplantor AB, won for research on the genetic functions and management of seed orchards and procurement. Jürg Andreas Stüchelberger, EcoEng Ltd., won for work on optimizing road networks for ecological and economic priorities in mountainous European areas. Guillermo Trincado, Universidad Austral de Chile, won for a dynamic model capturing branch and knot formation in Loblolly pine. Jiali Jiang, Research Institute of Wood Industry, China, won for work on the effects of temperature, time and frequency of the dynamic viscoelasticity of wood. Feng'e Yang, Ontario Ministry of Natural Resources, won for work on the welfare and competitiveness impacts of Ontario's stumpage pricing system. Mariëka Gryzenhout, University of Pretoria-FABI, won for evaluating the taxonomy of a group of important tree pathogens. Andreas Schindlbacher, Federal Research and Training Centre for Forests, Austria, won for work on the effects of global warming on carbon turnover in a limestone forest soil.

In the discussion, the awardees stressed the value of international collaborations.

### TECHNICAL SESSIONS

#### CHALLENGES AND ISSUES OF FOREST MANAGEMENT AND UTILIZATION IN ASIAN COUNTRIES:

Matti Palo, independent scientist, discussed deforestation and poverty challenges in the Democratic People's Republic of Korea, Mongolia and tropical Asian countries. He reviewed a theoretical model of deforestation drivers and an empirical model assessing poverty and ecological drivers, and stressed the difficulty of acquiring relevant data.

Ho Sang Kang, Seoul National University, delineated multiple threats to Indonesia's ecologically significant forests. He discussed an ecotourism training programme developed

by the School of Environment Conservation and Ecotourism Management as one possible approach to address these challenges.

Dar-Hsiung Wang, Taiwan Forestry Research Institute, discussed the history and evolution of Japanese cedar plantations in Taiwan, linking them to Japan's occupation of Taiwan and a forest management paradigm prioritizing the replacement of "unproductive" native forests with "productive" plantations. He ended by noting that degradation in their quality has necessitated proposals to replace them.

Shirong Liu, Chinese Academy of Forestry Sciences, reviewed China's forest resources, legislation, production and trade. He highlighted 2003 forest governance reforms, including transforming collective ownership into individual ownership, and underscored China's low forest productivity and forest area per capita, and the damages caused by pests, diseases and invasive species.

Juan Chen, University of British Columbia, discussed China's national forest protection and conversion of cropland back to forest programmes. Despite successes with afforestation of degraded lands, she noted challenges regarding unemployed forest workers and in ensuring the longer-term vitality of planted forests.

Nabaghan Ojha, Regional Centre for Development Cooperation, India, discussed the evolution of Indian forests and forest laws, including provisions for participatory forest management and the Forest Rights Act that recognizes rights of forest dwelling peoples, stressing implementation challenges.

Mohammad S.H. Chowdhury, Shinshu University, Japan, discussed medicinal plants and forest protection in Bangladesh. He described their use in 36 villages surrounding the Rema-Kalenga Wildlife Sanctuary, and closed with recommendations on balancing community and conservation needs.

**BIODIVERSITY AND CLIMATE CHANGE: DIRECT AND INDIRECT LINKAGES IN ADAPTATION AND MITIGATION:** M. Danesh Miah, University of Chittagong, presented challenges of harmonizing requirements of the Kyoto Protocol's Afforestation/Reforestation (A/R) Clean Development Mechanism (CDM) and those of the CBD. Bangladesh, he said, with a gross plantation carbon stock of 190 tons of carbon per hectare, has great opportunity to benefit from A/R carbon credits, but that this will come at the cost of introducing alien species in the plantation process.

Similarly, Jürgen Bausch, University of Freiburg, noted conflicts between silviculture strategies that change ecosystem structure to maintain select functions, and nature conservation that maintains historical conditions. He indicated that a focus on desired ecosystem functioning may reduce these conflicts.



Participants looking at posters submitted to the IUFRO XXIII Congress.

David Flaspohler, Michigan Technical University, spoke on intensive forest management for bioenergy. He noted that expanding markets for plant-based biofuels have the potential to intensify forest management in ways that harm native species, but said other models exist in which intensively managed forests sustain many ecosystem services furnished by unmanaged forests.

Eckehard Brockerhoff, New Zealand Forest Research Institute, said impacts of climate change on forest biodiversity include range-boundary changes and phenological shifts of 279 species, causing increased breeding cycle frequency, population booms and migration. In turn this creates new patterns of invasive species. He highlighted the value of mixed stands for climate adaptation and mitigation.

Chan Ryul Park, Korea Forest Research Institute, presented research on changing bird distribution patterns caused by climate's effect on metabolic rates. He said forest declines also influence distribution and that eco-tourism may enable habitat transition.

Alexander Belokurov, WWF, stressed that, though the potential of protected areas has only partially been realized, they remain the most important tool for biodiversity conservation and provide vital climate change mitigation and adaptation benefits.

**HEALTH BENEFITS OF FORESTS:** Won Sop Shin, Chungbuk National University, facilitated the session.

Si Hyung Lee, Research Institute for Korea Natural Medicine, proposed that a 2-3 day wilderness retreat positively increases levels of human serotonin, a neurotransmitter which reduces depression, eating disorders, and aggression.

Kjell Nilsson, University of Copenhagen, presented on the role of the environment in healthy lifestyles. He mentioned that several international working groups are looking at research on the prevention of illness, the importance of green spaces, and the effect of the environment on mental status.

Tatsuya Kushida, NalaPro Technologies, summarized biochemical research on flavonoids, substances contained in tree bark, which have been seen to improve human immune functions.

Nor Azah Mohamad Ali, Forest Research Institute Malaysia, presented on her institute's work on bioprospecting, i.e. the search for applications, processes or products in nature with useful health benefits. She said her team assists in the

development, and quality and safety assurance, of products for cosmetics and toiletries manufacturers, especially lotions and creams, anti-inflammatory agents and mosquito repellants.

Julius Adebayo John, Forest Research Institute, Nigeria, talked about perceptions and use of traditional herbal medicines in Nigeria, the popularity of which is returning as health risks of fake pharmaceuticals become more apparent. He recommended that policy-makers take steps to formally recognize herbal medicines to encourage their use.

#### INNOVATIVE APPROACHES TO FOREST

**ECOSYSTEM RESTORATION:** The session was moderated by Stephen Syampungani, Copperbelt University.

John Stanturf, US Forest Service, said that forest landscape restoration can serve to restore forest functions and meet human needs, but that there has so far been little success in systematically integrating these two complementary aims. He reviewed existing research and suggested ways to integrate social and natural science approaches with a resiliency science framework, such as reconstructing biotic/abiotic thresholds, colonization and afforestation, and repairing watershed functions.

Ekeoba Isikhuemen, Ministry of Environment and Public Utilities, Nigeria, discussed a pilot study on reversing biodiversity loss and degradation of agricultural lands in southern Nigeria. He said the project demonstrated that with appropriate eco-friendly cropping mixtures and agroforestry practices, degraded forest land can recover from a disturbed state.

Keiko Nagashima, Kyushu University, presented on a study examining abandoned plantation clearcuts on Kyushu Island of Japan to understand early stage vegetation recovery processes. She said deer browsing was the main factor inhibiting tree species recovery, and that slope form, adjacent natural broadleaf forests and abandoned sites influence vegetation types that emerge.

Arno Thomaes, Research Institute for Nature and Forest, Belgium, introduced a research project examining tree species as "ecosystem engineers" for restoration. He explained the specific influence of oak and poplar species on soil pH, which shapes the abundance of ancient forest herbs in post-agricultural forests.

Coert J. Geldenhuys, University of Stellenbosch, discussed a forest rehabilitation approach that emulates natural disturbance regimes and utilizes the benefits of secondary forests and locally developed slash-and-burn agriculture systems. Drawing on examples from the Congo Basin and South Africa, he used species richness in secondary forests as an indicator of recovery and explained how such recovery could serve as the basis for restoration projects matched with local agro-forestry systems.

Participants heard presentations on two related posters and in the ensuing discussion, considered, *inter alia*: appropriate measures of biodiversity, such as richness and endemism; and how the session informs discussions about REDD.

## IUFRO World Congress Bulletin (26 August 2010)



# IUFRO World Congress Bulletin

## A Daily Report of the XXIII IUFRO World Congress

Published by the International Institute for Sustainable Development (IISD) in collaboration with the International Union of Forest Research Organizations

ONLINE AT [HTTP://WWW.IISD.CA/YIMB/FOREST/IUFRO/IUFROXXIII/](http://www.iisd.ca/yimb/forest/iufro/iufroxiii/)  
ISSUE #3, VOLUME 178, NUMBER 3, THURSDAY, 26 AUGUST 2010



### XXIII IUFRO WORLD CONGRESS HIGHLIGHTS: WEDNESDAY, 25 AUGUST 2010

On Wednesday, participants dug deep into technical issues following a keynote speech in plenary by José Joaquín Campos Arce, Director General of CATIE. The day continued with three sub-plenaries on forest genetic resources, forest monitoring for climate change, and forest biomass utilization. Thirty-nine technical sessions met, along with multiple side and business events, as well as the final official poster session. Thursday's Congress will be held outdoors, with participants hoping for a break in the constant rainy weather for their eight field trips before returning to the COEX complex on Friday.



IUFRO delegates with the IUFRO Congress mascot mixing a giant serving of "Bibimbap". Photo courtesy of Reem Hajjar.

### PLENARY SESSION

John Parrotta, US Forest Service, chaired Wednesday's plenary, introducing Keynote Speaker José Joaquín Campos Arce, Centro Agronómico Tropical de Investigación y Enseñanza (CATIE).

Campos Arce presented on the integration of scales and sectors to improve sustainability of livelihoods, landscapes and forests. He highlighted that system approaches are necessary for addressing the complex set of challenges facing the world, as well as achieving sustainable development, which requires interdisciplinary multi-stakeholder platforms, mechanisms and intense coordination. Campos Arce said there is a need to find



José Joaquín Campos Arce, CATIE, accepted a token of appreciation from IUFRO President Don Koo Lee.

sustainable rural solutions to global challenges and local needs, requiring integrated and collaborative solutions on all scales, from local to global. He underlined that rural areas provide important ecological services.

Agroforestry systems, he said, are key to improving livelihoods of poor rural families. He identified several components of such systems including: managing tree density and growth to enhance carbon storage without affecting yields; linking local communities with socially responsible companies; finding innovative approaches to lower transaction costs; and ecosystem approaches to SFM, forest conservation, and establishment of biological corridors.

Campos Arce stressed the importance of PES, especially for small farmers and forest-dependent people. Scientific support, he said, will improve effectiveness of SFM, and he underlined the importance of forestry education and training of new forestry professionals.

Campos Arce concluded that social and ecological resilience are interdependent and the key for sustainable livelihoods, landscapes and forests.

### SUB-PLENARY SESSIONS

On Wednesday afternoon, three simultaneous sub-plenary sessions convened around the bustling COEX complex in Seoul.

#### IUFRO DIRECTORS FORUM: FOREST MONITORING IN TIMES OF CLIMATE CHANGE:

Co-moderator Konstantin von Teuffel, Forest Research Institute Baden Württemberg, called the Forum a place to exchange views on management of forest research. Co-moderator Ann Bartuska, US Forest Service, added that another aim of the Forum is to make the theoretical practical.

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Mette Loyche Wilkie, FAO

Peter Mayer, IUFRO, discussed the outcome of the 2009 World Forestry Congress regarding forest monitoring, emphasizing funding, climate change and significant regional differences in monitoring capacities.

Mette Loyche Wilkie, FAO, reminded participants that monitoring takes

place on different scales under different conditions. She said FAO supports formation of technologically-centralized but bottom-up global monitoring. Wilkie underscored the enormous data gaps researchers faced preparing for FAO's Global Forest Resources Assessment (FRA) 2010, especially on: net changes in carbon stocks; previous and current deforestation rates; and carbon emissions from deforestation.

Ben Chikamei, Kenya Forestry Research Institute, spoke on forest monitoring in Kenya and Africa. He noted that despite progress made in his country, only 11 African countries are set to benefit from REDD projects through the World Bank, saying complicated procedures and methodologies hinder expansion of CDM and REDD activities, recalling that according to UNEP's methodology, Kenya has 2 % forest cover but using FAO's it has 5.9 %.

José Joaquín Campos Arce, discussed forest monitoring in Latin and Mesoamerica, stressing it is an adaptive management tool, not a luxury. Aside from capacity deficits outside Mexico, he also noted difficulties agreeing on regional definitions for indicators, criteria and principles due to differences in Latin American national interests.

Joon Hwan Shin, Korea Forest Research Institute, stressed the need to address four questions: what forest information is important for climate change? What is the appropriate structure of a global forest monitoring system? How can the needs of developing countries be met? Who will pay for such a system?

Klaus-Herman von Wilpert, Forest Research Institute Baden Württemberg, presented the outcome of forest monitoring in Central Europe as a basis for SFM. He purported that forest decline is the result of air pollution and soil degradation, and emphasized that monitoring should be a continuous bottom-up endeavor. He concluded by voicing frustration that the EU refused to fund regional monitoring because of a lack of political appeal, and urged IUFRO to send a clear message to policymakers on this issue.

George Sam Foster, US Forest Service, said there is a critical demand for forestry monitoring information and that expanding interest is generated by rapid changes in global markets and environments. He stressed the need for, *inter alia*: further integrating satellite data with ground level information; a focus on innovations to lower monitoring costs; and better understanding what forest change really means.

**FOREST BIOMASS UTILIZATION FOR BIO-ENERGY: TECHNOLOGY, ECONOMICS AND ENVIRONMENT:** Woodam Chung, University of Montana, moderated this session, explaining that biomass can be used as a tool for mitigating climate change.

Nathaniel Anderson, University of Montana, explained it was cost-effective and feasible to supply timber residue at \$43 per ton in Oregon. He concluded that pyrolysis production of biochar has great potential.

Christian Suchomel, University of Freiburg, described harvesting firewood via the coppice method, which generates dense and sustainable re-sprouting of forest stands, providing sustainable bioenergy. He described different harvesting technologies and concluded that coppice is good for conservation.

Han-Sup Han, Humboldt State University, emphasized that non-uniform forest residues are difficult and expensive to handle, and described challenges with four current residue collection and transport systems: centralized processing; on-site processing; slash bundling; and integrated systems.

Xueyong Ren, Beijing Forestry University, presented fast pyrolysis bio-oil production. Using this method, he said, biomass can be converted to biochar, bio-oil, or combustible gas in a single chemical reaction.

Using a life cycle approach, Young-Seop Choi, Kangwon National University, compared wood fuels, concluding that the distance to the consumer and income level of the consumer are important.

On bioenergy in Japan Kazuhiro Aruga, Utsunomiya University, lamented that although forest, sawmill, and construction waste residues largely go unused, subsidies necessary to make them economically viable, are unlikely to be introduced.

Deborah Page-Dumroese, Michigan Technological University, highlighted the importance of soil science in forestry management and biomass harvest, stating that both alter soil processes physically, chemically, and biologically. She said retaining the forest floor is key to forest health and recommended practitioners create site-specific risk ratings to promote sustainability.

Lisa Sennerby-Forse, Swedish University of Agricultural Sciences, for Helene Lundkvist, summarized bioenergy development in Sweden, noting it had surpassed hydropower and nuclear power, and accounts for more than 25% of total energy supply. She also outlined the environmental concerns of producing bioenergy.

**CONSERVATION AND SUSTAINABLE USE OF FOREST GENETIC RESOURCES:** Heok-Choh Sim, Asia Pacific Association of Forest Research Institutions, moderated the session.

Zohra Bennadji, Instituto Nacional de Investigación Agropecuaria, Uruguay, detailed a project identifying critical problems in forest genetic resource (FGR) conservation and sustainable use, which will inform the first FAO assessment on the global status of FGRs. She noted: the need for standardized indicators for forest species priorities and genetic diversity; a lack of good exchange mechanisms for information sharing; and weak links between policy and science



Participants posing questions to a poster presenter.



The dais during a session of the President's Discussion on forestry education.

Judy Loo, Bioversity International, presented an approach for managing conservation of genetic diversity when reliable information on variability is lacking, underscoring that due to high costs and difficulties of obtaining genetic information, it is often neglected by forest managers. She suggested assuming that genetic diversity correlates with environmental variability until more information is available on FGR.

Dag Lindgren, Swedish University of Agricultural Sciences, discussed the significance of climate change for seed orchards and said they will become more important in years to come. To account for climate change, he offered suggestions on how to deploy genetic material in Sweden, such as shifting seed ranges upwards in elevation by 3.3 meters per year to offset temperature changes.

Kyu-Suk Kang, Korea Forest Research Institute, reviewed the history and aims of tree breeding in the Republic of Korea, including work on breeding indigenous timber species and the establishment of seed orchards. He discussed advances made over the years and stressed that seed orchards play a key role in preserving FGR.

Yongqi Zheng, Chinese Academy of Forestry, reviewed changes associated with climate change, and detailed the role FGR can play in ensuring species and ecosystems are adaptable and resilient in the face of changing climatic conditions and greater variability in these conditions. He stressed that diversity is the basis for evolution and resiliency to changing demands we place on forests.

#### **IUFRO PRESIDENT'S DISCUSSION: FUTURE CHALLENGES FOR FOREST EDUCATION:**

Meeting in the late afternoon, this special session was moderated by Peter Mayer, IUFRO.

Florent Kaiser, International Forestry Students' Association, lamented that current forestry curricula lack: practical learning opportunities for students; a global focus; and student exchange opportunities.

Yoon Soo Kim, Chonnam National University, said forestry graduates worldwide have declined by 30% since the 1990s. Additionally, to meet industry demand, he suggested a three-year technical education as more relevant.

Hosny El-Lakany, University of British Columbia, on improving forestry education, commented on the need for: more specialized departments; increased national and international collaborations; job preparation in and outside of specific fields of training; and improved marketing by universities.

Emmanuel Ze Meka, ITTO, discussed what students should know about international forest-related agreements. He emphasized that in reality, international agreements are often constrained and undermined by sovereignty issues, and said although their overall impact has been questionable, their role and relevance is becoming more central due to concerted international efforts to resolve global problems.

Hideki Nose, Sumitomo Forestry Group, said highly specialized students often lack comprehensive judgment on contemporary forest industry issues and it must be remembered that one "cannot see the forest by only looking at the trees."

Gerald Steindlegger, WWF, stated that forestry must demonstrate that "it no longer serves only a sector but an entire landscape-of values and people." He also noted that primary drivers of deforestation lie outside the forest sector and SFM alone is not the answer.

Don Koo Lee, IUFRO President, concluded the session by proposing the creation of an IUFRO e-learning tool and IUFRO Task Force on Forest Education.

#### **TECHNICAL SESSIONS**

Participants bustled to 20 technical sessions first thing in the morning and again to 20 more at the close of a very busy Wednesday.

#### **TO WHAT EXTENT CAN PAYMENTS FOR FOREST ENVIRONMENTAL SERVICES BE PRO-POOR?:**

Moderator Terry Sunderland, CIFOR, opened the session by highlighting continuing controversies over the validity of PES as a pro-poor approach.

Sim Eun Suh, Seoul National University, questioned motivations for linking poverty to PES, saying that PES' focus on cost efficiency actually benefits from poverty, and theoretically incentivizes locking the poor into environmentally "sustainable poverty."

Lisa Petheram, Charles Darwin University, shared lessons from engaging communities on PES near a Vietnamese national park. She found that: lack of trust in government led respondents to favor payments from other sources; a combination of monetary and in kind payments is preferred; and continued forest access for household products is desired. Petheram also speculated that respondents' motivation to participate in PES and forest preservation was influenced by her presence.

Stephen Garnett, Charles Darwin University, on behalf of Pham Thu Thuy, shared findings of a pro-poor PES case study in Vietnam. Main messages included that: influential stakeholders can fuel inequity and inhibit participation; neutral intermediaries are hard to find; PES may not cover opportunity and transaction costs of poor households, but monetary gain is not the sole motivation to participate; and that understanding locals' definition of poverty should be central to project planning.

Mariëka Sandker, CIFOR, presented on participatory modeling of potential REDD outcomes in Ghana. She discovered that in areas with high population, low forest density and valuable cash crops, REDD does not offer enough incentives to overcome planned conversion. Additionally, in her case study area, the poor have little access to REDD



proceeds because 90% of forest carbon is stored on land owned by the wealthy, creating the danger that landowners may repatriate land currently leased to poor farmers to benefit from REDD themselves.

**MANAGING ASIAN BAMBOO FOREST IN A CHANGING WORLD:** Yaoqi Zhang, Auburn University, moderated this session.

Jian Gao, International Center for Bamboo and Rattan, China, reviewed water quality problems in China's Chaohu Lake and described results from area forest plots. She said bamboo forests are useful for water conservation and reducing pollutant runoff because they retain more water in the litter layer than other forest types.

Masaharu Sakai, Forestry and Forest Products Research Institute, Japan, detailed a study of soil and water conditions in bamboo and conifer forests. He noted the problem of bamboo encroachment lowering soil moisture content, owing to higher water transportation in bamboo stands, and said that bamboo soils are at low risk of acidification.

Yueqin Shen, Zhejiang Forestry University, reviewed reforms in the bamboo sector. Drawing on a household survey, she discussed how different management approaches for bamboo affect economic benefits, local employment opportunities, and income distribution.

Ramasamy Yasodha, Institute of Forest Genetics and Tree Breeding, India, noted high demand for bamboo is complicated by its unpredictable reproductive cycle, limiting production. She explained the intricacies of *in vitro* micropropagation and said *Bambusa nutans* works well with these methods, but stressed that costs limit commercial production.

Benzhi Zhou, Zhejiang Forestry University, China, said bamboo is China's most important forest type, and reviewed its carbon sequestration properties. He discussed dry-weight biomass and carbon content to soil depth of 60 cm of a *Dendrocalamopsis vario-striata* plantation, finding 95.5 tonnes of carbon per hectare, with a third captured in plant biomass and two thirds by soil.

Guomo Zhou, Zhejiang Forestry University, China, discussed carbon storage of *Phyllostachys pubescens*, an economically important bamboo, which since the 1990s has come to account for 75% of Chinese and 40% of global bamboo forests. He revealed that the carbon storage capacity of this species can increase up to 40 fold in one month due to its quick growth rate.

**IDENTIFYING AND MONITORING OLD GROWTH FORESTS IN BOREAL, TEMPERATE AND MEDITERRANEAN ENVIRONMENTS:** Anna Barbati, University of Tuscia and Thomas Spies, US Forest Service, co-moderated the session.

Thomas Spies focused on old growth forests in the US Pacific Northwest, highlighting varied and complex definitions for old growth and different pathways by which these forests develop. For effective monitoring, he recommended a simple, structurally focused definition.

Rod Keenan, University of Melbourne, discussed events leading to Australia's policies for old growth protection. Detailing operational definitions used to map and designate protected areas, he stressed the need for adaptive approaches, particularly given climate change.

Anna Barbati said a structural approach is a fast and practical way to identify old growth forests, emphasizing that finding European old growth forests requires looking in hard to access places, at forests that have been under limited management, and at remnants of previous forests.

William Keeton, University of Vermont, explained that forests in the US Northeast were almost entirely cleared but are now re-growing. He discussed a study examining harvesting treatments designed to encourage development of old growth attributes in secondary forests.

Grant Wardell-Johnson, Curtin University, discussed tall open forests in southwest and southeast Australia. He stressed the importance of climate change when thinking about the conservation of old growth, noting, *inter alia*, carbon retained in old growth forest soils and changing temperature and precipitation affecting viability of protected forests.

Jan Bannister, University of Freiburg, reviewed research investigating the development of swamp and upland stands of old growth *Pilgerodendron wuiferum* forests in Patagonia, showing the tree species is stress and shade tolerant and can regenerate without large disturbances.

Alfredo Di Filippo, Università della Tuscia, Italy, described findings from a study of old-growth beech forests in northern and central Italy that reconstructed tree-life histories to analyze the transition of these forests towards old growth status from their previous state as managed forests.

Kris Verheyen, Ghent University, discussed long-term changes in understory vegetation in European forests based on an analysis of archived plots. He offered a synthesis quantifying the rate and nature of change in understory vegetation and their key environmental drivers.

**ADVANCES IN FOREST PEST SURVEILLANCE AND MONITORING:** Olle Anderbrant, Lund University, talked about forest insects in pest control and conservation, and the use of pheromone trap-catch at large scales.

Richard Hofstetter, Northern Arizona University, summarized that there is a positive correlation between trap-catch and infestation density, and that trap-catch may be a good large-scale predictor of beetle abundance and tree mortality.

Hongbin Wang, Chinese Academy of Forestry, described research to identify beetle population density at different elevations and cardinal directions in a forest using pheromone bait methods.

Steven Seybold, US Forest Service, reviewed invasive beetle populations, explaining that an "improved" rather than commercial pheromone bait showed better empirical results than models predict.

Robert Rabaglia, US Forest Service, presented on an early detection and rapid response project for non-native bark beetles that can severely impact the health of US forests. He relayed that the project had identified a list of 10 high-risk species, and traps baited with either species-specific pheromones or generally attractive host volatiles had been used in forest areas around high-risk sites in 17 states every year in the country.

Zhen Zhang, Chinese Academy of Forestry, presented work on detecting and trapping the red turpentine beetle introduced to China from North and Central America that caused serious damage to the Chinese pine.

Wonhoon Lee, Korea Forest Research Institute, reported the work of his research team in the construction of a Korean Forest Insect Pest DNA barcode database. He noted that DNA barcoding has potential applications in insect pest monitoring and quarantine.

Natalia Kirichenko, Institute of Forests, Russian Federation, reported on her work in detection of alien insect pests and diseases on European and North American woody plants in Siberia. The purpose of the study was to identify poorly known pests and diseases that, if introduced to Europe or North America, may present a threat.

Choi Won IL, Korea Forest Research Institute, reported findings of a study conducted by his research group on the occurrence and distribution of invasive insect pests in Korea after 2000.

## IUFRO World Congress Bulletin (28 August 2010)



# IUFRO World Congress Bulletin

## A Daily Report of the XXIII IUFRO World Congress

Published by the International Institute for Sustainable Development (IISD) in collaboration with the International Union of Forest Research Organizations

ONLINE AT [HTTP://WWW.IISD.CA/YIMB/FOREST/IUFRO/IUFROXXIII/](http://www.iisd.ca/yimb/forest/iufro/iufroxiii/)  
ISSUE #4, VOLUME 178, NUMBER 4, SATURDAY, 28 AUGUST 2010



### XXIII IUFRO WORLD CONGRESS HIGHLIGHTS: FRIDAY, 27 AUGUST 2010

Back in the COEX complex on Friday after a damp day of field trips, participants filled 20 early morning technical sessions before hearing the keynote speech by Nobel Laureate Elinor Ostrom in plenary, who also participated in a sub-plenary on new frontiers of forest economics. The two other sub-plenaries focused on agroforestry: the way forward, and enhancement of service life of wood in an environmentally conscious global society. Another 18 technical sessions met in the afternoon, as did numerous side events and business events.



IUFRO participants in a field trip to the World Cup Park, a landfill site turned Eco-Park.

### FIELD TRIPS

The IUFRO XXIII Congress was on hiatus Thursday, as participants braved the elements and headed into the field on eight trips organized to experience innovative forest-related projects around the Republic of Korea. Of the eight field trips, IISD Reporting Services was there to cover two: Landscape Restoration and Sub-alpine Forest; and Old-aged Natural Forests and Landfill Restoration. Remaining field trips included excursions about: a protected area for biological diversity; non-timber forest products; conservation and utilization of forest genetic resources; forests and human health; sustainable forest management and the ecosystem approach; and the wood processing industry.



Elinor Ostrom, 2009 Nobel Prize laureate in economics, stressed that it was feasible to be multidisciplinary.

During the old-aged Natural Forests and Landfill Restoration trip, participants visited the World Cup Eco-Park, a former landfill transformed into an environmentally friendly park, where wind energy and biogas from stored waste stored is produced. In addition, participants traveled to the Gwangneung Experimental Forest, registered as an international Long-Term Ecological Research for biodiversity study in 1998.

The Landscape Restoration field trip brought participants to Mt. Balwang in the Baekdudaegan Mountain Range where they observed a typical Korean sub-alpine forest ecosystem. Participants also viewed the Daegwallyeong plantation project, which illustrated various stages of forest restoration, including a stand of 20 meter conifer sentinels on land which had been a desert only 40 years ago.

### PLENARY SESSION

**THE POTENTIAL ROLE OF COMMUNITIES IN SUSTAINABLE FOREST RESOURCES:** Chair John Innes, University of British Columbia, introduced the keynote speaker Elinor Ostrom, Indiana University and Arizona State University, 2009 Nobel Prize laureate in economics.

Ostrom addressed the role of communities in sustaining forest resources. Multiple factors create forest conditions, she explained, meaning a simple management model is neither useful nor satisfactory. After stating that studying socio-ecological interactions requires both understanding of dynamic processes and adaptive policies, she advocated avoiding the "paper park," a static solution, as a panacea for conservation.

Ostrom then presented several case studies addressing the following: how alternative systems of governance affect social and ecological conditions; conditions favoring collective action for the provision of resource management; how people

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David Laband, Auburn University

respond to changing ecological and social conditions; and how diverse actors jointly affect forest conditions.

Within these case studies, she highlighted three indicators central to her research: tree density and richness; forest user behavior; and illegal forest activity. She stated that these played out in her case studies as follows:

first, comparing official parks to non-parks, ownership made no statistical difference to vegetative density; second, forests lacking effective law enforcement are more susceptible to degradation and those with effective enforcement mechanisms, including user monitoring, have a higher probability of regeneration; and third, conservation potential is highly dependent upon an effective combination of official and local user involvement.

She highlighted that privately owned forests had significantly less illegal activity when local users were permitted access to forest products, as do government forests where indigenous communities provide monitoring services. She said enabling communication between forest users and authoritative agencies enhances cooperation and conservation results even if sanctions are involved. However, she added, conservation is highest when local users can choose their own sanctioning methods.

Concluding, Ostrom stressed the feasibility of multidisciplinary and underlined the importance of careful designs, proper training and consistency. Innes echoed that it was time natural and social sciences worked together.

## SUB-PLENARY SESSION

### NEW FRONTIERS OF FOREST ECONOMICS:

Moderator Shashi Kant, University of Toronto, announced that IUFRO has founded a new group on forest economics in recognition that "You cannot create new policies based on old science, and we must step up to the plate."

Ostrom spoke about challenges of establishing whether a forest is deteriorating or improving over time. Sharing results from an 11-country study, she recognized that plot-based measurements are widely accepted but expensive, and that foresters measuring plots often lack local forest knowledge. As an alternative she highlighted how long term forest users can also provide information on forest condition, and opined on how and why their assessment of forest health may vary from foresters'.

David Laband, Auburn University, presented on public choice theory, focusing on political rent seeking activities in the forest sector, which see politicians more interested in the short term political and economic gains of the timber industry than the long-term goals of SFM. He also noted that the democracy's inability to account for intensity of voter preference can lead to a weakly motivated majority outvoting a highly motivated minority, and an overall decrease in societal welfare.

Urs Fischbacher, University of Konstanz, spoke about benefits of economic experiments in understanding how long-term forest objectives can be managed. Their value, he said, lies in the ability of the experimenter to control the situation to test for various influences. His models illustrated how conditional

cooperation is possible to preserve common pool resources, but that enforcement can be a potential issue, concluding that institutions that promote cooperation are necessary.

Karl-Gustaf Löfgren, Umeå University, considered economic modeling in forestry to avoid the "Lucas critique," which says that when policies change, one must change the parameters of the model because using previously observed behavior is no longer adequate. He said Finnish forestry, and forestry in general, can largely avoid this problem due to the richness of historical data.

**AGROFORESTRY: THE WAY FORWARD:** Tony Simons, ICRAF, and Ramachandran Nair, University of Florida, moderated the session.

Nair described development of agroforestry as an approach for: poverty alleviation; attainment of Millennium Development Goals (MDGs); food security; carbon sequestration; combating deforestation and desertification; fodder and fuel-wood supply; and environmental protection. He said the acquisition, effective transfer and feedback of such knowledge from practitioners are important.

Eike Luedeling, ICRAF, discussed a study on the carbon sequestration potential of agroforestry systems in African Sahel. He noted that recent conversion of large areas of Sahelian cropland to agroforestry has shown that adding trees to agricultural areas can be a strategy for sequestering atmospheric carbon, but concluded that climate change adaptation effects might be more important than mitigation.

Fergus Sinclair, ICRAF, spoke on the potential timber supply from agroforestry, saying only a proportion of tree cover has any timber value. After stating that there is a variable level of local knowledge on farm timber, he called for farmers and policy-makers to make explicit tradeoffs between trees and the agricultural landscape.

Shibu Jose, University of Missouri, presented on North American agroforestry practices, claiming they need to overcome many barriers, including a lack of public awareness.

Francisco Javier Silva Pando, University of Santiago, Spain, spoke on silvopastoral systems for forest fire prevention.

Simons summarized the history of agroforestry and listed several future recommendations including looking at agroforestry systems as a way to "bullet-proof" farms in the face of climate change.

In the panel discussion, participants debated PES' role in this field and the optimization of land use in the context of climate adaptation and mitigation needs. Many emphasized the need to attract new researchers and enlist more universities in helping communities with the complex analysis of these issues.



Maija Faehle, University of Helsinki, won the IUFRO poster award for Division 6: Social aspects of forests and forestry.



L-R: IUFRO participants Jung-Hwan Park, Republic of Korea; Frances Seymour, CIFOR; José Joaquín Campos Arce, CATIE; Niels Elers Koch, Forest and Landscape, Denmark; Don Koo Lee, IUFRO President, and Su See Lee, Malaysia.

**ENHANCEMENT OF SERVICE LIFE OF WOOD IN AN ENVIRONMENTALLY CONSCIOUS GLOBAL SOCIETY:** Andrew Wong, Universiti Malaysia Sarawak, D. Pascal Kamdem, University of Michigan, and Jöran Jermer, SP Technical Research Institute, moderated the session, and Jermer described the work of the International Research Group on Wood Protection, including a collaboration with IUFRO that made the session possible.

Gerard Deroubaix, Technical Industrial Center for Forest, Wood and Furniture (FCBA), explained that wood product carbon storage is small relative to forest stocks, but there are ways to increase it, including by extending the life of wood products in use, enhancing recycling and using wood products

Wong said ways need to be found to couple wood protection and wood durability, either via wood treatment or using naturally durable species. He reviewed durability of different tropical species and pushed for use of durable wood over non-durable and non-renewable building materials.

Kamdem said durability must involve protecting against biological, physical, chemical and mechanical degradation and noted four ways to address this: proper design; use of naturally durable species; physical-chemical-mechanical modification; and use of wood preservatives. He reviewed development of micronized copper preservatives and noted their application requires careful attention to, *inter alia*, the pH of wood species.

Gyu-Hyeok Kim, Korea University, discussed work looking at fungi capable of degrading wood treated with copper chromium arsenate as a means to safely dispose of waste wood. He said they found eight fungi strains which were deemed effective in rotting the wood and that fungi were more effective in extracting chromium and arsenic than copper.



Francisco Aguilar, University of Missouri, talked about forest products, market shares and consumer preferences.

over other carbon-intensive materials.

Koichi Yamamoto, Forestry and Forest Products Research Institute, said Japan is working to enhance forest carbon via: forest management; wood promotion policies to store carbon in products, such as by requiring 100% wood construction in government buildings of four stories or less; and expanding Japan's forest area.

Henrik Heräjärvi, Finnish Forest Research Institute, presented on the strength of wood-based construction materials compared to other materials. He reviewed the life-cycle of construction timber from forest to disposal, assessing opportunities for improving environmental performance of timber, including increasing the recycling of construction wood.

## TECHNICAL SESSIONS

**GREEN FOREST PRODUCTS MARKETING AND BUSINESS MANAGEMENT:** Richard Vlosky, Louisiana State University, moderated the session.

Bob Smith, Virginia Tech, said the hardwood industry was slow to adopt the "greening" movement, which is perceived as more regulation. He discussed low interest in green products among US consumers, noting that companies know more about forest certification than green building initiatives, and recommended better educating the hardwood industry on these issues.

Lei Wang, University of Helsinki, said corporate social responsibility (CSR), as a western concept has not done well in the Chinese market. He proposed a "harmony" CSR based on a yin-yang theory combining Confucianism and Taoism, inherent to Chinese culture, as a more natural approach.

Masami Shiba, University of Kyoto, examined certification as a marketing tool for Japanese pulp and paper companies. He said 4.3% of Japanese forests are certified, mostly through the Forest Stewardship Council (FSC), but that Japan accounts for roughly 10% of all global chain of custody certificates. He said market demand and societal expectations were key drivers of corporate interest in certification.

Francisco Aguilar, University of Missouri, detailed a study of how product origins, certification agencies, and timber prices affect market shares and UK and US consumer preferences. He noted that, *inter alia*, government agency and NGO certifications were favored in the UK, and that government schemes and temperate forest products were favored in both countries.

Ashlee Tibbets, Oregon State University, reported on interviews with US and Australian architects, engineers, builders and developers probing environmental impacts of building materials. She said interviewees felt the use of timber is a "double-edge sword," bearing environmental benefits but also historical conflicts over forest practices.

Alison Kriscenski, FSC, emphasized that certification is more than verifying practices, involving a multi-stakeholder governance process for deliberating forest management issues. She highlighted challenges FSC faces in communicating its benefits to consumers and called for research directed to improving FSC's work.

**COMPETING ROLES OF FORESTS IN CLIMATE CHANGE MITIGATION:** The session was moderated by Lauri Valsta, University of Helsinki.

Marc Hanewinkel, Forest Research Institute of Baden-Württemberg, presented on predicted harvest volume and carbon stocks in Germany. He concluded that prolonging business as usual would increase carbon stocks through to 2026 on a level above national Kyoto Protocol targets.

Bishnu Chandra Poudel, Mid Sweden University, reported a study on integrated carbon analysis of forest production and utilization in Sweden. She showed that increased temperature will significantly increase forest biomass production and that a large net reduction of carbon emissions is possible if wood replaces concrete and biomass residues replace fossil fuels.



Vanda Santos, FAO, spoke about forestry web education.

Valsta demonstrated case studies integrating SFM, wood products, and biofuels into climate change mitigation. He illustrated a need for integrated forest management and said climate policy must recognize forests provide multiple benefits.

Hans Verkerk, European Forest Institute, discussed European forests' contribution to climate change mitigation, concluding that European forests are expected to remain a net sink, but that this sink will decline under baseline conditions and increasing harvest levels could exacerbate decline.

Dodik Ridho Nurrochmat, Bogor Agricultural University, spoke about potential socio-economic and political consequences of carbon sequestration schemes, noting that a strong REDD scheme will have negative multiplier effects on associated industries and communities in timber exporting counties, increasing illegal logging.

Yoon Hyung Kim, Ohio State University, discussed the impact of US and European biofuels policies on forest carbon. He said his model incorporates the dynamic nature of forests to establish the geographic extent of biofuels policy impact. Kim found that the US and EU will lose significantly more forests than predicted by other models, and that Southeast Asia will actually gain forest.

Christine Fürst, Dresden University of Technology, spoke about the land-use modeling tool "pimp your landscape" to help communities and decision-makers choose from scenarios to mitigate climate change in Saxony, Germany. This tool uses a visual matrix to illustrate how various scenarios affect:



IUFRO poster exhibition showing more than 1,100 entries.

effectiveness of climate change mitigation; human well-being; aesthetic value; ecological benefits; bio-resource provision; and economic wealth.

**MANAGING THE DATA DELUGE: THE CHALLENGE OF EMERGING TECHNOLOGIES:** The session was moderated by Roger Mills, Oxford University.

Mills explained the complexity of managing data in the contemporary world. He stressed the need for data-management toolkits built upon a short- and long-term strategy for maintaining, managing and using data.

Margaret Sraku-Lartey, Forestry Research Institute of Ghana, stressed the need for institutional repositories to preserve forestry information. She described the potential for establishing such a repository in her institute, sketched its contents and possible users, and stated that it ought to concentrate on intellectual knowledge, electronic publishing and open access.

Stella Britwum Acquah, Forestry Research Institute of Ghana, introduced an on-line gateway established by the Forestry Research Network for Sub-Saharan Africa (FORNESSA) for exchanging forestry and natural resource information in the sub-region.

Vanda Santos, FAO, outlined the FAO's web-based forestry education platform, which serves as a repository for forestry education materials, and links to national, regional, and global forest information bases. She said its objective is to improve access to, and exchange of, information and knowledge in forestry science and technology among developing countries in Central America and the Caribbean.

Andrea Wirth, Oregon State University, discussed the Oregon Spatial Data Library, which provides access to GIS data created and managed by the State of Oregon. She reviewed the library's searching mechanisms and a new "clip, zip and ship" option that allows users to download small parts of GIS layers.

Mills, for Gillian Petrokofsky, Oxford University, outlined many biases that affect decision-making and discussed evidence-based forestry as a corrective. This approach, he said, involves systematic attention to defining our questions, reviewing the relevant evidence, and disseminating of results. He stressed that the review needs to be rigorous, peer-reviewed, transparent, and repeatable.

Randy McCracken, US Forest Service, said the guiding principle of web design should be: "give the users what they want, and don't create obstacles." He reviewed, *inter alia*: key concerns for usability, such as preventing user errors; optimizing site architecture; and writing and organizing text appropriately for online users.

# IUFRO World Congress Bulletin (31 August 2010)



## IUFRO World Congress Bulletin

### A Summary Report of the XXIII IUFRO World Congress

Published by the International Institute for Sustainable Development (IISD) in collaboration with the International Union of Forest Research Organizations

ONLINE AT [HTTP://WWW.IISD.CA/YWB/FOREST/IUFRO/IUFROXXIII/](http://www.iisd.ca/ywb/forest/iufro/iufroxiii/)  
FINAL ISSUE, VOLUME 178, NUMBER 5, TUESDAY, 31 AUGUST 2010



#### SUMMARY OF THE XXIII IUFRO WORLD CONGRESS: 23-28 AUGUST 2010

The XXIII IUFRO World Congress, organized by the International Union of Forest Research Organizations (IUFRO), took place from 23-28 August 2010 in Seoul, Republic of Korea. The Congress was themed, "Forests for the Future: Sustaining Society and the Environment," and it drew over 2,700 participants from 92 countries, the largest number of participants in the Congress' history. There were also 2,027 presentations and 1,053 posters. The six-day event began with a speech from Lee Myung-bak, President of the Republic of Korea, and continued with daily keynote speeches from prominent figures in forestry, 15 sub-plenaries, a special discussion led by IUFRO's President on the future challenges of forest education, 150 technical sessions, many poster sessions, side events, and a trade and exhibition area. Participants also attended eight forest-related field trips on the fourth day of the Congress organized to illustrate innovative forest-related projects around the Republic of Korea.

The Congress and its technical and poster sessions focused specifically on: forests and climate change; biodiversity conservation and sustainable use of forest resources; forest environmental services; Asia's forests for the future; forest products and production processes for a greener future; emerging technologies in the forest sector; frontiers in forest and tree health; forests, communities and cultures; and forests, human health and environmental security.

Despite the intense schedule, sessions were well attended and saw significant discussion on a number of recurring themes during the week. Of particular note were repeated references to the following issues: narrowing knowledge and other gaps between science and policy; the need for the discipline of forestry and forestry education to evolve with changing demands on forests; the need for greater interdisciplinary work efforts; the importance of adopting more socioecological perspectives, which recognize the social embeddedness of efforts to protect and improve forest ecosystems; and the need for, and role and approaches of, forests in climate change mitigation and adaptation. Beyond these emerging concerns, participants also took time to discuss and review advances in areas of long-standing concern for forest research, including forest health and statistical modeling of forest growth.

During the closing ceremony, the 2010 Congress Resolution was distributed, which details focal areas for future work and institutional commitments for IUFRO as an organization. Finally, new members of IUFRO's decision-making body, the International Council, were approved and a new president-elect announced.



Performance of the traditional Korean dance called the "Lotus Flower"

#### A BRIEF HISTORY OF THE IUFRO WORLD CONGRESS AND INTERGOVERNMENTAL FOREST-RELATED PROCESSES

IUFRO was founded as the "International Union of Forest Experiment Stations" in 1892, changing its name after the First World War to "International Union of Forestry Research Organizations." Uniting 15,000 scientists from roughly 700 organizations in 110 countries, IUFRO works to promote the coordination and implementation of international cooperative science on research related to forests and trees to advance the wellbeing of forests and the people who depend on them.

The first IUFRO World Congress took place in 1893, with Congresses convening approximately every five years since 1948. Each Congress is organized around a specific theme and serves as an opportunity to discuss, exchange, and disseminate scientific knowledge within and beyond IUFRO's global network of member organizations.

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The *IUFRO World Congress Bulletin* is a publication of the International Institute for Sustainable Development (IISD) <[info@iisd.ca](mailto:info@iisd.ca)>, publishers of the *Earth Negotiations Bulletin* © <[enb@iisd.org](mailto:enb@iisd.org)>. This issue was written and edited by Graeme Auld, Ph.D., Aaron Leopold, Liz Willetts, and Kunbao Xia. The Digital Editor is Francis Dejon. The Editor is Robynne Boyd <[robynne@iisd.org](mailto:robynne@iisd.org)>. The Director of IISD Reporting Services is Langston James "Kimo" Goree VI <[kimo@iisd.org](mailto:kimo@iisd.org)>. Funding for coverage of this meeting has been provided by the International Union of Forest Research Organizations (IUFRO). IISD can be contacted at 161 Portage Avenue East, 6th Floor, Winnipeg, Manitoba R3B 0Y4, Canada; tel: +1-204-958-7700; fax: +1-204-958-7710. The opinions expressed in the *Bulletin* are those of the authors and do not necessarily reflect the views of IISD. Excerpts from the *Bulletin* may be used in other publications with appropriate academic citation. Electronic versions of the *Bulletin* are sent to e-mail distribution lists (in HTML and PDF format) and can be found on the Linkages WWW-server at <<http://www.iisd.ca/>>. For information on the *Bulletin*, including requests to provide reporting services, contact the Director of IISD Reporting Services at <[kimo@iisd.org](mailto:kimo@iisd.org)>, +1-646-536-7556 or 300 East 56th St., 11A, New York, New York 10022, United States of America.





**IUFRO XX:** The twentieth IUFRO World Congress was held in 1995 in Tampere, Finland, and was themed, "Caring for the Forest: Research in a Changing World," and resolved to: enhance research in key forestry and forest product areas, such as climate change and restoration of degraded lands; expand the research capacity of developing countries, as well as their participation in IUFRO; increase frequency and intensity of interdisciplinary work, as well as communication with organizations outside IUFRO; and emphasize policy and problem oriented research, with a focus on more research in the social sciences.

**IUFRO XXI:** The twenty-first IUFRO World Congress was held in 2000 in Kuala Lumpur, Malaysia, and was themed "Forests and Society: The Role of Research." The Congress focused on forest and forestry related issues moving into the 21st century, particularly on the relationship between sustainable forest management and water, fire, genetic resources, pests and pollution, technology, and society.

**IUFRO XXII:** The twenty-second IUFRO World Congress was held in 2005 in Brisbane, Australia, and was themed "Forests in the Balance: Linking Tradition and Technology." The Congress adopted resolutions to promote: global cooperation in forest-related research, including by ensuring gender and cultural diversity in research and advancing participation by of developing country researchers; and science for decision making by enhancing provision of problem-oriented forest research and translating research findings into policy-relevant language.

**SELECTED INTERGOVERNMENTAL FOREST-RELATED PROCESSES:** Global forest policy has developed in a variety of fora, including the Intergovernmental Panel on Forests (IPF), the Intergovernmental Forum on Forests (IFF), the UN Forum on Forests (UNFF), the International Tropical Timber Organization (ITTO), and the Committee on Forestry (COFO).

**IPF:** At its third session in 1995, the Commission on Sustainable Development (CSD-3) established the IPF. During its two-year mandate, the IPF developed over 100 negotiated proposals for action on sustainable forest management. The IPF's outcomes were endorsed by CSD-5 in April 1997 and at the Special Session of the UN General Assembly in June 1997. The UN Economic and Social Council (ECOSOC) then established the IFF to continue this work under the auspices of the CSD.

**IFF:** The IFF met four times between October 1997 and January 2000 to "identify the possible elements of, and work toward consensus on, international arrangements and mechanisms, for example, a legally-binding instrument." The IFF also proposed the creation of the UNFF and invited relevant international organizations, institutions and instruments and UN organizations to participate in a Collaborative Partnership on Forests (CPF). CSD-8 endorsed these conclusions and invited the President of ECOSOC to initiate informal consultations on options for placing the UNFF within the intergovernmental machinery of the UN system.

**UNFF:** On 18 October 2000, ECOSOC adopted Resolution E/2000/35, establishing the UNFF as a subsidiary body of ECOSOC. The objective of the international arrangement on forests is to promote the management, conservation and sustainable development of all types of forests and to strengthen long-term political commitment to this end. The

resolution also establishes the CPF to support the work of the UNFF and enhance cooperation and coordination. The UNFF convened nine times between 2000 and 2010.

The IPF/IFF processes produced more than 270 proposals for action towards SFM, which form the basis for the UNFF Multi-Year Programme of Work and Plan of Action. Country- and organization-led initiatives have also contributed to UNFF's work.

**ITTO:** The International Tropical Timber Agreement (ITTA), 1983, established the ITTO, headquartered in Yokohama, Japan, to provide a framework for tropical timber producer and consumer countries to discuss and develop policies on issues relating to international trade in, and utilization of, tropical timber and the sustainable management of its resource base. The Agreement was renegotiated during 1993-1994, with a successor agreement, the ITTA, 1994, being adopted on 26 January 1994 and entering into force on 1 January 1997. A second successor agreement was then adopted on 7 January 2006, but has not yet entered into force.

The ITTO's mandate was expanded to focus on the world tropical timber economy and the sustainable management of the resource base, simultaneously encouraging timber trade and improving forest management. The mandate also allows for consideration of non-tropical timber issues as they relate to tropical timber. The governing body of the ITTO is the International Tropical Timber Council, with 60 members, which has met 45 times.

**COFO:** The Committee on Forestry (COFO) is the FAO's most significant Forestry Statutory Body, bringing together heads of forestry services and other senior government officials to identify emerging policy and technical issues, seek solutions and advise the FAO and others on appropriate action. This is achieved through: periodic reviews of international forestry problems and their appraisal; review of the FAO forestry work programmes and their implementation; advice to the FAO Director-General on the FAO's future work programmes in the field of forestry and their implementation; reviews of and recommendations on specific matters relating to forestry referred to it by the FAO Council, Director-General or member states; and reports to the FAO Council. COFO has met 19 times.

## REPORT OF THE XXIII IUFRO WORLD CONGRESS

### OPENING CEREMONY

The XXIII International Union of Forest Research Organizations (IUFRO) World Congress opened on Monday, 23 August 2010 with a drum performance and film presentation on the Republic of Korea's work promoting green growth.



Don Koo Lee, IUFRO President

Don Koo Lee, IUFRO President, highlighted IUFRO's history of advancing global cooperation on forest science through the activities of its member organizations, saying that only through such cooperation can contemporary global challenges be overcome.

After calling for new strategies for green growth, he declared the Congress officially open.

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L-R: Don Koo Lee, IUFRO President, and Su See Lee, IUFRO, presented the Host Scientific Award to Sung Gak Hong, The National Academy of Sciences, Republic of Korea

Eduardo Rojas-Briaies, UN Food and Agriculture Organization (FAO), highlighted difficulties faced due to the simultaneous increase in financial constraints on the forest sector and the demand for forest environmental services (FES). He called for, *inter alia*: forests to be recognized as more than simply carbon; reducing emissions from deforestation and forest degradation in developing countries (REDD); and increased forest-related education.

Jan McAlpine, UN Forum on Forests (UNFF), for Ban Ki-moon, UN Secretary General, said IUFRO plays an essential role in promoting sustainable forest management (SFM) through collaborations on forest research activities and in generating knowledge and assistance for improving forest governance.

IUFRO President Lee and Su See Lee, IUFRO, presented the host's scientific award to Sung Gak Hong, National Academy of Sciences, Republic of Korea, in recognition of his work in elevating the profile of forest science and research. They then presented scientific achievement awards to eleven other recipients for their work advancing forest research.

Lee Myung-bak, President of the Republic of Korea, discussed his country's efforts to restore its once barren lands, noting that forests are the foundation of our lives and the source of our basic needs. He said the Republic of Korea now ranks fourth in the Organisation for Economic Co-operation and Development for its ratio of forests to total land area.



Lee Myung-bak, President of the Republic of Korea

### PLENARY SESSIONS

Throughout the week participants attended daily plenaries led by a range of experts, from Nobel laureates to renowned scientists and poets.



Ko Un, Korean poet

On Monday morning, Ko Un, a famous Korean poet, called for the development of a Human Charter for the Forest to prevent future atrocities committed against forests, referring to the "cumulative crime of forest destruction perpetrated over previous centuries by human avarice." He stressed that

voluntary institutions are urgently needed to ensure that such a declaration does not become a mere slogan; said that the future of the human race can only be guaranteed by making the forest spirit the very spirit of humanity; and made suggestions on, *inter alia*: educating schoolchildren on the importance of forests; and raising the rank of the Korean Forest Service and other relevant government administrations to that of top government agencies. He concluded by stating that the nations of tomorrow will only succeed if they are nations of the forest.

On Tuesday morning Frances Seymour, Center for International Forestry Research (CIFOR), began by considering lessons learned from forest and communities research for the multiple challenges of integrating climate change into future research, and commended work and progress on understanding the importance of institutions,



Frances Seymour, CIFOR

rights and market constraints. She highlighted key areas for future research, including investigating: how REDD will shape or be shaped by existing financing institutions; the significance of climate change's political dominance for community forests; possibilities to reduce tradeoffs between climate and community; and social biases entrenched in policy. Seymour emphasized that there is much to be gained from investing in global comparative studies, but because no single organization has the capacity to undertake such an operation on its own, collaborative research must be pursued now more than ever.

On Wednesday morning, José Joaquín Campos Arce, Tropical Agriculture Research and Higher Education Center (CATIE), provided the keynote speech in which he presented on the integration of scales and sectors to improve sustainability of livelihoods, landscapes and forests. He highlighted that system approaches are necessary for addressing the complex set of challenges facing the world, as well as for achieving sustainable development, which requires



Keynote Speaker José Joaquín Campos Arce, CATIE



interdisciplinary, multi-stakeholder platforms, mechanisms and intense coordination. Agroforestry systems, he said, are key to improving livelihoods of poor rural families. He then identified several components of such systems including: managing tree density and growth to enhance carbon storage without affecting yields; linking local communities with socially responsible companies; finding innovative approaches to lower transaction costs; and identifying ecosystem approaches to SFM, forest conservation, and the establishment of biological corridors. He also said social and ecological resiliency are interdependent and the key to sustainable livelihoods, landscapes and forests, and concluded that implementing SFM requires collective and participatory research, capable leadership and long-term commitment of policy makers and researchers.

On Friday morning, Elinor Ostrom, 2009 Nobel Memorial Prize in Economics, addressed the role of communities in sustaining forest resources. She explained that multiple factors create forest conditions, and hence a simple management model is neither useful nor satisfactory. She stressed that studying socio-ecological interactions requires both an understanding of dynamic processes and adaptive policies, and advocated avoiding the "paper park," a static solution, as a panacea for conservation.

Ostrom then presented several case studies, which addressed, *inter alia*: how alternative systems of governance affect social and ecological conditions; what conditions favor collective action for the provision of common pool resource management; and how people respond to changing ecological and social conditions. She highlighted a number of results, including that: forests lacking effective law enforcement are more susceptible to degradation and that those with effective enforcement mechanisms have a higher probability of regeneration; and conservation potential is highly dependent upon an effective combination of official and local user involvement in management design and implementation. Ostrom stressed the feasibility of multidisciplinary and underlined the importance of careful research design, proper training and consistency in methods across regions.



L-R: Elinor Ostrom, Indiana University and Arizona State University, 2009 Nobel Laureate in economics, accepting a token of appreciation from IUFRO President Don Koo Lee



Peter Shaw Ashton, Harvard University

On Saturday morning, Peter Shaw Ashton, Harvard University, drew on decades of experience in South East Asia to expound on the trajectory of tropical rainforests. He said intact forests only remain on steep slopes or areas with limited access or agriculture potential, which means that the lowland *Dipterocarp* forests, the region's most productive, have been reduced to small remnants of a former grandeur. He attributed this transformation to low-cost energy. Although temperate forests underwent a similar transformation and have since re-grown, he opined that tropical forests are unlikely to revive.

Shaw also emphasized that conserving tropical forest diversity provides resilience to invasive species outbreaks. To retain this hedge against pathogens, he said small pockets of protection may be sufficient, but that these must be in areas under high threat, such as *Dipterocarpo* forests, and that timber management would be highly risky due to the close coupling of species viability and the structural evolution of forest stands.

A more detailed summary of the presentations is available in the Congress' daily reports at: <http://www.iisd.ca/ymb/forest/iufro/iufroxxiii/>

#### SUB-PLENARY SESSIONS

Throughout the week, participants attended 15 sub-plenary sessions on research related to forest health and restoration, biodiversity, and climate change. A more detailed summary of these presentations and discussions is available at: <http://www.iisd.ca/ymb/forest/iufro/iufroxxiii/>

#### FOREST HEALTH IN A CHANGING

**ENVIRONMENT:** On Monday, Elena Paoletti, National Research Council Plant Protection Institute, Italy, presented on the compounding effects of air pollution on forest ecosystems given climate change, saying climate change exacerbates ozone and nitrogen impacts forest health and reduces forest-carbon sequestration.

Nicola La Porta, Edmund Mach Foundation, said altered temperature and precipitation patterns may increase the effects of fungal diseases on forests, either because trees will be more stressed or new threats may appear because of changing species composition and the arrival of new pathogens.



Nicola La Porta, Edmund Mach Foundation

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Andrew Liebhold, US Forest Service

Andrew Liebhold, US Forest Service, emphasized globalization as a key driver of invasive species. He described varied impacts of invasions on natural, plantation, and urban forests, and said work to prevent arrivals can reduce costs to control or eradicate established invasive species.

Martin Lorenz, Institute for World Forestry, presented on the International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests, describing its work monitoring forest ecosystem conditions and spatial and temporal variation of forest health.

William Orosina, US Forest Service, described how land-use changes, including those resulting from fire suppression and agriculture, create sub-optimal conditions for certain species due to interactive effects with root pathogens.

Andrea Battisti, Padova University, presented on the importance of climate change for forest health, noting that direct and indirect effects of climate change will generally increase the activeness of herbivorous insects. When combined with expanded insect ranges, he said, this is likely to increase insect outbreaks.

### KEEP ASIA GREEN: REHABILITATING AND RESTORING FOREST ECOSYSTEMS IN ASIA:

On Monday, Don Koo Lee, IUFRO President, highlighted that the session summarized results of IUFRO's "Keep Asia Green" initiative.

Zhiqiang Zhang, Beijing Forestry University, presented on afforestation and ecological restoration in the East Asia region. He noted that despite deforestation and forest-land degradation, extensive forest-related land rehabilitation activities in his region have resulted in significant restoration of forest cover in some countries.

Victor Teplyakov, Seoul National University, discussed forest use and rehabilitation in the Russian Federation's Far East, noting reforestation efforts made.

Lucrecio Rebugio, University of the Philippines, presented successful cases and lessons learned on rehabilitating degraded forests in Southeast Asia, lamenting that in spite of efforts, forest cover decline continues in most of the regions' countries.

Promode Kant, Institute of Green Economy, India, reported on rehabilitating forests and extending tree cover in South

Asia, highlighting the importance of: forest law and policy; community-based forest management; and establishment of rehabilitation projects.

Khosro Sagheb-Talebi, Research Institute of Forests and Rangelands, Iran, presented on the forest landscape restoration and rehabilitation activities in West Asia, highlighting:

survey and site-specific planning; application of participatory approaches; watershed rehabilitation in mountainous regions; combating desertification; flood-water spreading; and rain-water harvesting.

Almazbek Orozumbekov, Kyrgyz National Agrarian University, presented on rehabilitating degraded forest landscapes in Central Asia, saying centuries of nomadic lifestyles have degraded forests through timber exploitation, uncontrolled grazing and fire. He then discussed rehabilitation efforts undertaken in the region.

### BIODIVERSITY, CLIMATE CHANGE AND FORESTRY – PERSPECTIVES OF THE COLLABORATIVE PARTNERSHIP ON FORESTS:

On Monday, Eduardo Rojas-Briales, FAO, spoke on the goals and achievements of the Collaborative Partnership on Forests. He also noted that 2011 will be the UN's International Year of Forests, to be organized by UNFF.



Lucrecio Rebugio, University of the Philippines



Khosro Sagheb-Talebi, Research Institute of Forests and Rangelands, Iran



L-R: Ahmed Djoghlaif, CBD; Bill Jackson, IUCN; Jan McAlpine, UNFF; Peter Mayer, IUFRO; Eduardo Rojas-Briales, FAO; Tony Simons, ICRAF; and Emmanuel Ze Meka, ITTO



L-R: Michelle Gauthier, FAO; Kjell Nilsson, University of Copenhagen; David Nowak, US Forest Service; and Jay Bolthouse, University of Tokyo

Bill Jackson, International Union for Conservation of Nature (IUCN), discussed the landscape approach for linking climate change, forest biodiversity and the needs of people. He recommended “nature-based solutions,” such as REDD, with an emphasis on all forest values.

Ahmed Djoghlaif, Convention on Biological Diversity (CBD), described the importance of the upcoming CBD’s tenth meeting of the Conference of the Parties, taking place in October in Nagoyga, Japan, to adopt a new global strategy for biodiversity, especially for improved access and benefit sharing and conservation of genetic resources. He hoped that an agreement would include a legally-binding monetary evaluation mechanism.

Emmanuel Ze Meka, International Tropical Timber Organization (ITTO), described reducing deforestation and forest degradation and enhancing environmental services in tropical forests (REDDES). He identified several REDDES research priorities, including: multi-purpose forest inventories; enhancement of environmental services in production forests; and capacity building and demonstration.

Tony Simons, World Agroforestry Centre (ICRAF), emphasized the importance of good communication. Saying that although the word “forestry” is now contained in 40 million Internet addresses, some much less inspiring searches bring up many times this number.

Jan McAlpine, UNFF, stressed the need to recognize that large populations depend on forests. On cross-sectoral connections, McAlpine described the UNFF 360 degree perspective on forests as an initiative valuing and creating institutional partnerships beyond the forestry sector, including with several UN conventions and the ITTO.

#### PROMOTING URBAN FOREST SERVICES IN PARTNERSHIP BETWEEN SCIENTISTS AND COMMUNITIES:

On Tuesday, Chair Cecil Konijnendijk, University of Copenhagen, said urban forestry should strive to be more: integrative, strategic, inter- and multi-disciplinary, participatory, and aware of modern urbanites’ demands, as they make up the majority of foresters’ “customers” today.



Chair Cecil Konijnendijk, University of Copenhagen

David Nowak, US Forest Service, discussed partnering with urban communities to secure data and promote urban management of forest services in the United States using the iTree tool.

Kjell Nilsson, University of Copenhagen, introduced the Peri-urban Land Use Relationships - Strategies and Sustainability Assessment Tools for Urban-Rural Linkages Project in which 14 European countries and China participated, and analyzed challenges and consequences of urbanization. Project results recommended responses, including: improved governance and integrated territorial policy approaches; and strengthening public sector control over urban sprawl.

Jay Bolthouse, University of Tokyo, illustrated how forests can bridge the urban/rural divide. He said managing urban forests can be treated as a leisure activity, presenting results of a study on a Japanese urban forest paradigm of volunteer management.

Michelle Gauthier, FAO, said FAO is increasingly requested to assist with rural-urban linkages in developing countries, primarily related to consequences of chronic urban watershed mismanagement, such as sinking water tables. Discussions focused on: the importance of partnerships; the need to develop internationally standardized assessment tools; the focus on matching policy to the needs and aspirations of the public; and integrating forestry issues into school education.

#### IUFRO AWARD WINNERS – THE NEXT

**GENERATION:** On Tuesday, Co-Chair Su See Lee, introduced this year’s awardees, noting that female and developing-country students were well represented. Co-Chair, Michael Rivoire, International Forestry Students’ Association, moderated a discussion on the students’ research.

Three people received the Student Award for Excellence in Forest Science: Lee Hong Tnah, Forest Research Institute Malaysia, for her work on a DNA database designed to help stop illegal logging; Marco Contreras, University of Montana, for using an innovative optimization technique to determine least-cost and environmentally friendly routes for wood transportation; and Mahbubul Alam, Ehime University, for characterizing the ecology and significance of “home gardens” in Bangladesh. Eight people received the Outstanding Doctoral Research Award.

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Winners of IUFRO's Student Award for Excellence in Forest Science and Outstanding Doctoral Research participated in a panel discussion on their motivations, challenges and experiences in conducting their research projects

### CAN FORESTRY AND FOREST SECTOR ACTIVITIES CONTRIBUTE TO MITIGATING CLIMATE CHANGE?:

On Tuesday, Werner Kurz, Natural Resources Canada, moderated the session and emphasized the importance of educating policy-makers about the forest sector's contributions to climate change mitigation.

Frank Werner, independent consultant, explained a model for effective long-term forest and wood management for GHG mitigation, emphasizing that an optimized life cycle of wood products should include a maximum but sustainable increment of harvestable wood, and continuous downcycling through a use "cascade" terminating as fuel for bioenergy.

Reid Miner, National Council for Air and Stream Improvement, reviewed the global forest industry's impact on greenhouse gasses (GHGs), highlighting that increasing the use of forest products can produce large benefits to society via GHG reductions.

Ben de Jong, El Colegio de la Frontera Sur, reported on the readiness of Mexico to begin carbon accounting based on REDD assessments. Richard Harper, Murdoch University,

spoke on bio-mitigation and, noting that forestry alone will not be able to solve carbon imbalances, proposed research on using abandoned farmland for mitigation to avoid the problem of the food versus fuel debate. William Keeton, University of Vermont, introduced a new study on the carbon storage potentials of temperate old growth forests based on an aggregated global dataset.

### IUFRO DIRECTORS FORUM: FOREST MONITORING IN TIMES OF CLIMATE CHANGE:

On Wednesday, Co-moderator Konstantin von Teuffel, Forest Research Institute Baden Württemberg, introduced the Forum as a place to exchange views on management of forest research. Co-moderator Ann Bartuska, US Forest Service, added that the Forum also aims to make the theoretical practical.

Mette Loyche Wilkie, FAO, underscored the enormous data gaps researchers faced preparing for FAO's Global Forest Resources Assessment 2010, especially on: net changes in carbon stocks; previous and current deforestation rates; and carbon emissions from deforestation. She stressed that



L-R: Mette Loyche Wilkie, FAO; Ben Chikamei, Kenya Forestry Research Institute; Peter Mayer, IUFRO; José Joaquín Campos Arce, CATIE; Joon Hwan Shin, Korea Forest Research Institute; Klaus-Herman von Wilpert, Forest Research Institute of Baden-Württemberg; and George "Sam" Foster, US Forest Service



REDD-plus is a window of opportunity to improve forests and forest data that must not be passed over. Ben Chikamai, Kenya Forestry Research Institute, spoke on forest monitoring in Kenya and Africa. He noted that despite progress made in his country, only 11 African countries are set to benefit from REDD projects through the World Bank.

José Joaquín Campos Arce discussed forest monitoring in Latin and Mesoamerica, stressing it is an adaptive management tool, not a luxury, and that this, as well as research results, must be better communicated to stakeholders. Joon-Hwan Shin, Korea Forest Research Institute, stressed the need to answer four questions: What forest information is important for climate change? What is the appropriate structure of a global forest monitoring system? How can the needs of developing countries be met? Who will pay for such a system?

Klaus-Herman von Wilpert, Forest Research Institute of Baden-Württemberg, presented the outcome of forest monitoring in Central Europe as a basis for SFM. He purported that forest decline is the result of air pollution and soil degradation, and emphasized that monitoring should be a continuous bottom-up endeavor. George "Sam" Foster, US Forest Service, said there is a critical demand for increased forestry monitoring information and stressed the need for, *inter alia*: further integrating satellite data with ground level information; a focus on innovations to lower monitoring costs; and better understanding what forest change really means.

**FOREST BIOMASS UTILIZATION FOR BIO-ENERGY: TECHNOLOGY, ECONOMICS AND ENVIRONMENT:** On Wednesday, Woodam Chung, University of Montana, moderated the session explaining that biomass can be used as a tool for mitigating climate change.

Nathaniel Anderson, University of Montana, explained it was cost-effective and feasible to supply timber residue at US\$43 per ton in Oregon for energy production, and concluded that pyrolysis production of biochar has great potential. Christian Suchomel, University of Freiburg, described harvesting firewood via the coppice method, which generates dense and sustainable re-sprouting of forest stands, providing sustainable bioenergy. He concluded that coppice is good for conservation.

Han-Sup Han, Humboldt State University, emphasized that non-uniform forest residues are difficult and expensive to handle, and described challenges with four current residue collection and transport systems: centralized processing; on-site processing; slash bundling; and integrated systems. Xueyong Ren, Beijing Forestry University, presented on fast pyrolysis bio-oil production. Using this method, he said, biomass can be converted to biochar, bio-oil, or combustible gas in a single chemical reaction. Using a life-cycle approach, Young-Seop Choi, Kangwon National University, compared wood fuels, such as wood pellets and chips, and assessed the conditions, such as transportation distance, which shape the benefits of these fuels for consumers and producers.

On bioenergy in Japan, Kazuhiro Aruga, Utsunomiya University, lamented that though forest, sawmill, and construction waste residues largely go unused, subsidies to make them economically viable are unlikely to be introduced.



Han-Sup Han, Humboldt State University

Deborah Page-Dumroese, Michigan Technological University, highlighted the importance of soil science in forestry management and biomass harvest, stating that both alter soil processes physically, chemically, and

biologically. She said retaining the forest floor is key to forest.

Lisa Sennerby-Forsse, Swedish University of Agricultural Sciences, for Helene Lundkvist, summarized bioenergy development in Sweden, noting it had surpassed hydropower and nuclear power, and accounts for more than 25% of total energy supply.

**CONSERVATION AND SUSTAINABLE USE OF FOREST GENETIC RESOURCES:** On Wednesday, Zohra Bennadji, National Agricultural Research Institute, Uruguay, detailed a project identifying critical problems in forest genetic resource (FGR) conservation and sustainable use, which will inform the first FAO assessment on the global status of FGRs. She noted: the need for standardized indicators for forest species priorities and genetic diversity; a lack of good exchange mechanisms for information sharing on FGRs; and weak links between policy and science.

Judy Loo, Bioversity International, presented an approach for managing conservation of genetic diversity when reliable information on variability of FGRs is lacking, recommending that management decisions should assume that genetic diversity correlates with environmental variability until better information is available on this important resource.

Dag Lindgren, Swedish University of Agricultural Sciences, discussed how climate change has raised the profile and necessity

of seed orchards and said they will become more important in years to come. Kyu-Suk Kang, Korea Forest Research Institute, reviewed the history, advances and aims of tree breeding in the Republic of Korea, including work on breeding indigenous timber species and the establishing seed orchards. Yongqi Zheng, Chinese Academy of Forestry, detailed the role FGR can play in ensuring that species and ecosystems can adapt and survive changing climatic conditions and greater variability in these conditions.

**ENHANCEMENT OF SERVICE LIFE OF WOOD IN AN ENVIRONMENTALLY CONSCIOUS GLOBAL SOCIETY:** On Friday, Gérard Deroubaix, Technical Industrial Center for Forest, Wood and Furniture, explained that the amount of carbon stored in wood products is small relative to forest stocks, but there are ways to increase it, including by extending the life of wood products in use, enhancing recycling and using wood products over other carbon-intensive materials. Koichi Yamamoto, Forestry and Forest Products Research Institute, said Japan is working to enhance forest carbon via:



Deborah Page-Dumroese, Michigan Technological University



Dag Lindgren, Swedish University of Agricultural Sciences



Kyu-Suk Kang, Korea Forest Research Institute

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forest management; wood promotion policies to store carbon in products, such as by requiring 100% wood construction in government buildings of four stories or less; and expanding Japan's forest area.

Henrik Heräjärvi, Finnish Forest Research Institute, presented on the strength of wood-based construction materials compared to other materials. He reviewed the life-cycle of construction timber from forest to disposal, and assessed opportunities for improving environmental performance of timber.



Andrew Wong, Universiti Malasia Sarawak

Andrew Wong, Universiti Malasia Sarawak, highlighted the need to couple wood protection and wood durability, either via wood treatment or using naturally durable species. D. Pascal Kamdem, University of Michigan, said durability must involve protecting against biological, physical, chemical and mechanical degradation and noted ways to address this: proper design; use of naturally durable species; physical-chemical-mechanical modification; and use of wood preservatives. Gyu-Hyeok Kim, Korea University, discussed work on fungi capable of degrading wood treated with copper chromium arsenate as a means to safely dispose of treated wood that ends up in the waste stream. He said they found eight fungal strains which were deemed effective in rotting the wood and that these were more effective than copper.



Gyu-Hyeok Kim, Korea University

**AGROFORESTRY: THE WAY FORWARD:** On Friday, Ramachandran Nair, University of Florida, described development of agroforestry as an approach for: poverty alleviation; attainment of MDGs; food security; carbon sequestration; combating deforestation and desertification; fodder and fuel-wood supply; and environmental protection. Eike Luedeling, ICRAF, discussed a study on the carbon

sequestration potential of agroforestry systems in the African Sahel. He noted that while adding trees to agricultural



Fergus Sinclair, ICRAF

areas can be a strategy for sequestering atmospheric carbon, climate change adaptation might be more important than mitigation. Fergus Sinclair, ICRAF, spoke on the potential timber supply from agroforestry, saying only a proportion of tree cover has any timber value.

Shibu Jose, University of Missouri, presented on North American agroforestry practices, claiming they need to

overcome many barriers, including a lack of public awareness. Francisco Javier Silva Pando, University of Santiago, Spain, spoke on silvopastoral systems for forest fire prevention. Tony Simons, ICRAF, summarized the history of agroforestry and listed several future recommendations, including looking at agroforestry systems as a way to "bullet-proof" farms in the face of climate change.



Shibu Jose, University of Missouri

In the panel discussion, participants debated payment for environmental services' (PES) role in this field and the optimization of land use in the context of climate adaptation and mitigation needs. Many emphasized the need to attract new researchers and enlist more universities in helping communities with the complex analysis of agroforestry issues.

### NEW FRONTIERS OF FOREST ECONOMICS:

On Friday, Moderator Shashi Kant, University of Toronto, announced that IUFRO has founded a new group on forest economics in recognition that "You cannot create new policies based on old science, and we must step up to the plate."

Elinor Ostrom spoke about challenges of establishing whether a forest is deteriorating or improving over time. Sharing results from an 11-country study, she recognized that plot-based measurements are widely accepted as a



L-R: Karl-Gustaf Löfgren, Umeå University; Urs Fischbacher, University of Konstanz; David Laband, Auburn University; and Elinor Ostrom, 2009 Nobel Memorial Prize in Economic Sciences



reasonable measure, but that it is expensive. As an alternative she highlighted how long term forest users can also provide information on forest condition. David Laband, Auburn University, presented on public choice theory, noting that, due to re-election pressures, politicians' are incentivized to care more about the short-term political and economic gains offered by the timber industry, rather than the longer-term goals of SFM.

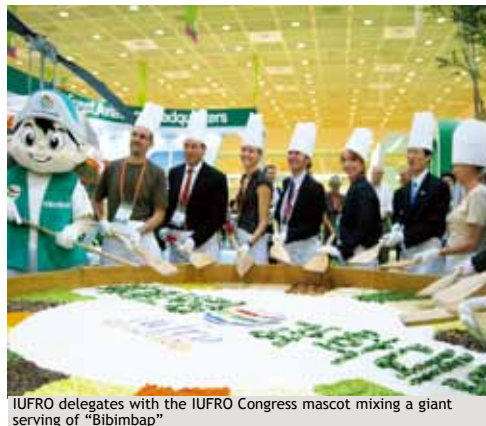
Urs Fischbacher, University of Konstanz, spoke about benefits of economic experiments in understanding how long-term forest objectives can be managed. He said his models illustrate how conditional cooperation is capable of preserving common pool resources, but that enforcement can be a potential issue. Karl-Gustaf Löfgren, Umeå University, considered economic modeling in forestry to avoid the "Lucas critique," which says that when policies change, one must change the parameters of the model because using previously observed behavior is no longer adequate. He said forestry can largely avoid this problem due to the richness of historical data.

**READING THE PULSE OF FOREST SCIENCE – IUFRO PRIORITIES 2010-2014:** On Saturday, Moderator Niels Elers Koch, IUFRO, introduced the session and IUFRO research division coordinators and deputy coordinators, who were to describe the outlook for their respective thematic areas.

For Silviculture, Björn Hånell, Swedish University of Agricultural Sciences, said IUFRO should not restrict itself to only financially supporting conference participation of young scientists from developing countries. For Physiology and Genetics, Bailian Li, North Carolina State University, said the division's work is being shaped by increased wood demand, especially for biofuel production, noting intensive genetically modified and cloned plantation forestry is needed to meet increasing demand. For Forest Operations Engineering and Management, Hans Heinimann, ETH Zurich, said his division aims to: increase interdisciplinary work; compile best practices for bioenergy supply; develop inventory input/output models for harvesting; and analyze eco-profiles for eco-efficiency. For Forest Assessment, Modeling and Management, Margarida Tomé, Technical University of Lisbon, highlighted research priorities for her division as: improved forest monitoring; multisource inventories at a reasonable cost; methodologically new, more complex forest modeling; and designs for adaptive forest management.

For Forest Products, Dave Cown, Scion and New Zealand Forest Research Institute, stressed that IUFRO must: improve public outreach by ensuring public access to knowledge and popularizing forests through the media; and find ways to ensure that

developing country board members can afford to come to meetings. For Social, Aspects Of Forests and Forestry, Perry Brown, University of Montana, said the way forward is to



IUFRO delegates with the IUFRO Congress mascot mixing a giant serving of "Bibimbap"

improve forest education, stating that "it is only when people realize what they have to lose that they'll get interested." For Forest Health, Mike Wingfield, University of Pretoria, said biological invasions have reached a terrifying state and feared that genetic modification may be the only way to grow trees in the future. For Forest Environment, Jean-Michel Carnus, French National Institute for Agricultural Research, focused on new priorities for the division, including: climate and forest ecosystems; feedback between land cover, disturbances and climate change; forest and water interaction; and effects of land-use change on watershed hydrology.

**AN HONEST CONVERSATION ABOUT DECENTRALIZATION AND FOREST LIVELIHOODS IN A GLOBALIZED WORLD:** On Saturday, Carol Colfer, CIFOR, moderated the session and introduced the first all-female IUFRO panel.

Reem Hajar, University of British Columbia, presented findings from six case studies examining the devolution of management authority to community forests in Brazil and Mexico. In spite of variation across the cases, she said the communities have received limited decision-making authority for their forests, as governments remain heavily involved in medium- and long-term planning. Monika Singh, University of British Columbia, presented two case studies on community-forestry experiences of indigenous communities in India and Canada. With both, she said, the final management authority remained with government, albeit with different but minimal processes for involving indigenous people.

Joleen Timko, University of British Columbia, described an assessment of Cameroon's approach to community forestry. She explained that legal, administrative and procedural frameworks for such communities are in place, as well as monitoring and enforcement provisions, but that the model could be further improved by, *inter alia*, reducing administrative costs. Juan Chen, University of British Columbia, reviewed two case studies in China exploring the challenges facing communities in managing collective forests, including illegal activity and unclear or insecure forest tenure.

S. Denise Allen, University of British Columbia, discussed the experiences of the Wet'suwet'en First Nation in Canada in a globalizing world, and called for more culturally sensitive decentralization of land-use management in recognition that cultural and ecological preservation are at stake.



Margarida Tomé, Technical University of Lisbon



Dave Cown, Scion and New Zealand Forest Research Institute

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L-R: Joleen Timko, University of British Columbia; Juan Chen, University of British Columbia; Reem Hajjar, University of British Columbia; Denise Allen, University of British Columbia; and Monika Singh, University of British Columbia

In the discussion, participants considered, *inter alia*: ensuring community forests are not “designed to fail,” and situations where local elites control decision-making to the detriment of the larger community.

**FOREST BIODIVERSITY – THE KEY TO HEALTHY AND RESILIENT FORESTS:** On Saturday, Moderator Ian Thompson, Canadian Forest Service, opened the session with a UN Environment Programme (UNEP) film celebrating the UN International Year of Biodiversity. He then presented an overview of the relationship between forest biodiversity, resilience and climate change.

Robert Nasi, CIFOR, Indonesia, presented on defaunation and tropical ecosystem resiliency. He noted biodiversity as important for ecological, economic and social function, and that certain creatures act as keystone species on which an entire system depends, highlighting the example of bushmeat. He urged for balance between forest conservation and valuation. Yusuf Bahtimi, International Forestry Students’ Association (IFSA), looked at the effect of invasive *Acacia* species on forest resilience in Indonesia.

Summarizing, Thompson described the session’s three main points: the relationship between biodiversity and resilience; and the great impacts of biodiversity loss and those of invasive species on goods and services.



Robert Nasi, CIFOR, Indonesia

### TECHNICAL SESSIONS

On Monday, Tuesday, Wednesday, Friday and Saturday, participants attended 150 technical sessions organized around the Congress’s nine thematic areas. IISD RS covered 15 of these sessions below. A more detailed summary of technical sessions is available in the Congress’ daily reports at: <http://www.iisd.ca/yimb/forest/iufro/iufroxiii/>

#### FORESTS AND CLIMATE CHANGE

Seventeen technical sessions under the theme forests and climate change discussed topics including: climate change impacts and interactions in the boreal forest zone; adapting to future wildland fire regimes; and impacts of climate change on forest ecology, ecosystem processes, and management.

#### BIODIVERSITY AND CLIMATE CHANGE: DIRECT AND INDIRECT LINKAGES IN ADAPTATION AND MITIGATION:

On Tuesday, M. Danesh Miah, University of Chittagong, presented challenges of harmonizing requirements of the Kyoto Protocol’s Afforestation/Reforestation Clean Development Mechanism (CDM) and those of the CBD. He emphasized potential benefits of Afforestation/Reforestation credits, but cautioned that alien species may arrive via the plantation process. Jürgen Bauhus, University of Freiburg, noted conflicts between silviculture, which aims to enhance select forest functions, and nature conservation, which aims to maintain an ecosystem’s historic conditions. He said planning for desired future ecosystem functioning may reduce these conflicts.



M. Danesh Miah, University of Chittagong



Participants heard presentations on linkages between biodiversity and climate change

David Flaspohler, Michigan Technical University, explained that demand for plant-based biofuels could intensify forest management in ways that harm native species, but that well designed intensive management can be developed to sustain ecosystem services.



David Flaspohler, Michigan Technical University

phenological shifts, which can



Eckehard Brockerhoff, Scion and New Zealand Forest Research Institute

mitigation and adaptation benefits.

**COMPETING ROLES OF FORESTS IN CLIMATE CHANGE MITIGATION:** On Friday, Marc Hanewinkel, Forest Research Institute of Baden-Württemberg, forecasted that Germany's business as usual timber harvest volume and growing forest stock will increase carbon stocks until 2026 on a level above the national cap set by Kyoto Protocol targets. Bishnu Chandra Poudel, Mid Sweden University, showed that temperature rise will significantly increase forest biomass production in Sweden and that a large net reduction of carbon emissions is possible if wood replaces concrete and biomass residues replace fossil fuels.

Lauri Valsta, University of Helsinki, stressed that climate policy must recognize that forests provide multiple benefits. Hans Verkerk, European Forest Institute, explained



Lauri Valsta, University of Helsinki



Hans Verkerk, European Forest Institute

multiplier effects on associated



Dodik Ridho Nurrochmat, Bogor Agricultural University

actually gain forest. Christine Fürst, Dresden University of Technology, spoke about the land-use modeling tool "pimp your landscape" to help communities and decision-makers choose from scenarios to mitigate climate change in Saxony, Germany. This tool uses a visual matrix for assessing trade-offs among social, ecological and economic objectives.

#### **BIODIVERSITY CONSERVATION AND SUSTAINABLE USE OF FOREST RESOURCES**

Under this, 28 technical sessions were held on topics, including: long-term forest monitoring and its importance for decision-makers; frontiers in wildlife ecology and management; the contribution of science to the fight against illegal logging; and challenges and progress with silvicultural systems for tropical forests.

#### **INNOVATIVE APPROACHES TO FOREST ECOSYSTEM RESTORATION:**

On Tuesday, John Stanturf, US Forest Service, highlighted the significant opportunity of forest restoration and suggested ways to integrate social and natural science approaches with a resiliency science framework. Ekeoba Drawing from a study in southern Nigeria on restoration of agricultural lands, Isikhuemen, Ministry of Environment and Public Utilities, Nigeria, explained that appropriate eco-friendly cropping mixtures and agroforestry practices can be effective restoration tools. Keiko Nagashima, Kyushu University, reviewed patterns of vegetation recovery on abandoned plantation clearcuts on the Kyushu Island of Japan. She said deer grazing was the main factor inhibiting tree species recovery, and that slope form, adjacent natural broadleaf forests and abandoned sites influence vegetation types that emerge.

Arno Thomaes, Research Institute for Nature and Forest, Belgium, outlined the influence of oak and poplar species on soil pH and how this, in turn, shapes the abundance of

that European forests are expected to remain a net carbon sink, but that this sink will decline with business-as-usual practices and that the increased harvest levels could exacerbate the decline.

Dodik Ridho Nurrochmat, Bogor Agricultural University, warned that a strong REDD scheme will have negative multiplier effects on associated industries and communities in timber exporting countries, thereby increasing illegal logging.

Yoon-Hyung Kim, Ohio State University, discussed the impact of US and European biofuels policies on forest carbon. Kim found that the US and EU will lose significantly more forests than predicted by other models, and that Southeast Asia will



Keiko Nagashima, Kyushu University

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ancient forest herbs in post-agricultural forests. Coert J. Geldenhuys, University of Stellenbosch, discussed species richness in secondary forests of the Congo Basin and South Africa as an indicator of recovery. He explained how such recovery could serve as the basis for restoration projects matched with local agro-forestry systems.



Coert J. Geldenhuys, University of Stellenbosch

### IDENTIFYING AND MONITORING OLD GROWTH FORESTS IN BOREAL, TEMPERATE AND MEDITERRANEAN ENVIRONMENTS: On

Wednesday, Thomas Spies, US Forest Service, focused on old growth forests in the US Pacific Northwest, highlighting varied and complex definitions for old growth and different pathways by which these forests develop. Rod Keenan, University of Melbourne, reviewed the operational definitions used to map and designate protected areas in Australia and stressed the need for adaptive management approaches, particularly given



Rod Keenan, University of Melbourne

climate change. Anna Barbati, University of Tuscia, said a structural approach is a fast and practical way to identify old growth forests, emphasizing that to find European old growth forests one needs to look in hard-to-access or unmanaged areas. William Keeton, University of Vermont, discussed a study on harvesting treatments designed to encourage development of old growth attributes in secondary forests of the US Northeast.

Grant Wardell-Johnson, Curtin University, outlined the importance of climate change for old growth protection given that shifting temperature and precipitation regimes



Grant Wardell-Johnson, Curtin University

will alter the viability of protected areas to sustain specific ecosystems. He also stressed that forest protection plays a role in mitigating climate change given the large carbon storage of their soils. Jan Bannister, University of Freiburg, discussed stand dynamics of swamp and upland *Pilgerodendron uviferum* forests in Patagonia and said, counter to previous knowledge, the tree species is stress and shade tolerant and can regenerate in the absence of large disturbances, such as fire. Alfredo Di Filippo, University of Tuscia, described work on life histories of beech stands in Italy where he used to analyze the transition of these forests towards old growth status.



Jan Bannister, University of Freiburg

Kris Verheyen, Ghent University, reviewed long-term changes in understory vegetation in European forests and offered a synthesis quantifying the rate and nature of change and the key environmental drivers.

### FOREST ENVIRONMENTAL SERVICES

Sixteen technical sessions were held under the theme, "Forest Environmental Services," and examined such topics as: the impact of global environmental change on forest ecosystem services; agroforestry for climate change adaptation; and forest carbon credit markets and the forest sector.

**ECONOMIC VALUATION OF FOREST ECOSYSTEM SERVICES:** On Monday, Larry Mason, University of Washington, sketched the policy challenges to successfully valuing and compensating for FES, citing administrative costs of forest certification and carbon markets. He advocated, place-based approaches to forest management instead. He advocated, place-based approaches to forest management instead. Richard Yao, Scion and New Zealand Forest Research Institute, discussed research on non-market valuation of recreational use of New Zealand's Whakarewarewa forest, and noted, *inter alia*, differences in how users valued recreational opportunities and forest characteristics.

Peter Herbst, IUFRO, described the habitat-scoring methods used to determine the offsets needed to compensate for forest habitat destruction in Georgia related to an international pipeline right-of-way. Robert Deal, US Forest Service, described the challenge of coordinating across regulatory agencies, avoiding double counting and demonstrating additionality when valuing bundles of ecosystem services.

Shuirong Wu, Chinese Academy of Forestry, presented a meta-analysis of FES valuation



Shuirong Wu, Chinese Academy of Forestry

in China. She concluded that there is great variation in FES values, and that predicting values based on previous studies is unreliable. Eduardo H. Ditt, Ecological Research Institute, Brazil, discussed valuation and policy in the context of the Atlantic Forest of Brazil and presented a range of ecosystem value scenarios - US \$49-60 million per year - differentiated by land use type and valuation method.

### TO WHAT EXTENT CAN PAYMENTS FOR FOREST ENVIRONMENTAL SERVICES BE PRO-POOR?:

On Wednesday, Sim Eun Suh, Seoul National University, questioned motivations for linking poverty to PES, saying that PES' focus on cost efficiency actually benefits from

poverty and may create an environmentally "sustainable poverty." Lisa Petheram, Charles Darwin University, shared lessons from engaging communities on PES near a Vietnamese national park. She noted, *inter alia*, limited trust in government led respondents to favor payments from other sources and a combination of monetary and in kind payments was preferred.



Lisa Petheram, Charles Darwin University



Stephen Garnett, Charles Darwin University

Stephen Garnett, Charles Darwin University, on behalf of Pham Thu Thuy, shared findings of a pro-poor PES case study in Vietnam. Main messages included that: influential stakeholders can fuel inequity and inhibit participation; neutral intermediaries are hard to find; PES may not cover opportunity and transaction

costs of poor households, but monetary gain is not the sole motivation to participate; and that understanding locals' definition of poverty should be central to project planning.

Mariëka Sandker, CIFOR, presented on participatory modeling of potential REDD outcomes in Ghana. She discovered that in areas with high population, low forest density and valuable cash crops, REDD does not offer enough incentives to overcome planned conversion. Additionally, she said that the limited ownership of forests by the poor will limit their access to REDD proceeds, creating the danger that landowners may repatriate leased lands in order to collect these proceeds.

#### ENERGY FORESTS – SOCIAL IMPACTS AND ENVIRONMENTAL SERVICES:

On Saturday, David Neil Bird, Joanneum Research, discussed using forests to provide energy for climate change mitigation. He said using transient biomass, which decays quickly, shows short-term emissions increases but these decrease significantly over time. Ioannis Dimitriou, Swedish University of Agricultural Science, illustrated that short rotation willow coppicing can have positive impacts on water quality in Sweden when using water from wastewater storage ponds. He said more innovation in multifunctional biomass production systems is needed.

Graham von Maltitz, Council for Scientific and Industrial Research, South Africa, talked about potential impacts of *Jatropha* plantations on key ecosystems services in South Africa, including that: yields are likely to be an order of magnitude less than expected; water impacts are negligible; and biodiversity impacts are similar to other woody crops. Arviand Reddy, Winrock International India, presented an investigation of social impacts of bio-energy programmes in India, finding that the government's programme offers the least social benefit, using the indicators of: community and institutional structure; political and social resources;



Jennifer Harrison, Newcastle University

community and family change; and community resources.

Jennifer Harrison, Newcastle University, spoke about social impacts and need for stakeholder involvement in Indian and Ugandan bioenergy production. Heru Komarudin, CIFOR, analyzed expanding oil palm plantations in Indonesia's Papua region, finding that while some communities enjoyed economic and social benefits from such plantations, others experienced restrictions on or loss of traditional land uses. Yufang Su, ICRAF, China, discussed energy challenges facing China and options for developing forest-based energy in the country. She recommended that policy focus on, and



Yufang Su, ICRAF, China

support research and development of, decentralized wood-based energy technology as well as implementation of small to medium-scale bioenergy projects. Jolien Schure, CIFOR, reported that fuelwood is the main source of energy in the Democratic Republic of Congo, even among large urban populations. She said this decimates local forests and policies must be developed to reconcile tradeoffs between environment and livelihoods.

#### ASIA'S FORESTS FOR THE FUTURE

Seventeen technical sessions were held in which participants discussed: recreation management in protected areas: Asian perspectives; biology, ecology and management of *Pinus koraiensis* in East Asia; and advances in plantation forest management in Asia.

#### CHALLENGES AND ISSUES OF FOREST MANAGEMENT AND UTILIZATION IN ASIAN COUNTRIES:

On Tuesday, Matti Palo, independent scientist, discussed deforestation and poverty challenges in the Democratic People's Republic of Korea, Mongolia and tropical Asian countries. He reviewed deforestation drivers, an empirical model assessing poverty and ecological drivers, and the difficulty of acquiring relevant data. Ho Sang Kang, Seoul National University, discussed an ecotourism training programme as one possible approach to addressing the challenges to Indonesia's forests.

Dar-Hsiung Wang, Taiwan Forestry Research Institute, discussed Japanese cedar plantations in Taiwan, linking them to Japan's occupation of Taiwan and a forest management paradigm prioritizing the replacement of "unproductive" native forests with "productive" plantations. Shirong Liu, Chinese Academy of Forestry Sciences, reviewed China's 2003 forest governance reforms, including transforming collective ownership into private



Ho Sang Kang, Seoul National University



Dar-Hsiung Wang, Taiwan Forestry Research Institute



Shirong Liu, Chinese Academy of Forestry Sciences

ownership, and underscored China's low forest productivity and forest area per capita, and the damages caused by pests, diseases and invasive species.

Juan Chen, University of British Columbia, discussed China's national forest protection and conversion of cropland back to forest programmes. Despite successes with afforestation of degraded lands, she noted challenges regarding unemployed forest workers and in ensuring the longer-term vitality of planted forests.

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Nabaghan Ojha, Regional Centre for Development Cooperation, India, discussed the evolution of Indian forests and forest laws, including provisions for participatory forest management and the Forest Rights Act that recognizes rights of forest dwelling peoples, stressing implementation challenges.

Mohammad S.H. Chowdhury, Shinshu University, Japan, described the use of medicinal plants in 36 Bangladeshi villages surrounding the Rema-Kalenga Wildlife Sanctuary, and made recommendations on balancing community and conservation needs.

### MANAGING ASIAN BAMBOO FOREST IN A CHANGING WORLD:

On Wednesday, Jian Gao, International Center for Bamboo and Rattan, China, reviewed water quality problems in China's Chaohu Lake. Drawing on field plots, she said bamboo forests are useful for water conservation and reducing pollutant runoff because they retain more water in the litter layer than other forest types. Masaharu Sakai, Forestry and Forest Products Research Institute, Japan, detailed a study of soil and water conditions in bamboo and conifer forests, and explained the problem of bamboo encroachment lowering soil moisture content owing to higher water transportation in bamboo stands.



Masaharu Sakai, Forestry and Forest Products Research Institute, Japan

Yueqin Shen, Zhejiang Forestry University, drew on a household survey to discuss how different management approaches for bamboo affect economic benefits, local employment opportunities, and income distribution in China. Ramasamy Yasodha, Institute of Forest Genetics and Tree Breeding, India, noted high demand for bamboo is complicated by its unpredictable reproductive cycle, limiting production. She explained the intricacies of in vitro micropropagation and said *Bambusa nutans* works well with these methods, but stressed that costs limit commercial production.



Ramasamy Yasodha, Institute of Forest Genetics and Tree Breeding, India

Benzhi Zhou, Zhejiang Forestry University, said bamboo is China's most important forest type, and reviewed its carbon sequestration properties. He discussed dry-weight biomass and carbon content to soil depth of 60 cm of a *Dendrocalamopsis vario-striata* plantation, finding 95.5 tonnes of carbon per hectare, with a third captured in plant biomass and two thirds by soil. Guomo Zhou, Zhejiang Forestry University, discussed carbon storage capacity of *Phyllostachys pubescens*, an economically important bamboo and said its carbon storage capacity can increase up to 40 fold in one month due to its quick growth rate.

### FOREST PRODUCTS AND PRODUCTION PROCESSES FOR GREENER FUTURE

Ten technical sessions were held under this theme on topics including: green forest products marketing and business management; value chain optimization in the forestry industry context; and sustainability impact assessment of the forest based materials to promote sustainability.

### GREEN FOREST PRODUCTS MARKETING AND BUSINESS MANAGEMENT:

On Friday, Bob Smith, Virginia Tech, said the hardwood industry was slow to adopt the "greening" movement, which is perceived as more regulation. He discussed low interest in green products among US consumers, and that companies know more about forest certification than green building initiatives. Lei Wang, University of Helsinki, said corporate social responsibility (CSR) is a western concept and has not done well in the Chinese market. He proposed a culturally recognizable approach to CSR that draws on Confucianism and Taoism.

Masami Shiba, University of Kyoto, said 4.3% of Japanese forests are certified, mostly through the Forest Stewardship Council (FSC), but that Japan accounts for roughly 10% of all global chain of custody certificates. He said market demand and societal expectations were key drivers of corporate interest



Masami Shiba, University of Kyoto

in certification. Francisco Aguilar, University of Missouri, detailed a study of how product origins, certification agencies, and timber prices affect market shares and UK and US consumer preferences. He noted that, *inter alia*, government agency and NGO certifications were favored in the UK, and that government schemes and temperate forest products were favored in both countries.

Ashlee Tibbets, Oregon State University, reported on interviews with US and Australian architects, engineers, builders and developers probing environmental impacts of building materials. She said interviewees felt the use of timber is a "double-edge sword," bearing environmental benefits but also historical conflicts over forest practices. Alison Kriscenski, FSC, emphasized that certification is more than verifying practices as it involves a multi-stakeholder governance process for deliberating forest management issues. She highlighted challenges FSC faces in communicating its benefits to consumers and called for research directed to improving FSC's work.

### EMERGING TECHNOLOGIES IN THE FOREST SECTOR

Eleven technical sessions were held under this theme on topics including: detecting, monitoring and modeling forest fire and carbon emission using remote sensing; and biotechnology applications in forest breeding and plantation management.

### MANAGING THE DATA DELUGE: THE CHALLENGE OF EMERGING TECHNOLOGIES:

On Friday, Roger Mills, Oxford University, stressed the need for data-management toolkits built upon a short- and long-term strategy for maintaining, managing and using data. Margaret Sraqu-Lartey, Forestry Research Institute of Ghana, stressed the need for institutional repositories to preserve forestry information. She described the potential for establishing such a repository in her institute, sketched its contents and possible users, and stated that it ought to concentrate on intellectual knowledge, electronic publishing and open access.



Stella Britwum Acquah, Forestry Research Institute of Ghana, introduced an on-line gateway established by the Forestry Research Network for Sub-Saharan Africa for exchanging forestry and natural resource information in the sub-region. Vanda Santos, FAO, outlined FAO's web-based forestry education platform, which serves as a repository for forestry education materials, and links to national, regional, and global forest information and reviewed its work in Central America and the Caribbean.



Vanda Santos, FAO

Andrea Wirth, Oregon State University, discussed the Oregon Spatial Data Library, which provides access to GIS data created and managed by the State of Oregon. She reviewed the library's searching mechanisms and a new "clip, zip and ship" option that allows users to download small parts of GIS layers.



Andrea Wirth, Oregon State University

Mills, for Gillian Petrokofsky, Oxford University, outlined many biases that affect decision-making and discussed evidence-based forestry as a corrective. This approach, he said, involves systematic attention to defining our questions, reviewing the relevant evidence, and disseminating of results. He stressed that the review needs to be rigorous, peer-reviewed, transparent, and repeatable.

Randy McCracken, US Forest Service, said the guiding principle of web design should be: "give the users what they want, and don't create obstacles."

#### FRONTIERS IN FOREST AND TREE HEALTH

On this theme, 20 technical sessions were held on topics including: damage caused by insect pests, pathogens and air pollution; invasive species; and climate change.

#### ADVANCES IN FOREST PEST SURVEILLANCE AND MONITORING:

On Wednesday, Olle Anderbrant, Lund University, talked about forest insects in pest control and conservation and the use of pheromone bait trap-catch at large scales. Richard Hofstetter, Northern Arizona University, said trap-catch yields correlate with infestation density, meaning that trap-catch may be a good large-scale predictor of beetle abundance and tree mortality. Hongbin Wang, Chinese Academy of Forestry, described research to identify beetle population density at different elevations and cardinal directions in a forest using pheromone bait methods. Steven Seybold, US Forest Service, reviewed invasive beetle populations, explaining that an "improved" rather than commercial pheromone bait showed better empirical results than models predict.

Robert Rabaglia, US Forest Service, presented on an early detection and rapid response project that had identified 10 high-risk bark beetle species. He said traps baited with either



Zhen Zhang, Chinese Academy of Forestry

species-specific pheromones or generally attractive host volatiles are monitoring high-risk sites in 17 states. Zhen Zhang, Chinese Academy of Forestry, presented work on detecting and trapping the red turpentine beetle introduced to China from North and Central America and the damage it inflicted on the Chinese pine.

Wonhoon Lee, Korea Forest Research Institute, reported the work of his research team in the construction of a Korean Forest Insect Pest DNA barcode database. He noted that DNA barcoding has potential applications in insect pest monitoring and quarantine.



Wonhoon Lee, Korea Forest Research Institute

Natalia Kirichenko, Institute of Forests, Russian Federation, detailed work to identify poorly known pests and diseases that, if introduced to Europe or North America, may present a threat. Choi Won IL, Korea Forest Research Institute, reported findings of a study conducted by his research group on the occurrence and distribution of invasive insect pests in Republic of Korea after 2000.

#### FORESTS, COMMUNITIES AND CULTURES

On this theme, 23 technical sessions were held on topics including: the importance of traditional knowledge in forest management and biodiversity; community management of forests; the role of small-scale forest-based enterprises; and emerging issues and opportunities for forest users in the trend towards decentralized forest management.

#### INCOME FROM SMALLHOLDER FORESTRY – CAN IT BE A DRIVER OF POVERTY ALLEVIATION?:

On Monday, Divine Foundjem-Tita, Ghent University, discussed how creating institutional arrangements for informal NTFP markets can improve livelihoods of farmers in Cameroon through increased point of sale prices, market certainty and bargaining power.

In two case studies, Verina Ingram, CIFOR, found only small financial benefits and even economic losses arise from shifting to communal forest usage in some cases, but estimated that communal farming is more sustainable than traditional methods in Cameroon. Dede Rohadi, CIFOR, discussed the role of teak harvesting in income generation, and introduced a tree valuation system to ensure smallholders receive fair market prices. He concluded that though teak is financially feasible it is often not the best source of income for smallholders.



Kazuhiro Harada, University of Hyogo

Kazuhiro Harada, University of Hyogo, highlighted that small group timber certification can play a role in poverty alleviation in Indonesian communities by providing financial support, income security, and reducing in illegal logging due to improved income from certified products. Aziza Rbivate, University of Johann Heinrich von Thünen-Institut, analyzed the Malagasy

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forest fringe and the development of adaptation incentives in the context of REDD. She noted that motivations to deforest or degrade forests are highly dependent on social and economic structures, and that these should form the basis of any REDD related incentives or alternatives.

Kazi Kamrul Islam, Kyushu University, talked about how participatory agroforestry in Bangladesh is hindered by: bureaucracy; monopoly market structures; poor infrastructure; and exploitation by middlemen.

Shoana Humphries, FSC, expounded on the economic feasibility of community-based forest enterprises in Brazil. She found that although these enterprises can be successful, donors must incorporate options for long-term support in order to alleviate poverty sustainably. Sushila Kumari Thapa Magar, ForestAction, discussed community forest enterprises in Nepal, noting their success is a function of appropriate regulation, stakeholder participation in decision-making and project ownership. Ousseynou Ndoye, FAO, discussed the need for regulatory policy reform in the development of NTFP enterprises in Central Africa. He highlighted that current use-right law criminalizes the sale of NTFPs by smallholders and that mid-level corruption creates financials burden for smallholders.

### CONTRIBUTION OF POLITICAL THEORY TO POLICIES FOR SUSTAINABLE USE OF FOREST RESOURCES:

On Saturday, Bas Arts, Wageningen University, compared five theories used in policy sciences and assessed their use in forest policy research: the advocacy coalition framework; network analysis; and rational, institutional and critical policy analyses. Wil De Jong, Kyoto University, introduced the idea of "territorialization," the process of imposing territorial control over, resources or people, in pursuit of national increased security. He examined this process in the Bolivian Amazon, a porous territorial border over which the Bolivian government is attempting to exert increasing territorial control.

Mistuhiko Nose, Research Institute for Humanity and Nature, Japan, analyzed financial constraints facing the Japanese forest administration and its impacts on forest sector productivity. He said forestry investment has not been successful in improving economic productivity and advocated for directed investments to enhance the viability of certain local forest areas. Dodik Ridho Nurrochmat, Bogor Agricultural University, presented three practical options for converting political theory on green fiscal policy into practice in Indonesia: implement PES via a conservation fund; enforce the liability rule through revision of fiscal balance law; regulate the mechanism for purchasing land use rights; and greening the gross domestic product calculation.

Bruno Salomon Ramamonjisoa, University of Antananarivo, illustrated the relevance of sociocultural institutionalism to forest policy management in Madagascar, which, he said, is a way to better integrate local knowledge into policy. Olufunso Somorin, CIFOR, presented three climate policy discourses: mitigation policy only; adaptation and mitigation policy separately; and integrated adaptation and mitigation policy. He proposed that the separatist policies of the North and South cause political problems in the analysis of climate change solutions.



Bas Arts, Wageningen University

### FORESTS, HUMAN HEALTH AND ENVIRONMENTAL SECURITY

On this theme, eight technical sessions were held on topics including: the interrelationships between forests and human health; the impacts of environmental changes on the well-being of social groups in and around forests; and the role of forests in promoting community health, security and well-being.

**HEALTH BENEFITS OF FORESTS:** On Tuesday, Si Hyung Lee, Comprehensive Research Institute for Korea Natural Medicine, proposed that a 2-3 day wilderness retreat may positively increase levels of human serotonin, a neurotransmitter which reduces depression, eating disorders and aggression. Kjell Nilsson, University of Copenhagen, presented on the role of the environment in healthy lifestyles. He mentioned that several international working groups are evaluating forests' role in the prevention of illness and its effect on mental status. Tatsuya Kushida, NalaPro Technologies, summarized biochemical research on flavonoids, substances contained in tree bark, amongst others, which have been found to improve human immune function.

Nor Azah Mohamad Ali, Forest Research Institute Malaysia, presented her institute's work on bioprospecting, i.e. the search for applications, processes or products in nature with useful health benefits. She said her team assists in the development, and quality and safety assurance, of products for cosmetics and toiletries manufacturers, especially lotions and creams, anti-inflammatory agents and mosquito repellants. Julius Adebayo John, Forest Research Institute, Nigeria, talked about perceptions and use of traditional herbal medicines in Nigeria, the popularity of which is returning as health risks of fake pharmaceuticals become more apparent. He recommended that policy-makers take steps to formally recognize herbal medicines and encourage their use.

### SPECIAL EVENTS

#### FIELD TRIPS

On Thursday participants braved the rainy, foggy weather and headed into the field on eight trips organized to illustrate innovative forest-related projects around the Republic of Korea. Of the eight field trips, IISD RS covered two: Landscape Restoration and Sub-alpine Forest; and Old-aged Natural Forests and Landfill Restoration. The remaining field trips included excursions about: a protected area for biological diversity; non-timber forest products (NTFPs); conservation and utilization of forest genetic resources; forests and human health; SFM and the ecosystem approach; and the wood processing industry.



IUFRO participants in an excursion to the World Cup Park, a landfill site turned Eco-Park





### **IUFRO PRESIDENT'S DISCUSSION: FUTURE CHALLENGES FOR FOREST EDUCATION:**

On Wednesday, Florent Kaiser, IFSA, lamented that current forestry curricula lack: practical learning opportunities for students; adequate global focus; and student exchange opportunities. Yoon Soo Kim, Chonnam National University, said forestry graduates worldwide have declined by 30% since the 1990s, and that students cannot find jobs after graduation because current university programs are not matched to modern demands. He suggested a three-year technical education as more relevant.

Hosny El-Lakany, University of British Columbia, criticized that although forestry is now high on the global agenda, foresters are not adequately incorporated into these discussions. He highlighted the need for, *inter alia*: halting over-specialization of departments; and increased national and international collaboration. Emmanuel Ze Meka, ITTO, emphasized that, in reality international agreements are often constrained and undermined by sovereignty issues, and said although their overall impact has been questionable, their role and relevance is becoming more central due to concerted international efforts to resolve global problems.

Hideki Nose, Sumitomo Forestry Group, said highly specialized students often lack comprehensive judgment on contemporary forest industry issues and it must be remembered that one "cannot see the forest by only looking at the trees." Gerald Steindlegger, WWF, said forestry must change to demonstrate "it no longer serves only a sector but an entire landscape— of values and people." He also noted that primary drivers of deforestation lie outside the forest sector and that, therefore, SFM alone is not the answer.

### **CLOSING CEREMONY**

On Saturday, the ceremony opened with a medley of songs sung by Lee Tae Won, singer and actress, accompanying a video compilation of Congress highlights.

Jung-Hwan Park, Chair of the Congress Organizing Committee, thanked the government of the Republic of Korea and the Korea Forest Research Institute for their contributions, and acknowledged efforts of John Parrotta, Chair of the IUFRO Congress Scientific Committee; IUFRO President Don Koo Lee and the IUFRO team; the Korea Forest Service; and all participants and exhibitors. He also acknowledged IUFRO for financing participation of 182 developing country participants.

Su See Lee, IUFRO Board member, then announced the IUFRO 2010 Best Poster Award winners:



Korean musician and actress Lee Tae Won entertained participants during the closing plenary of XXIII IUFRO World Congress

- Pifeng Lei, University of Freiburg: Belowground niche separation and productivity in tree species mixtures;
- Yoshihiro Hosoo, Shinshu University: Isolation and analysis of a gene encoding a potassium membrane transport protein from *Cryptomeria japonica*;
- Sungho Choi, Korea University: Predicting the changes in forest distribution using the thermal and hydrological indices;
- Lee Su-Yeon, Seoul National University: Analysis of terpenoids released during the drying process of *Cryptomeria japonica*;
- Maija Faehnle, Finnish Forest Research Institute: Evaluating the use of social information in urban forest planning;
- Takahashi Yukiko, University of Tokyo: Genetic diversity of the pathogen of Japanese oak wilt, *Raffaella quercivora*, in the gallery bored in an oak tree, and mycangia of the ambrosia beetle, *Platypus quercivorus*; and
- Ahn Young San, Korea Forest Research Institute: Historical change in sediment yield in Lake Toro catchment, Kushiro-mire, northern Japan, over the past 300 years.

Don Koo Lee announced that the IUFRO International Council had met and adopted the 2010 Congress Resolution and approved its new Council members. Risto Seppälä and Eric Teissier du Cros were acknowledged as honorary Council members. He then revealed that the 2014 XXIV IUFRO World Congress will be held in Salt Lake City, Utah, USA.

Parrotta presented the 2010 Congress Resolution, stating that IUFRO will strive to promote the themes of: forests for people; climate change and forestry; bio-energy; forest biodiversity conservation; forests and water interactions; and forest resources for the future. The Resolution also commits IUFRO to:

- improving communication within and outside of IUFRO;
- expanding work on the science-policy interface;
- renewing and strengthening forest monitoring activities;
- expanding the IUFRO membership; and
- promoting high-quality forest-related research and interdisciplinary cooperation.

Incoming IUFRO President Niels Elers Koch introduced the new Board of Directors and President's nominees. He acknowledged the accomplishments of Don Koo Lee. In closing, Koch highlighted the strength and dedication of



L-R: Risto Seppälä and Eric Teissier du Cros, received Honorary memberships to IUFRO from IUFRO President Don Koo Lee and Peter Mayer, IUFRO

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IUFRO President Don Koo Lee handed over the IUFRO flag to Ann Bartuska, US Forest Service on behalf of Salt Lake City, US, the host of the XXIV IUFRO World Congress

IUFRO's international network and volunteers, and called on members to "look outside the forest box," across sectors and at the science-policy interface.

IUFRO President Lee handed over the IUFRO flag to Ann Bartuska, US Forest Service, who invited participants on behalf of the host city Salt Lake City to the XXIV IUFRO World Congress in 2014.

President Lee delivered closing remarks, expressing his appreciation to participants for their contribution to the success of the Congress, and closed the Congress at 5:15pm.

### UPCOMING MEETINGS

**Workshop on Forest Governance, Decentralisation and REDD in Latin America:** This workshop will discuss regional perspectives on REDD and help prepare for the 9th session of the UN Forum on Forests. **dates:** 31 August - 3 September 2010 **location:** Oaxaca, Mexico **contact:** Claudia Greco, Intercooperation **phone:** +41 31 385 10 60 **email:** claudia.greco@intercooperation.ch **internet:** <http://www.cifor.cgiar.org/Events/CIFOR/decentralisation-redd.htm>

**Japan-CARICOM Public Symposium on Climate Change and Biodiversity:** This symposium will bring together the foreign ministers of CARICOM's 15 member countries and explore further cooperation between CARICOM and Japan. **date:** 2 September 2010 **location:** Tokyo, Japan **contact:** Yaeko Higo, UNU-ISP **phone:** +81-(0)3-5467-1212 **fax:** +81-(0)3-3499-2828 **email:** [higo@unu.edu](mailto:higo@unu.edu) **internet:** [http://unu.edu/events/#caricom\\_201009](http://unu.edu/events/#caricom_201009)

**Seminar on the Vulnerability of International Trade to the Carbon Footprint:** This seminar will examine the possible impacts of the "carbon footprint" on trade in Latin America and the Caribbean.

**dates:** 2-3 September 2010 **location:** Santiago, Chile **contact:** Joseluis Samaniego **phone:** +56-2-210-2291 **email:** [joseluis.samaniego@cepal.org](mailto:joseluis.samaniego@cepal.org) **internet:** <http://www.eclac.org/default.asp?idioma=IN>

**Workshop on a Practical Guide for Integrating Climate Change into National Forest Programmes:** This workshop will bring together results from four previous workshops in Cambodia, Paraguay, South Africa and Tanzania to develop generic guidelines for integrating climate change into national forest policy. **dates:** 20-21 September 2010 **location:** Rome, Italy **contact:** Jerker Thunberg **fax:** +39 06 570 55137 **email:** [Jerker.Thunberg@fao.org](mailto:Jerker.Thunberg@fao.org) **internet:** <http://www.nfp-facility.org/63721/en/>

**Workshop on Improving the Regional Distribution of CDM Projects in Asia and the Pacific:** This workshop aims to actively increase the number of Clean Development Mechanism (CDM) projects in countries currently hosting fewer than ten registered CDM projects. **dates:** 8-9 September 2010 **location:** Manila, Philippines **contact:** Alma Cañarejo **email:** [acanarejo.consultant@adb.org](mailto:acanarejo.consultant@adb.org) **internet:** <http://www.adb.org/>

**International Seminar on the Role of Agrobiodiversity in Addressing Hunger and Climate Change:** This seminar will highlight the role of agricultural biodiversity for food security in the context of climate change and the importance of international cooperation for its protection and sustainable use. **dates:** 13-15 September 2010 **location:** Cordoba, Spain **contact:** International Treaty on Plant Genetic Resources for Food and Agriculture Secretariat **phone:** +39 06 570 53441 **fax:** +39 06 570 56347 **email:** [pgrfa-treaty@fao.org](mailto:pgrfa-treaty@fao.org) **internet:** [http://www.planttreaty.org/gbnex\\_en.htm](http://www.planttreaty.org/gbnex_en.htm)

**Global Expert Workshop on Biodiversity Benefits of Reducing Emissions from Deforestation and Forest Degradation in Developing Countries:** This workshop supports the efforts of parties in addressing Reducing Emissions from Deforestation and forest Degradation in developing countries (REDD) in the framework of the UN Framework Convention on Climate Change (UNFCCC) in a way that contributes to the implementation of the CBD programme of work on forest biodiversity. **dates:** 20-23 September 2010 **location:** Nairobi, Kenya **contact:** CBD Secretariat **phone:** 1-514-288-2220 **fax:** 1-514-288-6588 **email:** [secretariat@cbd.int](mailto:secretariat@cbd.int) **internet:** <http://www.cbd.int/doc/?meeting=EWREDD-01>

**World Habitat Day 2010:** The theme of this event is "Better City, Better Life." **dates:** 5 October 2010 **location:** Shanghai, China **contact:** The Coordinator, World Habitat Day **phone:**



Niels Elers Koch, President elect of IUFRO, introduced the members of the new IUFRO Board



(254 20) 762 5311 fax: (254 20) 762 3477 email: whd@unhabitat.org internet: <http://www.unhabitat.org/categories.asp?catid=643>

**UNECE Timber Committee Market Discussions and Policy Forum:** The forum, under the theme "Innovative Wood Products are the Future," will address: wood energy, carbon markets and certified forest products markets, and the role of wood products in mitigating climate change. **dates:** 11-15 October 2010 **location:** Geneva, Switzerland **contact:** UNECE Forestry and Timber Section **phone:** +41-22-917 1286 **fax:** +41-22-917 0041 **email:** [info.timber@unece.org](mailto:info.timber@unece.org) **internet:** <http://timber.unece.org/index.php?id=302>

**5th Latin American Carbon Forum:** This forum promotes knowledge and information sharing on the CDM while facilitating business-opportunity environments among main carbon market stakeholders. **dates:** 13-15 October 2010 **location:** Santo Domingo, Dominican Republic **contact:** Miriam Hinojosa **email:** [milh@risoe.dtu.dk](mailto:milh@risoe.dtu.dk) **internet:** <http://www.latinacarbon.com/2010/english/index.htm>

**CBD COP 10:** This meeting is expected to assess progress on the 2010 target to reduce significantly the rate of biodiversity loss, adopt an international regime on access and benefit-sharing and celebrate the International Year of Biodiversity 2010. **dates:** 18-29 October 2010 **location:** Nagoya, Japan **contact:** CBD Secretariat **phone:** 1-514-288-2220 **fax:** 1-514-288-6588 **email:** [secretariat@cbd.int](mailto:secretariat@cbd.int) **internet:** <http://www.cbd.int/meetings/>

**UNECE Forum on the Potential of Forests in Europe for Climate Change Mitigation and Adaptation:** **dates:** 22-24 November 2010 **location:** Geneva, Switzerland **contact:** UNECE Secretariat **phone:** +41(0)22 917 44 44 **fax:** +41(0)22 917 05 05 **email:** [info.ece@unece.org](mailto:info.ece@unece.org) **internet:** <http://www.unece.org/meetings/meetgen.htm>

**International Conference on Forestry Education and Research for the Asia-Pacific Region:** This conference aims to assess the state of forestry education and research in the Asia-Pacific, identify priorities, and make recommendations on future goals. **dates:** November 23-25, 2010 **contact:** Forestry Development Center, University of the Philippines **location:** Laguna, Philippines **email:** [fored2010@uplb.edu.ph](mailto:fored2010@uplb.edu.ph) **phone:** +63 49 536-3097 | 536-2341 **internet:** <http://www.jericotolentino.com/fored.uplb.edu.ph/>

**Forest Day 4:** This event will be held alongside the 16th session of the Conference of the Parties to the UNFCCC. **dates:** 5 December 2010 **location:** Cancun, Mexico **internet:** <http://www.cifor.cgiar.org/Events/ForestDay4/>

**46th meeting of the International Tropical Timber Council:** This meeting will take place together with associated sessions of the four committees. **dates:** 13-18 December 2010 **location:** Yokohama, Japan **contact:** ITTO **phone:** 81-45-223-1110 **fax:** 81-45-223-1111 **internet:** <http://www.itto.or.jp>

**9th Session of the UN Forum on Forests:** The theme for UNFF 9 is 'Forests for people, livelihoods and poverty eradication' and the forum is expected to complete discussions on approaches for implementing sustainable forest management. **dates:** 24 January - 4 February 2011 **location:** New York, USA **contact:** UNFF Secretariat **phone:** 1-212-963-3401 **fax:** 1-917-367-3186 **email:** [unff@un.org](mailto:unff@un.org) **internet:** <http://www.un.org/esa/forests/>

**XXIV IUFRO World Congress:** The XXIV IUFRO World Congress location and approximate date was announced at the close of the XXIII Congress, further details are currently unavailable. **dates:** August 2014 **location:** Salt Lake City, Utah, USA **internet:** <http://www.iufro.org/>

## GLOSSARY

CBD	Convention on Biological Diversity
CDM	Clean Development Mechanism
FAO	Food and Agriculture Problem of the United Nations
FES	forest environmental services
FGR	forest genetic resources
FSC	Forest Stewardship Council
PES	payment for environmental services
ITTO	International Tropical Timber Organization
IUFRO	International Union of Forestry Research Organizations
MDGs	Millennium Development Goals
NTFP	non-timber forest product
REDD	reducing emissions from deforestation and forest degradation
SFM	sustainable forest management
UNFF	United Nations Forum on Forests



Children reminding Congress participants that children are the future

# IUFRO Honours and Awards

## • Honorary Membership

Honorary Membership was conferred upon two outstanding present and former officeholders:

- Risto Seppälä, Immediate Past President
- Eric Teissier du Cros, former Vice-President Science



## • Host Scientific Award

- Sung Gak Hong



## • Scientific Achievement Awardees

- Janaki Alavalapati
- Nor Azah Mohamad Ali
- Michael Battaglia

- Yousry A. El-Kassaby
- Tonni Agustiono Kurniawan
- Sun-Young Lee
- Andrew M. Liebhold
- Shawn Mansfield
- Jerry Vanclay
- Jiaojun Zhu
- Janusz Zwiazek

## • Distinguished Service Awardees

- Jung-Hwan Park
- John Parrotta
- Seung-Jin Suh

## • Outstanding Doctoral Research Awardees

- Guillermo Gea Izquierdo
- Marieka Gryzenhout
- Jiali Jiang
- Finnvid Prescher
- Andreas Schindlbacher
- Jürg Andreas Stükelberger
- Guillermo Trincado
- Feng'e Yang

## • Student Awardees for Excellence in Forest Science

- Mahbulul Alam
- Marco A. Contreras
- Tnah Lee Hong

## • Best Poster Awardees

- **Division 1:** Poster B24-P06: "Belowground niche separation and productivity in trees species mixtures" – Pifeng Lei, University of Freiburg, Germany
- **Division 2:** Poster B10-P12: "Isolation and analysis of a gene encoding a potassium membrane transport protein from *Cryptomeria japonica*" – Yoshihiro Hosoo, Shinshu University, Japan

- **Division 3:** No winners
- **Division 4:** Poster A12-P04: “Predicting the changes in forest distribution using the thermal and hydrological indices” – Sungho Choi, Korea University, Republic of Korea
- **Division 5:** Poster E-Other-P24: “Analysis of terpenoids released during the drying process of *Cryptomeria japonica*” – Su-Yeon Lee, Seoul National University, Republic of Korea
- **Division 6:** Poster H02-P04: “Evaluating the use of social information in urban forest planning” – Maija Faehnle, Finnish Forest Research Institute, Finland
- **Division 7:** Poster G19-P09: “Genetic diversity of the pathogen of Japanese oak wilt, *Raffaelea quercivora*, in the gallery bored in an oak tree, and mycangia of the ambrosia beetle, *Platypus quercivorus*” – Takahashi Yukiko, The University of Tokyo, Japan
- **Division 8:** Poster C14-P01: “Historical change in sediment yield in Lake Toro catchment, Kushiro-mire, northern Japan over the past 300 years” – Young Sang Ahn, Korea Forest Research Institute, Republic of Korea



# IUFRO International Council

The IUFRO International Council (IC) met twice on the occasion of the XXIII IUFRO World Congress in Seoul, on 24 and 27 August 2010. Being the most authoritative statutory body of IUFRO, the IC discussed the future strategic orientation of IUFRO and took decisions of key importance for the next Board period. Both IC meetings were chaired by the IUFRO President and Chair of the IC, Don Koo Lee.

## 1. Reports on the Board period 2006~2010

Besides an electronic Mid-Term Meeting of the IC in 2007, the representatives of the IC had the opportunity in 2008, 2009 and 2010 to actively participate in electronic ballot votes on changes in the roles and responsibilities of IUFRO Board members, the split of Division 6 into the two new Divisions 6 and 9, and the changes in the IUFRO Statutes (MC has the responsibilities of the former Finance Committee or Finance officer, deletion of the Advisory Council, and the change in the voting procedure).

The IUFRO President, Vice-Presidents Divisions and Task Forces, and the Executive Director reported on the main developments and achievements of IUFRO in the Board period 2006~2010. The reports highlighted the developments in IUFRO during the Board period in relation to each of the three goals of the IUFRO Strategy 2006~2010. Significant progress had been made in strengthening research for the benefit of forests and people, expanding strategic partnerships and cooperation, and improving communication and links with the scientific



community, students, policy makers and society at large. Furthermore, IUFRO had been very active at the science-policy interface especially at the global level: IUFRO leads two joint initiatives of the Collaborative Partnership on Forests (Global Forest Expert Panels and Global Forest Information Service), and is observer to various international bodies and processes. The IUFRO Special Programme for Developing Countries (IUFRO SPDC) organizes training activities aimed at enhancing scientific contributions to policy processes.

## 2. Election of President and Vice-Presidents and Members of the Board

The IC elected the following personalities who will play a key role in shaping the further development of IUFRO in the period 2010~2014: The new President of IUFRO, Niels Elers Koch (Denmark) will be assisted by the two Vice-Presidents, Su See Lee (Malaysia) and Mike Wingfield (South Africa). Björn Hanell (Sweden), Yousry El-Kassaby (Canada), Hans Heinemann (Switzerland), Margarida Tomé (Portugal), Andrew Wong (Malaysia), Tuija Sievänen (Finland), Jean-Michel Carnus (France), and Daniela Kleinschmit (Germany/Sweden) will serve IUFRO as Division Coordinators for the period 2010~2014. Furthermore, the IC elected José Joaquín Campose Arce (Costa Rica), Ben Chikamai (Kenya), Elena Kulikova (Russia), Shirong Liu (China) and Ulrike Pröbstl (Austria) as President's Nominees.

## 3. Congress Resolution

Based on the experience gained from previous Congresses,

a simpler outline of the Congress Resolution reflecting both the content of the Congress and the future strategic orientation of IUFRO had been drafted by a special Congress Resolution Committee. At its second meeting on 27 August 2010, the IC adopted the proposed Congress Resolution with the amendments suggested in the first meeting on 24 August 2010 and the inclusion of a new paragraph on strengthening forest monitoring activities.

#### 4. Venue of the IUFRO Congress 2014

The IC noted that bids to host the Congress had been received from Lisbon, Portugal and Salt Lake City, USA. Subsequently the bids for the venue of the Congress 2014 had been discussed by the Board over a period of one year. At the Board meeting in Seoul, the Board recommended Salt Lake City as host of the IUFRO Congress 2014. The IC followed the recommendation and in a secret ballot voted to invite the USA, Salt Lake City, to host the next IUFRO Congress in 2014.

#### 5. Future policy and orientation of IUFRO

Given its crucial role in advising the President and the Board on major issues, the IC was invited to discuss the draft Strategy 2010~2014 “Reading the pulse of forest science for the benefit of forests and people.” This draft had resulted from a collaborative process of evaluating past achievements and determining the future orientation of IUFRO and included findings from the IUFRO Review



2008~09, in particular with regard to a stronger thematic orientation. The Strategy contains two parts: the first part sets out the Research Goals in six thematic areas which should guide the science collaboration in IUFRO in the coming years. The second part contains Institutional Goals which have been adapted from the former Strategy 2006~2010. At its first meeting on 24 August 2010, the IC suggested several amendments which were included in the final draft version. At its second meeting on 27 August 2010 the IC recommended the final draft for adoption by the IUFRO Board at its Joint incoming and outgoing Board Lunch on 28 August 2010.

#### 6. Other items

In recognition of their outstanding contributions to IUFRO, the IC approved the nominations of Risto Seppälä (Finland) and Eric Teissier du Cros (France) as Honorary Members of IUFRO.



# Seoul Resolutions

John Parrotta, Chair of the Congress Scientific Committee, declared the Seoul Resolution at the Closing Ceremony. The Seoul Resolution was translated into the IUFRO languages by the IUFRO Headquarters.



## English Version

### • THE SEOUL RESOLUTION

The XXIII IUFRO World Congress “Forests for the Future: Sustaining Society and the Environment” provided a unique forum for presentation and discussion of the results of current global research related to forests and trees. The Congress explored a broad range of current and emerging issues of great importance for the future of forests and their capacity to provide the environmental, economic, social, cultural, and health benefits that sustain rural and urban societies worldwide.

During this historic International Year of Biodiversity, in anticipation of the upcoming International Year of Forests, and recognizing the vital role that forest science must play in meeting the common challenges we face worldwide, IUFRO commits itself to:

Focusing more on scientific research and international collaboration in six thematic areas: Forests for People; Climate Change and Forestry; Bio-Energy; Forest Biodiversity Conservation; Forests and Water Interactions; and Forest Resources for the Future.

Further, IUFRO commits itself to the following goals:

Improving communication within the IUFRO structure, with other scientists, students, forest professionals, and the public; and increasing visibility and accessibility of research findings;

Expanding and deepening IUFRO’s work at the science-policy interface by enhancing scientific contributions to international processes, conventions, and organizations; responding rapidly to new policy issues; expanding partnerships and collaborating with international organizations and processes through the provision of scientific information and policy options;

Urging member institutions and external stakeholders to renew and strengthen forest monitoring activities and support global monitoring efforts;

Improving IUFRO’s capacity to expand its membership and funding base to provide support for the full range of IUFRO’s activities to benefit the forest researchers belonging to IUFRO’s member organizations; and

Promoting high-quality forest-related research and expanding IUFRO’s capacity for interdisciplinary cooperation; strengthening scientific capacity; relating the work of all IUFRO units to the six thematic research areas; broadening IUFRO’s membership base; and identifying emerging issues and changing paradigms.

## German Version

### • DIE RESOLUTION VON SEOUL

Der XXIII IUFRO Weltkongress “Wälder für die Zukunft – Nachhaltigkeit für Gesellschaft und Umwelt” bot ein einzigartiges Forum zur Präsentation und Diskussion der neuesten wissenschaftlichen Ergebnisse über Wälder und Bäume auf internationaler Ebene. Im Rahmen des Kongresses wurde eine große Bandbreite von aktuellen und neu aufkommenden Themen behandelt, die von großer Bedeutung sind für die Zukunft der Wälder und ihre Fähigkeit, das gesamte Spektrum an Leistungen im Bereich Umwelt, Wirtschaft, Gesellschaft, Kultur und Gesundheit für eine nachhaltige ländliche und urbane



Gesellschaft weltweit zur Verfügung zu stellen.

Im Rahmen dieses bedeutenden Internationalen Jahres der Biodiversität, in Vorbereitung des kommenden Internationalen Jahres der Wälder, und in Anerkennung der vitalen Rolle, die die Waldwissenschaft spielen muss, um gemeinsam den Herausforderungen gerecht zu werden, verpflichtet sich IUFRO zu:

Verstärkter Aufmerksamkeit auf wissenschaftliche Forschung und internationale Zusammenarbeit in den sechs Themenbereichen: Wälder für die Menschen; Klimawandel und Wälder; Bio-Energie; Erhaltung der Artenvielfalt; Wälder und Interaktionen mit Wasser; und Waldressourcen für die Zukunft.

Darüber hinaus verpflichtet sich IUFRO zu folgenden Zielen: Verbesserte Kommunikation innerhalb der IUFRO-Struktur, mit anderen Wissenschaftlern, Studenten, Waldfachleuten und der Öffentlichkeit; und erhöhte Sichtbarkeit und Zugang zu Forschungsergebnissen; Erweiterung und Vertiefung der IUFRO-Aktivitäten an der Schnittstelle zwischen Wissenschaft und Politik durch verstärkte wissenschaftliche Beiträge zu internationalen Prozessen, Konventionen und Organisationen; rasche Reaktion auf neue walddpolitische Themenstellungen; vermehrte Partnerschaften und Zusammenarbeiten mit internationalen Organisationen und Prozessen durch die Bereitstellung von wissenschaftlichen Informationen; und Aufruf an die Mitgliedsorganisationen und externe Interessenten, ihre Aktivitäten im Bereich Monitoring der Wälder neu aufzunehmen bzw. zu verstärken und Monitoring auf internationaler Ebene zu unterstützen; Verbesserung der Möglichkeiten IUFROs, die Mitglieder- und die finanzielle Basis zu stärken, die breite Palette von IUFRO Aktivitäten zu unterstützen, zum Nutzen der Waldwissenschaftler in IUFRO Mitgliedsorganisationen.

Förderung von waldbbezogener Forschung von höchster Qualität und Ausweitung von IUFRO's Fähigkeit zu interdisziplinärer Zusammenarbeit; Stärkung des wissenschaftlichen Potentials; Anbindung der Arbeit aller IUFRO Einheiten an die sechs Themenbereiche; Förderung interdisziplinärer Zusammenarbeit; Vergrößerung der Anzahl der IUFRO Mitglieder; und Erkennen von aufkommenden Themen und Paradigmenwechseln.

## French Version

### • LA RESOLUTION DE SEOUL

Avec le thème "Les forêts pour l'avenir des sociétés et de l'environnement" le XXIII<sup>e</sup> Congrès Mondial IUFRO a mis en place un forum unique pour présenter et discuter les résultats les plus récents en matière de recherche forestière internationale. Dans les débats du congrès, une grande variété de thèmes de recherche d'actualité et émergents a été évoquée portant sur le futur des forêts et leur capacité à fournir des bénéfices sur le plan environnemental, économique, social, culturel et de santé dans le but de soutenir les sociétés rurales et urbaines dans le monde entier.

Tout au long de cette Année internationale de la biodiversité, et à l'aube de l'Année internationale des forêts à venir, et en reconnaissant le rôle vital que la science forestière doit jouer pour faire face aux défis communs auxquels le monde d'aujourd'hui se voit confronté, l'IUFRO s'engage à:

Renforcer la recherche scientifique et la coopération internationale dans les six domaines thématiques: les forêts et les populations; les changements climatiques et la forêt; la bioénergie; la protection de la biodiversité forestière; les interactions forêts-eau; et les ressources forestières dans l'avenir.

De plus, l'IUFRO s'engage à réaliser les objectifs suivants: Améliorer la communication au sein de la structure de l'IUFRO, avec d'autres chercheurs, étudiants, professionnels forestiers et le grand public; et en augmentant la visibilité et l'accès aux résultats de recherche.

Elargir et approfondir le travail de l'IUFRO à l'interface de la science et de la politique tout en encourageant les contributions scientifiques aux processus internationaux, conventions, et aux organisations; en répondant rapidement aux thèmes politiques nouveaux; élargissant les partenariats et la coopération avec les organisations et les processus internationaux par la mise à disposition de l'information scientifique;

Solliciter les organisations membres et parties prenantes externes pour renouveler et renforcer les activités de suivi des forêts, et pour soutenir les efforts de suivi à l'échelle

mondiale;

Améliorer la capacité de l'IUFRO à élargir sa base de membres et de ressources financières pour appuyer toute la gamme des activités IUFRO au profit des chercheurs forestiers appartenant à des organisations membres IUFRO; et

Promouvoir la recherche forestière de haute qualité et améliorer la capacité de l'IUFRO en vue de la coopération interdisciplinaire, renforcer la capacité scientifique; lier le travail de toutes les unités IUFRO aux six domaines thématiques; élargir le nombre des membres; et identifier des thèmes émergents et des paradigmes changeants.

## Spanish Version

### • LA RESOLUCIÓN DE SEÚL

Bajo el lema “Bosques para el futuro: Sosteniendo la sociedad y el medio ambiente”, el XXIII Congreso Mundial IUFRO ofreció un foro excepcional para presentar y discutir los resultados de la investigación actual relacionada con los bosques y árboles a nivel mundial. El Congreso exploró una extensa variedad de asuntos en trámite y emergentes que son de suma importancia para el futuro de los bosques y su capacidad de suministrar la gama completa de beneficios ambientales, económicos, sociales, culturales y de salud que sustentan a las sociedades rurales y urbanas en todo el mundo.

En el curso de este Año Internacional de la Biodiversidad histórico, y en anticipación del Año Internacional de los Bosques que viene, reconociendo el papel esencial que la ciencia forestal debe empeñar para afrontar los desafíos comunes a los que nos enfrentamos mundialmente, IUFRO se compromete a:

Prestar mayor atención a la cooperación internacional en seis áreas temáticas de investigación: bosques para la gente; cambio climático y bosques; bioenergía; conservación de biodiversidad forestal; interacciones entre bosques y agua; y recursos forestales para el futuro.

Además, IUFRO se compromete a las metas siguientes:

Mejorar la comunicación dentro de la estructura de IUFRO, con otros científicos, estudiantes, forestales profesionales, y el público; y aumentar la visibilidad de y el acceso a resultados de investigación;

Ampliar y profundizar el trabajo de IUFRO en la interfaz entre ciencia y política fomentando contribuciones científicas a procesos internacionales, convenciones, y organizaciones; responder rápidamente a asuntos políticos nuevos; aumentar asociaciones y colaborar con organizaciones y procesos internacionales a través del suministro de información científica y de opciones políticas;

Apelar a sus organizaciones afiliadas y a partes externas interesadas a renovar y fortalecer las actividades de monitoreo forestal y apoyar esfuerzos mundiales de monitoreo.

Mejorar la capacidad de IUFRO de ampliar su base de membresía de financiamiento para apoyar a la gama completa de las actividades de IUFRO al beneficio de los investigadores forestales que pertenecen a las organizaciones afiliadas a IUFRO; y

Adelantar la investigación de alta calidad relacionada con los temas forestales y aumentar la capacidad de IUFRO para la cooperación interdisciplinaria; fortalecer la capacidad científica; relacionar el trabajo de todas las unidades IUFRO con las seis áreas clave de investigación; extender la base de membresía de IUFRO; e identificar asuntos emergentes y paradigmas cambiantes.



# IUFRO Officers 2010 ~ 2014

## The New President and Vice-Presidents:

**President:** Niels Elers Koch, Denmark

**Vice-President responsible for Divisions:**

Mike W. Wingfield, South Africa

**Vice-President responsible for Task Forces, Special Programmes, Projects and IUFRO-led Initiatives:**

Su See Lee, Malaysia

**Immediate Past President:** Don K. Lee, Rep. of Korea



## The New Board:

### • Division Coordinators:

- **Division 1:** Björn Hånell, Sweden
- **Division 2:** Yousry El-Kassaby, Canada
- **Division 3:** Hans Rudolf Heinemann, Switzerland
- **Division 4:** Margarida Tomé, Portugal
- **Division 5:** Andrew Wong, Malaysia
- **Division 6:** Tuija Sievänen, Finland
- **Division 7:** Andrew Liebhold, United States
- **Division 8:** Jean-Michel Carnus, France
- **Division 9:** Daniela Kleinschmit, Sweden/Germany

### • President's Nominees:

- José Campos, Costa Rica
- Ben Chikamai, Kenya
- Elena Kulikova, Russia
- Shirong Liu, China
- Ulrike Pröbstl, Austria

## Congress Evaluation

Congress delegates were requested to complete a survey of their assessment of Congress events and record their comments/feedback for the consideration of future Congress planning teams. A total number of 155 responses (from 53 countries) was sampled among all the Congress participants

in a random sample way. The results of the survey have been analyzed by a senior researcher of the Danish Centre for Forest, Landscape and Planning, University of Copenhagen, Denmark. The major results of the survey are tabulated below.

Category	Score (1 – 5)	Comments
A. The Information Package (IUFRO News Vol. 38, 2009)	Mean = 4.43	Median = 5, Mode = 5 (n = 132)
B. The Registration Package (IUFRO News Vol. 39, 2010)	Mean = 4.46	Median = 5, Mode = 5 (n = 142)
C. The Conference Webpage in general (www.iufro2010.com)	Mean = 4.39	Median = 5, Mode = 5 (n = 148)
D. The on-line Paper/Poster Submission	Mean = 4.44	Median = 5, Mode = 5 (n = 131)
E. The review process for papers/posters	Mean = 4.20	Median = 4, Mode = 4 (n = 130)
F. The on-line Registration	Mean = 4.47	Median = 5, Mode = 5 (n = 150)
G. The on-line Hotel Reservation	Mean = 4.19	Median = 5, Mode = 5 (n = 114)
H. The on-line Tour Reservation	Mean = 4.24	Median = 5, Mode = 5 (n = 125)
I. The Registration at the venue – COEX	Mean = 4.65	Median = 5, Mode = 5 (n = 149)
J. The Conference venue (COEX) in general	Mean = 4.44	Median = 5, Mode = 5 (n = 153)
K. The Congress Program book	Mean = 4.44	Median = 5, Mode = 5 (n = 154)
L. The Abstracts Volume ( <i>International Forestry Review</i> )	Mean = 4.22	Median = 4, Mode = 5 (n = 148)
M. Your scientific outcome of the conference	Mean = 4.07	Median = 4, Mode = 4 (n = 147)
N. Your outcome regarding networking/making new Contacts	Mean = 4.25	Median = 4, Mode = 4 (n = 150)

Notes: Evaluation based on 155 completed survey forms

Scores: 5 = very good through to 1 = not good

# Congress Facilities



Located in the central business district of Seoul, COEX Convention and Exhibition Center is one of Korea's largest venues for conventions and exhibitions. The center is also adjacent to the COEX mall, a must-visit destination in Seoul featuring business, shopping and entertainment.

With a total area of approximately 40,000 m<sup>2</sup> and the number of daily visitors reaching up to 250,000 on weekends, the COEX Complex offers a complete package in terms of congress facilities, ensuring the success of congresses held in this modern arena. The congress rooms come in a variety of sizes, from small rooms to mega event halls: four specialized

exhibition halls that can be partitioned into 12 separate smaller halls, a convention hall that can accommodate up to 7,000 people at once, and 51 conference rooms that can be partitioned into 89 separate rooms. The spaces are also equipped with advanced technology, such as simultaneous interpretation equipment and audio-visual and lighting systems.

The Organizing Committee of the XXIII IUFRO World Congress exerted great efforts to offer convenient services to participants and welcomed everyone to COEX, Seoul's state-of-the-art convention center.



# Congress Organizers

## XXIII IUFRO World Congress Committees

### I. Congress Steering Committee

Wan-Yong Choi [Chair]	Korea Forest Research Institute
Joon Hwan Shin	Korea Forest Research Institute
Eul Sun Baik	Korea Forest Research Institute
Wae-Jung Kim	Korea Forest Research Institute
Sang Kyun Kim	Korea Forest Research Institute
Hyug Lae Kwon	Korea Forest Research Institute
Don-Ha Choi	Korea Forest Research Institute
Jung-Hwan Park	Korea Forest Research Institute
Young-Kyoon Yoon	Korea Forest Service
Yong-Ha Kim	Korea National Arboretum
Byung Cheol Cho	Forest Human Resources Development Institute
Gil Bon Koo	Northern Regional Forest Service
Ju Lin Kwak	Eastern Regional Forest Service
Ji Hong Kim	Kangwon National University
Jun Jae Lee	Seoul National University
Eui-Gyeong Kim	Gyeongsang National University
Ki-Weon Kim	Kookmin University

Ha-Hyun Chung	Korea Wood Panel Association
Dong Myun Sur	National Forestry Cooperative Federation
Eun Wook Lee	Forest for Life
Woo Hyuk Byun	Korea Forest Forum

### II. Congress Organizing Committee (COC)

Jung-Hwan Park	Chair
Do-Hyun Jung	Planning and Coordination
Seok-Woo Lee	Scientific Program and IUFRO Liaison
Jae-Hyoung Cho	Finance and Congress Tours
Im-Kyun Lee	Official and Social Events
Myungkil Kim	Exhibition
Soo Im Choi	Registration and Accommodation
Chan Sik Jung	Scientist Assistance Program
Hyon Sun Jeon	PR and Publicity
Dong Won Son	PR and Publicity
Uk Lee	PR and Publicity
Mi Sook Lee	Administrative Support
Eun-Kyung Kim	English Editor
Min-Joo Kim	English Editor





### III. Congress Scientific Committee (CSC)

- John Parrotta [Chair], US Forest Service, Washington, DC, USA
- Perry J. Brown, University of Montana, Missoula, MT, USA
- Susan Conard, US Forest Service (retd.), Washington, DC, USA
- Dave Cown, Scion, Rotorua, New Zealand
- Hans R. Heiniman, ETH, Zurich, Switzerland
- John Innes, University of British Columbia, Vancouver, BC, Canada
- Bailian Li, North Carolina State University, Raleigh, NC, USA
- Andrew Liebhold, US Forest Service, Morgantown, WV, USA
- Michäel Rivoire, International Forestry Students' Association,  
Freiburg, Germany
- Jens Peter Skovsgaard, University of Copenhagen, Denmark
- Lauri Valsta, University of Helsinki, Finland
- Michael Wingfield, University of Pretoria, Pretoria, South Africa

### Assisting Congress Organizers

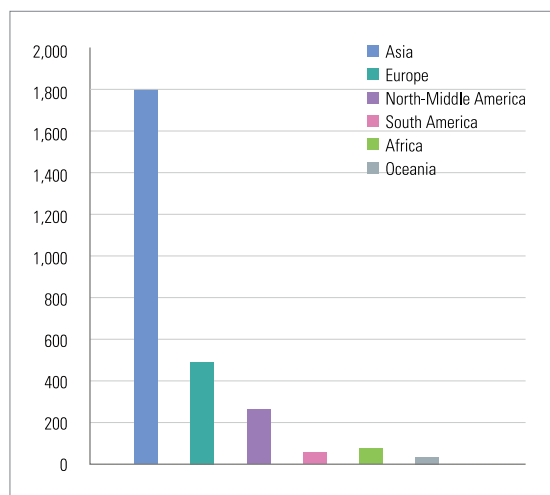
- INTERCOM Convention Sevices, Inc.**
- Young-Don Kwon     Director
  - Jung-Wook Yi        Project Manager
  - Jaok Ku                Official and Social Events
  - Thomas Hwang       Trade and Exhibition
  - Jay Hwang            Scientific Program
  - April Kang            In-Congress Tours
  - Eun Young Kim       Registration and Accommodation
  - Leah Shim            Scientist Assistance Program
  - Kahye Ju              PR and Publicity
  - Joan Cho              English Editor
  - Kim's Travel Services   Housing Office
  - Grace Travel         Tour Office

# Congress Delegates

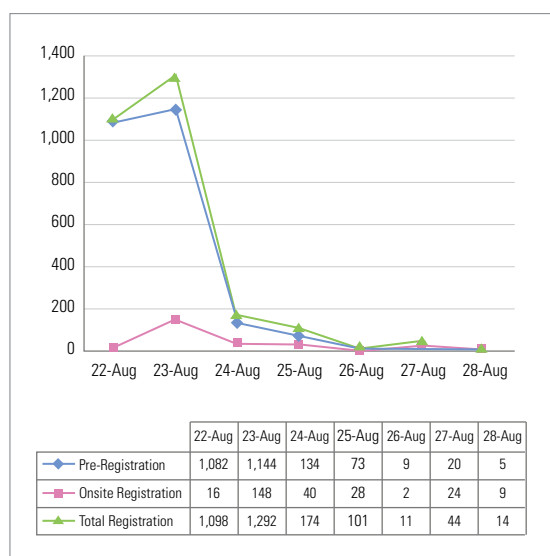
2,734 persons from 92 countries participated in the XXIII IUFRO World Congress held from August 23 to August 28, 2010 in Seoul, Republic of Korea, comprising;

- Full Registration 2,381
- Daily Registration 353
- Total Participant 2,734

## Number of Participants by Region



## Number of Daily Participants



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**PUBLISHER** The Korean XXIII IUFRO World Congress Organizing Committee

**EDITORS** Jung-Hwan PARK, Seok-Woo LEE, Jae-Hyoung CHO and Do-Hyun JUNG

Copies are available from:

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Printed in Republic of Korea by JINAD

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