The Congress logo, commissioned from local aboriginal artist Louise Nelson, incorporates cross-hatching which represents an indigenous presence on the land. The two leaves represent the northern and southern hemispheres, and reflect the element of balance. The motif under the leaves is representational of communication and the flow between the water and land elements on a stylised Australia. The logo aligns with the Congress Theme “Forests in the Balance: Linking Tradition and Technology”.

The International Forestry Review

Forests in the Balance: Linking Tradition and Technology

XXII IUFRO World Congress, 8-13 August 2005, Brisbane, Australia

ABSTRACTS
XXII IUFRO World Congress  *Forests in the Balance: Linking Tradition and Technology*
Preface

On behalf of the Congress Scientific Committee, I am pleased to provide an introduction to this volume of abstracts. The abstracts represent the scientific contributions to the XXII World Congress of the International Union of Forest Research Organizations, a Congress that has as its theme ‘Forests in the Balance: Linking Tradition and Technology’. This title was deliberately ambiguous, and was intended to mean different things to different people. At its most basic, the future of many forests around the world really is in the balance, as conversion of forests to other forms of land use continues. For the forests that remain, and for the increasing area of forests in some countries, pressures are mounting on the goods and services that they provide. Some of these goods and services are mutually exclusive, and making trade-offs between them is all about achieving the right balance. On a more abstract note, the future of forestry as a profession is also in the balance. Major changes are occurring in the way forestry is practiced, and these changes seem to be occurring globally, although not always in the same direction. For example, in Europe and some parts of North America, we are seeing pressure to practise forms of forestry that are ‘closer to nature’. In areas that still have natural forests, the pressure is there to make forestry less intrusive, and techniques such as reduced impact logging are becoming mainstream. We are also seeing changes in the skills needed by those working within the forest sector. Forest management skills are evolving rapidly to be much more focused on the relationship between people and their forests, yet our university curricula are having difficulty adjusting to this change in demand. The forest sciences are increasingly dominated by biotechnology and tensions have developed between, for example, traditional forms of tree breeding and improvement and those that involve techniques such as bioengineering. We are also seeing major changes in the ways that we utilize the products derived from forests, including both timber and non-timber products. Wood processing techniques are becoming increasingly sophisticated, requiring new skills and expertise. All of these changes are reflected in the sub-themes and sessions of the Congress.

The sub-title ‘Linking Tradition and Technology’ reflects the efforts that are needed to ensure that the changes engendered by the rapid introduction of technology do not completely mask more traditional forms of knowledge, particularly the traditional knowledge of aboriginal peoples and forestry communities. This is no more evident than in Queensland ‘The Smart State’, where the government has a vision that ‘knowledge, creativity and innovation drive economic growth to improve prosperity and quality of life for all Queenslanders’, yet there is a significant aboriginal legacy. The vision of the Queensland Government could equally be applied to forest sectors around the world; the move by forest-dependent communities around the world to gain greater control of their resources reflects their desires to see forests provide a greater contribution to their livelihoods, whether in the form of economic, social or spiritual aspects of their quality of life.

The 2005 Congress has seen the introduction of a number of changes to the way the Congress is organized and structured. The sessions were the result of a call for proposals for sessions made in 2003. Some fields of research are less well-represented than others, but this reflects the willingness of scientists within those areas to organize sessions. In making the selection of sessions a competitive process, we have tried to ensure not only a consistent quality across all sessions, but also to encourage external groups into the IUFRO sphere. I am particularly pleased to see the presence of so many sessions dealing with the social and economic aspects of the forest sector. The forest sector could, and should, be the epitome of sustainable resource management, and we must always remember that sustainability represents a balance between environmental, social and economic values. In response to views expressed after the 2000 Congress, we have attempted to reduce the
number of parallel sessions, and ensure minimal overlap between these. This has meant that much information will be presented in the form of posters, and I strongly encourage you to make effective use of this form of communication. You will find that we have placed the posters in prominent positions throughout the Convention Centre, reflecting the belief of the Congress Scientific Committee that they are a highly effective means of communication.

I hope that you will take the opportunity to browse through abstracts not directly related to your own field of interest. A Congress is intended to be an opportunity for people from diverse disciplines to get together to discuss issues of common concern. Even if you were unable to attend the Congress itself, the abstracts presented here represent an important snapshot of the state of the art of forest science in 2005, and well worth any time that you can devote to them.

Professor John Innes
Chair, Congress Scientific Committee
Sub-themes and sessions

Sub-theme: Integrating Approaches to Achieve Multiple Goals: Intensive Management, Extensive Management or Conservation?
Integrating approaches to achieve multiple goals: Intensive management, extensive management or conservation .......................................................... 1
Biodiversity and plantations – oxymoron or opportunity? Integrating approaches to achieve multiple goals: intensive management, extensive management or conservation .......................................................... 1
Wood quality from intensive management ........................................................................................................................................ 2
Integrating wood production within sustainable forest management .............................................................................................................. 5
Designing policies for the protection of biodiversity in forested environments .............................................................................................................. 10
Economics of forest multi-functionality .................................................................................................................................................... 14
Environmental planning for harmonizing forest biodiversity conservation and sustainable development .............................................................. 21
Uneven-aged silviculture: from temperate to tropical forests .......................................................................................................................... 22
Harmonizing commercial utilization, social, and conservation values through intensive tropical forest management (ITFM) ........................................ 26
Properties and utilization of plantation timbers: Plantation wood as a substitute for native forest resources .................................................................................................................................................... 31
Modelling multi-dimensional forest dynamics for multiple-purpose management objectives .................................................................................. 34
Monitoring and indicators of forest biodiversity: Towards a harmonized system at country, landscape and stand scale ...................................................... 36
Managing forest landscape mosaics for production and conservation .......................................................................................................................... 36
The expanding international role of agroforestry in the establishment and management of planted forests: Impediments and success stories ................ 42
Research demonstration: Long-term multi-purpose experiments in the forest sector ...................................................................................... 46

Sub-theme: Utilizing Genetic Resources to Further Sustainable Forestry .................................................................................................................. 49
Utilizing genetic resources to further sustainable forestry ................................................................................................................................. 49
Threats to forest genetic resources and approaches for gene conservation ..................................................................................................... 50
Forest biotechnology ............................................................................................................................................................................................... 52
Using genetics and silviculture to manage multiple stress complexes in planted forests ....................................................................................... 56
Genomics: Present status and progress ......................................................................................................................................................... 59
Interspecific hybridization for sustainable forestry: Breeding and deployment ........................................................................................................... 61
Genomics and tree breeding for sustainable forestry .................................................................................................................................... 62
Progress in tree breeding for tropics and subtropics .......................................................................................................................................... 65
Recent advances in Eucalyptus breeding ................................................................................................................................................. 67
Management and conservation of forest genetic resources .................................................................................................................................. 67

Sub-theme: Meeting the Challenge of Climate Change. ........................................................................................................................................... 72
Meeting the challenge of climate change ......................................................................................................................................................... 72
Tree rings as indicators of the impact of environmental changes on forest growth .................................................................................................. 73
Global fire trends and climate change ............................................................................................................................................................... 77
Experimental manipulations of forest ecosystems: hints on global change ........................................................................................................... 78
Climate change and tree resistance to insects and pathogens ......................................................................................................................................... 80
Forest insect effects on forest productivity, management decisions, and carbon sequestration ........................................................................ 83
Forests between air pollution and climate change ............................................................................................................................................. 87
Understanding linkages between climate and forest fire ........................................................................................................................................ 91
The contributions of tree physiology to understanding the effects of climate change ............................................................................................... 91
Impacts of drought and heat on forests ............................................................................................................................................................... 98
Forestry in climate change mitigation ........................................................................................................................................................... 102
Managing and conserving genetic resources in a changing climate ................................................................................................................. 103

Sub-theme: Promoting Development Through Improvements to the Forest – Wood and Products
Promoting development through improvements to the forest – wood and products chain ........................................................................................................ 105
Wood production in agroforestry and in short-rotation forestry systems – synergies for rural development (A) ........................................................................ 105

The International Forestry Review Vol.7(5), 2005
Finishing and surfacing ................................................................. 108
Cross-sectoral policy linkages in forestry sector ............................. 111
Agroforestry for economic, social and environmental prosperity in rural areas: Current highlights from Australia’s Joint Venture Agroforestry Program .................................................... 114
Small-scale private forestry and its role in producing multiple benefits for society: Enhancing management for multiple objectives and challenges of forest fragmentation and parcelisation .......................... 115
The role of the International Energy Agency in creating a carbohydrate-based economy: bioenergy, biofuels and bioproducts .......................................................... 118
The role of wood chains in the social and economic development of tropical countries ........................................... 120
Utilization of plantation teak ................................................................ 121
Application of newly-developed technologies in mechanical wood processing towards sustainable utilization of forest products in the 21st century .............................................................. 124
Using wood composites as a tool for sustainable forestry .................. 126
Links between supply chain management and value recovery ................ 130
Promoting economic development through forest products marketing and business management ......................... 131
The small get smaller: Fragmentation in small-scale forestry ................. 135
Forests and the livelihoods of rural people ........................................ 137
Wood production in agroforestry and in short-rotation forestry systems—synergies for rural development (B) ...................................................... 139
Current issues in forest products marketing and business management .................................................. 140

Sub-theme: Involving Indigenous Groups in Forest Science and Forestry .............................................. 142
Involving indigenous groups in forest science and forestry .................. 142
The state of scientific and indigenous knowledge and dissemination of non-timber forest product classification and utilization ............................................. 142
Indigenous peoples and commercial enterprises in forestry .................. 146
‘Forestry’ for indigenous peoples: Learning from experiences with forest industries ............................................ 147
Indigenous knowledge and biodiversity conservation ....................... 148
Co-management agreements between indigenous peoples and others ........................................ 150

Sub-theme: Increasing the Value of Forests Through Innovative Products and Technologies ............... 151
Increasing the value of forests through innovative products and technologies .................................................. 151
Utilizing small-diameter trees and solving forest resource problems ........................................................ 152
Role of genetics in manipulating wood quality ................................... 156
Strengthening collective innovation capacity of forest stakeholders in research and development .......... 157
Linking research, development and implementation in forestry ............... 159
Innovation and entrepreneurship – rural development and forest sector competitiveness ............................................ 161
Fire safety of wood structures ........................................................ 165
Remote Sensing in Forestry: Recent developments of forest remote sensing .............................................. 166
Integration of wood utilization with intensive forest management ............... 169
Optimal matching of species to sites: impacts on growth and wood quality ...................................................... 171
Understanding and managing wood quality to improve product value ........................................................ 172
Recent developments in biodegradation and protection of wood materials .......................................................... 175
Site specific management and precision forestry .................................... 179
Detecting, monitoring and modeling deforestation and forest degradation using remote sensing and GIS ............................................................... 183
Agroforestry: taking stock of recent developments .................................. 187

Sub-theme: Demonstrating Sustainable Forest Management .......................................................... 191
Demonstrating sustainable forest management ................................... 191
Research: A critical partner in forest certification .................................. 192
National forest inventories to support sustainable forestry: Research for linking practices to emerging challenges ..................................................................................... 194
International research to monitor sustainable forest spatial patterns .......................................................... 198
The certification of fast-grown plantation forests: Issues, costs and benefits ..................................................... 200
Economics of sustainable forest management ........................................ 201
Long term experiments, inventories and observations in irregular (complex) forests ............................................. 204
Sustainable harvest planning and scheduling ....................................... 208
Do we need new management paradigms to achieve sustainability in tropical forests? ........................................... 209
Evaluating new modes of governance for sustainable forestry ................................................................. 213
Attempts to measure sustainable forest management ................................................................................... 215
Evaluation of sustainable forest management ............................................................................................. 216

Sub-theme: Sustaining Forests: A Duty for Forestry and Society? ................................................................. 218
Sustaining forests: A duty for forestry and society? ...................................................................................... 218
Conditions for the transition to sustainable forestry ................................................................................... 219
The changing roles of stakeholders in sustainable forest management ......................................................... 223
What future for community forestry? The case of Nepal ............................................................................. 226
Boreal Zone forests in the balance: Regional and global factors in boreal forest management ................. 228
Emerging issues for sustainable forest management ...................................................................................... 231
Changes in forest ecosystems and their implications on human health ......................................................... 235
Natural and anthropogenic disturbances – rehabilitation of forests ........................................................................ 238
Towards sustainable forestry – The living soil: Soil biodiversity and ecosystem function ...................... 243
Social and cultural values of forests: benefit for today’s society ................................................................. 250
Alien pests threatening biodiversity of forest ecosystems ........................................................................... 252
Linking experience with disciplinary science to address sustainable forest management’s greatest need—reliable prediction .................................................................................................................. 256
Impact of exotic invasive plant species on the forest ecosystems ................................................................ 258
Forests in the global balance: Changing paradigms ...................................................................................... 262
Forests, trees and human health and well-being ............................................................................................. 267
Forest landscapes for locals and tourists ....................................................................................................... 268
Forest policy research: New methodological and empirical developments in the last decade and priorities for the future ......................................................................................................................................... 271
Setting conservation targets in managed forest landscapes: Theory and practice ..................................... 273
Sustainable management of high-value timber species of the Meliaceae: A global perspective .......... 275
Environmental concerns of forest products utilization .................................................................................. 277
Building synergies between institutions and conventions dealing with Non-Wood Forest Products ........ 280
Ozone exposures and effects on forest vegetation: A global overview ........................................................... 282
Remote sensing in forestry: Modern technology supporting sustainable development ..................................... 285
Silviculture and management of rare, threatened and endangered tree species ........................................... 286
Social and cultural values of forests: Benefits-based management .............................................................. 288
Mangroves and the protection of coastal areas ............................................................................................... 289
Forests, trees, and human health and well-being (B) .................................................................................... 290

Sub-theme: Realizing the Environmental Benefits of Forests ................................................................ 293
Realizing the environmental benefits of forests ........................................................................................... 293
The role of forests in carbon sequestration: Considerations for the carbon market ........................................ 294
Innovations in forestry accounting: Integration of forest assets and non-market environmental benefits into management and national accounting and reporting ...................................................... 297
Decisions with long-term effects in forest management: how to deal with uncertainty? ........................... 300
Forestry for urban development: Urban forestry as a tool for industrializing countries ............................... 301
An overview of national forest greenhouse gas accounting systems: Progress and scientific challenges ... 304
Improving the functional benefits and ecological services from forest rehabilitation ................................. 307
Stem and shoot fungal pathogens and parasitic plants: The values of biological diversity ..................... 309
Protection forests: Recognizing and maintaining the forest influence with regards to hydrogeomorphic processes ............................................................................................................................................. 310
Managing forests for biodiversity conservation .............................................................................................. 314
Net environmental benefits of plantation forests in degraded agricultural landscapes ............................. 317
Carbon balances in planted forests established in agricultural landscapes .................................................. 319
Planted forests and water .................................................................................................................................. 321
Field experiments in the conservation of forest biodiversity .......................................................................... 324
Forests and people: Valuation of the forest ecosystems’ outputs ................................................................. 327
The role of forests in carbon sequestration: Accounting for ecosystem dynamics ....................................... 328
Environmental goods, institutions and markets ............................................................................................. 333
Stem and shoot fungal pathogens and parasitic plants: The values of biological diversity (B) ................. 334
Sub-theme: Advancing The Role of Communication, Education and Capacity Building in the Future of Forestry

Advancing the role of communication, education and capacity building in the future of forestry ........................................ 338
Horizontal communication: Combining traditional expressions in communication strategies ........................................... 339
Technology and tradition at the desktop: effective use of global forest information resources ........................................ 340
Added value of terminology work for forestry stakeholders .......................................................................................... 342
Communicating forest science to the public: From theory to practice ........................................................................ 345
Crossing borders: International perspectives on interdisciplinary research ............................................................... 346
International networking in forest education .................................................................................................................. 350
Effective teaching with technology in higher forestry education: Foundations for success ........................................ 353
Expanding the knowledge base by improving non-timber forest products (NTFP) educational opportunities ......................... 356
From needs to solutions: A dialogue on core business and institutional models for effective development, marketing and implementation of science ........................................................... 357
Capacity building as an objective of international development projects: Case studies from ACIAR’s Asia-Pacific forestry program ................................................................. 359
Interactions between science and practice .................................................................................................................. 360
Linking science and practice through the Landcare approach ......................................................................................... 362
Dissemination of forest restoration and regeneration knowledge into management ......................................................... 367

General Sessions .......................................................................................................................................................... 368
General Posters: Silviculture ............................................................................................................................................ 368
General posters: Physiology and genetics .......................................................................................................................... 369
General posters: Forest operations ....................................................................................................................................... 373
General posters: Forest assessment, modeling and management .......................................................................................... 377
General Posters: Forest products ........................................................................................................................................ 378
General posters: Social, economic, information and policy sciences .................................................................................. 383
General posters: Forest health ........................................................................................................................................... 389
General Posters: Forest environment ................................................................................................................................... 394
presenting opportunities to search for efficiency improvements across company borders. This article report the findings from a case study involving a major lumber manufacturing corporation in Norway and its largest customer, a vertically integrated distributor and home improvement retailer. In particular, the order process extending from identification of demand at the retail store to fulfillment of demand was comprehensively mapped, and possible areas for improved efficiency in the supply chain were identified. Using this approach, simple solutions for process improvement are commonly found, simply because individual actors rarely focus on optimizing the complete supply chain, but rather sub-optimize a small fraction of the chain. The article also discusses some of the problems encountered when developing measures of performance intended to monitor and improve the process across company borders. Creating measures for monitoring performance is technically and methodologically difficult when dealing with several actors in a complex organization, using different business systems. The challenge greatly increases when the actor's business objectives and philosophies are traditionally conflicting.

Current state-of-knowledge: Innovation research in the global forest sector. Hansen, E. (Oregon State University, USA; eric.hansen2@oregonstate.edu), Rametsteiner, E. (BOKU University of Natural Resources and Applied Life Sciences, Austria; ewald.rametsteiner@boku.ac.at), Bull, L. (University of Melbourne, Australia; l.bull@grad.unimelb.edu.au), Korhonen, S. (University of Helsinki, Finland; sikorhon@mappi.helsinki.fi), Segura-Bonilla, O. (Universidad Nacional Costa Rica; osegura@una.ac.cr), Shook, S. (University of Idaho, United States; Shook@uidaho.edu).

In recent years, countries with fast-developing economies, change in technologies, especially ICT, changing consumer markets and other factors have had a dramatic impact on forestry and forest-based manufacturing sectors in many parts of the world. As a result, there has been a renewed interest in innovation and innovativeness as a means to maintain global competitiveness and assure healthy economic growth. We discuss findings from a recent multi-authored white paper on innovation in the forest sector. The paper reviews the main concepts applied in contemporary innovation research and related findings, discusses the situation of innovation research (concepts applied, related findings) in the forest sector, identifies future research needs and problems to tackle as well as proposals for further work/ways to strengthen the field. Our goal is to provide a forum amongst global researchers on innovation in the forest sector leading to enhanced networking and discovery in this field.

A non-parametric approach to analyze productive efficiency, competitiveness and innovation in Spain’s wood and paper industry. Herruzo, A.C., Diaz-Balteiro, L., Martinez, M., González-Pachón, J., Romero, C. (Technical University of Madrid. Spain; herrzc@montes.upm.es).

In Spain, previous studies have found a lack of significant links between the efficiency of the timber and paper industries and R&D activities both at the aggregate and industry group levels. This outcome is consistent with the innovation strategy followed in the past by many Spanish industries, based on the acquisition of embodied technology available in international markets and a low entrepreneurial priority toward research and innovation activities as a mean to achieve competition. This paper intends to discuss these conclusions in more detail by analyzing the relationship between competitiveness, efficiency and innovation activities in Spain’s wood and paper industries. This is accomplished by using a non-parametric technique (data envelopment analysis, DEA), incorporating several inputs and outputs associated with the abilities of these enterprises.

Threads for the development of forestry contractors in Central and Eastern European countries: The Hungarian case. Major, M. (Albert-Ludwigs-University, Germany; matyas.major@fobawi.uni-freiburg.de), Kastenholz, E. (Office for Occupational Safety and Work Organisation, Germany; edgarkastenholz@enfe.net), Lewark, S. (Albert-Ludwigs-University, Germany; siegfried.lewark@fobawi.uni-freiburg.de).

The transition of Central and Eastern European countries from centrally planned to market economies led to radical changes. In Hungary, rationalization in the still-dominant state forest enterprises led to the dismissal of almost all directly-employed forestry workers. Workers were offered job opportunities, but now as independent contractors. To describe development tendencies an inquiry using a standardized questionnaire among all Hungarian state forest enterprises (return rate 35%) and 700 forestry contractors (return rate 20%) was carried out. First results indicate that many contractors would strive for economic development, but that their own possibilities for influencing the recent situation are limited. Factors such as precarious economic conditions, insecure future job perspectives, lack of possibilities for decent loans, high taxes and insurance rates and competition by contractors using illegal workers are among the issues that have posed severe threats for enterprises that have been established recently. It is crucial to find solutions for these problems on the level of individual contractors as well as to identify appropriate political and economic instruments to avert the ruin of many contractors, which would lead to the loss of experienced forestry workforce, and threaten Hungarian forestry as a whole.