ISTF NEWS

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Fire Effects Reported

In an article "Slow burn: the insidious effects of surface fires on tropical forests" (Trends in Ecology and Evolution 18(5):209–212) William F. Laurance reports on recent findings in Amazonia. An abstract follows:

Several recent or forthcoming studies, led by Jos Barlow and Carlos Peres from the University of East Anglia, UK, now reveal that surface fires can have profound impacts on Amazonian wildlife.

The immediate effects of the fire were striking. Numerous animals, including monkeys, marmosets, sloths, peccaries, deer, parrots, toucans, snakes and lizards, were killed or injured. Most vulnerable were species with low mobility, poor climbing ability, or a reliance on cavity nests in trees. Villagers reported sharp declines of army ants, understorey wasp colonies and leaf-litter invertebrates, such as spiders and centipedes.

By 10–15 months after the fire, an average of 36% of all trees, three-quarters of all saplings, and many lianas had died. Canopy openness was four times greater than in unburned forest (ranging from 12–32%) and light levels had risen dramatically in the forest understorey. As a result, a dense flush of vegetation, dominated by disturbance-loving pioneer trees, bamboo, sedges and coarse herbs, had proliferated in the understorey. Moreover, tree and liana species bearing fleshy fruits, which provide key food resources for wildlife, had much higher mortality than did species with inedible hard or wind-dispersed seeds. Such dramatic changes in forest structure, micro-climate and resource availability have especially strong effects on

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Eucalyptus Impacts Assessed in the Congo

In an article "Eucalyptus and soil fertility in the Congo" (Bois & Forets des Tropiques 277:69–84, 2003) Jean-Paul Laclau analyzes the nutrient dynamics of short cycle plantations. Excepts follow:

Clonal eucalyptus plantations have been established since 1978 on savannah soils along the coastal plains of the Congo. The short-rotation forestry methods used in these plantations cause high nutrient removal in biomass every 7 years, on soils with very poor chemical fertility (Ferralic Arenosol). Sustainable management of these short-rotation forests depends on enhancing stand productivity (constant genetic improvement) and on maintaining the soil's production capacity over the long term (sustainability).

Comparisons of the biogeochemical cycles were made between a clonal eucalyptus stand aged 6–9 years (stands are usually harvested around 7 years) and an adjacent savannah ecosystem.

Considerable changes in the ecosystem's mineral cycle occurred after afforestation. The dynamics of accumulation in the eucalyptus stands varied for the different elements: whereas P and Ca were incorporated in proportion to the accumulation of dry matter, Mg was essentially incorporated during the early growth period. The curve for N and K lay in between. Dry deposition of Na^+, Ca^{2+} and Cl^-, as well as water and nutrient uptake, were significantly higher in the eucalyptus stand than in the savannah.

Large amounts of litter fall resulted in the accumulation of a forest floor in the eucalyptus stand. In contrast, dead material was burned every year during the dry season in the savannah.

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Biodiversity Indicator Design Fraught with Mistakes

In an article "Ten common mistakes in designing biodiversity indicators for forest policy" (Journal of Environmental Management 68:121–132, 2003) Lee Failing and Robin Gregory list the following:

1. Failing to define endpoints
2. Mixing means and ends
3. Ignoring the management context
4. Making lists instead of indicators
5. Avoiding importance weights for individual indicators
6. Avoiding summary indicators or indices because they are considered overly simple
7. Failing to link indicators to decisions
8. Confusing value judgments with technical judgments
9. Substituting data collection for critical thinking
10. Oversimplifying: ignoring spatial and temporal trade-offs

The development of indicators as part of a forest management strategy that addresses biodiversity should begin with a decision process in which policy makers define the problem, set clear objectives and indicators of performance, identify alternative man-

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4 February 2004. Annual Conference, International Society of Tropical Foresters. Washington, D.C. Contact: Patricia Heaton Holmgren, ISTF, 5400 Grosvenor Lane, Bethesda, MD 20814 USA. Fax: +1-301-897-3690; <istf.Bethesda@verizon.net>; <www.istf-bethesda.org>.

World Bank/WWF Alliance

In Arborvitae no. 22 of May 2003 is a report on progress of an alliance between the World Bank and the World Wildlife Fund. Part follows:

The World Bank/WWF Alliance (Alliance) can perhaps best be described as a partnership between two organizations designated to catalyze further partnerships with a wide array of forest conservation stakeholders—a partnership within partnerships. As such, the Alliance serves as an appropriate example of the theme of this issue of Arborvitae: that separate institutions can combine their respective strengths to leverage results greater than they could have achieved on their own.

Example of an Alliance-supported regional activity is a consortium formed to resolve common obstacles to sustainable forestry in Central America. Most forest landowners in the lowland tropics of Central America agree that it is difficult for sustainable forest management to compete with the economic benefits of alternative land uses such as illegal logging and agriculture. Compounding this problem, the development of management tools relevant for forest managers is often relatively expensive, inconsistent, of varying quality and seldom oriented toward resolving common obstacles to sustainable management. To address these obstacles, the Alliance is supporting WWF-Central America, the Tropical Agricultural Center for Research and Higher Education (CATIE) and Oregon State University (OSU) by providing funding for an analysis of certified forestry operations in Central America, development and testing of a biological monitoring protocol for High Conservation Value Forests in Guatemala and Nicaragua, and development and testing of a stepwise approach to certification in Nicaragua. By strategically supporting the efforts of the consortium between WWF, CATIE, and OSU, the Alliance is hoping that the resulting tools will be utilized by forest certification practitioners throughout Latin America.❖

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MEMBERSHIP APPLICATION AND DUES RATES LISTED ON BACK PAGE.

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Domingo Cozzo 1918–2003

As reported by Peter Laharrague, Domingo Cozzo, Professor Emeritus of the University of Buenos Aires, passed away in August. One of Latin America's best read foresters, he was a researcher in forestry and authored several books, and sustained the technical journal "La Revista Forestal Argentina" for many years. In 2001 the Faculty of Agronomy published Cozzo's "Las Ciencias Forestales y la Conservación Ambiental," a collection of 14 articles. He was ISTF's Vice President for Argentina.

Member Recruitment

ISTF members who will be participating in a conference or meeting on forest resources are in a good position to recruit new members. So if you have a meeting coming up, please let me know ahead of time and I will send you a supply of brochures, membership forms, and newsletters to use in recruiting.

J. L. Whitmore

FAO State of the World's Forests

The *State of the World's Forests* reports every two years on the status of forests, recent major policy and institutional developments and key issues concerning the forest sector. This is the fifth edition of the publication, the purpose of which is to provide current and reliable information to policy-makers, foresters and other natural resource managers, academics, forest industry and civil society.

An effort has been made to cover many subjects that are especially relevant to discussions taking place in international fora today. Part I presents recent developments and areas of current attention in forest resources; the management, conservation and sustainable development of forest; the institutional framework; and the international forest policy dialogue. Part II contains five chapters, each addressing a particular subject in more detail.

The 150 page reprint is available from FAO, Viale delle Terme di Caracalla, 00100, Rome, Italy.❖

Industry Notes from Brazil

Notes from Zobel Forestry Associates, Inc. submitted by William E. Ladrach include the following:

One of the main criticisms of the international forest certification efforts is that there has been certification of relatively few companies that depend on wood from natural forests in the tropics, which is where the initial interest in certification began. There exist more than 2,000 sawmills in the Brazilian Amazon region, with a combined output of 30 million m3 of sawn wood. Only 8 of these companies have their products certified.

When the Brazilian Real was deregulated in 1997, it lost roughly half of its value against the US dollar within the year. (Currently it is R$3/US$1). However, the Brazilian economy was relatively stable at the time and internal costs did not inflate at a corresponding rate to the devaluation. This resulted in increased competitiveness for Brazilian export products. Brazilian pulp industry is now highly competitive in the world market with pulp production costs below those of Indonesia and the United States. Additionally, forest plantation productivity has increased by 100% during the past 30 years through research, improved silviculture and improved management techniques. Last year combined production of the entire forest industry was US$27.8 billion, or 4.5% of GNP and it generated US$4.6 billion in tax revenues. The forest industry currently employs about 2.5 million persons directly and indirectly. Last year, Brazil exported US4.5 billion in forest products.

The Northeast Industrial group João dos Santos is producing pulp from bamboo. The Group's Portela pulp mill is located in Pernambuco State, and has a production capacity of 72.000 mtpy. The bamboo pulp is used primarily for packaging and bags with 20–30% exported. A 78.000 mtyp paper mill which is owned by the group and located in Maranhão State is producing Kraft liner and boxboard using the bamboo pulp. McDonalds, Unilever, Natura, and Nestlé are using this product which has good acceptability in the market. The bamboo species that is planted is *Bambusa vulgaris*, originally from India. Harvesting of bamboo is labor intensive, which is an advantage in the Northeast, where there is widespread unemployment.❖

US Initiative Against Illegal Logging

In Forestry Source, Vol. 8, No. 9 (2003) is an announcement of a new effort by the U.S. to combat illegal harvesting of forests of the tropics. Some of the announcement follows:

US Secretary of State Colin Powell announced the President's Initiative against illegal logging, to help developing countries address the problems of illegal logging, the sale of illegally harvested timber products, and corruption in the forest sector. The initiative will focus on-the Congo Basin, Amazon Basin and Central and South America, and South and Southeast Asia.

The plan also includes the transfer of remote sensing technology to help developing countries monitor forest activity, community-based forest management programs to ensure local citizens have a say in and are responsible for the management of their forests, and efforts to harness market forces to give people an incentive to preserve the forest for their long-term benefit.

To accomplish these objectives, the administration has budgeted $15 million for 19 programs to, in Powell's words, "get the initiative off to a good start." A wide range of organizations, including the American Forest & Paper Association, Conservation International, and the World Wildlife Fund (WWF), support the President's initiative.❖

Reproductive Traits Summarized and Compared

On article "Reproductive traits of tropical rain-forest trees in New Caledonia" (Journal of Tropical Ecology 19(4):351–365, 2003) by Raymond Carpenter and others shows relationships worth comparing more generally. The abstract follows:

Reproductive traits of 123 species of rain-forest tree from ultramafic regions of New Caledonia were assessed, mainly from herbarium specimens. Most species had extremely small, simple, pale-colored flowers that are probably mainly pollinated by small insects, but not including bees. The seeds of most species were considered to be bird dispersed. However, wind is also important for pollination and seed dispersal. The phenological trend was for an increase in the number of species flowering and fruiting around the end of the warm dry season/start of the hot wet season, followed by a decline at the end of the wet season, and lower proportions during the cooler season. Seed size was significantly correlated with fruit size. Other correlations, between flower size and fruit size, and between seed size and seed number, were significant using species as independent observations, but did not hold following phylogenetic correction. Compared with non-dioecious species, dioecious species had significantly larger seeds, and a greater proportion of species with biotic dispersal, abiotic pollination and solitary (female) flowers. The long-term persistence of at least the larger-seeded tree species in New Caledonia is precarious, since the endemic giant pigeon, *Ducula goliath*, is probably their principal effective disperser, and this species is in decline.❖

Florida University Has New Program Balance

A release from the University of Florida describes a new graduate education and research program "Working Forests in the Tropics" described further as follows:

Professor Daniel Zarin said the three main goals of the UF research and education program are to compare the trade-offs between different economic and conservation options; to learn how social, economic, political and environmental issues affect economic development and conservation; and to determine how local communities, regional governments, international agencies, philanthropic foundations and the private sector can best intervene to improve forest management and conservation in the tropical forests of Latin America.

"The conventional logging common in most tropical forests is often cited for its destructive impacts such as loss of biodiversity, decline of wildlife populations, increased erosion and fire susceptibility," said Francis Putz, a UF professor of botany and a member of the program's executive committee. "This type of logging violates the principle of management for sustained timber yields, which allows forests to produce a continuous volume of commercially harvestable timber."

UF graduate students will have an opportunity to work in different tropical forest regions, including the Amazon in Brazil, lowland areas in Bolivia and the Maya Forest in Belize, Guatemala and Mexico, he said.

"Like other UF doctoral programs, this one requires technical proficiency in a scientific discipline," Zarin said. "And the cross-disciplinary components of the program will provide the broader perspective generally lacking in doctoral programs."

UF academic units participating in the Working Forests in the Tropics Program include anthropology, botany, civil and coastal engineering, environmental engineering, forest resources and conservation, geography, Latin American studies, law, natural resources and the environment, sociology, soil and water science, wildlife ecology and conservation, and zoology.

Doctoral fellowships have been awarded to seven UF graduate students who will enter the program this year. Five current doctoral students were awarded IGERT summer research grants in 2003 to support their fieldwork in Latin America. January 15, 2004 is the fellowship application deadline for students who want to enter the program next August; 2004 summer research grant applications will be due in February. The website for the application process is: <www.tropicalforests.ufi.edu/wft>❖

FSC Expansion Proposed

An article in ITTO Forestry Update (volume 12, number 3, 2002) by S.T. Mok describes plans of the Forest Security Council to expand its coverage. Details follow:

The Forest Stewardship Council (FSC) is a unique, non-profit, international standards and accreditation organization committed to promoting the conservation, restoration, and protection of the world's production forests. The FSC's forest management standard-setting processes are transparent and inclusive, with the participation of a wide range of stakeholder groups, including those that are traditionally marginalized in forest policy debates.

Although the FSC promotes responsible forestry through certification, it does not certify; rather, it accredits certification bodies to conduct the certification and monitoring of good forest management. More than ten certification bodies have been accredited, none of which is based in the tropics. Some accredited certification bodies have agents and partners carrying out FSC audits in tropical countries, notably in Bolivia and Brazil but also in Indonesia and Malaysia.

Most of the certified tropical forests are in South America. For example, over one million hectares have been certified in Bolivia, while some 333,000 hectares of natural Amazonian forest have been certified in Brazil; only small areas have so far been certified in Africa and the Asia-Pacific region. Nevertheless, the first FSC-certified particleboards and non-timber forest products (Jungle Gum Chicle, Hand Care Cream, After-Shave Gel) came from the tropics.

In spite of steady growth in the area of certified forest, FSC certification covers only about 6% of the world's production forests, mostly outside the tropics.

The FSC's immediate role is to increase the area of certified forests owned by its standards, not only in the tropics but also worldwide. The plan, which will accord priority to the tropics, calls for a significant expansion and decentralization of the FSC's service-delivery mechanisms as follows:

- regional offices will be established in Latin America, Europe, Asia, and Africa. National offices will be added in Russia, China, and throughout Latin America;
- the service-delivery role of these regional and national operations will be expanded with appropriate professional staffing;
- FSC standards-setting, certification and education activities will be stepped up in such critical areas as Africa's Congo Basin, China, Russia, and Southeast Asia;
- accreditation processes will be streamlined without sacrificing integrity. The FSC's network of accredited certification bodies will be expanded to make FSC certification more readily accessible to forest landowners and forest products manufacturers around the world.❖

NCSU/ISTF Visit to Washington

The ISTF Chapter at North Carolina State University visited Washington on January 7 and 8, 2003. The participants were able to meet representatives of important international organizations involved in development and conservation of natural resources. In two days we visited the USDA Forest Service—International Programs, World Wildlife Fund, Forest Trends, the International Society of Tropical Foresters (Headquarters), The Nature Conservancy, the World Bank, and World Resources Institute. The objectives of these meetings were to get a closer perspective of the mission and goals of each of these organizations, learn about the main issues related to international conservation and forestry, and also learn about career, research, and internship opportunities in these organizations. The participants shared their experience at a Departmental Seminar.❖

Trade and Biodiversity

In a recent article in *Our Planet*, Yolanda Kakabadse wrote that trade and biodiversity conservation are fundamentally linked, and called for both to be vehicles for sustainable development. Ms. Kakabadse is President of the World Conservation Union-IUCN.

The linkages between trade and the environment have long been established, she continues, with trade and economic development relentlessly driven environmental change. Trade, in itself—to summarize the academic debate—is neither the beauty nor the beast for the environment. That depends on whether it takes place within the law and policy context that includes and supports environmental conservation and sustains people's livelihoods.

Travel and tourism now account for 11 percent of global GDP and 55 percent of tourists worldwide visit protected areas. The Galapagos Islands World Heritage Site, in Ecuador, is a hallmark of ecotourism. Cancún (Mexico), by contrast, illustrates "industrial tourism": there is a growing concern among the people of the area that the 'gains' from tourism are being retained by foreign corporations rather than used locally to raise standards of living in the community.

Tourism is also a top export industry in Africa. In southern Africa alone, biodiversity and protected-area-based enterprises are creating sustainable sources of income for their communities., making a strong business case for sustainable development. Exports of 'Rooibos', the famous herbal tea, total 6,000 tons, earning $7.45 million per year. Meanwhile 700 tons of *Aloe ferox* raw extract is exported annually for cosmetic and medicinal products, bringing employment to entire communities in the Eastern Cape.

Ecuadorian rainforests hold a cornucopia of goods and services, and more are discovered every day. Recent economic calculations show that in the long term those provided by protected areas can be worth more than oil exploitation. The international trading system should be structured so as to allow them to be traded fairly and sustainable. In China, 40 percent of all medicines consumed depend on traditional herbal components. Many of the plants used are rapidly disappearing through logging and the transformation of natural areas into agricultural fields. The country's protected areas are expected to provide their last refuge. Worldwide, a quarter of patented medicinal products now come from Southern plants and from the knowledge and practices of traditional healers. So intellectual property rights must support indigenous peoples and local communities, sustaining their rights and livelihoods.

There is no sustainable trade without the natural resource base. The two are fundamentally linked. Trade and biodiversity conservation are—or can be made into—vehicles for sustainable development.❖

Fire (continued from page 1)

bird communities.

Terrestrial browsers and foragers, such as deer, large rodents, armadillos and forest tortoises, increased in abundance in response to dense foliage and cover in the understorey. Other species that favor secondary forests also increased, sometimes dramatically.

Returning three years after the fire, the researchers made some remarkable observations. Many additional trees had died, especially larger trees (≥50 cm diameter), from fire-induced injuries. As a result, total tree mortality rose to 48% after the fire (compared to just 4% in unburnt forest), and nearly half (49%) of the living tree and liana biomass was killed.❖

Biodiversity (continued from page 1)

agement strategies, assess the impact (and associated uncertainties) of alternative management strategies on each objective, and evaluate trade-offs. This logic leads to a small set of decision-focused questions:

- How much and what type of biodiversity improvement is achieved under strategy A vs. strategy B?
- Does this type of biodiversity improvement address the fundamental management objectives?
- What are the costs (economic, environmental and social) of strategies A and B?
- Does the incremental biodiversity improvement under strategy A justify its additional costs?❖

Gommier Studied on Grenada

A note from Peter Hannah describes profuse regeneration of gommier (*Dacryodes excelsa*) on the island of Grenada. Some of his observations follow:

Gommier is one of the most valuable trees that grow on moist sites in the natural forests of Grenada and some other islands of the Caribbean and thus worthy of managing as a timber crop on the appropriate sites. This tree grows to great size, has an attractive wood with a color of light mahogany and is used in construction and crafts in the Caribbean area. Large trees often develop cavities in broken branch stubs making it important as habitat for nesting birds, particularly parrots.

Gommier is most commonly found on well drained upland sites, often on ridges where bedrock is relatively close to the surface. The trees are relatively shade intolerant and thus are usually dominants in the canopy. Gommier, however, develops a deep and broad spreading root system that affords good resistance to hurricane damage.

Gommier regeneration taller than 1 meter in the understory of a closed canopy is usually sparse.

A study was implemented in Grenada to test whether in closed canopy areas and in canopy gaps the removal of understory competition would improve regeneration. Sites were selected for study in both the Grand Etang and St. Margaret region of Grenada to test the effect of canopy closure and understory competition on gommier regeneration.

Gommier seems capable of germinating under a wide range of overstory and understory conditions but it often is slow unless a gap occurs affording seedlings adequate sunlight. At both sites small gommier seedlings are plentiful in some places but few saplings 1 m tall or greater were observed. This pattern suggests that abundant viable seed is produced by the mature trees and germinates but gommier seems intolerant of shade and unable to survive and grow to the sapling size class under a full canopy. Some kind of canopy disturbance seems essential for seedlings to survive and ultimately reach the main canopy. There is no evidence that browsing animals are limiting development of small gommier seedlings.❖

Eucalyptus (continued from page 1)

High production was achieved in this plantation of an alien species thanks to effective nutrient recycling both in the plant (internal retranslocation) and in the soil. Despite large amounts of nutrients returning to the soil in leaf litter in the eucalyptus stand, nutrient concentrations in the solutions were not greatly enhanced through the forest floor. A dense network of fine roots adhering to decaying organs allowed quick nutrient uptake and improved mineral recovery while reducing mineral losses from the ecosystem.

Quantification of the main nutrient flows in the eucalyptus plantations throughout stand rotation highlighted the changing requirements for each nutrient during tree growth. This information allows fertilizer inputs to be adjusted to stand requirements. Input-output budgets during the first rotation of eucalyptus plantations quantify the impact of afforestation on stocks of available nutrients in savannah soils. Although these budgets need to be refined to take account of drainage losses after stand harvesting, they show that the impact of afforestation is low on soil stocks of P, K, Ca and Mg. These budgets are consistent with the poor response of trees to fertilization with these minerals. In contrast, the N budget deficit is large in these plantations (-165 kg/ha during stand rotation) as compared to N stocks in the A1 soil horizon (about 2 t ha-1). This feature is of concern for the sustainability of N nutrition in eucalyptus plantations and shows that high N inputs are necessary to balance the N budget. Field trial results are consistent with these budgets and show that N fertilizer inputs have to increase over successive rotations.❖

Forestal XXI

Luis Sangri Namur, editor of Forestal XXI, has submitted numerous issues. This journal deals with current details of the Mexican forestry scene. An issue numbered Volume 5(5) of September–October 2002 carried articles on Mexican plantations experience, chicle production, conclusions from the meeting of the Latin American Forestry Commission in Buenos Aires, and the Johannesburg Summit, biotechnology, certification and the Mexican Association of Foresters. Available from Av. Contreras, 461 Casa 5, San Jerónimo Contreras, Mexico, D.F. C.P. 10200.❖

Gary S. Hartshorn Named New World Forestry Center President

PORTLAND, Oregon - The World Forestry Center's board of directors recently announced the selection of Dr.Gary S. Hartshorn as the Center's new president and CEO. Hartshorn began his appointment in October, 2003.

Hartshorn is responsible for overseeing the WFC's Forest Discovery Center museum, demonstration forests, and World Forest Institute. He came to the Center with strong credentials including work in fields of forest ecology, forest management, biodiversity conservation and environmental assessment. His degrees include a B.S. from Moravian College, an M.S. from North Carolina State University, and a Ph.D in forest resources from the University of Washington. He also received an honorary doctorate from the University of Costa Rica.

"Dr. Hartshorn is a nationally and internationally recognized professional in forest resource management and education relating to managed forests and the many benefits they provide for us all. His leadership at the World Forestry Center will be very positive for the organization and for Portland, Oregon," said John Wilkinson, Chair of the Governing Board of the World Forestry Center.

Formerly the chief executive officer of the Organization for Tropical Studies (OTS) based at Duke University, Hartshorn was also Professor of the Practice of Tropical Ecology in the Nicholas School of the Environment. Prior to joining OTS, Hartshorn served as chief scientist and a vice president of the World Wildlife Fund U.S. in Washington, D.C.

The World Forestry Center is an independent, community non-profit organization located in Portland, Oregon, dedicated to educating and informing people about the world's forests and trees, and their importance to all life, in order to promote a balanced and sustainable future. Dr. Hartshorn can be located at:

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Comparison of Secondary Forests and Plantations

Dr. Gerardo Budowski, Professor of the Universidad para la Paz in Costa Rica sent us two papers from local seminars on comparisons between a natural mix of forest and plantations. A tabulated summary of the comparison follows:

Factor	*Natural Mixed Forest*	*Timber Plantations*
Establishment cost	Low	High
Silvicultural cost to the second rotation	Moderate to high (liberation)	Low to moderate (thinning)
Harvesting cost per unit of volume	High	Low
Growth rate of the crop	Low to moderate	High
Yield m^3/ha/yr	Low	High
Environmental services	High	Low to moderate
Non-timber productivity	Usually high	Low to moderate, exceptions
Accessibility	Costly in primary forests	Economical

Wood quality Needs Seen in Southern Africa

In an article "The wood quality of the South African timber resource for high-value solid wood products and its role in sustainable forestry" (Southern African Forestry Journal 198:53–62, 2003) F.S. Malan presents the following synopsis:

Maximizing volume growth and yield per unit area is generally recognized as an important objective towards maintaining or enhancing forest productivity. However, the forest industry's future success will also be judged on how well it understands the qualities of the timber supply, how successful it is with the implementation of appropriate wood quality improvement strategies and how willing it is to introduce new species and hybrids which are unique and different from the other commercial species grown locally. It will also depend on how well the wood product processing industry can relate knowledge of the market for manufactured wood products to resource characteristics. These are important elements of sustainable wood production, required to optimize conversion efficiency and effective utilization into products which meet international standards with regards to predictability and performance characteristics. These should be seen as major challenges, considering the continuous changes in the qualities of the timber supply combined with the rapidly increasing demands for wood products in terms of quality and diversity.❖

Management of Mangrove in St. Lucia

In an article "Conservation and sustainable livelihoods: collaborative mangrove management in St. Lucia" (The International Forestry Review 4(4):292–297, 2002) Tighe Geoghegan and Allan smith describe a successful forest operation as follows:

The Makote basin mangrove is the largest mangrove in St. Lucia, covering about 63 ha. It has been used as a source of fuelwood and charcoal since the 18th Century. Since the early 1980s the mangrove has been part of an applied research project testing the effectiveness of a management strategy based on sustainable harvesting for charcoal production and implemented with the active collaboration of the harvesters. Management is based on an agreed set of harvesting practices that serve as rules to be followed by the harvesters and which are intended to maximize regeneration of cut areas. A key element of the apparent success of management has been the agreement of sole access rights granted to the charcoal producers group and their sustainable prescriptive harvesting and surveillance functions supported by the management strategy endorsed by the relevant agencies, within a policy context set by the St. Lucian government that has favoured protection and permitted the delegation of management authority.❖

CITES Decisions Questioned

Barney Chan, Trade Advisory Group Coordinator for ITTC, made this comment in his statement to the 34th session of ITTC:

The TAG believes it is important to raise the issue of CITES once again. It is of considerable concern to the TAG that decisions in CITES appear to be driven by politics and emotions rather than the science upon which the process of listing should be based. In recent years, there have been decisions on tropical timbers made by CITES. More recently, a decision was taken to upgrade big leaf mahogany to Appendix II. In cases such as this, we urge Member Countries to ensure a smooth transition so as to give the least disruption to the trade. However, the TAG would like to alert the Council to the risks to the tropical timber trade if the process of CITES is based on doubtful and scanty scientific evidence without technical input from ITTO. Almost nine years ago, in the Cartagena Session of Council, CITES and ITTO entered into a formal agreement to exchange participation in each other's meetings, to share information and to advise each other on issues related to trade and endangered tropical timber species. The close cooperation between CITES and ITTO envisaged in this agreement appears no longer to exist. The TAG urges Council to re-examine this agreement and to re-invigorate the exchange between these two organizations.❖

Fuelwood Production Assessed in Mali

In an article "La production de bois d'énergie dans les jachéres au Mali (Bois & Forêts des Tropiques" No. 276:5–15, 2003) Yves Nouvellet and others measure the fuelwood volume on fallow croplands. Part of their abstract follows:

As a Sahelian country, Mali is mainly dependent on its timber resources to satisfy its energy needs. Fuelwood and charcoal account for 90% of national energy consumption. Total timber extraction for energy needs amounted to almost 6 million tonnes in 2000.

Introducing a system for the sustainable management of timber resources requires sound knowledge of the productivity of woody formations, especially in the fallow lands that supply substantial amounts of the wood used as fuel by local populations.

The lowest tree densities per hectare in the survey sites were observed in the Kougnana zone (26 trees /ha), the country's main cotton growing area. Densities in the other zones varied from 222 trees/ha (Fana) to 334 trees/ha (Cinzana).

Average productivity in fallow lands (excluding parkland trees) amounted to 0.12 m3/ha/year for all survey sites taken together except Kougnana (results not significant). Productivity was evaluated at 0.07 m^3/ha/yar at Négala, 0.09 m^3/ha/year at Cinzana and 0.23 m^3/ha/year at Fana.

The different stocks of standing timber were estimated as follows:

- 7.0 m^3/ha for the 0–5 year category
- 11.0 m^3/ha for the 6–10 year category
- 10.2 m^3/ha for the 11–15 year category
- 12.5 m^3/ha for the 16–20 year category
- 12.1 m^3/ha for the category above 20 years.❖

Publications

Titles of the following publications are listed for your information, but are not available from ISTF.

Revising the taungya plantation system: new revenue-sharing proposals from Ghana. Agyeman, V.K. et al. Unasylva 212, vol. 54: 40–43.

Nepal Forestry Handbook. Amatya, S. M., K. R. Shrestha (comps.). 2003. Available from Dr. S. Appanah, FORSPA, FAO Regional Office for Asia and the Pacific, Phra Atit Road, Bangkok, 10200, Thailand. E-mail: <Simmathiri.Appanah@fao.org>.

Planted forests and Biodiversity. Carnus, J-M., J. Parrotta, et al. 2003. IUFRO Occasional Paper 15. 31–50 pp. IUFRO Contribution to the UNFF Intersessional Expert Meeting on "The role of planted forests in sustainable forest management: Maximising planted forests' contribution to SFM". Wellington, New Zealand, 24–30 March 2003.

Practicing agroforestry in the Mt. Makiling Forest Reserve. Dizon, J. T . 2003. Philippines. APANews No. 22, P. 8–10 <dizon@laguna.net>.

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Insect pest incidence on timber tree species in natural forest in south Cameroon. Foahom, B. 2002Tropenbos Cameroon Documents 12. Tropenbos-Cameroon Program, Kribi, Cameroon.

Using *Dalbergia sissoo* in agroforestry systems in India. Gill, A. S. 2003. APANews No. 22, pp. 3–4. <asgill@igfri.up.nic.in>.

Agroforestry research and education in India. Gill, A. S. 2003. APANews No. 22, pp. 3-4 <asgill@igfri.up.nic.in>.

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Lianas and logging in West Africa. Tropenbos International. Parren, M. P. E. 2003. Ph.D. Thesis, Wageningen University, Wageningen, The Netherlands.

Polarimetric data for tropical forest monitoring. Quiñones Fernández, M. 2002. Studies at the Colombian Amazon. Tropenbos Series 21. Tropenbos International: Wageningen, The Netherlands.

Paying for forest environmental services: the Costa Rican experience. Rodriguez Zuñiga, J. M. 2003Unasylva 212, vol. 54:31–33.

Long-term changes in tropical tree diversity: studies from the Guiana Shield, Africa, Borneo and Melanesia. ter Steege, Hans (editor). 2003. Tropenbos Series 22. Tropenbos International, Wageningen, The Netherlands, 2003. 215 pp.

Commercial potential of lesser-used Guyanese wood species. Walcott, A. et al. 2002. Tropenbos-Guyana Reports 2002–1. Georgetown, Guyana.

Meetings and Courses

12–28 January 2004. Managing Conflict in Community Based Forestry, Bangkok, Thailand. This course provides participants with basic principles, skills and techniques used in conflict management. Participants will increase their knowledge and skills in analyzing conflict, assessing options and developing strategies to manage conflict, learn various conflict management techniques, and plan for and support collaborative approaches to problem solving. Notably, participants are encouraged to take a proactive role in anticipating and addressing conflict in its early phases. For further information, send a message to <contact@recoftc.org> or visit <www.recoftc.org>.

9–20 February 2004. Convention on Biological Diversity, COP-7. Kuala Lumpur, Malaysia. For more information see their website: <http://www.biodiv.org/doc/meeting.asp?lg=0&wg=COP-07>.

18–20 February 2004. 17th Annual Conference of the Society of Tropical Ecology - Biodiversity and dynamics in tropical ecosystems. University of Bayreuth, Germany. See their web site: <http://www.bitoek.uni-bayreuth.de/gtoe/>.

23 February to 3 March 2004. Decentralised Forest Management Planning: Improving the Impact. RECOFTC. The aim of the course is to develop capacity at the local government level to guide and manage cost-effective multi-stakeholder planning processes. The course addresses fundamentals of decentralised planning, good governance, planning frameworks and processes, stakeholders in the planning process, setting objectives, monitoring, technological aids, decision-making and negotiations, and institutional and organizational challenges. Recommendations from the September 2003 course will be incorporated into the second session. If you are interested in improving your planning skills, this is a great opportunity to sign up now. For further information, send a message to <contact@recoftc.org> or visit <www.recoftc.org>.

4 March 2004. Quality hardwoods - what future, Stoneleigh Park, Warwickshire, UK. An international hardwoods improvement conference arranged by the Royal Forestry Society, the British & Irish Hardwoods Improvement Programme and the Royal Agricultural Society of England. Details on their web site: <www.rase.org.uk/conferences>.

17•19 March 2004, Orlando, Florida, United States. World of Wood is organized by the International Wood Products Association, and brings together importers, producers, wholesalers and service providers, among others, to conduct business and to discuss the latest issues concerning trade in imported wood products. As the program and speakers are finalized, updates will be posted online at <www.iwpawood.org/convention.html>.

29 March–1 April 2004. IUFRO Research Group 3.08.00 - Human Dimensions of Family and Farm Forestry International Symposium. Washington State University, Pullman, Washington, USA. URL: <www.familyforestrysymposium.wsu.edu > or contact: <familyforestry@wsu.edu>. First Call for Papers: August 1, 2003 deadline with September 1, 2003 notification of acceptance.

31 March 2004. 17th Annual Global Forest Industry Conference. Vancouver, B.C., Canada. Contact: Angie Dosanjh, PricewaterhouseCoopers; <angie.dosanjh@ca.pwc.com>.

18–24 April 2004. Silvopastoralism and Sustainable Management. Lugo, Spain. See: <http://www.usc.es/ssm2004>. The deadline for submitting the abstracts for voluntary presentations is 1 November 2003. Contact: <ssm2004@lugo.usc.es>.

29 March–2 April 2004. Fifth Certification Watch Conference. The

Meetings (continued from page 8)

Frontiers of Forest Certification, Vancouver, BC. See the Certification Watch Conference web site: <http://www.certificationwatchconference.org/>.

1 April 2004. Management of Tropical Dry Forest Woodlands and Savannas: Assessment, Silviculture, Scenarios, Brasilia, Brazil. Contact : Prof. Dr. Jose Imana Encinas. Phone : +55 61 273 6026; Fax number : +55 61 347 0631; E-Mail : <imana@guarany.cdp.unb.br>.

12–14 April 2004. Management of Tropical Dry Forest, Woodlands and Savannas: assessment, silviculture and scenarios, Brasilia, Brazil. IUFRO 4.00.00, 4.02.00 and 4.11.00. The objective of this symposium is to bring together foresters, ecologists, geologists and other experts to discuss specific problems and aspects of tropical dry forests, woodlands and savannas. The topics to be discussed include ecological, environmental, socioeconomics, hydrological and forestry aspects. Contact: Prof. José Imaña, University of Brasilia. <iufro@unb.br> or <forest@unb.br> (see their web site: <http://www.unb.br/ft/efl/iufro/>.

18–24 April 2004. Silvopastoralism and Sustainable Management, Lugo, Spain. See: <http://www.usc.es/ssm2004>. The deadline for submitting the abstracts for voluntary presentations is 1 November 2003. Contact: <ssm2004@lugo.usc.es>.

20 April–31 May 2004. Biodiversity Monitoring and Assessment Techniques—(BIOMAT).Training Center for Tropical Resources and Ecosystems Sustainability (TREES). Los Baños, Philippines. Deals with monitoring and assessment techniques, surveys and methods, procedures, data analysis, and interpretation of long-term biodiversity data. The course offers a wide range of topics covering the scope and relevance of biodiversity in terrestrial ecosystem, planning and approaches in assessing and monitoring biodiversity, genetic and population inventory methods, fauna and floral inventory, single and multi-species inventory, ecosystem and landscape diversity inventory, analysis and interpretation of biodiversity data and information. Contact: The Director, Training Center for Tropical Resources and Ecosystems Sustainability (TREES), College of Forestry and Natural Resources, University of the Philippines Los Baños, P.O. Box 434; College, Laguna 4031, Philippines. Tel. No.: +(63 49) 536-2268 or 536-2736. Fax: +(63 49) 536-3340. Email: <trees@laguna.net>. URL: <www.apafri.org/trees/index.htm>.

21–23 April 2004. 3rd International Symposium on Sustainable Management of Forest Resources- SIMFOR 2004. Pinar del Rio, Cuba. Contact: C. Fernando Hernandez Martinez; Fax: 82-77-9353; <fhernandez@af.upr.edu.cu>.

22–25 Nov. 2004. Multipurpose trees in the tropics: assessment, growth and management, Jodhpur, India. Contact: Dr. V. P. Tewari. E-mail: <vptewari@afri.res.in>.

Tejwani Discusses Reforestation in India

Dr. K.C. Tejwani ISTF Vice President for India submitted comments on natural regeneration plantations in India. Most of his comments follow:

It is estimated that of the 77 mha of forest area of India about 35 mha are degraded forest. Further, to meet the target of 109 mha of forest in India, additional 32 mha will need to be afforested. In addition there are non-arable wastelands (33 mha) which need to be afforested.

So far the rehabilitation degraded forest lands have been attempted by afforestation. These afforested areas do not necessarily result in a forest due to various reasons. Considering the exorbitant cost of afforestation, (approximately to US$ 380–540/- per ha) it will not be possible for any Government to find the resources to completely afforest the degraded forest land and wastelands. Further, in afforesting in the name of the "purity of plantation," the plant and animal bio-diversity is destroyed. The presence of many useful indigenous tree species (and also shrubs and lower storey vegetation) is ignored. In some cases, a root stock of as many as 5000 plants per ha may be present. This root stock has excellent root systems already developed, has been hardened to the vagaries of adverse weather and has survived grazing, trampling and lopping. It is just waiting for an opportunity to shoot up provided it is protected.

Given the favourable edaphic conditions throughout the various climatic zones of India, these lands generally become a forest. Thus these wasted lands can be easily under good forest cover. Reforestation can be much more easily achieved by the forest that will result from the natural root stock already present on the land, provided about 500 tree plants are properly tended. Not only the initial cost of plantation but even the customary cost of "filling the gaps" carried out for two years after planting is avoided.

A number of case studies from experimental plots and large scale development programms are available indicating the favourable and positive impact of reforestation on the production of quantity and quality grasses, regeneration of leguminous and non-leguminous tree and shrub species, tree growth and creation of secondary forests and biodiversity restoration and conservation not only of trees, shrubs, grasses and herbs but also of the local fauna. In one large scale (2,650 ha) social forestry project, it was observed that six years after closing the area there were 20 timber, 14 NTFP, four medicinal and four miscellaneous tree species. In addition there were many shrub and creeper species for NTFP and medicinal use. Further, even after four years, 19 bird, seven reptile, and six other wild animal species were recognized.

It is recommended that the degraded forests and wasteland lands can be quickly reforested at a lower cost, at a faster rate of covering the area, with not only good quality indigenous species.❖

IWPA Names McClendon

The International Wood Products Association (IWPA) recently appointed Brent McClendon to the post of Executive Vice President. He replaces Wendy Baer who resigned after 26 years.

McClendon has more than 13 years senior management experience in the wood products industry. For the last 3 years, he was with The Dean Company, a U. S.-based hardwood veneer manufacturer and importer, most recently as General Sales Manager.

IWPA was established in 1956, and represents 180 companies and trade associations engaged in the import of hardwoods and softwoods.❖

Urgency of Mountain Management Cited

In an article "Mountain environment and development" by M. Muthoo (Unasylva 208:26–37, 2002) the importance of observing the International Year of Mountains is described. Part of what the author contributes follows:

There are over 130 mountain ranges in the world, discounting those that occur below sea level. Given the wide range of mountain ecosystems, they have developed broad biodiversity. The diversity of mountain resources is important not only to ensure the sustainable livelihoods of mountain communities, but also for the food security and socio-economic welfare of the people in the plains.

An unabated flow of natural assets downstream and the marginalization of mountain communities evoke urgency for measures to compensate mountain people for their stewardship role. Empowerment of mountain people, enhanced capacity and reinvestment of revenues are needed to ensure a continued flow of environmental goods and services, and to strike an equitable balance between the needs of the mountains and the ever increasing demands of the lowlands. The mountains in developing countries harbor the highest proportion of the world's poorest. Over 80 percent of mountain communities in developing countries live on less that US$1 a day.

While there is a need for site-specific solutions, these shall have to be devised within the framework of integrated environmental and development strategies suitable for various watersheds and vulnerable ecosystems. Conversion in conservation areas will not suffice. Nor will narrow sectoral interventions regarding only forests, soils, and water, or only grazing and farming, or only renewable energy, ecotourism, and infrastructure.

Current resource uses call for creative solutions whereby protection of wildlife, watersheds, and landscapes is reconciled with potential productive functions, balancing the present and future demands of downstream users (e.g., water, power, timber, and tourism) with the needs of mountain communities (e.g., safe shelter, fuel wood, fur, and food). This balance would be facilitated if resource users, producers, and managers were to adopt the concept of multifunctionality of the mountains as a guiding principle.❖

Invasive Species Mechanisms Reviewed

In an article "Exotic plant invasions and the enemy release hypothesis" (Trends in Ecology and Evolution 17(4):164–170, 2002) R.M. Keane and M.J. Crawley review hypotheses concerning the success of invasive plants. Part of what they contribute follows:

Biological invasions are believed to be the second largest cause of current biodiversity loss, after habitat destruction. As international trade increases, the number of both accidental and intentional exotic introductions is likely to increase. One commonly accepted mechanism of invasions is that proposed by the enemy release hypothesis (ERH).

The ERH states that plant species, on introduction to an exotic region, should experience a decrease in regulation by herbivores and other natural enemies, resulting in an increase in distribution and abundance. This hypothesis is based on a three-point logical argument: (1) natural enemies are important regulators of plant populations; (2) enemies have a greater impact on native than on exotic species; and (3) plants are able to capitalize on a reduction in enemy regulation, resulting in increased population growth.

Although enemy release is an intuitively clear and clean explanation of exotic plant invasions, a full understanding of the assumptions underlying ERH is required to test it properly. The success of classical biological control and patterns of size and reproduction have been used as support for ERH, but this observational evidence does not directly test ERH, whereas our review of the experimental evidence is equivocal. Competitive release through greater generalist enemy impact on the natives seems to be an important and understudied mechanism of enemy release, and experiments involving exclusion of natural enemies in invaded plant communities are seriously needed.❖

Eucalyptus/lLegume Mixtures Yield More

In an article "Mixed species plantations of Eucalyptus and Acacia: growth, nutrition and soil changes", ETFRN news 37:8–11, Winter 2002/03. Partap Khanna and others conclude in part as follows:

Mixing Eucalyptus species with N-fixing trees generally increases the total production of wood and in some cases even the total production of Eucalyptus wood. For example, mixtures of *Eucalyptus globulus* and *Acacia mearnsii* produce 15% more eucalyptus biomass than pure stands of eucalypts in addition to the substantial growth of acacias. This resulted from the additional N that was made available to eucalypts when grown in mixtures with acacia and also from better utilization of soil resources. An investigation by Bauhus *et al.* of fine roots of mixed-species plantation (at 6.5 years of age) suggested that increased productivity (most evident in the 50:50 acacia-eucalypt mixtures) was the result of stratification in the fine-root systems of the two species.

It has been demonstrated that the productivity and vitality of mixed plantations can be higher than that of mono-specific plantations of either species used in the mixture. Mixing the species is expected to increase the amount and quality of the harvested wood by improving the form of the tree. Mixed species may return a higher amount and better quality of leaf and root litter resulting in a higher storage of organic carbon in the soil.❖

Lianas (continued from page 11)

Pioneer trees can emerge from liana-suppressed gaps into the open, high-light zone of the gap up to 20 years after gap formation. Lianas can also indirectly promote pioneer tree abundance by creating more and larger gaps through increasing tree mortality and pulling down neighboring trees in a treefall. Because lianas affect tree species differentially, the abundance of lianas in any given forest probably plays an integral role in tree species competition and colonization, and thus in the overall composition of the tree community.❖

Plantations Sustainability Reviewed in Southern Africa

In an article "Growth and yield as an indication of sustainable forest management in industrial plantations" (Southern African Forestry Journal No. 195:47–55, 2002) A.R. Morris and C.W. Smith review local evidence of plantation productivity decline and study techniques. Their conclusions, in part, follow:

Many criticisms have been made of data from comparisons of growth and yield from successive rotations. The data are unable to easily differentiate the effects of forestry practices on resource allocation of Net Primary Productivity (NPP) and the ability of the site to support NPP. Differences between matched plots are confounded with site variation and differences between sequential plots are confounded with climatic variation. Certainly simple sequential or matched plots are fatally flawed as a way of establishing clear cause and effect. The addition of a controlled experiment dimension corrects this deficiency but will inevitably generate intensive data on few sites rather than extensive data from many sites.

The strongest criticism of sequential and matched plot growth measurements has been leveled by those focused on the potential impact of forestry practices on soil quality. However, actual growth and yield will always be the product of a number of influencing factors. Soil fertility is one important factor that is clearly influenced by harvesting and re-establishment practices. Yet it is not the only factor influencing sustainability. The diversity of species that represent competing vegetation, pathogens and insect pests associated with plantations (particularly when exotic) can only increase with successive rotations. Stand density is an important determinant of yield that is influenced by harvest residue management and site preparation impacts on post-planting survival. Forestry practice must adapt to all these changes if production is to remain sustainable. The simple trend of growth and yield for successive rotations is an important reference point against which an understanding of cause and effect of forestry practice and ecosystem process must ultimately be compared.

Importance of Lianas Described

In an article "The ecology of lianas and their role in forests" by S.A. Schnitzer and F. Bongers (Trends in Ecology and Evolution 17(5):223–230, 2002) existing scientific knowledge about lianas is analyzed. Excerpts follow:

Recent studies have demonstrated the increasingly important role of lianas (woody vines) in forest regeneration, species diversity, and ecosystem-level processes, particularly in the tropics. Lianas contribute to forest regeneration and competition, not only by competing directly with trees, but also by differentially affecting tree species and thus changing how trees compete among themselves. In addition, they contribute considerably to ecosystem-level processes, such as whole-forest transpiration and carbon sequestration.

Lianas typically constitute ~25% of the woody stem density (abundance) and species diversity (species richness) in many tropical forests. The mean abundance, diversity and taxonomic composition of lianas in lowland tropical moist and wet forests are similar among tropical regions, although liana abundance is higher in Africa. In forests on the rim of the Amazon basin, liana diversity can be as high as 44% of the woody species, averaging 51 liana species ha^{-1}.

Many studies have demonstrated that, even in relatively low abundance, lianas decrease the growth, fecundity and even survivorship of trees in intact, closed-canopy forest, treefall gaps and managed forests. Historically, most studies on liana—tree interactions have assumed that aboveground competition is the predominant effect of lianas on trees. However, belowground competition plays a much greater role in liana versus tree competition than has been previously suspected.

Competition between lianas and trees for soil water could be intense in forests that experience seasonally low rainfall. For example, during the dry season in a lowland Bolivian forest, the pre-dawn water potential of the host tree *Senna multijuga* became significantly less negative within one day after encroaching lianas were cut from the tree, suggesting strong competition for water between lianas and trees during the dry season. Interestingly, the same result was not found in a companion study on mahogany *Swietenia macrophylla*.

Lianas appear to harm slow-growing, shade-tolerant tree species, whilst not affecting, or even indirectly promoting pioneer species. In a lowland tropical forest in Costa Rica, lianas were found in only one out of 142 adult pioneer trees, whereas the canopy of most of the shade-tolerant trees (50–97% of trees >70 cm in diameter) hosted lianas.

(continued on page 10)

The reported comparisons of growth and yield in successive rotations demonstrate that yield declines can occur when inappropriate forestry practices are applied to specific sites. Identification and understanding of these effects appear to have been initiated by data from simple growth comparisons. Decline in successive rotations is followed by empirical and process studies to establish a cause and this leads to modification of forestry practice to correct the decline.

It is proposed that the objective of growth comparisons between successive rotations should be to compare actual production against some expectation. This expectation will most commonly be improved rather than sustained production. The level of improvement should be anticipated from field trials.

The benefits derived from these improvements may place pressures on sustainability of production, particularly given the short rotations and intensive site preparation often used. There is an urgent need to initiate measurement of growth and yield in successive rotations in eucalypt plantations. These measurements should not be made in isolation but within a physiological and climatic context so that meaningful partitioning of key factors driving productivity can be made. This not only reduces the source of errors between growth comparisons but also allows the results to be cast into a modeling framework permitting a rational basis for addressing forest sustainability❖

Mountain Forest Development Proceeds

In an article "Sustainable development of mountain forests-whose claims, whose issues and whose benefits?" (ETFRN News 38:5–11, 2003) Birgit Habermann describes activities during the 2002 year of the mountain. Excepts follow:

Mountain forests represent almost 1/3 of the world's closed forest area. Mountain forests are diverse and widely spread over all continents. 48% of the world's total terrestrial surface lies above 500 m; 27% above 1000 m; and 2% above 4000 m.

The FAO's State of the World's Forests Report (FAO, 2003) points out that mountain areas in developing countries are characterized by multiple land use systems. There is a high demand for pasture areas, wood (as the main fuel) and non wood forest products (NWFPs) from the forests. Forests are often overexploited, but sometimes mountain forests are also valued as sacred groves containing sites of religious or spiritual importance, thus conserving and promoting rare/uncommon woody plants.

The International Year of Mountains 2002 was proclaimed in 1998 by the General Assembly of the United Nations based on an initiative from Kyrgyzstan. The mission statement follows: "The International Year of Mountains promotes the conservation and sustainable development of mountain regions, thereby ensuring the well-being of mountain and lowland communities."

The Bishkek Mountain Platform was a key outcome of the Bishkek Global Mountain Summit. The purpose of the platform is to provide guidance to governments and others on how to improve the livelihoods of mountain people, to protect mountain ecosystems and to use mountain resources more wisely. It aims at achieving a UN resolution on sustainable development on mountain regions and pledges a long-term commitment and determination to the fate of mountain regions, protecting mountain ecosystems, promoting peace and economic equity, and providing support for current and future generations of mountain people.❖

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AGRI	Agriculture	FIRE	Fire Mgmt	PHYS	Tree Physiology
AGRN	Agronomy	GEOG	Geography	PLNT	Plantations
AGRO	Agroforestry	GEOL	Geology	POLY	Policy
ANTH	Anthropology	GIS	Geog Info Systems	PROD	Forest Products
ARID	Arid Zone Forestry	HARV	Harvesting	RAMG	Range Mgmt
		HORT	Horticulture	REMS	Remote Sensing
BIOM	Biometrics	HYDR	Hydrology	SAWM	Sawmills
BOTY	Botany	INTL	Intl Relations	SEED	Seeds, Orchards
BUSI	Business Admin	LAUS	Land Use Planning	SILV	Silviculture
CHAR	Charcoal	LIBR	Library Science	SOCL	Sociology
COMM	Communications	LSAR	Landscape Architecture	SOFO	Social Forestry
COMP	Computers			SOIL	Soil Science
COOP	Cooperatives	MAPP	Mapping	TRIM	Tree Improvement
ECOL	Ecology	MENS	Mensuration, Inventory	URBN	Urban Forestry
ECON	Economics			UTIL	Utilization
EDUC	Education	MGMT	Forest Mgmt	WASH	Watershed Mgmt
ENER	Energy	MKTG	Marketing	WIND	Windbreaks
ENGR	Engineering	NARS	Natural Resources	WLMG	Wildlife Mgmt
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