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Contributed Articles

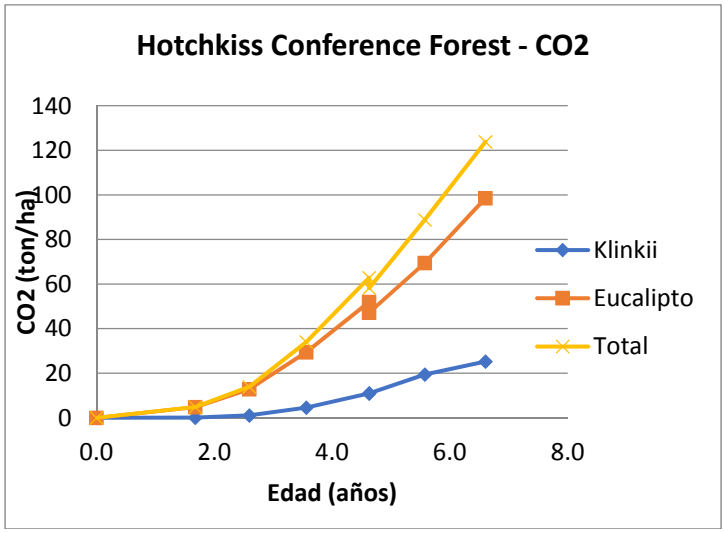
A FOREST TO CAPTURE CO_2 EMISSIONS FOR THE HOTCHKISS SCHOOL

In a joint project with Reforest the Tropics, Hotchkiss has sponsored the 2 ½-acre forest to sequester at least 20 tonnes of CO2 annually from the atmosphere for 25 years. The purpose of this forest is to balance the travel emissions of the participants to the 2009 Round-Square Conference. This forest, now 7 years old, has sequestered a total of 124 metric tonnes of CO2 in 6.6 years. See the graph below. In this UNFCCC-AIJ project, we are learning how to capture CO2 and store it for 100+ years in **permanent farm forests in the tropics**.

EARTH students in the rear of this 7-yr old forest (July 28, 2017).

Round-Square participants at Hotchkiss in 2009

Presently, RTT is working with dozens of U.S. sponsors, testing more than 30 models of forests, different mixtures of tree species to sequester their CO2 efficiently and to generate significant income from the forest for the participating farmer.



This is a powerful combination of development goals: environmental education, sequestration, farmer income and new information on mitigating climate change through tropical farm reforestation.

Hotchkiss began with the first 25-year contract with the Las Delicias Farm in Costa Rica. The farmer received a grant from the donation from Hotchkiss to help defray the cost of converting his pasture to a productive forest. Important research to improve the model is currently being done in this forest.

THE LAS DELICAS FARM IN COSTA RICA ON JULY 28, 2017 HOSTS STUDENTS FROM EARTH UNIVERSITY. Twenty students, their professors and RTT foresters show why the Hotchkiss School sponsored a forest in cooperation with this farm. RTT has developed a new model for pasture reforestation using mixtures of selected tree species for efficient CO2 capture, farmer income, biodiversity and economic sustainability. Forests have been shown to be able to capture 20-50 metric tonnes of CO2e/ha/average/yr in the first (of 4) 25-year contracts. This forest is 7 years old with 122 tonnes of captured CO2e. For more details, contact Dr. Herster Barres, HBarres@reforestthetropics.org, or cell 860=912-7706.

Wealth or welfare? The Oxford Emerging Markets Symposium 2017

Professor Jeff Burley
Vice-President, Commonwealth Forestry Association; Emeritus Fellow, Green Templeton College Oxford University; and Emeritus Director, Oxford Forestry Institute

Green Templeton College is the newest of 43 colleges and halls within Oxford University. It was formed in 2008 by the merger of two existing colleges, Green College, with its focus on human and environmental health and welfare, and Templeton College with its emphasis on business and management. The new college's mission seeks understanding and promotion of global human welfare through scholarship, debate and action. The series "Emerging Markets Symposium" was initiated in the same year with Ian Scott, formerly Director of the World Bank, as Executive Director; it is an academic initiative to address issues of human welfare in emerging markets. Since its inception the EMS has acquired an international reputation as an informed and influential forum on the origins and nature of human welfare issues in emerging economies and how they might be resolved.

In early 2017 an expert group of 50 world leaders in governance, public and private sectors, civil society, multilateral institutions and academe gathered for three days to review the issues affecting 20 emerging market countries and make recommendation for global leaders, particularly as they assembled for the G20 meeting in Hamburg, Germany, in July, 2017. The theme of EMS 2017 was "Health and the environment in emerging markets".
The purpose of this current note is to make readers aware of the Symposium, its report and recommendations, and the opportunities for the forestry sector in particular to influence official and public opinion while updating forest research and management to optimize the benefits of forests, woodlands and trees. The full report is available on the EMS web-site www.ems.gtc.ox.ac.uk.

Emerging Markets. The emerging markets are a diverse group of countries with enough political, cultural and institutional attributes in common that they can be considered together. They include, brazil, China, India, Indonesia, Mexico, Russia, South Africa, Turkey and about 15 smaller countries in Africa, Asia, Europe and the Americas. In general they have achieved strong rates of economic growth while reducing poverty, illiteracy, fertility, infant mortality, communicable diseases and premature deaths. They have acquired sufficient economic power and external influence to become significant actors in regional or global geopolitics.

New opportunities. The EMS thus focussed on topics for which it could expect to expand or support existing knowledge and understanding. While much of the emphasis was on disease and morbidities themselves, topics of concern to foresters included the relationships between health outcomes and non-health policies, programmes and projects, including social, "green" and "circular" economy policies that affect environmental health.

The EMS report and web-site have four audiences:- the public at large; students, researchers and academics; journalists and others who help shape public opinion; decision takers and policy makers. It is important to richer countries in addition to the EMS to recognize the increasing

threats to human health, e.g. 14% deaths worldwide annually are due to environmental pollution; 6 million deaths are due to air pollution; in 2013 the cost to the global economy caused by lost labour alone was $225 billion. Nearly 80% of deforestation in emerging markets is linked to cattle farming but Intensive agriculture is increasing global antibiotic consumption and resistance; the total meat chain accounts for 40 times more toxic gas emissions than growing vegetables or grains, indicating dietary change is a major need. Opportunities for forests and trees to be managed for food and health products are great; a Research Group in the international Union of Forest Research Organizations is addressing the health benefits of trees and forests and a large number of institutions, including some in emerging markets, focus on medicinal and food trees.

Conclusions and recommendations. The EMS 2017 report calls on world leaders to reverse the traditional economic view that environmental initiatives harm economic growth. They have long been concerned more with the cost of interventions than with the cost of not intervening. The expert group accepted the view that rapid economic growth has generated unprecedented improvements in human welfare in recent decades but stressed that many policies seek to maximize growth without enforcing environmental controls.

The expert group prepared a total of 36 major recommendations related to governance at the global (6), national (2), international obligatory (1), domestic (11) and local governmental (4) levels, in addition to business (4), civil society (6) and academic and research communities (11). Two themes that emerged from the majority of the discussions and these recommendations was the need to great inter-disciplinary approaches to identifying, describing and researching the issues and the urgent need for scientists and practitioners to develop mechanisms for widespread dissemination of appropriate knowledge to all beneficiaries in forms they can understand and implement, including the role of evidence-based decisions.

Foresters have long recognized the multiple benefits of trees and forests for economic, social and environmental enhancement and several of the 83 international environmental agreements listed in the EMS report relate to the conservation, management and wise use of these resources. Greater interaction with other disciplines is now needed including medicinal, public health and agricultural sciences and the several layers of governance.

The report identifies many long-term risks of inaction and short-term risks of some actions to halt or reverse the health consequences of environmental change in emerging markets. Readers should examine the EMS web-site for vastly more details of the outstanding ideas that emerged from the EMS 2017.

SUSTAINABLE APOLOGIZING

Francis E. "Jack" Putz, fep@ufl.edu

I wish to apologize to the generations of authors whose manuscripts I berated on the basis of their loose use of the word "sustainable," particularly in the phrase "sustainable forest management." For many years I was resolute that a forest from which timber yields diminish over time was not sustainably managed. But now that Elsevier publishes the Journal of Sustainable Mining, I can no longer hold forestry to that high standard.

I stuck with my strict definition of sustainable forest management despite the Brundtland Commission's promotion of sustainable development, with its focus on intergenerational equity. A few years later, when faced with the economists' choice between weak and strong sustainability, it was easy to opt for the latter, which retains sustained timber yields as a requirement. In contrast, timber stocks can decline under weak sustainabilty, but given that timber can recover if allowed to do so, attention is focused on safeguards for the protection of the irreplaceable resources and public services. When confronted with the idea that practices are sustainable as long as the sum of capitals does not decline, I rejected the trading of natural capital for financial, built, or social capital. I must admit that my foray into meta-analyses of tropical timber sustainability made me less sanguine about what exactly it means to sustain yields, but I persisted. But now, confronted by sustainable infrastructure, sustainable intensification, and sustainable mining, I give up.

For those of you at whom I lashed out with my editorial pen for your use of "sustainable," I offer you my apology. Henceforth I will conform with the new convention and use "sustainable" as a synonym for good, better, or responsible.

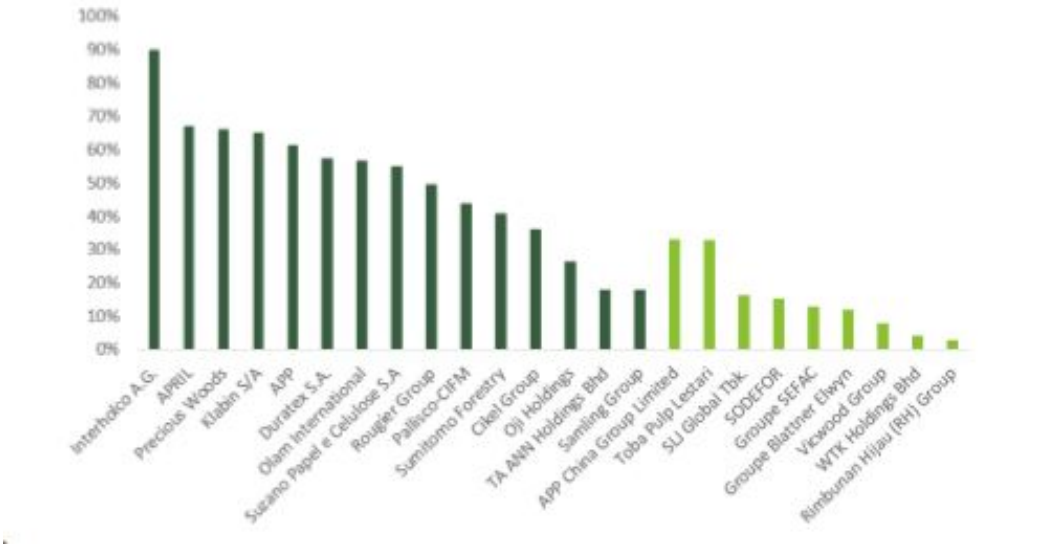
Assessing transparency in the forestry sector

International conservation charity ZSL (Zoological Society of London) has recently released new research regarding the timber, pulp and paper industry, examining how key timber, pulp and paper producers are setting and reporting on their environmental and social commitments

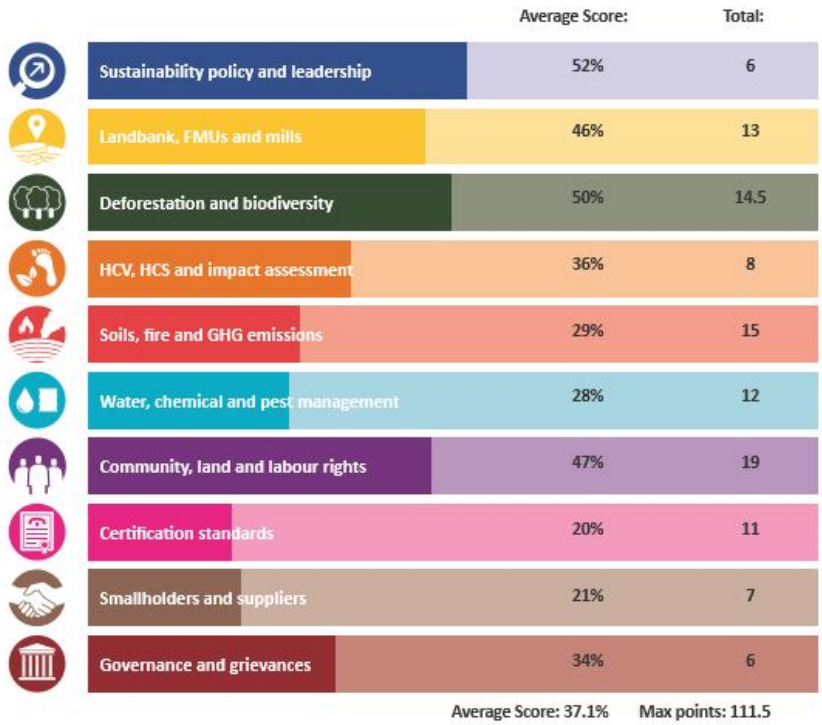
ZSL's new assessments on the SPOTT platform assesses 24 timber, pulp and paper companies – all of whom have significant operations in highly-biodiverse and threatened tropical landscapes across the globe – against a range of key environmental and social sustainability indicators. By encouraging best-practice in industries that can have significant impacts on wildlife habitats and ecosystems, as well as livelihoods, SPOTT contributes towards ZSL's charitable mission of achieving the worldwide protection of animals and their habitats.

ZSL's assessments show that levels of transparency in the timber, pulp and paper sector vary greatly, with some companies scoring extremely low when assessed against SPOTT's indicators, while others fare comparatively well.

Average SPOTT scores of FSC/PEFC FM certified (dark green) and non FSC/PEFC FM certified companies (light green)



Of the companies assessed, two-thirds have a commitment to set aside areas for conservation. However, less than a third are implementing a landscape-level approach to biodiversity conservation – a crucial tool for addressing complex environmental and social challenges linked to the industry. Another such challenge is respecting the rights of indigenous communities, something that 16 of 24 companies surveyed have committed to do – although only five companies commit to fully consult with and gain the consent of these communities.



Chris Eves, ZSL's Forestry Officer, said: "We've had a really encouraging response from those companies we've engaged during the initial round of SPOTT assessments of timber, pulp and paper producers, as the industry increasingly recognises the advantages of increased transparency. Though many have scored lower than expected in our initial round of assessments, based on our experience in the palm oil sector we expect to see relatively rapid progress during future surveys, as companies move to implement the rigorous environmental, social, and governance-related commitments and disclosures that investors increasingly expect.

"We also found that more than half of the companies assessed are already actively working with government, NGOs or academic institutions to improve the sustainability of forest products, suggesting that the sector is taking these challenges increasingly seriously."

To view the latest scores visit the timber, pulp and paper assessments page or read the summary highlighting the latest facts and figures: https://www.spott.org/wp-content/uploads/sites/3/2017/05/Summary-of-timber-pulp-and-paper-assessments.pdf

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27th Session of the Asia-Pacific Forestry Commission

The Food and Agriculture Organization of the United Nations together with the Government of Sri Lanka organized the 27th Session of the Asia-Pacific Forestry Commission (APFC), 23-27 October 2017, at the Bandaranaike Memorial International Conference Hall, Colombo, Sri Lanka.

The APFC is one of six regional forestry commissions established by FAO to provide a policy and technical forum for countries to discuss and address forest issues on a regional basis. The Commission meets every two years, and this year's session was attended by around 250 participants, including delegates from 22 member countries, forestry experts, and decision-makers.

The President of Sri Lanka, Hon. Maithripala Sirisena, who also serves as the Minister of Mahaweli Development and Environment, graced the event by sharing forests and rural development initiatives of Sri Lanka for poverty reduction and biodiversity conservation. "In the current post-conflict era, Sri Lanka is striving to optimize the economy through a comprehensive development process to ensure the better living conditions for our people and in this process, we all have the responsibility of protecting the natural resources and environment of our country, which is rich in biodiversity", he added.

The theme of the Session was "Forestry in a new landscape". The keynote address from Dr. Tony Simons, Director General of the World Agroforestry Center, elaborated the importance of the role of forests in evolving landscape approaches and management.

Mr. Hiroto Mitsugi, the Assistant Director-General of the FAO Forestry Department, highlighted the broad contribution that forestry can make to achieving sustainable development goals (SDGs) in his opening address. "There are major changes in many of the dimensions in which the forest

sector operates – socio-economic, technological, cultural, environmental, and political landscapes and many more", he reminded the Commission.

Moreover, the Commission welcomed its new Secretary, Dr. Thomas Hofer. As the Senior Forestry Officer in FAO Regional Office for Asia and the Pacific, Dr. Hofer was excited to take up his new role as the Secretary.

Delegates to the 27th Session of the Asia-Pacific Forestry Commission

Lively and rich discussions filled the hall as the government delegates and observers talked about the diverse and challenging agenda items. The Commission highlighted the importance of forest restoration to countries in the region including the use of landscape approaches and mobilization of both community and private sector resources. It has identified key regional priorities for the forestry sector as recommendations, including: landscape approach to forest management and restoration; incorporating the forest sector into National Adaptation Planning (NAP) processes; capacity building on REDD+; assistance to Small Island Developing States (SIDS) to balance competing economic, social, environmental and cultural objectives for forestry; development of tools and best practices for urban forestry; and capacity building for forest genetic resources conservation *(see www.fao.org/3/a-mp816e.pdf for the full list of agenda)*.

A range of informative partner events ran alongside the session. Various organizations hosted events to discuss forest monitoring, forestry research, Forest Law Enforcement, Governance and Trade (FLEGT), REDD+, youth involvement in Sustainable Development Goals (SDGs), and many more. For the list of partners and events, please go to www.fao.org/3/a-bt658e.pdf.
The full report will be uploaded soon and will be available at this link: http://www.fao.org/forestry/82939/en/

Interdisciplinary IUFRO Task Force synthesizes diverse knowledge on biological invasions in forests

For as long as humans have traversed the earth, we have moved plants and animals with us – for food, goods and services - with many small organisms being moved unwittingly. These organisms, established outside of their natural range, are alien species. Some alien species do not survive their new environment, but a small percentage thrive in these novel habitats; wreaking havoc on the ecosystem and causing huge economic impacts on forest resources. Increases in both diversity and numbers of alien species occur with the growth and prosperity of a region; highlighting globalization as the main cause of the biological invasion problem. The key to preventing future biological invasions lies in the management of introduction pathways. However, a single government is unlikely to achieve an effective solution. Understanding and solving this global issue demands international cooperation and collaboration among scientists from diverse disciplines including not only traditional fields of forest biology but also the social sciences. The International Union of Forest Research Organizations (IUFRO) is *the* global network connecting forest science researchers from around the world for 125 years. Given the importance of this subject, IUFRO has taken on a lead role in coordinating research on biological invasions in forests with the formation of an IUFRO Task Force in April of 2015.

The IUFRO Task Force on Biological Invasions in Forests (http://www.iufro.org/science/task-forces/biological-invasions) is an inter-disciplinary team of scientists with goals of synthesizing the current state of knowledge across diverse fields of research and developing comprehensive approaches to managing invasions across the world. The team of scientists are from 13 countries and are experts on various scientific disciplines germane to the problem of invasions in forests. These fields include forest botany, entomology, pathology, ecosystem ecology, silviculture, international trade studies, economics and sociology. The task force seeks to synthesize the current state of knowledge about the causes, effects and potential solutions to the problem of biological invasions in forest ecosystems in various portions of the world. Taking on this problem, the team is seeking to understand the drivers of invasions in both planted and natural forest ecosystems and to develop an understanding that promotes the identification of new, more integrative approaches to managing the problem.

In an effort to promote informational exchange, a workshop was held 18th – 21st of July 2016 at the US Fish and Wildlife Service National Conservation Training Center in Shepherdstown, WV, USA. This meeting was attended by 65 individuals representing Argentina, Canada, China, Hungary, India, Italy, Japan, Kenya, New Zealand, South Africa, Switzerland, United Kingdom and the USA with backgrounds ranging from research, to policy, education and advocacy. The meeting began with a keynote address by Dr. Michael Wingfield, IUFRO President and Director of the Forestry and Agricultural Biotechnology Institute, at the University of Pretoria, and was followed by 24 invited presentations by task force members as well as 17 contributed presentations by others. The last day of the meeting was devoted to a field trip at Shenandoah National Park for a first-hand view of forest invasions.

A series of 23 synthesis papers authored by task force members and presenters at the Shepherdstown workshop is now available in a special issue of the journal "Biological Invasions" (http://www.springer.com/life+sciences/ecology/journal/10530). These papers

summarize various topics in biology, sociology and policy related to forest invasions from a global perspective. This special issue advances scientific knowledge across many disciplines in hopes of developing solutions to this growing environmental problem.

By sharing information with a diverse group of scientists and stakeholders, a number of key concepts emerged on biological invasions in forests. Cross disciplinary collaboration is needed for both management and policy solutions to biological invasions. We need a better understanding of multi-species interactions to outline the impacts of invasions. More work is needed to understand the social and economic impacts of invasions, as well as the social processes driving invasions. A global network for sharing information on biological invasions should be enhanced. Also, the lack of resources for research and management in countries with developing economies is a problem that potentially affects forests throughout the world.

Photo captions: **top left** – The workshop meeting room, photo by Richard Sniezko, USDA Forest Service; **top right** - Dead and dying pine trees infected with the pinewood nematode, *Bursaphelenchus xylophilus*. Photo by Mactode Publications, Bugwood.org; **bottom right** – IUFRO task force break-out session, photo by Richard Sniezko, USDA Forest Service; **bottom left** – Dead and dying hemlock trees attacked by Hemlock Woolly Adelgid, *Adelges tsugae*. Photo by William M. Ciesla, Forest Health Management International, Bugwood.org

Ebony under threat in Sulawesi

Ebony (*Diospyros celebica* Bakh.) is a most important timber species in Sulawesi Island. It has a worldwide reputation for quality fancy wood because of its combination of remarkable attractive beautiful color, grain, and durability. It is well suited for use in extraordinary fancy furniture and, and for many others exceptional decorative handicrafts.

However, like in most parts of Indonesia, Sulawesi has lost a substantial area of its lowland natural forests which is the habitat of ebony. Losses mainly result from uncontrolled felling operations and converting lowland forests into cash crop plantations over the last four decades. The remaining stands of this valuable species are found only as a poor stand with small scatters trees and their potential for natural regeneration is very low. Therefore, ebony is now under threat with a conservation status of IUCN Red List Categories of Threatened Species and ebony is included as a vulnerable species.

If no seriously rehabilitation and protection efforts are taken and implemented, deforestation will proceed rapidly and South Sulawesi will increasingly contain only fragments of forest retained either as islands or as a small patches containing only a poorer community tree species in a predominantly agricultural landscape. As high pressure on forested land for agriculture development continue and although logging has been banned, small scale illegal cutting of ebony still continues and is uncontrolled. Ebony would become rare to encounter and may become extinct in its natural habitat.

The remaining natural stands represent of lowland multistoried stand. Typically, this multistoried stand is composes of various trees. As for example in one area near Maros in South Sulawesi tree species including *Dracamtomelon dao., Syzigium sp., Buchanian sp., Lansium domesticum, Cinnamomun verum, Flaucortia rucam, Artocarpus altilis, Alstonia scholaris.* Two palm species *Arenga catechu (*aren*) and Areca catehu* (pinang) are common. Trees height reaches less than 30 m. Under this canopies are ebony, pinang, and dao. Understory occupied by various plants, including herbs, and seedlings of upper canopies trees. Besides low of standing stock, ebony has also been poor in its natural regeneration. The number of young trees of various size classes including seedling, sapling, and pole are insufficient and unbalanced.

It is proposed that efforts should be made to increase ebony stock through enrichment planting. Supplementing seedling regeneration in a naturally, remaining degraded ebony forest is urgently needed because of the low capacity of natural regeneration within existing stands. Then seedling planted under the canopy where gaps occur will help to establish enough young trees that form canopy in the future. Tending the trees includes removal of vine, bushes, and others unwanted species that may be retarding growth and competing with ebony seedlings. Through this it hoped that natural stands will be improved and ensure their sustainability in Sulawesi.

Contributed by B. Nurkin, ISTF Member

Primer simposio regional de arborización urbana de Sinop, Mato Grosso, Brasil.

Profesor Dr.C. Pastor Amador Mojena

Entre los días 20 y 30 del mes de septiembre se realizo el primer simposio regional sobre arborización urbana de Sinop, en el centro de eventos Dante de Olivera, con el apoyo de la alcaldía de la ciudad de Sinop.

El simposio forma parte de la "Virada sustentable", caracterizado como un proyecto de iniciativa e idealización de profesionales del área de educación, arquitectura urbana, Ingeniería Ambiental, Silvicultura Urbana y Medicina con el objetivo de ejecutar acciones que beneficien a toda la ciudad, elevar la conciencia de personas para la lucha por el bien estar común y establecer parecerías con el poder público para ejecutar proyectos que puedan transformar la realidad de los bosques urbanos de la ciudad, así como la ejecución de estudios que puedan auxiliar e orientar el crecimiento urbano ordenado y mejoría de la salud preventiva.

Las conferencias presentadas y debatidas por el público asistente fueron.

1. Arborización urbana en Sinop- Ingeniero Agrónomo Roberto Knoll. Secretario municipal de medio ambiente y desarrollo sustentable, Alcaldía municipal de Sinop – Mato Grosso.
2. Arborizacion y salud. Dr. Milton Malheiros da Silva. Otorrinolaringología. Sinop Clínica. MT
3. Silvicultura, ciudad y salud humana. Profesor Dr. C. Pastor Amador Mojena. Universidad Federal de Mato Grosso-Campus Sinop. Brasil
4. Gestión de arboles en las ciudad y servicios ambientales. Profesor PhD. Demóstenes Ferreira da Silva Filho. Universidad de San Paulo, Escuela Superior de Agricultura Luiz de Queiroz, Departamento de Ciencias Forestales.
5. Ciudad para las personas, abriendo caminos para vivir mejor en Sinop. Natalia García. Periodista

Los profesionales del área de educación, los especialistas en medicina cardiorespiratorias, los funcionarios públicos de la alcaldía, profesores e estudiantes de la Universidad Federal de Mato Grosso y de la Universidad Estadual de Mato Grosso participantes en el simposio reafirmaron y concordaron con los elementos y desafíos claves de la silvicultura urbana; y se creó un pequeño grupo de expertos para ejecutar acciones conforme con las Directrices para la silvicultura urbana y periurbana (FAO, 2017)

Entre las Directrices para la silvicultura urbana y periurbana (FAO, 2016) en el acápite la salud y el bienestar humano cita que los bosques urbanos y demás áreas verdes, si están bien diseñados

y gestionados, pueden tener un papel importante para garantizar vidas saludables y promover el bienestar por medio de la prevención, terapia y recuperación de enfermedades.

Los bosques urbanos pueden desempeñar tres funciones relacionadas con la salud:

1) prevención de enfermedades;
2) terapia;
3) recuperación de enfermedades.

Pueden reducir las causas directas e indirectas de algunas enfermedades no contagiosas, factores estresantes urbanos como las radiaciones ultravioleta y la contaminación del aire y acústica; y pueden ayudar a refrescar el entorno.

El grupo de expertos en su levantamiento de las aéreas verdes de la ciudad tiene como meta alcanzar en el año 2020 lo recomendado por la sociedad brasileña de arborización Urbana (SBAU, 2008) que en sus directrices nacionales, y en sintonía con la Organización Mundial de Salud (OMS) establece que la ciudad debe de disponer como mínimo 15m2 de área verde por habitante (parques, jardines, plazas, bosques urbanos e peri-urbanos), distribuidos equitativamente en relación con la densidad de población.

La ciudad de Sinop es hoy referencia en Mato Grosso por la producción agropecuaria, siendo considerada la Capital del Agro negocio de Mato Grosso., pero a pesar de la expansión urbana, los bosques siguen siendo compañeros valiosos en la ciudad.

Bibliografía.
FAO. Directrices para la silvicultura urbana y periurbana. Roma. 2017. 191.p
SBAU. Sociedade Brasileira de Arborização Urbana. A Carta de Vitória , Site SBAU, 2008.

*** English Version ***

FIRST REGIONAL SYMPOSIUM OF URBAN ARBORIZATION OF SINOP, MATO GROSSO, BRAZIL.

Por:Professor Dr. C. Pastor Amador Mojena.

Between September 20 and 30, the first regional symposium on urban arborization of Sinop took place at the Dante de Olivera events center, with the support of the city hall of Sinop.

The symposium is part of the "Sustainable Way", characterized as an initiative and idealization project for professionals in the area of education, urban architecture, environmental engineering, urban forestry and medicine with the aim of carrying out actions that benefit the entire city, raise the conscience of people for the fight for the common good and to establish a relationship with the public power to execute projects that can transform the reality of the urban forests of the city, as well as the execution of studies that can help and orient ordered urban growth and improvement of preventive health.

The lectures presented and debated by the attending public were:

1. Urban Arborization in Sinop - Roberto Knoll Agronomist. Municipal Secretary of the Environment and Sustainable Development, Municipal Mayor of Sinop - Mato Grosso.
2. Arborization and health. Dr. Milton Malheiros da Silva. Otorhinolaryngology. Clinical Sinop. MT
3. Urban forestry, city and human health. Professor Dr. C. Pastor Amador Mojena. Federal University of Mato Grosso-Campus Sinop. Brazil
4. Management of trees in the city and environmental services. Professor PhD. Demosthenes Ferreira da Silva Filho. University of São Paulo, Luiz de Queiroz Higher School of Agriculture, Department of Forestry Sciences.
5. City for people, opening roads to live better in Sinop. Natalia García Journalist.

Education professionals, specialists in cardiorespiratory medicine, public officials of the mayor's office, professors and students of the Federal University of Mato Grosso and the State University of Mato Grosso, participants in the symposium, reaffirmed and agreed with the elements and challenges key to urban forestry; a small group of experts was created to carry out actions in accordance with the Guidelines for urban and peri-urban forestry (FAO, 2017)

Among the Guidelines for urban and peri-urban forestry (FAO, 2016) in the section on health and human well-being, he cites that urban forests and other green areas, if properly designed and managed, can play an important role in guaranteeing healthy lives and promote well-being through prevention, therapy and recovery from diseases.

Urban forests can perform three functions related to health:

1) disease prevention;
2) therapy;
3) Recovery from diseases.

They can reduce the direct and indirect causes of some non-contagious diseases, urban stressors such as ultraviolet radiation and air and acoustic pollution; and can help to refresh the environment.

The group of experts in its survey of the green areas of the city aims to achieve by 2020 what is recommended by the Brazilian urbanization society Urbana (SBAU, 2008) than in its national guidelines, and in line with the World Health Organization. Health (WHO) establishes that the city must have at least 15m2 of green area per inhabitant (parks, gardens, squares, urban and peri-urban forests), equally distributed in relation to population density.

The City of Sinop is now a reference in Mato Grosso for agricultural production, being considered the Capital of Agrobusiness of Mato Grosso., but despite the urban expansion, forests are still valuable partners in the city.

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New Belize Cacao Research Farm Seeks Collaborators

Minni Forman

The Belize Cacao Agroforestry Institute (BCAI) is currently partnering with Maya Mountain Cacao, a socially-driven cacao exporter, to establish a non-profit cacao research farm. This farm is located in the far south of Belize with a mission to better understand sustainable cacao cultivation in Belize's microclimate and to provide a practical approach for local farmers to implement agroforestry practices and prevent deforestation. We planted 60 acres of cacao plantations four years ago, but we are still in the very early stages of developing the non-profit as a long-term research station.

Volunteer studying cacao.

Currently, we are seeking partnerships with university faculty, students, and independent researchers and programs interested in agroforestry systems. The potential research focuses are diverse. We are hoping to track and compare tree growth, production, rainfall, maintenance costs, disease outbreaks, light availability, phenology, genetics, etc. We are also interested in both planned and unplanned biodiversity, and the effect of different timber intercropping systems.

This research is critical for several reasons. The first is its validation on the value of agroforestry systems. We are striving to make cacao and timber systems more economically and

environmentally attractive for local farmers than slash-and-burn corn systems, which are often the local alternative. Cacao is a tree so it stores carbon year after year. Better yet, it is a shade tree, so it grows best among larger trees that store even more carbon. Corn fields that are burned annually, on the other hand, release enormous amounts of carbon dioxide. In addition to carbon storage, cacao trees prevent soil erosion and provide habitat to species dependent on increasingly threatened tropical rainforests.

Slash and burn agriculture in Belize

Several studies have supported the ability of cacao agroforestry systems to harbor biodiversity and serve as a carbon sink, but a large amount of our knowledge is still based on research on similar agroforestry systems and established ecological principles rather than in the climate specific to Belize. Research at BCAI can further support the potential of cacao as a conservation tool.

The second critical need for BCAI's research is the dearth of data on cacao cultivation in Belize. This small low-lying country hugging the Caribbean coast has its own microclimate, culture, economic conditions, and cacao genetics. While cacao research conducted in other countries is relatable, it does not address Belize's unique conditions. The agricultural powerhouse of Brazil is growing a body of literature on cacao, but this mostly focuses on optimization for enormous farms. Belize is even overshadowed by its Central American neighbors. For example, a simple search in Google Scholar yields 50,700 results for "Cacao Costa Rica" while only 6,290 for "Cacao Belize". Belize's total cacao output is small, but this does not mitigate the need to better understand this region's cultivation. One "cacao research farm" currently exists in Belize, but it does not publish primary research and relay market-driven information to local farmers. A better understanding of regional cultivation can also lead to more fair and stable pricing for farmers.

In addition to being a site for primary research, we are hoping to grow as a training venue for both local farmers and forestry and agriculture students. Successful experiments at BCAI can serve as demonstration plots. The biggest barrier to changing smallholder farmer behavior is simply the inertia of what they have done for so long. The most effective way to combat this inertia is not through lecturing on a study conducted thousands of miles away, but through implementing changes in the farmers' own backyards. BCAI provides the opportunity for local cacao farmers to learn on-site about the most effective cultivation techniques.

There are currently almost a thousand cacao farmers in Belize who can all benefit directly from BCAI's research on increasing yields and market access. Furthermore, a cacao agroforestry system preserves the natural systems for which their livelihoods depend for everything from bathing in the river to thatching a palm leaf roof. We aim to expand our farmer impact by encouraging further adoption of cacao cultivation as an economically attractive and environmentally sustainable alternative. Globally, cacao plantations can preserve threatened tropical biodiversity and serve as carbon sinks.

Volunteer harvesting cacao.

Cacao is a "women-friendly crop" as it does not require too much physical labor (and a hired laborer can take care of the semi-annual weeding) but it requires a large amount of post-harvest supervision for the fermentation and drying. BCAI therefore has the potential to empower large groups of women.

Please contact us if you are interested in becoming involved with any aspect of our work here at BCAI! Our email address is belizecacaoagroforestry@gmail.com.

Africa's first community-owned Forest Stewardship Council™-certified sawmill for hardwoods from natural community forests

Some of the world's poorest people have opened up a new and lucrative source of revenue through Tanzania's first Forest Stewardship Council™ (FSC™)-certified community-owned sawmill. This is set to triple the incomes that rural villages are able to generate from responsibly managing their natural forests. It will contribute towards local economic empowerment and create incentives for forest conservation; this will help to meet global climate, biodiversity and sustainable development goals.

> *"Instead of [being limited to] selling logs, now villages will sell sawn timber to increase their incomes... Money is the driving force behind development... This sawmill is for the benefit of all of us."*
> Hon. Christopher E. Ngubiagai, Kilwa District Commissioner

In 2009, two villages in south-east Tanzania (Kilwa District) were the first rural communities in Africa to be accredited by FSC for employing the highest international standards to manage their natural forests. Since then, Mpingo Conservation & Development Initiative and its partners have supported 12 more villages to reach this status; more than 185,000 hectares of natural forests have been FSC-certified in total.

Kilwa District Commissioner in Tanzania presents certificate to newly trained community sawmill operator.

Crowd gathers for sawmill demonstration in Ngea Village, Kilwa District, Tanzania.

This represents a massive achievement for community-based forest management in Africa. However, until recently, the ability of these villages to generate sufficient income to manage their forests has been hampered due to insufficient start-up capital finance, equipment, skills and market access. These barriers have prevented communities from adding value to their local hardwoods through further processing.

"There are very few buyers for logs, but huge demand for sawn timber. This is where the money is."

Makala Jasper, CEO-MCDI

MCDI and partners, including World Wide Fund for Nature (WWF-Tanzania), local government authorities and communities, experimented using different methods of small-scale sawn timber production. They trialled pit-sawing, renting sawmills and locally-made processing facilities with circular saw blades before progressing to a portable commercial-scale sawmill by Norwood Sawmills.

"We trialed different methods of producing sawn timber. These increased local incomes by 18%, but the technology was outdated, not efficient and lacked safety measures. Now confident that sawn timber production was the way to go, we sought funding for a modern sawmill."

Makala Jasper, CEO-MCDI

The sawmill, funded by **the Addax and Oryx Foundation** through MCDI, is entirely owned by communities and will be transported between villages to meet local demand. It is able to process five to six cubic metres of timber daily with exceptionally high recovery of 55.5%, compared to just 30% recovery of log volume with other machines.

"We aim to use everything harvested, including branches and off-cuts, so recovery could get as high as 70%."

Makala Jasper, CEO-MCDI

The official handing over and launch took place on Friday 13th in Ngea, one of the first villages set to benefit from the mill. Hon. Ngubiagai, Kilwa District Commissioner led the first public demonstration. He presented certificates to 19 trainees, including 10 community members from five villages, who qualified as sawmill operators and saw doctors following two weeks of training by Tanzania Forest Industries Training Institute. This is a game-changing opportunity, which will secure jobs for those involved in sawn timber production; their incomes are set to increase by up to 75%.

"Two people per village will benefit directly by operating the sawmill, and others will benefit from felling trees, arranging logs and other activities."

Makala, CEO-MCDI

But the benefits do not stop with the jobs created. Communities will now be able to sell their hardwood timber directly into national and international markets, where there is potential to secure a higher prices and and some buyers are willing to pay a premium for FSC-certified timber. Each village is projected to generate more than TZS 150 Million (USD $68,000) from FSC-certified timber sales in year one alone, and they will use the profits to fund local development projects that improve access to basic services such as clean water, education and healthcare. "This will improve the wellbeing of Tanzanian people." Makala, CEO-MCDI

Kilwa District Commissioner leads first demonstration of the new sawmill.

Kilwa District Commissioner officially hands over sawmill to Ngea Village Chairman.

Responsible community forestry represents a key agricultural sub-sector that will set Tanzania on course to achieve economic empowerment. This sawmill signifies a modest yet meaningful step towards achieving the Government of Tanzania's goal to transition to a more industrial economy that better serves those living below the poverty line.

> *"I congratulate MCDI's CEO for explaining the benefits of forests for increasing the economic status of the people - of individuals, the economy of districts, and of the nation."*
>
> *"Money is the driving force behind development... District Council incomes will increase because villages contribute 5% of their revenues from forest resources... Government taxes will also increase... villages will be engaged in business and therefore paying taxes to Tanzania Revenue Authority."*
>
> Hon. Ngubiagai, Kilwa District Commissioner

Ultimately, in addition to improving the economic prospects of Tanzanians, this sawmill will serve to protect forests and wildlife in the country.

> *"Income motivates local people to see that the forests have value and the sawmill will encourage them to put more effort into protecting natural forests... Harvesting is done sustainably according to Forest Management Plans and Five-year Harvesting Plans in each community."*
>
> Makala Jasper, CEO-MCDI

Initiatives such as this have the potential to transform trade in tropical hardwoods from one which is associated with corruption and unsustainable practices to a sector which is responsible, accountable and which contributes towards forest conservation and the economic empowerment

of the rural poor. Manufacturers and consumers of wood products alike can contribute, by opting to purchase products made from FSC-certified timber sourced from well-managed community forests.

Contact details:
For more information or to purchase sustainable, FSC-certified hardwood timber from southern Tanzanian community forests, contact MCDI
Website: www.mpingoconservation.org
Email: timber@mpingoconservation.org
Phone: +255(0)712040020
Facebook: MCDITanzania
Twitter: MCDITanzania

New Interim Director General of CIFOR reflects on the future of forests and research

Robert Nasi has been named the Interim Director General of the Center for International Forestry Research (CIFOR). He is not new to CIFOR, having collaborated and worked with the organization for more than 20 years, most recently as Deputy Director General for Research. In his new role, Nasi will lead CIFOR as it builds momentum towards more equitable, resilient and productive forest landscapes.

"It's not that the forests look different; it's the way society looks at forests that has changed," Nasi explained. "When I started my career, forestry was still much more about looking at forests as producing timber or goods, and now we have another ongoing evolution toward looking at ecosystem services, carbon storage, water and biodiversity."

Robert Nasi also looked back at how CIFOR's research priorities have changed over time. When the Center was founded in 1993, researchers were focused on forest management, but later the strategy was broadened to include policies, the importance of forests for the climate change agenda and, ultimately, the central role of forests and landscapes to attain the Sustainable Development Goals.

"My longer-term priority is to put CIFOR on a growth trajectory and to make sure that we continue to deliver relevant research, capacity development, outreach and engagement," said Nasi. He expects CIFOR will contribute "to change the way forests and forestry are perceived, and, ultimately, make the world a better place."

New role for a CIFOR veteran

CIFOR's Board of Trustees appointed Robert Nasi as the new Interim Director General last month, during the organization's all-staff Annual Meeting in Bogor, Indonesia. "I am ready to continue CIFOR's transformation and carry on the positive impact of CIFOR on human well-being, equity and environmental integrity. I am looking forward to continued collaboration with our donors and partners," expressed Robert Nasi after being appointed.

Robert Nasi, Interim Director General of the Center for International Forestry Research (right), conducting field research in the Yoko Forest Reserve, Democratic Republic of the Congo, with graduate students from the University of Kisangani. (Photo: CIFOR)

Robert Nasi joined CIFOR as staff in 1999 and has held a variety of research and senior management positions in the organization, including Director of the CGIAR Research Program on Forests, Trees and Agroforestry (FTA) from 2011 to 2013. He is a national of France, with a PhD in the field of ecology from the University of Paris-Sud Orsay. Nasi has more than 30 years of experience in Africa, Asia and the Pacific, undertaking research activities in the fields of ecology, botany, biometrics, tropical forest management, and silviculture.

His scientific work aims to integrate social and biological sciences for better management of tropical forests, sustainable livelihoods and better design of forest policies. Nasi has authored or co-authored more than 300 scientific publications. He has written widely on topics including forest certification schemes, biodiversity in African Forests, bushmeat and diets in the Democratic Republic of the Congo and the link between Ebola and deforestation.

CENTER FOR PROTECTED AREA MANAGEMENT
COLORADO STATE UNIVERSITY

2018 Short Course Guide / *Guía de Cursos Cortos 2018*

XXVIII Curso Internacional de Manejo de Áreas Protegidas (dado en español)

3 de julio al 4 de agosto, 2018

. Ofrecido en colaboración con la Oficina de Programas Internacionales del Servicio Forestal de los Estados Unidos, este curso se centra en los desafíos involucrados en la planificación y gestión de áreas protegidas. Enseñado totalmente en español, el curso de 32 días combina clases, ejercicios en grupo y viajes al campo a áreas protegidas de diferentes categorías, tipos de usos y desafíos de gestión en Colorado y Utah. Temas cubiertos incluyen planificación y gestión de sistemas de áreas protegidas; corredores de conservación y zonas de amortiguamiento; manejo de recursos naturales; mitigación de impactos de proyectos de desarrollo; financiamiento de la conservación; gobernanza, colaboración y resolución de conflictos; interpretación ambiental; turismo y recreación; investigación, monitoreo y evaluación; cambio climático; y liderazgo personal y profesional. Para más información y para el link para postularse visite http://conservation.warnercnr.colostate.edu/. El costo, excluyendo pasajes y visas, es $6,395. La fecha límite para postularse es el 2 de febrero de 2018

VIth Mobile Seminar on Tourism in Protected Areas (given in English)

September 6-22, 2018

The Mobile Seminar on Planning and Managing Tourism in Protected Areas is an intensive, 2.5-week field-based training event for professionals working to promote sustainable tourism and outdoor recreation in protected areas globally. It is given in partnership with the US Forest Service International Programs. Seminar themes include planning and zoning for public use and

tourism in protected areas; legal, financial and policy frameworks; institutional arrangements and governance including public-private partnerships; interpretation and environmental education; and tourism infrastructure. The seminar travels through Colorado, Wyoming, Montana and South Dakota and makes visits to national parks, forests, monuments, state and local parks, a guest ranch, and a tribal reservation. The seminar visits Yellowstone, Grand Teton, Badlands and Rocky Mountain national parks, Black Hills National Forest; Devils Tower National Monument and Mount Rushmore National Memorial. Cost excluding airfare and visas is $5,395. To apply and for more information visit http://conservation.warnercnr.colostate.edu/. Deadline to apply is May 11, 2018.

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https://www.facebook.com/centerforprotectedareamanagement/

TROPICAL DRY FOREST RESTORATION INTERNSHIPS WITH THE AZUERO EARTH PROJECT, PANAMA

The Azuero Earth Project in Panama offers opportunities for students and professionals interested in tropical reforestation with native/fruit species and stream restoration to participate in our reforestation program in Panama. Opportunities are available on our tropical forest restoration crew from May-August, or in native and fruit species nursery management from September-March. For more information or to apply please send a CV and cover letter to ruth@proecoazuero.org. You can learn more about our organization's work at www.proecoazuero.org or by following us (@proecoazuero) on Facebook, Twitter and Instagram.

Workshop, January 8-9, Cusco, Peru. Forest Ecosystem Services across the Pacific Rim: Comparing Tropical Asian and Tropical American perspectives, approaches and operationalization

The Center for Southeast Asia and Integrated Area Studies, Kyoto University and the Peruvian Amazon Research Institute, Peru are organizing a two day workshop in Cusco Peru, January 8 and 9, 2018 to compare academic scholarship development on forest ecosystem services in Asia and South America. The workshop aims to explore and understand commonalities and differences in familiarity with the ecosystem services concept, related debates and applications.

Workshop participants are senior and junior academics and policy actors from China, Japan, South Korea, Bolivia and Peru whose work focuses on ecosystem services assessment and of forest ecosystem services enhancement. Participants will present their own work and collaborate to prepare a summary and general conclusion from the workshop to be made available to interested audiences. Participants will also be invited to collaborate on the preparation of academics outputs from the workshop.

2018

24th International Society for Tropical Foresters Conference

JOIN US!

Feburary 1st - 3rd

Yale School of Forestry and Environmental Studies

Attending to Socio-ecological Complexity in Tropical Forest Landscapes

Tropical forest landscapes are complex systems shaped by interacting ecological, social, and multi-dimensional processes. Complexity includes the dynamic ecologies, socio-political regimes, and diverse stakeholder perspectives that converge within any given tropical forest locale. While many who live and work in tropical forest landscapes have acknowledged the need to move away from siloed management, challenges persist for addressing the socio-ecological complexity of forest landscapes.

The **2018 International Society of Tropical Foresters Conference** will bring together practitioners, academics, and forest users to explore the thought, experiences, and methods used for attending to the complexity of tropical forest

Keynote Speakers

YALE ISTF 24th Annual Conference 2018

More information at:
http://istf.yale.edu/
Email us: istf@yale.edu

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Search for Orphaned Tropical Forest Data Sets

Gillian Petrokovsky and Sheila Ward

We hope to compile information on orphaned data for tropical forests, including inventory and plot data, that are in danger of being lost. Many projects over the years have generated a lot of tropical forest data. But the information is scattered among different institutions and people, some still only on paper, some digitized but in older formats. TROPIS and ATROFI-UK are two previous databases that compiled metadata on forest plots and inventories. The data for certain plots are available at www.forestplots.net and www.givd.info and associated networks.

But other plots and inventories still need attention, even rediscovery. We would like to compile information on datasets that should be digitized or transformed to an up-to-date digital format. The goal is firstly to make metadata on these datasets available on a publicly accessible website, and then to try to secure the data itself by pushing for appropriate curation with open-access availability.

These legacy datasets are invaluable for understanding how tropical forests change through time, including the cumulative impacts of change in land use and climate, and changes in patterns of biodiversity and carbon storage. The past can help inform the future.

If you know of any such orphaned databases for tropical forests, please send a message to Gillian Petrovsky gillian.petrokofsky@zoo.ox.ac.uk or Sheila Ward sheila.emily.ward@gmail.com .

Post-doctoral Fellowship Opportunity

Applications for the John J. and Katherine C. Ewel post-doctoral fellowship in tropical or subtropical ecology and environmental science are now being accepted. This fellowship is hosted through the University of Florida's International Center. Information can be found at https://www.ufic.ufl.edu/OGRE/EwelFellowship.html

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News on the International Society of Tropical Foresters (ISTF)

Sheila Ward

Reactivation of the International Society of Tropical Foresters is underway! Fourteen people have volunteered for the Reformulation Committee, which is tasked with revamping the bylaws and purpose/mission of the central organization, revising the guidelines for chapters, and developing guidelines for the current era of electronic communication and social media. The hope for the bylaws to be ready for members to review by April 2018 and for approval in August. The aim is to have elections for officers in October, who would assume positions in January 2019. This restart of ISTF is being carried out on a volunteer basis, and for now, the organization is dues-free.

Several meetings have been or are being held to discuss ISTF.

ISTF side meeting in September 2017 at IUFRO 2017 Congress, Freiburg, Germany. This meeting had about 24 attendees. The main item was a change in the vision for the organization. According to Frank Wadsworth, one of the ISTF founders, a main function of ISTF was to be a communication pathway, to get new information on best practices in tropical forestry out to the tropical forester in the field, who would often not have access to the literature. The group at IUFRO wanted to amplify the vision for ISTF, from communication TO the forester in the field, to two-way communication BACK to the policymaker, government, academic. This would include on-the-ground needs for better project design and more relevant research.

ISTF side meeting at the SAF Annual Convention November 2017, Albuquerque, New Mexico. At the meeting on ISTF at the SAF convention, a lively discussion took place with about 17 people (mostly Masters students) who attended, on how much of an activist organization ISTF should be. They want to see results on the ground! They also want to see more frequent interaction among members and more available training/education tools.

UPCOMING: At the ISTF-Yale 2018 Conference (Feb 1-3, 2018) at New Haven, Connecticut, we will have a session on the draft ISTF bylaws and chapter guidelines. The theme for the Conference this year is "Attending to Socio-ecological Complexity in Tropical Forest Landscapes". More information on the conference can be found at https://istf.yale.edu/2018-conference.

ISTF membership. If you would like to be a member of ISTF, please send a message to tropicalforesters@gmail.com, to receive the membership form.

SAF World Forestry Committee News

This year's SAF Gregory Award brought Prabin Bhusal from Nepal to the SAF Convention in Albuquerque, New Mexico. Prabin is an Assistant Professor at Tribhuvan University's Institute of Forestry, Department of Social Forestry and Forest Management in Pokhara, Nepal. In addition to meeting and networking with professionals throughout the conference, Prabin also presented his work on community forestry in Nepal. Special thanks to Bob Sturtevant for all his help with this program on-site at this and past conventions. The next application period will open in March 2018. For more information on the Gregory Award, click here.

Prabin Bhusal speaks at the SAF national convention in Albuquerque, New Mexico.

Interested in getting more involved with SAF? Want to help promote and grow the SAF Gregory Award? We're cutting the bureaucratic tape and opening up this opportunity for engagement to anyone in the International Forestry Working Group. If you are interested or just want to share some ideas on how SAF can be more engaged with international forestry professionals, please contact Danielle Watson at watsond@safnet.org.

Join an SAF Working Group

** Especially Because SAF Has Edited the Working Group Lists **

This newsletter goes out to people beyond SAF members, but if you are on the working group list you receive this newsletter. When SAF updated their website the membership list was reduced to 28 members. Your editor was surprised to find he wasn't on the list of IFWG members, so he had to sign up again.

As a member of the Society of American Foresters you can join SAF working groups by going to the website:

Join a working group here.

If you want to join, or rejoin, this working group, we are B3, the International Forestry Working Group. Please pass this information along to SAF members who might be interested in joining a working group – especially B3, the International Forestry Working Group.

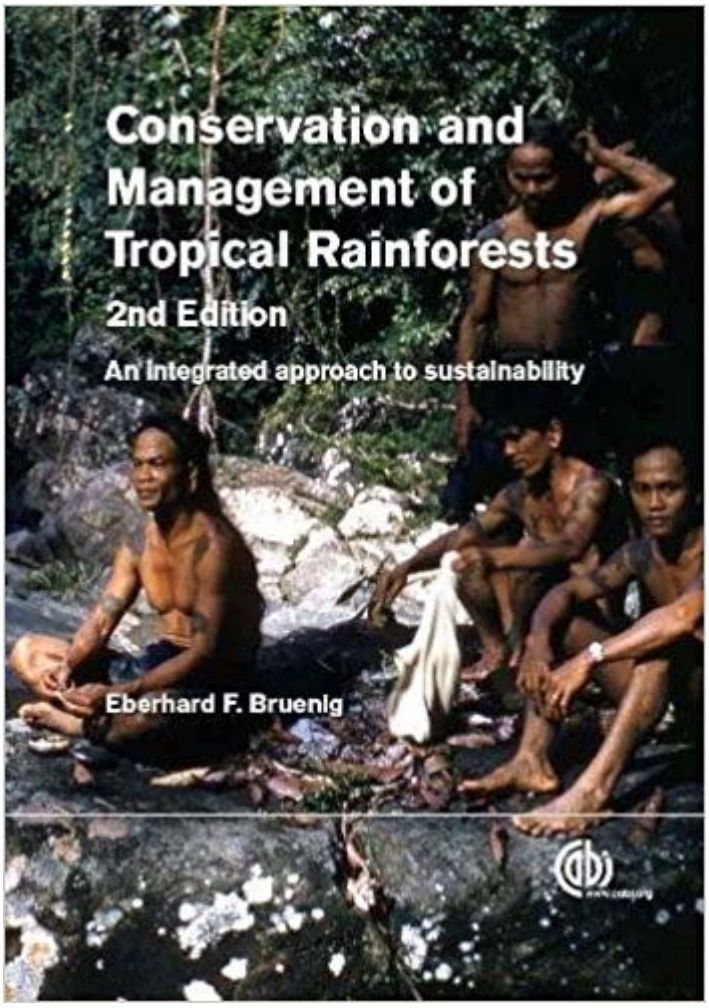
From the archives:

Haile Selassie plants a tree on Arbour Day (1958?).
http://chronological-speeches-of-him-qhs.blogspot.com/2014/07/1907-2-speech-of-day-forestry-arbour-day.html.

Book Review

Conservation and Management of Tropical Rainforests: An Integrated Approach to Sustainability 2nd Edition by Eberhard Bruenig

CAB International, 2017 401pp. Amazon Price: New USD 66-180, used USD 50-133.



The jacket banner describes this as a thoroughly revised second edition that widens the discussion on conservation and management of tropical forests. The book includes a helpful list of acronyms, 12 chapters, a well-done glossary, an appendix on biocybernetics principles, references, and an index. The chapters basically cover: characteristics of tropical forests, influence of original inhabitants, several chapters that discuss sustainability, another series of chapters that discuss Close-to-Nature forestry and introduce restoration, intensive tree plantations, and guidelines for tropical forest management including certification. The final two chapters are opined essays on the need for reforms, goals for forward action, re-education of forest stakeholders, and forest policy and management principles for the future. I will discuss in turn these major themes and chapter groups.

Chapter 1 reviews climate patterns that create tropical forests. It is recognized that the forests of the tropics are not homogeneous. There is a nice tabular summary of changes in tropical forest area and population over the past 50 years. It is striking how much natural forests have declined and how little reforestation has occurred. The overall topic of tropical forests and climate including effects of climate change are scattered in several sections of the book. The author moves from climate to the rooting sphere, canopy dynamics, soils, nutrients and pollutants. The first part of the chapter fits together and is like how other authors have approached this topic. As expected there is heavy reference to Malaysia and Southeast Asia where the author spent much of his professional career. The final topics in this chapter are tropical forest diversity, distribution patterns, animal life, forest biomass, growth and productivity. Topics are covered well enough but not formally connected to climate, as their position in the organizational scheme would lead you to believe.

Chapter 2 begins with a robust discussion of the role of original inhabitants, shifting cultivation, native customary rights and "nightmares of customary logging". There is a nice visual (Fig 2.4) describing the change in the rural landscape in the course of cultural evolution. The topic shifts at the end of the chapter to harvesting, low impact logging, and logging impacts. There is a section on global climate change that would have fit well in Chapter 1. The discussion on carbon offset forestry at the end of the chapter does not say much about the topic in reference specifically to tropical forests and the author holds a strong opinion that forests provide raw material that is more valuable than just generating thermal energy or a sink for carbon dioxide.

Chapters 3, 4, and 5 represent the core presentation on tropical forest sustainability. Chapter 3 begins with a well prepared and thoughtful discussion of the concept of sustainability, its holistic nature and uncertainty. There is also a section on the history of sustainability in tropical rainforests. As an academic, I would choose this discussion as the core of a lecture on forest sustainability. Chapter 4 is a basic how-to manual on implementing sustainable forestry on national, regional management unit, and forest stand scales. The topic of management by segregation versus integration is introduced. Chapter 5 is the final chapter presenting ideas on sustainability. It consists of a series of case studies. There is a lot of information and experience, but the reader must work hard to get to a clear conclusion as is often the situation with a case studies approach. Not much is said about the once popular criteria and indicators of sustainability.

Chapter 6 is all about Close-to-Nature Forestry (CNF) and whether principles of CNF fit well with tropical forestry management. CNF is a concept of German origin dating back to the 1950s. It is basically a low intensity ecosystem management approach. The concept endeavors to create a single management approach that eliminates the need to segregate forest lands into production reserves versus national parks. It mimics or inspired the multi-resource management concept in the United States; the basic concept is all lands are managed for all resource outputs. Multi-resource management has not gained much traction in US forestry for a variety of reasons including the complexity of implementation.

Chapter 7 was a very readable discussion of upgrading degraded forests. I prefer the use of restoration of degraded forest or simply forest restoration. The author outlines the need for

different strategies for restoring over-logged forests versus degraded secondary forests. A lot of the valuable information toward the end of the chapter is presented in case studies which require effort on the part of the reader to extract the useful information.

Chapter 8 is a brief discussion of short rotation plantations. The author takes a very conventional view of plantations as they are often narrowly defined as fiber or fuel factories. There is nothing about the word "plantation" that restricts its use to either a small subset of forest uses or to short rotation. Around the tropics we can find small scale community based forest plantations that serve as cover crops for coffee or cacao, sources of medicinal plants, climate change barriers, etc. We again hear biofuels is an inappropriate use for plantations in the tropics. Extensive conversion of natural forest to biofuels is agreed by all to be a poor land allocation strategy. However small community based teak plantations in West Africa have been quite successful in providing fuel, medicinal plants, shade for cacao, etc, and, perhaps more importantly in building community support for creating and conserving forests. Scale matters.

Chapter 9 is a short discussion of tropical forest management doctrine and procedures. The rhetorical question is: "Do we need International Tropical Timber Organization tropical forest guidelines?". There are some valid points made about additional information needs. The reader is not lead to a specific answer to the rhetorical question.

Chapter 10 is an essay about the value of forest certification schemes. The author offers mostly non-supportive comments. There is a useful presentation of criteria and indicators of sustainable forestry. The discussion would not be well received by proponents of forest certification but healthy skepticism of when and how to use forest certification has a place.

Chapter 11 and 12 are the final two chapter and constitute some easy reading. Chapter 11 covers challenges to tropical forest management including tropical forest silviculture, forest planning, utilization, environmental impact assessment, monitoring, influence of micro and macroeconomics, illegal timber trade, legal enforcement, development strategies, ethics, and social values. Chapter 12 is a forward-looking essay on future tropical timber production and consumption, proposed action priorities, comprehensive policy reforms and the need to re-consider what tropical forests can provide. The last few pages of the last chapter are a list of the key policy changes advocated by the author.

My recommendation is to not attempt to read this book cover to cover as I did. Rather take the sage advice to "Life is short, eat dessert first!". I suggest reading the last two chapters first which are an easy read and demonstrate the extensive knowledge and wisdom that a 60-year career focused on managing tropical forests can bring. Once you have found the topic of most interest, then use the index to go back and read those detailed sections to gain an understanding of why the author holds these views.

I appreciated a couple of pearls of wisdom I found in the book:
"We know enough, we have the technologies, and funds are available to achieve tropical forest sustainability and save the remaining tropical forests".
"Ask the trees how they want to be tended and trained and they will teach you better than the books".

This book is unique in being both a reference and a collection of essays on conservation and management of tropical forests. At first, I was uncomfortable about the mixed style but when I finally finished the book I found it quite satisfying. Professor Bruenig is clearly one of the giants in the field of tropical forest management and his stature carried me through some of the long paragraphs and dense reading. The book belongs in every library, on the shelf of every practicing tropical forester, on the reference list of every tropical forestry course and perhaps most importantly in the hands of every advocate of conservation and preservation of tropical forests!

Michael R. Wagner, Regents' Professor Emeritus
School of Forestry, Northern Arizona University
Flagstaff, Arizona, USA

A Robust Productivity Model for Grapple Yarding in Fast-Growing Tree Plantations

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3 Istituto per la Valorizzazione del Legno e delle Specie Arboree, Consiglio Nazionale delle Ricerche, Via Madonna del Piano 10, Sesto Fiorentino 50019, Italy
4 Australian Forest Operations Research Alliance, University of the Sunshine Coast, Locked Bag 4, Maroochydore DC, QLD 4558, Australia
***** Correspondence: spinelli@ivalsa.cnr.it

Abstract: New techniques have recently appeared that can extend the advantages of grapple yarding to fast-growing plantations. The most promising technique consists of an excavator-base un-guyed yarder equipped with new radio-controlled grapple carriages, fed by another excavator stationed on the cut-over. This system is very productive, avoids in-stand traffic, and removes operators from positions of high risk. This paper presents the results of a long-term study conducted on 12 different teams equipped with the new technology, operating in the fast-growing black wattle (*Acacia mangium Willd*) plantations of Sarawak, Malaysia. Data were collected continuously for almost 8 months and represented 555 shifts, or over 55,000 cycles—each recorded individually. Production, utilization, and machine availability were estimated, respectively at: 63 m^3 per productive machine hour (excluding all delays), 63% and 93%. Regression analysis of experimental data yielded a strong productivity forecast model that was highly significant, accounted for 50% of the total variability in the dataset and was validated with a non-significant error estimated at less than 1%. The figures reported in this study are especially robust, because they were obtained from a long-term study that covered multiple teams and accumulated an exceptionally large number of observations.

The full article appears in *Forests* 2017, Volume 8 (10) of 2017 and can be accessed at http://www.mdpi.com/1999-4907/8/10/396

Tropical forests for sustainable development: Shaping our post-2015 future with knowledge from the field

Proceedings of the Yale International Society of Tropical Foresters Annual Conference, 2016

Jacob J. Bukoski*, Erika Drazen, Whitney R. Johnson, Latha Swamy

Yale School of Forestry and Environmental Studies
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Summary: A forthcoming issue of the Journal of Sustainable Forestry will be housing the conference proceedings from the Yale chapter of the International Society of Tropical Foresters 2016 annual conference. The topic of the conference was focused on the role that tropical forests may play in achieving the United Nations Sustainable Development Goals, adopted in September 2015.

The Yale chapter of the International Society of Tropical Foresters holds an annual conference each winter at the Yale School of Forestry and Environmental Studies in New Haven, Connecticut. For the 2016 annual conference, the focus of the meeting was on the role that tropical forests may play in the United Nations Sustainable Development Goals, which were adopted in September 2015. As the formal publication of the 2016 conference proceedings, a forthcoming Special Issue in the Journal of Sustainable Forestry houses scientific contributions of conference participants, as well as those working with tropical forest conservation and sustainable development more broadly.

The United Nations Sustainable Development Goals are broad in topic, reflecting key development concerns as diverse as poverty, gender equality, sustainable energy, and institutional structure. The full listing of the Sustainable Development Goals can be found here. Given the broad scope of the goals, the eight articles that comprise the special issue are equally diverse in nature. The editors of the special issue provide a comprehensive review of the literature as it relates to tropical forests and sustainable development, while the remaining seven pieces provide case specific studies. Topics covered range from growth rates and restoration practices in dry forests of Ecuador, to the economic impacts of declining forest resources on indigenous communities in Cambodia.

Participants at the conference were recruited from policymaking, scientific, and practitioner circles such that the 2016 conference took place as an interdisciplinary environment with voices from diverse backgrounds. In doing so, dialogue around the key challenges and opportunities for simultaneously conserving tropical forests and supporting the human communities dependent upon them took place. As we now sit two years after the adoption of the goals, the need for further science, policy and practice towards interweaving conservation and development in tropical forest communities is equally present. In publishing the conference proceedings in the *Journal of Sustainable Forestry*, it is hoped that the impact of the authors' work is expanded to the broader audience concerned with protecting both our tropical forests and the human communities dependent upon them.

Note: The Yale chapter of the International Society of Tropical Foresters will be holding its 2018 annual conference from February 1-3 in New Haven, Connecticut. The focus of the conference is "Attending to socio-ecological complexity in tropical forest landscapes." For more information and registration, please see here.

Contents of the Special Issue:

Effects of Biodiversity on Ecosystem Functioning

Guerrero-Ramirez, N.R., D. Craven, P. B. Reich, J. J. Ewel, F. Isbell, J. Koricheva, J. A. Parrotta, H. Auge, H. E. Erickson, D.I. Forrester, A. Hector, J. Joshi, F. Montagnini, C. Palmborg, D. Piotto, C. Potvin, C. Roscher, J. van Ruijven, D. Tilman, B. Wilsey, N. Eisenhauer. 2017. Diversity-dependent temporal divergence of ecosystem functioning in experimental ecosystems. *Nature Ecol Evol*. DOI: 10.1038/s41559-017-0325-1.

Abstract: The effects of biodiversity on ecosystem functioning generally increase over time, but the underlying processes remain unclear. Using 26 long-term grassland and forest experimental ecosystems, we demonstrate that biodiversity–ecosystem functioning relationships strengthen mainly by greater increases in functioning in high-diversity communities in grasslands and forests. In grasslands, biodiversity effects also strengthen due to decreases in functioning in low-diversity communities. Contrasting trends across grasslands are associated with differences in soil characteristics.

Natural Forest Management in Indonesia

A recently published series of articles by Ruslandi et al. (2017a,b,c) provides a firm foundation for natural forest management in Indonesia and elsewhere in Southeast Asia. The work is based on data from permanent sample plots in stands subjected to one or two rounds of reduced-impact logging (RIL) in a Forest Stewardship Council certified forest in Central Kalimantan, Indonesia. In addition to plots in RIL areas, others were located in portions of the 49,000 ha in which the company carried out enrichment planting since 1999. Analysis of the up to 20 years of plot data and use of a silvicultural intensification stand projection model (SILFOR) revealed:

1. Timber yields will not be sustained even with RIL if the minimum cutting diameter is 40 cm and the cutting cycle is 30 years, as permitted by Indonesian regulations.
2. Timber yields from twice-logged forest line-planted with dipterocarp seedlings will be sustained with cutting cycles of 40 years.
3. Profits from enrichment planting, expressed as net present values (NPVs), greatly exceed those from selective logging alone, but the financial advantage disappears with discount rates of 8 %/year or higher.
4. After the first harvest from primary forest, timber yields and profits from selective logging alone, even with RIL, are very low but stay positive until discount rates exceed 12%/year.
5. Carbon-timber tradeoffs are initially evident with enrichment planting, but by 40 years post-planting, standing stocks of both timber and carbon exceed those in primary forest.

Based on these findings the authors recommend spatial zoning of natural forest management activities with intensification through enrichment planting on gentle slopes near access roads, low intensity RIL with >30 year cutting cycles on slopes up to 40%, and protection of steeper slopes, riparian buffer zones, and other sensitive areas.

Copies of the papers and model are available from ruslandi_rsl@yahoo.com or fep@ufl.edu.

Ruslandi, W. Cropper, and F.E. Putz. 2017a. Effects of silvicultural intensification on timber yields, carbon dynamics, and tree species composition in a dipterocarp forest in Kalimantan, Indonesia: An individual-tree-based model simulation. Forest Ecology and Management 390: 104-118.

Ruslandi, W. Cropper, and F.E. Putz. 2017b. Tree diameter increments following silvicultural treatments in a dipterocarp forest in Kalimantan, Indonesia: A mixed-effects modelling approach**.** Forest Ecology and Management 396: 195-206.

Ruslandi, C. Romero, and F.E. Putz. 2017c. Financial viability and carbon payment potential of large-scale silvicultural intensification in logged dipterocarp forest in Indonesia. Forest Policy and Economics 85: 95-102.

For more details or to receive copies of the publications mentioned, please contact the authors:

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Putz: fep@ufl.edu; 1 (352) 665-1486

Silvicultural Management Recommendations for Mexico: Publications Available

By Mary Ann Fajvan

The North American Forest Commission* (NAFC) was founded by the Food and Agriculture Organization of the United Nations in 1959, and is one of six regional forestry commissions worldwide. The heads of the national forestry agencies of the United States, Mexico and Canada meet every two years to discuss forest-related issues relevant to the three countries. Seven working groups serve the Commission as technical advisors in their respective subject areas. Two projects were initiated in 2013 by the NAFC Silviculture Working Group. Project goals were to produce silvicultural management recommendations for several commercial Mexican tree species. Funding for field work and resulting publications of these guidelines was provided by the Mexican Comisión Nacional Forestal (CONAFOR).

Project 1: Silvicultural choices for the restoration of mahogany and associated commercial species in the medium semi-evergreen forests of Quintana Roo, Mexico

Globally, multi-species forests with few valuable timber species have historically been high-graded for short-term profit. In the Mexican state of Quintana Roo, on the Yucatan Peninsula,

the semi-evergreen tropical forests are complex and consist of up to 200 tree species. In the 1950s, local, community forest owners' claims to timber resources were contracted by the federal government to timber industries for the extraction of only valuable species. After 1983, the community forest owners (ejidos) were put in control of their forest management and subsequent timber harvests. However, in many ways they followed the same pattern of extracting only commercially valuable species without regard to silviculture. After 25 years of targeted harvesting of big-leaf mahogany (*Swietenia macrophylla* King), Spanish cedar (*Cedrela odorata* L.), and 15 other timber species, the forests' commercial value continued decreasing. These species are naturally scarce and, in addition, growth and yield predictions of residual trees were well below those anticipated by managers to provide sustainable harvests and income. As a result, silvicultural treatments are aimed at restoration and tending of financial keystone species, while maintaining the ecological viability of the broader tree community. Treatments are diverse and flexible and must create conditions to accelerate growth rates for pole and mature trees of acceptable quality, while simultaneously focusing on regeneration and successful development of seedlings and saplings.

The new guidelines highlight our knowledge about the ecological characteristics of the current forests in the context of a suite of silvicultural choices that managers can use to restore the commercial value of these forests. The ultimate goal is full occupancy by a diversity of valuable trees, including mahogany and Spanish cedar. These findings are based on a synthesis of long-term research and management activities in Quintana Roo.

> Negreros C., P.; Cámara C., L.; Devall, M.S.; Fajvan, M.A.; Mendoza B., M.A.; Mize, C.W.; Navarro M., A. 2014. **Silvicultura de las selvas de caoba en Quintana Roo, México: Criterios y recomendaciones (Silviculture of the mahogany forests in Quintana Roo, Mexico: Criteria and recommendations).** Comisión Forestal para América del Norte, Organización de las Naciones Unidas para la Alimentación y la Agricultura, Comisión Nacional Forestal (MEX). Spanish and English. Zapopan, Jalisco, MX 186pp.

Available for downloading (PDF): http://treesearch.fs.fed.us/pubs/49853.

Project 2: Silvicultural options for managing the ponderosa pine forests of the Sierra Madre Occidental

Ponderosa pines are the most important timber producing species in Mexico. In western North America, ponderosa pines grow under a wide variety of physiographic, edaphic, climatic and biotic habitat conditions. They occur primarily throughout the mountains of the Sierra Madre Occidental in Mexico, and the Rocky Mountains of the United States and Canada.

There are many possible factors to consider in silvicultural decisions across a range of site quality and production goals for ponderosa pine production in Mexico. The wide range of growth plasticity of ponderosa pines allow for great flexibility in their reproduction scenarios and subsequent intermediate treatments. Some general guidelines were first developed from research projects and case studies, which can be modified by experienced professionals to adapt to specific sites, species, regions and management objectives. The guidelines then specifically

address the silvics of *Pinus arizonica, P. durangensis, P. engelmannii*, *P. ponderosa,* and *P. jeffreyi*, and associated species.

Another factor that defines trends for ponderosa pine silviculture is land tenure. Most ponderosa pine forests in Canada and the United States, are on public lands. In Mexico, practically all forests, including those with ponderosa pine, are privately owned. There are two forms of private ownership: groups (ejidos, comunidades), and individual property. In the absence of large public ownerships, silviculture possibilities typically focus on those schemes that can offer a continuous flow of income to the owner. Hence, the guidelines focus on those options that maximize production within the constraints provided by ownership objectives and site quality.

> Mendoza B., M.A.; Fajvan, M.A.; Chacón S., J.M.; Velázquez M., A.; Quiñones S., A. 2014. **Criterios y recomendaciones para el manejo silvícola de los bosques de pinos ponderosa (Silvicultural recommendations for the management of ponderosa pine forests).** Comisión Forestal para América del Norte, Organización de las Naciones Unidas para la Alimentación y la Agricultura, Comisión Nacional Forestal (MEX). Spanish and English. Zapopan, Jalisco, MX 136pp.

Available for downloading (PDF): http://treesearch.fs.fed.us/pubs/49782.

**The North American Forest Commission (NAFC) is one of six regional forestry commissions established by the Food and Agriculture Organization of the United Nations. The NAFC member countries-Canada, Mexico and the United State of America-are organized by: 1) Commissioners: the heads of the national forestry agency in each member country, who guide the work of the Commission, 2) Bureau of Alternates (BOA): appointed by the Commissioners to facilitate the business aspects of NAFC, 3) Working Groups: consist of subject area specialist who work on technical, policy, or research issues. Working Group members are representatives from all three member countries and can be recruited from government, universities, NGOs or the private sector. Since Canada, Mexico and the United States contain a mix of boreal, temperate and tropical ecosystems, the results of the commission's work can be applied more broadly to assist other countries and regions facing similar conditions. The most critical function of the NAFC Silviculture Working Group is maintaining cooperation among the three countries in promoting silvicultural practices to ensure that diverse, healthy forests continue to supply needed goods and services.*

Author: Mary Ann Fajvan, Research Forester, USDA Forest Service, Northern Research Station (mfajvan@fs.fed.us). Served as chair of the NAFC Silviculture Working Group from 2009-2014 and was a member of the SAF World Forestry Committee from 2013-2015.

Climate change effects in the Western Himalayan ecosystems

Climate change effects in the Western Himalayan ecosystems of India: evidence and strategies. V.P. Tewari, R.K. Verma and K.v. Gadow, Forest Ecosystems, 2017, 4:13 (DOI 10.1186/s40663-017-0100-4)

Abstract: The fragile landscapes of the Himalayan region are highly susceptible to natural hazards, and there is ongoing concern about current and potential climate change impacts. This study provides background information on India's Western Himalayas and reviews evidence of warming as well as variability in precipitation and extreme events .Understanding and anticipating the impacts of climate change on Himalayan forest ecosystems and the services they provide to people are critical. Efforts to develop and implement effective policies and management strategies for climate change mitigation and adaptation requires particular new research initiatives. The various studies initiated and conducted in the region are compiled here. Several new initiatives taken by the Himalayan Forest Research Institute in Shimla are described. This includes new permanent observational field studies, some with mapped trees, in high altitude transitional zones for continuous monitoring of vegetation response. We have also presented new strategies for mitigating potential climate change effects in Himalayan forest ecosystems. Assessment of the ecological and genetic diversity of the Himalayan conifers is required to evaluate potential responses to changing climatic conditions. Conservation strategies for the important temperate medicinal plants need to be developed. The impact of climate change on insects and pathogens in the Himalayas also need to be assessed. Coordinated efforts are necessary to develop effective strategies for adaptation and mitigation.

It is open access and may be downloaded directly from the following link: https://forestecosyst.springeropen.com/articles/10.1186/s40663-017-0100-4

Website on the forests of Northwest Belize

Nick Brokaw and Sheila Ward

In the process of our research in the Rio Bravo Conservation and Management Area in northwest Belize, we have put up a website with information on the ecology of the region. It can be found at ecologynwbelize.org. Among other resources, a tree guide for northwest Belize authored by Nick Brokaw *et al*. can be downloaded at https://ecologynwbelize.org/field-guide-to-trees/ .

Special Issue: Forest Governance in the Anthropocene.

Bhagwat, Shonil A. and Humphreys, David (Editors) (2017) Forest governance in the Anthropocene: Challenges for theory and practice. Forest Policy and Economics. Online:

http://www.sciencedirect.com/science/journal/13899341/79

The introduction to the Special Issue is published as:

Bhagwat, Shonil A.; Humphreys, David and Jones, Nikoleta (2017). Forest governance in the Anthropocene: Challenges for theory and practice. Forest Policy and Economics, 79 pp. 1–7.

Abstract: The concept of the Anthropocene signals the unprecedented impact of humankind on the Earth's biosphere that will leave a distinct signature in the Earth's geosphere. As a term, the "Anthropocene" originated in discussions at the 2000 Science Committee of the International Geosphere and Biosphere Programme. It was later made popular by Crutzen and Stoermer (2000) and Crutzen (2002). Although there are debates as to when the Anthropocene started, a general consensus is emerging among scientists that the impact of human activity on the planet's ecosystems is now especially detectable on a global scale since the commencement, around 1800, of the Industrial Revolution in western Europe (Steffen et al., 2007; Ellis et al., 2013). Since then humans have changed the planetary biosphere through increasing emissions of carbon dioxide through forest clearance and fossil fuel burning. The Industrial Revolution has also led to the creation by humans of plastics, chemical pollutants and nuclear material that will leave traces in the geological record. While the view that the Anthropocene should be imagined as an Industrial Revolution phenomenon is now widely recognised, there are some scholars who have proposed the 'Early Anthropocene' hypothesis suggesting that the Earth's biosphere has been severely altered since the beginning of settled, organised forms of agriculture approximately 10,000 years before present (Ruddiman, 2003; Ellis, 2015). Others have suggested that the advent and use of nuclear bombs and their impact on the Earth's biosphere should be seen as marking the beginning of the Anthropocene (Zalasiewicz et al., 2015). Today the concept of the Anthropocene both invites "creative tensions" while also providing opportunities for new conceptual syntheses and integrative approaches (Brondizio et al., 2016). In this special issue, we provide such a conceptual synthesis for forest governance.

Articles can be obtained at: http://oro.open.ac.uk/48873/.

Biomass Measurement in Tropical Forests

Contribution from Sabin Guendehou, sguendehou@yahoo.com

Traditionally, destructive sampling method has been applied for forest biomass measurement in tropical forests. The method consists of cutting down trees and measuring biophysical properties. Given the large number of trees involved, the method not only disturbs the forest ecosystem, but also releases significant amount of carbon dioxide (CO_2) and other non-CO_2 gases (CH_4, N_2O, CO, NOx) to the atmosphere, contributing to climate change.

Non-destructive sampling methods have been successfully implemented in forest ecosystems in West Africa and have generated volume and biomass models, basic wood densities, carbon contents and carbon maps. The results are published in the scientific papers listed below.

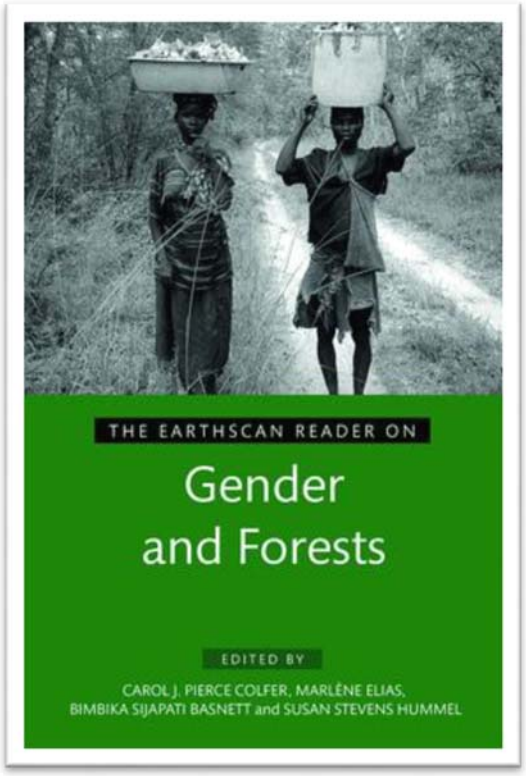
- **GHS Guendehou**, A Lehtonen, M Moudachirou, R Mäkipää & B Sinsin (2012): Stem biomass and volume models of selected tree species in West Africa, *Southern Forests:* a journal of Forest Science, 74:2, 77–88.

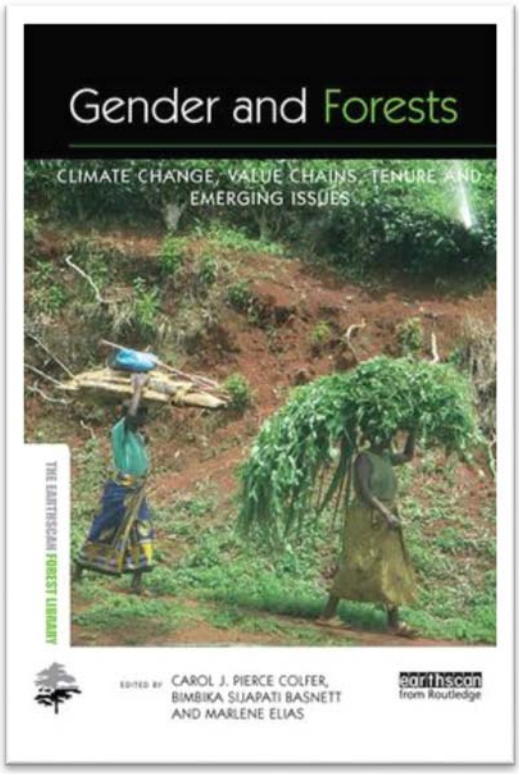
- Goussanou C.A., **Guendehou S**., Assogbadjo A.E., Kaire M., Sinsin B., Cuni-Sanchez A. (2016). Specific and generic stem biomass and volume models of tree species in a West African tropical semi-deciduous forest. *Silva Fennica* vol. 50 no. 2 article id 1474. 22 p.

- Goussanou C.A., **Guendehou S**., Assogbadjo A.E., Sinsin B. (2017). Application of site-specific biomass models to quantify spatial distribution of stocks and historical emissions from deforestation in a tropical forest ecosystem. Journal of Forestry Research, DOI 10.1007/s1 1676-017-0411-x. ISSN 1007-662X.

Collection of wood samples using an increment borer in a tropical forest in Benin for basic wood density measurement

Two new books on gender and forests





The Earthscan Reader on Gender and Forests.

https://www.routledge.com/The-Earthscan-Reader-on-Gender-and-Forests/Colfer-Elias-Basnett-Hummel/p/book/9781138231597

Bender and Forests: Climate Change, Tenure, Value Chains, and Emerging Issues.

https://www.routledge.com/products/9781138955042

Enrichment planting in dry tropical forests.

Eric Horstman, Jhony Ayón & Heather Griscom (2017). Growth, survival, carbon rates for some dry tropical forest trees used in enrichment planting in the Cerro Blanco protected forest on the Ecuadorian coast. Journal of Sustainable Forestry. 15 pp. online

article: http://www.tandfonline.com/doi/full/10.1080/10549811.2017.1387153

Abstract: Deforestation principally to establish cattle pastures has created large expanses of land dominated by exotic grass prior to the establishment of the Cerro Blanco Protected Forest in Ecuador. A dry forest restoration program was carried out from 2008 to 2017. Tree planting sites were cleared in parallel lines through abandoned pasture and secondary vegetation using manual labor. Native tree species were produced in a nursery on site and used in yearly plantings during the rainy season. A total of 637 hectares were planted at an average stocking density of 1,000 trees per hectare. Growth data was collected from trees planted in nine sites from 2008 to 2017. Mortality rates were determined from a sample of 400 trees of twenty-two species. Survival of all species was greater than 50%. Ten species had survival rates greater than 90%. Vitex gigantea, with high survival rates, also had significantly greater growth rates than the other species ($p < 0.0001$) and showed the greatest yearly accumulation of total carbon (2.07 Kg C yr^{-1} $stem^{-1}$). Other species with high growth rates were Cordia alliodora and Centrolobium ochroxylum. This restoration program demonstrates that the dry forest restoration with timely maintenance and protection from fire and grazing is possible with intensive tree planting of native species.

Hybrid Poplar: A Potential Multipurpose Tree for Woody Biomass in Semi-arid Climates

Samuel C. Allen, Michael K. O'Neill, Kevin A. Lombard and Robert F. Heyduck
New Mexico State University Ag Science Center at Farmington, NM

Abstract of Oral Presentation for Society of American Foresters (SAF) Annual Conference, Albuquerque, NM, November 17, 2017

Establishment of tree plantations in semi-arid areas is often made difficult due to water scarcity and poor-quality soils. There is thus interest in water-efficient, drip-irrigated plantations that can provide much-needed wood products (e.g., lumber, excelsior, pulp) and environmental services (e.g., windbreaks, phytoremediation). Given the success of hybrid poplar (*Populus* spp.) in semi-arid Eastern Oregon, the New Mexico State University (NMSU) Agricultural Science Center at Farmington began provenance testing in 2002 with 10 poplar clones recommended by growers in the Pacific Northwest. Additional trials were established in 2003, 2005 and 2007. From these trials, *P. deltoides* x *P. nigra* crosses (*P.* x *canadensis*) has demonstrated the greatest level of site adaptation. The *P.* x *canadensis* clone OP-367 has proven the fastest growing, surpassing a commercial target of 25-cm diameter at breast height (DBH) after eight seasons, while a related clone (544) has proven exceptionally drought- and frost-resistant. For the 2016 growing season,

clone 544 led for height (71.6 ft; 21.8 m), surpassing entry 433 (clone OP-367) at 67.0 ft (20.4 m) for the third year in a row. However, both clones were statistically similar and highest for DBH (mean of 9.9 inches, or 25.0 cm), wood volume (mean of 4,259 ft3/acre, or 298 m3/ha), and biomass (mean of 83 tons/acre, or 185 Mg/ha). Additional studies of biomass/biochar production and use are planned at the site. Results indicate that hybrid poplar can flourish in a semi-arid climate, provided that BMPs are used for germplasm selection, site management and irrigation.

For more information, please contact Sam Allen, Ag Research Scientist, NMSU Ag Science Center at Farmington, (505) 960-7757, samallen@nmsu.edu

Viewable at:
https://www.researchgate.net/publication/321228979_Hybrid_Poplar_A_Potential_Multipurpose_Tree_for_Woody_Biomass_in_Semi-arid_Climates

And soon at:
https://www.eforester.org/Main/Library/JOF/Convention_Proceedings.aspx

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TROPICAL NOTES:
Recent findings of ecology or management of forest and fauna which tropical foresters should understand

Frank H. Wadsworth and Library Staff
International Institute of Tropical Forestry
USDA Forest Service
San Juan, Puerto Rico

Logging gap enrichment, well done, can pay

In southeast Para, Amazonia logging gaps were sown in 19945 with an average of 15 seeds per gap of *Schizolobium parahyba,* a fast-growing timber tree requiring but capable of exploiting the light of the gaps. Thirty percent of the seeds germinated, became established, and in 13 years grew to an average DBH of 25cm. In the 108 ha forest they had produced 3.1 m^3/ha/yr. The yield was round wood and laminated saw timber, worth more than alternative land uses.

G. Schwartz and others. Enrichment in logging gaps with *Schizolobium parahyba* (Huber ex Ducke). A financially profitable alternative for degraded tropical forests in the Amazon [Forest Ecology and Management 390: 166-172 2017].

US trade balance in forest products

US dollar depreciation and the purchasing power of the rest of the world produced the US in 2009 as the world's largest exporter of forest products. Imports suffered from economic depressions, less domestic consumption, and the Lacey Act, calling for sustainability.

Z. Duowey and others. Fr m d efecit to surplus: An economic analysis of US trade balance in forest products. [Forest Science 63 (2) 2017].

Andre Aubreville (1897-1982) French forestry pioneer

A product of the Nancy Forestry School, and realizing that tropical forest were under serious threat he joined the Colonial Forest Service and established forestry bodies that worked to assure what today is known as sustainable forest production. In 1939 he served as Inspector General of Water and Forests in French Equatorial Africa. He had already achieved renown as a botanist specializing in biogeography. At the age of 60 he led became Professor at the National Museum of Natural History in Paris. By that time his books reflect an encyclopedic mind visionary talent and clarity of thought. He was the first to point to secondary forests instead of primary forests. He had no doubt that timber would remain superior because of economic value. He advocated intervention always designed to prevent overexploitation.

J. Tassin. Andre Aubreville (1897-1982) a pioneering forester and a visionary mind.[Bois et Forets des Tropiques (3) 2015]

Nature protection in tropical Africa

A French delegation to the Bukavu Conference in 1953 submitted a recommendation which was unanimously adopted, calling for an overall policy for nature protection in Africa, not limited to Natural Parks and Nature Reserves, but including wherever people live. This includes spontaneous vegetation that protects water and soils and yet is not forest, termed "bush". A specific convention for Africa is justified because Africa is more seriously endangered than elsewhere because of the extreme climate that cannot sustain the undernourished population. Over and above a Charter for natures protection, the population must be protected without disregarding **their** natural practices.

Aubreville. A Charter for nature protection in Tropical Africa.[Bois et Forets des Tropique 2015]

Post-logging silviculture in Kalimantan

The magnitude and duration of silvicultural treatment on the growth of individual trees expected to make up the second dipterocarp harvest was monitored by different methods. Twenty-year data **from** permanent plots were used to compare treated and untreated tree growth. Trees were grouped by ecological traits and merchantability of their timber, an improvement in measurement. Rates of tree group diameter growth varied substantially compared to a fixed-species approach. Patterns and rates of tree diameter increment varied substantially as indicated by large differences among species groups. Treatment differences diminished over time. Logging followed by underplanting results in the fastest diameter increments. The study presents a useful approach to the analysis of growth data for tropical forests producing timber.

Ruslandi. Tree diameter increments following sylvicultural treatments in a dipterocarp forest inKalimantan, Indonesia. [Forest Ecology and Management 396:195-206 2017].

Forest services in Costa Rica

Costa Rica recognizes that the aggregate value of the environmental services offered by its forests constitute an enormous financial potential beyond the mere commercial value of the wood in the country's natural forests and forest plantations. Smallholder owners of natural forest and forest plantations receive direct payments for the environmental services that these forests provide to Costa Rican society and to the world at large. These payments are for carbon sequestration, conservation of soil water, preservation of biodiversity, and scenic beauty.

A law of 1996 provides the legal basis for payments for forest protection and improvement of the environment. Other laws and United Nations assistance have enabled Costa Rica to take a leading role in prevention of climate change. with participation of smallholders. A legislative program to assist forestry was broadened to include environmental values. Funding the payments first came from a tax on the consumption of crude oil and then from voluntary private sources and then international assistance attracted by Costa Rica's sustainable forests, including from the World Bank.

I.M. R. Zuniga. Paying for environmental services, the Costa Rican experience [Unasylva 212 Vol. 54:31-33 2003]

Mekong mangrove carbon storage

Mangrove forests are considered the most important carbon sinks in the tropics. Can Glo Forest Park is the largest restored mangrove in the Mekong Delta, Vietnam. Ecosystem carbon was quantified by measuring the biomass of trees, roots, downed woody debris, and sediment organic carbon. Above and below-ground ecosystem carbon ranged from 765 to 1,026 mgC/ha.Can Glo can store up to 41.5 TgC. Mangrove restoration enhanced C storage and offset C emissions.

L. V. Dung and others. Carbon storage in a restored mangrove forest in Can Glo Mangrove Forest Park, Mekong Delta, Vietnam.

Thinning for drought resistance

Comparisons indicated that thinning of broadleaves helped to mitigate growth reductions during droughts, apparently due to increases in soil water availability. In conifers, thinning improved post-drought recovery and resilience in growth. Thinning benefits decrease with time since last thinning. Growth resistance declines with tree age. Heavy thinning of both broadleaves and conifers improves growth response to drought.

J. A. Sohn and others. Potential of forest thinning to mitigate drought stress [Forest Ecology and Management 380: 261-273 2016].

Mahogany sustainability potential

An individual-based population model evaluates the natural development of big-leaf mahogany (*Swietenia macrophylla*) in unmanaged forests in southeast Amazonia. Only 12.5% of seedlings survive to merchantable size (60 cm DBH). Commercial-sized trees range naturally from 33 to 180 years of age, with a median of 74 years. Brazilian forest management regulations imply a rotation of 60 years, suggesting that naturally-spaced harvests may not be sustainable. With the vast spread in natural rotation, it appears that with minor silvicultural stimulation the Brazilian rotation can produce sustainably harvestable mahogany

C. M. Free and others. Management implications of long-term tree growth and mortality rates. A modelling study of big- leaf mahogany (Swietenia macrophylla) in the Brazilian Amazon [Forest Ecology and Management 330:46-54 2014].

Omitted is evidence in Puerto Rico that with timely thinning a mahogany rotation can be almost halved, and sustainability requires only 70 mature trees per hectare.

Silviculture with *Pinus canariensis*

Little is known about the effects of forest management on this species, which in dense stands has low seed rain, prohibiting regeneration. Seven years after a 60% basal area thinning was applied to a 60-year-old plantation. One result was increased seed rain during summer peaks, apparently due to reduced competition and rapid tree crown development. A result was increased seedling, sapling, and juvenile densities. It increased understory plant diversity but did not trigger plant invasion. Thinning is an important management tool for plantations that cover large areas in the Canary Islands.

R. Otto and others. Effects of thinning on seed rain, regeneration, and understory vegetation in a *Pinus canariensis* plantation. [Forest Ecology and Management 280:71-81 2012].

Woods and drought resistance

Eight tree species were compared as to the relation of their woods and performance in a drought climate of Costa Rica. Wood density, contrary to moist forests, in semi-dry climates proved negatively related with tree growth by drought-adapted species. It is indicated that fast growing species with light wood possessed a more efficient hydraulic system but closed their stomata early to prevent xylum dysfunction. Growth rate was positively related with tree size, foliar nitrogen content, vessel diameter, and leaf water potential. In tropical semi-dry climates, productivity is closely associated with foliar nitrogen and hydraulic wood properties.

S. Hoeber and others. The importance of hydraulic conductivity and wood density to growth performance in eight tree species from a semi-dry climate. [Forest Ecology and Management 330:126-136 2014].

Silvicultural restoration of the Atlantic Forest

Deforestation for urbanization and agriculture reduced the Atlantic Forest biome in Brazil. Two practices of reforestation with native tree species were compared: “traditional” is common low-input and “intensive” includes fertilizer and weed control. Six years after planting coarse roots and above-ground biomass with intensive silviculture had reached 23.3 MgC/ha, more that thrice that of the traditional practice. In C accumulation, the intensive practice achieved 12.8% of that stored in mature forest, only 3.8% with the traditional practice. Forest plantations aiming at restoration are practicable and are highly responsive to intensive silviculture.

Nesheim and others. Selective logging and regeneration of timber species in the Maya Biosphere Reserve in Guatemala. [Journal of Sustainable Forestry

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Search for sustainability in Guatemala

Reported regeneration of 12 timber species over 300 hectares of the Maya Biosphere Reserve and seedlings and saplings in a smaller area are both low compared with a proposal for reharvest in 25 years. The prospect for a progressively smaller harvest calls for forestry measures to sustain the yield.

P . Ferez and others. Silvicultural opportunities for increasing carbon stock in restoration of Atlantic forests in Brazil. [Forest Ecology and Management 350; 40-45 2015]

Regeneration in New Caledonia

In New Caledonia the secondary forests, although species rich, have a single dominant species. In nursery tests under light the dominants outgrew the subordinates. Under shade they grow equally. Under both conditions the subordinate species have higher root mass than the dominant species.In field conditions dominant species with shade intolerance may get ahead, to be followed by subordinate species due to better root development

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AGB in northwestern South America.

Above-ground biomass was determined in 32 1-hectare plots and the variation evaluated. The most important variable determining the magnitude of AGB in lowland forests is the number of large trees. Seasonably flooded forests may differ in species diversity relative to AGB. AGB also varies with the distance of animal seed storage, with flooding and fragmentation.

M. Aldana and others. Drivers of biomass stock in northwestern South American forests. [Forest Ecology and Management RG Journal impact 6 2016].

Agroforestry in Bangladesh

The cultivation of different plants around homesteads for subsistence and income has been a long tradition in Bangladesh. A review in the drouth-prone northwestern region of Bangladesh covered 96 homesteads and found 56 tree species in use. There is a strong preference for fruit trees rather than timber, and native species are popular. The most common fruit-bearing species is mango (*Mangifera indica*).

Sarker and others. Homestead agroforestry in Bangladesh[Journal of Sustainable Forestry 2016

Community management in Tanzania

The Tanzanian policy is that with formalized tenure by village community's results in increased incentives for sustained forest management. A review of northeastern Tanzania suggests that practices follow policy in terms of increased security of rights but without livelihood benefits while costs are unevenly distributed.

S. Rantala and others. Community-based forest management., What scope for conservation and livelihood co-benefits? Experience from the Usambara Mountains, Tanzania. [Journal of sustainable forestry 31 (8):777-797 2012

Leguminous trees alley-cropping with maize

A nitrogen-deficient soil in Hawaii was exposed to green manure from 5 to 12 dry tons /ha of branches of 9 leguminous tree species placed around maize. Maize without the branches yielded less than 600 kg/ha, and increased with the hedge to about 1,800 kg/ha for two seasons. It was determined that yield increased 12 kg for each kg of nitrogen applied.

Alley-cropping of maize with 9 leguminous trees. [Agroforestry Systems 1992]

Charcoal problem in Burundi

Wood in Burundi makes up 96% of the energy. Of this three quarters is consumed by the cities. This comes from 5,200 to 7,000 ha of forest per year. At this rate Burundi's forest cover will disappear in 25 to 33 years. To make the system sustainable, natural regeneration must be assisted the most productive, trees must be planted, waste to energy needs introduction, as should be alternative energy sources and improved stoves

F. Bangirinama and others. Charcoal as the main source of fuel for city dwellers: a serious problem for the conservation of Burundi's forest cover. [Bois et Forets des Tropiques 2015]

Teak for smallholders.

A sample of 221 farmers in southern Benin was reviewed. One third of these were small farms with labor dominant and the rest were larger with capital dominant. The market was for inexpensive poles for cheap construction timber. The first three motivations for tree planting were to earn income, to meet household needs, and to secure title to the land. The larger capitalization farms secure land tenure and an assured market were the motives, in that order. It was clear that land tenure and market are requirements for planting new trees on farms.

A.K.N. Aoudji and others.Teak, Tectona grandis l.f. planting in smallholders' farming system in southern Benin [Bois et foretS DES Tropiques 2015]

Additional Tropical Articles
Laura Burmann, RPCV Senegal, MS student, Michigan Technological University

Seed Dispersal and Potential Forest Succession in Abandoned Agriculture in Tropical Africa

Regeneration of human-disturbed lands is often dependent on seeds dispersed from off-site, many of which are deposited by fruit-eating birds. A study in Uganda measured bat and bird seed dispersal within a deforested agriculture area that is adjacent to Kibale National Park. Seed rain (numbers of seeds and seed species) was monitored for 6 months in short and tall grasslands, and below short, medium, and tall trees. Seed rain under all trees was greater than either grasslands and seed rain under tall trees was greater than under short or medium sized trees. Bats dispersed seeds mostly below tall trees, while birds were mostly responsible for dispersing seeds below small and medium trees. Over half of the seeds collected were from hemi-epiphytic Ficus that are unable to grow in the ground soil. One-third of the seeds collected were from shrubs. The results of the study suggest that in the African region, forest succession may proceed very slowly on degraded lands

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Duncan, S.R. & Chapman, C.A. (1999) Seed dispersal and potential forest succession in abandoned agriculture in tropical Africa. *Ecological Society of America.* 9(3):998-1008

Drought-induced shifts in the floristic and functional composition of tropical forests in Ghana

Abstract
The future of tropical forests under global environmental change is uncertain, with biodiversity and carbon stocks at risk if precipitation regimes alter. This study assesses changes in plant functional composition and biomass in 19 plots from a variety of forest

types during two decades of long-term drought in Ghana. A consistent increase was found in dry forest, deciduous, canopy species with intermediate light demand and a concomitant decrease in wet forest, evergreen, sub-canopy and shade-tolerant species. These changes in composition are accompanied by an increase in above-ground biomass. Results indicate that by altering composition in favor of drought-tolerant species, the biomass stocks of these forests may be more resilient to longer term drought than short-term studies of severe individual droughts suggest.

Fauset, S., Baker, T,R., Lewis, S.L., Feldpausch, T.R., Affum-Baffoe, K., Foli, E.G., Hamer, K.C., Swaine, M.D. 2012. Drought-induced shifts in the floristic and functional composition of tropical forests in Ghana. *Ecology Letters*. 15(10): 1120-1129

Does Urban Vegetation Enhance Carbon Sequestration?

Abstract
There are many cities that are developing policies to reduce their net greenhouse gas emissions by promoting greenery. Urban forests may represent an important carbon reservoir. Most assessments only consider carbon accumulated by trees and neglect the contributions from soil respiration and the emissions associated with greenery management. Studies in mid-latitude cities suggest that the carbon uptake by urban vegetation is small compared to the magnitude of the anthropogenic emissions. To investigate if the typically evergreen vegetation in (sub)tropical cities has a larger potential for carbon sequestration, the CO_2 flux data from two residential neighborhoods of Singapore and Mexico City were analyzed. Results suggest that (sub)tropical vegetation may act as either an emission source or sink depending on the species and characteristics of the trees and the amount and conditions of pervious surfaces for soil respiration.

Velasco, E., Roth, M., Norfod, L., Molina, L.T. 2016. Does urban vegetation enhance carbon sequestration? *Landscape and Urban Planning*. 148: 99-10

Carbon Storage in a Bamboo (*Bambusa vulgaris*) plantation in the degraded tropical forests: Implications for Policy Development

Abstract Summary
Carbon Sequestration in Tropical forest can potentially contribute to climate change mitigation. This study investigated the carbon storage potential of a common bamboo species, *Bambusa vulgaris,* at the Lawachara forest reserve in Bangladesh. Results showed that five-year-old *B. vulgaris* stand stored in total 77.67 t C ha^{-1} of which 50.44 t C ha^{-1} were stored in the above ground biomass (culms, branches and leaves), 2.52 t C ha^{-1} in the below ground biomass and 24.71 t C ha^{-1} in the soils. This amount of carbon storage is much more promising than the carbon storage of many other tree species of the reserve. These findings demonstrate the potential of *B. vulgaris* to be as a plantation species and thereby mitigate climate change impact more efficiently.

Sohel, S.I., Alamgir, M., Akhter, S., Rahman, M. 2015. Carbon storage in a bamboo (Bambusa vulgairs) plantation in the degraded tropical forests: Implications for policy development. *Land Use Policy.* 49:142-151

High-Resolution Global Maps of 21st-Century Forest Cover Change

A study was conducted from 2000-2012 with the purpose of quantifying global forest change. Earth observation satellite data were used to examine and map forest density, loss, and gain. During the 12-year study period, observations conclude a devastating loss of 2.3 million square miles, while only 0.8 million square kilometers were gained. Of the four climate domains (tropical, subtropical, boreal, and temperate), the tropical domain exhibited the greatest total loss and gain of forested area. The dry tropical rainforests of South America had the greatest loss due to deforestation in the Chaco woodlands of Argentina, Paraguay, and Bolivia. Also significantly high in loss were dense tropical forests in parts of Africa and Eurasia. Brazil, while the second highest in gross tropical forest loss due to decades of deforestation in the Amazon Basin, has seen a reduction of forest cover loss that can be attributed to policy-driven initiatives. Boreal forests were second to tropical forest in the absolute and proportional terms of change. Loss was largely due to fire of boreal coniferous and mountain ecozones, while gain is attributed to forestry efforts, agricultural abandonment, and forest recovery after fire.

Hansen, M.C., Potapov, P.V., Moore, R., Hancher, M., Turubanova, S.A., Tyukavina, A., Thau, D., Stehman, S.V., Goetz, S.J., Loveland, T.R., Kommareddy, A., Egorov, A., Chini, L., Justice, C.O., Townshend, J.R.G. (2013). High-resolution global maps of 21st-century forest cover change. *Science.* 342(6160):850-853

Bushmeat consumption in Africa

The human population in sub-sahara Africa has a historic dependency on wild animals as sustenance in their diet. This wild animal meat, known as "bushmeat", has been the primary source of protein for many forest-dwelling communities. Increase in commercial hunting, however, is threatening the sustainability of sourcing wildlife for consumption. This recent increase is attributed to several factors:

1. Improved roads reaching remote forests
2. Greater access to modern weapons
3. Population growth in urban centers
4. Cultural preferences for bushmeat over livestock
5.

For ungulates, such as antelope, populations may be able to bounce back after exploitation if surrounding habits remain undisturbed and hunting pressure does not increase; although, actual measurements of hunting sustainability of antelope are largely unknown.

Fa, J.E. (2016). Importance of antelope bushmeat consumption in Africa wet and moist tropical forests. In J. Bro-Jorgensen & D.P. Mallon (Ed.) *Antelope Conservation: From Diagnosis to Action* (1st ed., pp. 78-87). West Sussex, UK: John Wiley and Sons, Ltd.

Vulnerability of Disturbed vs. Undisturbed forest

A study in the Uttara Kannada District in India compares the composition of deciduous and evergreen forests that are classified as "used" and "unused" in order to determine the effects of human disturbance and climate change. Observations show that "more disturbed" areas had less biodiversity and variations in size class structure were noted, primarily in the 10-15cm dbh class. However, differences in biomass stock were low between the two, suggesting that community dependency on the forest has had minimal impact. Long-term monitoring is necessary in order to better understand human impact, but it is suggested the communities adopt "adaptive resource management" practices.

Murthy, I.K., Bhat, S., Sathyanarayan, V., Patgar, S., Beerappa, M., Bhat, P.R., Bhat, D.M., Ravindranath, N.H., Khalid, M.A., Prashant, M., Iyer, S., Beeber, D.M., Saxena, R. (2016). Vegetation structure and composition of tropical evergreen and deciduous forests in Uttara Kannada District, Western Ghats under different disturbance regimes. *Tropical Ecology*. 57(1):77-88

FORESTRY IN SCOTLAND AND THE UK

As Reported in *Scottish Forestry* (SF) the journal of the Royal Scottish Forestry Society (www.rsfs.org), Carol Crawford, Editor (editor@rsfs.org.uk)
Compiled by Richard Reid, SAF, Clarkston, WA
From the Autumn 2017 issue, Vol. 71, No. 2

Principal articles:

The RSFS Monitor Woods Scheme (p.6)

The Monitor Woods Scheme recognizes that the silvicultural challenges faced by forest and woodland managers are similar regardless of preferred outcomes. There is a recognized need to equip forest and woodland managers with the knowledge to meet the challenge of growing complexity. To help address these issues and to provide enhanced opportunities for practical learning, the Royal Scottish Forestry Society plans to establish a network of Monitor Woods throughout Scotland, The objective is to help forest managers improve resilience, sustainability and profitability as well as other diverse wider outcomes from

forests and woodlands. For more information contact the society at the above email address. This is a system that could be applied in the U.S. in the states.

Pine-tree lappet moth (*Dendro limus pini*) in Scotland: Discovery, timber movement controls and assessment of risk (p.34)

The pine-tree lappet moth is a pest of pine forests across Europe but until recently was not known to be established in Britain. In 2009 a small breeding population was discovered in pine plantations near Inverness in the Scottish Highlands. Populations have remained low since discovery and currently are much lower than those that cause economic damage in Europe. Restrictions on timber movement appear to have been effective at preventing spread, but there are early signs of short distance range expansion. Climate analyses predict a risk that with warming summers in eastern Scotland it will become increasingly favorable for damaging outbreaks."The debate continues about whether pine-tree lappet moth is native or non-native to Scotland as well as whether it represents a serious risk to Scotland's native trees." Senior author Roger Moore can be contacted at roger.moore@forestry.gsi.gov.uk

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Other articles of interest:

Pruning broadleaves (P. 44)

Over the past several years there has been a movement in Scotland to diversify its forests, where appropriate, away from conifer plantations by expanding the planting for broadleaved (hardwood) species. This article is a discussion of policies and techniques applied to pruning broadleaved trees for timber production.

Assessment of the value of the UK Annual Forestry Index for calculating the profitability of forestry investment in the United Kingdom (P. 47)
The UK Annual Forestry Index was established in 1992 to provide an annual measure of the investment worth of forestry in the UK. The reliability of the index, however, has been called into question over the very high returns on forestry investments claimed in recent years. This article looks at the input data and the calculations used in the index to determine the validity of these criticisms and makes suggestions on how the index can be improved.

A Letter of Interest from Jim Pratt, West Linton

Intercontinental spread of tree diseases: a cautionary tale from Italy. (P. 7)

Note from the editor

Feel free to send this newsletter on to others.

Many thanks to the many contributors to this issue. It is the most substantial issue to date.

If you would like to be added to the distribution list for the newsletter, send an email to Blair Orr (blairorr@ymail.com).

- Blair Orr, IFWG Newsletter Editor
(blairorr@ymail.com)

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http://www.fao.org/forestry/infonews/en/

Unasylva

http://www.fao.org/forestry/unasylva/en/ - An FAO forestry publication going back to 1947.

Global Forest Information Service (GFIS)

https://www.gfis.net/gfis/en/en/ (also available in Spanish and French) Global Forest Information Service contains up-to-date information on news, events, publications and job vacancies (on the homepage) and lists other info resources such as databases, as part of the GFIS system.
