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Contributed Articles

Rainfall, Climate and the Panama Canal

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I first experienced the rainfall in Panama when I was a soldier there from 1958-1961. I worked shiftwork. The afternoon shift, which ran from three PM until eleven PM was the one during which we usually got thoroughly drenched. The downpours there are amazing in their volume and in their ability to block one's vision. This is the wet season.

From May to December, at the Southern end of the canal, there are about 101 days in the wet season during which 68 inches of rain falls. On the northern end, the season lasts about 198 days and delivers about 132 inches of rain. During the dry season, very little rain falls.

Of course, it is this plentitude of water that supports the operation of the Panama Canal. During the construction of the canal, the Chagres River was dammed. This allowed the storage of vast volumes of water. The resulting body is called Gatun Lake. It is within this lake where we find Barro Colorado.

In January,2017, I was visiting the Smithsonian installation on that island. By happenstance, I met a Panamanian forester there, Mario Santamaria. It was my good luck that we had an hour together in the woods. He introduced me to several trees and herbaceous plants and explained some of their uses: food, medicine and art.

Barro Colorado, Panama

I was not prepared to take notes on his botanical knowledge. However, one thing he told me stands out in my mind: the previous dry season (2015-2016) had been much longer than normal. So much so that the canal's managers are considering directing another of Panama's many rivers into the canal system.

Are longer dry seasons, which could negatively affect international commerce, a product of man-caused climate change?

INDIGENOUS AUTONOMY: A NEW PARADIGM FOR FOREST CONSERVATION?

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Twenty-six years ago, Kent Redford published a provocative article entitled "The Ecologically Noble Savage"[3] that postulated a conservation ethic was not a determining factor that guided indigenous peoples' uses of forest resources. We believe it is time to take a fresh look at the growing momentum of the indigenous autonomy movement and what it may mean for forest conservation. We recognize that traditional knowledge is an important asset that indigenous and rural peoples can bring to ecologically sound conservation programs and forest research inquiries.

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[3] Redford, K. 1991. The ecologically noble savage. Orion 9: 24-29.

The recent proliferation of national governments granting considerable to nearly full autonomy to native peoples, e.g., Brazil (Indigenous Reserves), Canada (First Nations), Colombia (Resguardos), Panamá (Comarca de San Blas), and United States (Native Americans) typically includes control over natural resources such as timber, wildlife, and fish. However, governments usually retain control and rights to "underground resources" such as minerals, natural gas and petroleum. But indigenous or tribal peoples may have very different ideas and attitudes about harvesting—let alone managing—their forest resources. Indigenous autonomy all too often runs into obstacles and opposition when the autonomy is rescinded or ignored for mega-development projects such as dams, highways, petroleum exploration/production, agri-business ventures or tourism. These types of conflicts are also occurring with other forest conservation efforts, such as with reserves for indigenous groups and particularly with the addition of large areas of "wilderness" to the national systems of protected areas.

One of the new challenges associated with this paradigm shift is the need for forest managers and researchers to both understand and respect indigenous autonomy in the context of which native communities find themselves. Spiritual owners/keepers of forest resources tend to be important determinants of how and when these resources can or should be taken. For example, hunters may be limited to a specific lunar phase for only one species and to have received the spiritual owner's blessing to kill that individual animal. But there is a worrisome trend of indigenous persons adopting the extractivist western model, particularly for high-value minerals such as gold, or timber like mahogany and rosewood. We also note increasing resistance by indigenous people to allowing scientific research to be conducted in their forests.

Indigenous and rural peoples have the legal right to make decisions on the use (or management) of their forest resources. One of the great challenges for everyone is to build a culture of respect and support for indigenous control and management of their forest resources. A critically important corollary of indigenous autonomy is that potential collaborators must invest much greater time, effort and resources into building new partnerships. The era of commando-style approaches to ripping off the forest resources of tribal and rural people is over.

Production, Protection and Uncertainty in Forests: Overlooked Relations

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Situation: The trend of ill-treating and overusing our common resources from timber to habitat continues. Who is to blame depends on the ideology and history distortion of the accuser. This situation is not sustainable however one looks at it. Truth, good sense and good forestry practice are ignored worldwide, even in Germany. First, we had and still have the notoriously ill-conceived campaigns against tropical timber use and forestry for production in general: *Baum ab, nein danke* (tree felling, NO, thank you). Second, now even diplomacy and populism overruled good sense and good forestry practice. The Federal German Government committed itself at an International Biodiversity Conference to put 5% of the current, sustainable production

forest under total production and tending ban for the sake of nature observation. The aims are to do the same as with committed developing nations and to create an opportunity to observe what happens. This is expensive, scientifically absurd and against sustainable development (ref. the recent debate in *AFZ/Der Wald, vol. 2016 and 2017)*. The level of absurdity meets what Frank Wadsworth indicated with respect to ecological research in a 2015 letter to me: *"Several trends have appeared. The subject matter has slipped from conventional forestry over into ecological details, only some of which are relevant for foresters. Some ecologists discover and publish what was forestry a century ago"*. That is very true and does not only apply to ecology and forestry.

As an undergraduate at Goettingen University, Hann.-Muenden, I felt something was missing. I sense a wide gap between basic nuclear- and astro-science on one side and the science, technology and practice of forestry on the other. If the principles of *Quantum Mechanics, Relativity, Uncertainty* are the creation of the Big Bang ("*The Word"*), they should have undoubted relevance to all aspects of life now.

In 1949, I gave an introductory talk to fellow forestry students on *Heisenberg's Uncertainty Principle*. None of us really grasped its significance and relevance, but we all felt that there was something in the air for the future. Later, as a practical forester in the 1960s, I marvelled at the indifference of most forestry planners towards probability and risk. Much later in the 1980s, I asked some of those fellow students who had the privilege to have worked as *Forstmeisters*: "In your career, did you achieve your main targets and goals in silviculture, management or utilisation?" Their answer was: "*With good luck, the short-term targets but long-term goals, hardly."*

Assuming that the of principles of uncertainty, relativity and quantum physics (plus mutual induction) are intrinsic and common to all naturally evolved and all constructed anthropogenic (social, political, economic, financial and technical) ecosystems, they must be considered in analysing and planning. Intuitive, empirical or mechanistic interpretation of the dynamics of natural or anthropogenic ecosystems is not enough. Human folly and greed have blindly and unnecessarily added topical threats to human survival, among them Global Climate Change (GCC). A possible reversion of the magnetic poles adds uncertainty and insecurity. We can, in this situation, no longer tolerate the steadily increasing and wasteful rates of natural resource exploitation and the associated habitat deterioration. More responsibility, care and holistic far-sightedness in treating the planet are required.

Since Heske's inauguration of World Forestry in 1931 and Möller's *Dauerwald* concept in 1922 (easy and brief descriptions of both in Bruenig, E.F., 2016, Sect. 3.8: 153 - 155 and Chapt.6: 195 ff.), the awareness of the need for more responsibility and care grew in good forestry. While Heske's concept of forest ecosystems equalling an organism is misleading, his and Möller's holistic approach to studying and managing forest ecosystems is sensible and feasible. Heske sensed a greater, but invisible power acting on and interacting in the matter and energy exchange processes of natural ecosystems. The question now is whether these powers and their laws of interaction could be as much the product of the *Big Bang* as energy, matter and laws which are defined in atomic sciences. Uncertainty, relativity and quantum are principles profusely and daily demonstrated by nature and also in diverse ways by human beings in their interferences.

This applies globally to good forestry as much as to the current boom of post-modern and post-post-modern abuse. The present situation in the world is characterised by booming unintentional and intentional deception (Flyvbjerg, B., 2017; Flyvbjerg, B. in Bruenig, E.F., 2016) in the political, economic and financial sectors. This urgently requires global attention and redirection to truthfulness.

Figure: During many centuries of using and tending this natural Mixed Broadleaf forest, villagers realised an intuitive concept of integration of production and protection. Natural or logging gaps were enriched by planting the favoured species, Cherry (brownish crowns) and Sugi (dark crowns). Forest utilisation increased α- and β- biodiversities. Shirakawa-go, Japanese Alps.

Special Problems in Forestry: A young native Sarawakian forest officer told me at a Charity some years ago: *"In the 1950s, you protected our forests against us, now we must protect "your" forests* (i.e. the communal, protected and reserved forests and the present *Heart of Borneo Concept* which the native Sarawakians and the local and colonial officers established together in the 1950s – author's comment) *against others"*. The "others" are, and in forestry, always have been the greatest problem. In its first report in Nairobi, 2013, the UNEP - Interpol investigation into the black (illegal) timber market uncovered the existence and activities of *Networks of Organised Crime"* in forestry and forest products trade in Tropical America which operate globally (UNEP-Interpol, 2013, cit. in Bruenig, E.F., 2016). I am not aware of any further activities and reports on Africa and Asia, which may indicate problems. The environmental consequences of these illegal, exploitative and destructive network activities are manifold. They

include diversion, disruption and devastation of energy and matter feed-back loops and cycles in forests, landscapes and bio-geographic regions. In the economic and financial sectors the loss of resources and illegal outflow of money are covered by deception. Sustainable development planning is manipulated to substitute facts by convenient alternatives. No national or international authority is powerful, independent or motivated enough to tell the truth, flush and clean the Augean Stables and terminate the spread of the habitual deception. Even NGOs fall victim to pressure and temptation in favour of funds.

The great biodiversity of tropical rainforests had been first described by a Chinese geographer, one-and-a-half millennia ago, and interpreted as the indicator of harmony (C.W. Wang, 1996, in Bruenig, E.F. 2016). Today, the public debate is more concerned with biodiversity, focussing on "cute" animals and rare plants, while the more crucial substitution of unsustainable raw material or energy sources meets less committed public response.

Repair work in aid: Repair strategy remains the favoured choice in aid projects. In forestry, ecology (biodiversity, nature preservation), silviculture (tree planting), REDD+ schemes and social or legal improvement for the local people are popular public funding themes. Most overseas R&D aid projects typically concern narrowly focussed repair work. Holistic approaches are rare and confined to scientific research, as in the Unesco-MAB and IUBS programmes. The World Forestry concept (easy and brief reference in Bruenig, E.F., 2016, Sect. 3.8: 153 - 155) at first sight looks like an out-of-step theory, but is realistic, feasible and offers ways to solve the problems sustainably. The interdisciplinary programme to investigate the situation, problems and ways-out of the Indonesian peatswamp cut-and-burn calamity was well designed at the Kyoto University Centre of Excellence. Twelve Japanese and two Indonesian scientists, did three years of comprehensive interdisciplinary field work in the peatswamp forest of Sumatra. In the execution, the project (K. Mizuno *et al.*, eds., 2016) offered repair strategies and the concept of biomass culture. One of the two giant timber, pulp and paper corporations (which was one of the corporations responsible for the cut-and-burn calamity) took it upon itself to manage and administer a large Unesco Biosphere Reserve in the area. This may provide a hint to explain the lack of holistic problem solving.

The System Approach. This approach has been the trademark of World Forestry. The concept has its roots in the *Close-to-Nature* and *Socially Responsible Forestry* in the early 19th century. World Forestry must not be confused with the differently orientated and implemented International Forest Policy. The integrating effect of the WF concept helped R&D and the Unesco-MAB programmes to design sustainable development concepts in the tropics, in China and worldwide. The next step is to achieve sustainability of resources by substitution and habitat improvement by protection. In this demanding task, the atomic sciences can offer guidance to solve the technical, economic, financial, social and spiritual problems in a world of conflicts, deception and uncertainty which must be considered and natural laws which must not be offended.

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Forest Pathology Trip to the Western Pacific.

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From March 15th to April 18th, Phil Cannon (Regional Forest Pathologist for R5) made a trip to the western Pacific area with the purpose of working with partners towards further understanding and resolving the *Phellinus noxius* butt-rot problems impacting forests in this vast region of the world.

The Hong Kong government hosted the first leg of this trip as *Phellinus noxius* is causing unacceptably high losses of the "Old Venerable" banyan trees (*Ficus microcarpa*) in that city. The remainder of the trip was spent in Guam, Yap, Rota, Pohnpei and Kosrae and was financed by the U.S. Forest Service. A total of eight power point lectures were given on *Phellinus noxius* and its management and three more power point lectures were given on the molecular genetics of this fungus. In addition, a total of 10 days were spent in the forests with local forestry staffs to demonstrate how to correctly identify this fungus and also how to efficiently control it.
A few other forestry activities were conducted by Phil during this trip including four days of participation in the Pacific Island Forestry Conference, one-half a day in the "First Agroforestry

Meeting for the Federated States of Micronesia", one day conducting a survey of *Serianthes nelsonii* health in Rota, one day setting up a fertilizer trial in Yap, and one-half day considering possible biochar applications in Yap and Palau.

Figure1. James Manglona shows a Phellinus noxius-infected breadfruit tree on his farm in Rota, a remote but beautiful island in the western Pacific. The "black sock" climbing up the outside of the bole of this tree is actually the mycelium of this butt-rotting fungus. This white part of the root in the lower right-hand corner of this picture shows where a chisel was used to remove a sample of this fungus. The fungus was later isolated onto selective agar in a petri plate and then sent to the Ned Klopfenstein USFS Forest Pathology Lab in Moscow, Idaho for a molecular analysis of its chromosomes.

Valledupar, Colombia Consultancy on Urban Tree Health

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In October of 2016 Phil Cannon accompanied Camille McCarthy, George Hernandez and Dana Coelho to Valledupar, Colombia to determine why urban trees of that municipality were experiencing such poor health and to recommend solutions. Twelve locations were visited during this trip and all possible biotic or abiotic agents were considered for their possible influence. We found that there were a few fungal problems that were causing some problems in the urban forests of Valledupar (eg anthracnose of mango leaves, butt rot of algorobino, and defoliating insects), but, within the city limits, these were causing minor damage compared to the huge

impacts that had taken place as a result of stem breakage and/or poor pruning practices which, in turn, had provided termites (*Cryptotemis brevis*) with an easy way to get into the heartwood of the poorly-pruned trees. The need to prune these trees was most seriously felt by the electrical companies that wanted to make sure that the limbs of these rapidly growing trees would not interfere with the power lines of the city. The use of small planting boxes was another problem commonly observed. In the future, a lot of the urban forestry problems of Valledupar can best be resolved if city planners give sufficient recognition of the spatial needs of each of the tree species that they want to plant and then make sure that they are given enough space so as they grow they do not impinge on the infrastructures that are also a part of the urban forest (eg sidewalks, streets, power lines, buildings). Better pruning practices would also help a lot.

Figure2. In Valledupar, Colombia, termites and butt rot fungi have a great opportunity to get established when big branches break off or are hacked off by machetes. Note the powerlines overhead which probably necessitated this "pruning".

Status of the Borneo Forestry Cooperative: August 2017

2017 marks the seventh year since the Borneo Forestry Cooperative (BFC) was formed. This document sets out the objectives of the cooperative, documents the current legal and financial status, reviews the progress made and acts as an introduction for interested organisations.

The **objective** of the BFC is to improve the productivity and profitability of tree plantations in Borneo, and indirectly in the tropical regions of the world. This is being undertaken by advancing the relevant silviculture, pest & disease, wood properties, harvesting impacts as well as tree improvement programs based on the sharing of germplasm. Information is shared between member organisations as regards BFC field trial results and analysis. Fundamental to this objective is the upgrading of the research capabilities of member companies via support from specialists and stimulation through regular contact with fellow researchers. The **philosophy** is essentially that by sharing information everyone benefits as enshrined by the quote "cooperation and collaboration are the keys to innovation". Member companies continue to cooperate and collaborate with other national, regional and international organisations including universities, NGOs and others.

The cooperative was formed in 2010 between two founder members Sabah Softwoods and Asian Forestry Company (Sabah). Since then two further companies from Sabah, Sabah Forest Industries and Acacia Forest Industries have joined while Jaya Tiasa Holdings from Sarawak was a member up to December 2016. Araya Bumi Indonesia is the most recent member to join beginning July 2017. The strength of the BFC lies in establishing complex (breeding) trials across a number of companies allowing for analysis of responses over a wide range of sites and conditions. There are also obvious advantages in sharing costs and other research inputs.

Legal aspects. The BFC is run by an Executive Committee consisting of one senior manager from each member company and the chairman David Boden of Boden & Associates. The Executive Committee meets once a year at the same time as the annual technical meeting and field day. The cooperative initially operated under a non-binding Memorandum of Understanding but in November 2016 it was registered as the legal company BFC Research & Development Sdn Bhd in Malaysia. This allows the cooperative to operate its own bank account and to operate under its own constitution.

It order to minimise administrative issues and liability, the company has three shareholders which also serve as members of the Board i.e. one each from the Founder members Sabah Softwoods and Asian Forestry (Sabah) Company and David Boden. This Board will have a non-executive function but is required to comply with the legal regulations, and will be run according to the decisions made and budget set by the Executive Committee. The objective of the

company is not to accumulate profits but to reinvest funds received from joining fees and sales of seed etc. into the development of the R&D capacity of the Cooperative.

Fees. There are two sets of fees:

- A joining fee is paid by any new member and is based on the amount of relevant germplasm brought into the BFC. These fees are used to purchase additional germplasm for use in the breeding programs, to purchase equipment, to assist with the development of the R&D capabilities (travel costs to symposiums etc.) and occasionally to bring in experts for seminars. These fees will be paid directly to the cooperative;
- Each company has an annual contract with Boden & Associates to provide specialist support for (a) the Core tree improvement program which also includes pest & disease and wood quality sub-programs, and (b) the Supplementary programs which may include silviculture, harvesting, growth & yield, bio-technology etc. The annual Supplementary program is optional – typically this will vary from 0 days for smaller companies to 40 days for larger companies. The travel costs of the support specialists are shared among members;

There are four **categories of membership**:

- Founder - Sabah Softwoods and Asian Forestry (Sabah) Company;
- Full - members who actively participate in the joint tree improvement program and who undertake to share germplasm and information;
- Association - membership by a group of companies;
- Affiliate - organisations who do not participate in the breeding programs but who want to maintain links with the BFC through meetings, workshops and web site (when it becomes available) - this category would be suitable for academic and other R&D organisations and interested companies.

Summary of the **Tree Improvement Programs**. *Acacia mangium* was initially the focus species but the increasingly negative impact of the *Ceratocystis* pathogen saw a change to *Eucalyptus pellita* in 2012. The main thrust with *A. mangium* is currently to screen for disease resistance with anticipation that *Ceratocystis* resistant clones can be developed over the next 2 to 4 years. After four years the *E. pellita* program has tested c.300 families in 14 progeny trials (which will be converted into seed orchards) and 10 seed source trials (to be developed as Seed Production Areas). A clonal program commenced in 2015 and a hybrid program commenced in 2016. Albizia *(Falcataria moluccana)* is currently the second main species of interest with Sabah Softwoods having 2nd generation Seedling Seed Orchards and actively working on deployment options using tissue culture techniques. Other species will be added to the program as required.

Embedded in the tree improvement program are the sub-programs of silviculture, pest & disease and wood quality. The overall objective is to produce high quality timber for the solid wood (or pulp) markets that is resistant to the known and anticipated pests & diseases. There is currently a strong emphasis on wood quality for solid wood products such as plywood and sawntimber.

Support specialists currently used for the tree improvement program include Dr Jeremy Brawner (genetics), Prof Mike Wingfield & Dr Simon Lawson (pest & disease), Dr Roger Meder (wood quality), Paul Macdonell (technical support) and David Boden (coordination). Specialists

used in the supplementary programs include Kevin Molony (growth & yield), Cathy Hargreaves (bio-technology), Bruce Calder (harvesting & transport), Dr Tim Smith (nutrition), David Boden (silviculture) and Brad Shuttleworth (operational efficiencies). All these specialist have extensive experience working in south east Asia.

Requirements for potential members. A full member must have the R&D capability to establish complex breeding and silvicultural trials according to the protocols set by the BFC. This includes correct labelling in the nursery and field, compiling of establishment reports and maintaining detailed records of individual families, and sound trial layout and measurement procedures according to the BFC protocols. Specialists supporting the program will visit the sites to ensure conformity while new R&D teams are encouraged to visit their fellow teams in the established companies. A fundamental requirement is the sharing of BFC field trial results and germplasm. All trials must be established under Best Operating Practices – for this reason silviculture and (site sensitive) harvesting are important auxiliary programs with the cooperative.

The **annual program** will include a number of set trials that need to be established and measured by all members, entering all results onto the BFC database so that they can be collectively analysed by Jeremy Brawner. Also included are annual board and technical meetings together with a field day; workshops on key issues, internal quarterly meetings, and seminars as required with inputs from outside specialists via presentations and/or on-site visits.

The **vision of the BFC for 2022** is three fold viz:

- From the Tree Improvement Program to have developed for the tropical regions of Southeast Asia, a range of eucalypt hybrids of high productivity for both solid timber and pulp markets, the re-introduction of *Ceratocystis* resistant *A. mangium* and/or *A. mangium x A. auriculformis* hybrid, deployment protocols to allow for wide scale planting of high yielding *F. moluccana* clones and the development of site specific thinning and pruning regimes to optimise the above germplasm;
- To have developed research staff of the member companies to a regional and/or international level of competence through intensive mentoring on all aspects of R&D, further fostered by frequent interactions between research staff of different companies;
- To have applied this R&D resulting in profitable and sustainable tree plantation companies with access to a wide range of down-stream processing options;

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Report on the North Carolina State University Chapter of ISTF

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The NC State Chapter of the International Society of Tropical Foresters (ISTF) is a student-run non-profit organization. ISTF acts in concert with the Department of Forestry and Environmental Resources (DFER) and the College of Natural Resources (CNR) to enhance the international dimension of forestry studies at NC State University. With members from all around the world, the group's objectives are: (i) to advance the science, technology, education and practice of professional forestry in the tropics and, (ii) to encourage and support international activities in DFER and CNR. ISTF promotes the personal and professional development of members by organizing travel to conferences and hosting research symposia.

Our ISTF chapter hosts monthly meetings with guest speakers. In a relaxed environment that always includes food and refreshments, usually a potluck, students have the chance to interact with guest speakers from all over the world. This year, researchers presented on topics such as the history of land use change in a national park in southern Brazil, and local perspectives on a food security program in Panama. We have also hosted guest speakers from NGOs such as the Rainforest Alliance to expose our members to the broad spectrum of job opportunities available in industry, non-profit, government, and academia. In addition, our chapter of ISTF brings a group of students and presenters to the symposium organized by the Yale chapter of ISTF every year. Our members have presented their research and moderated sessions at the event.

NC State student Matthew Jurjonas presents at the Yale University ISTF symposium.

NCSU faculty and students recognize participation in ISTF as an important way for students to develop their skills and increase networking. Our former members hold a diversity of positions as researchers, consultants and faculty around the world. Our community of current members and alumni seeks to contribute to the study of tropical forests and to participate in some of the most important dialogues of our time concerning the future of tropical forests.

If you will be visiting the NC Research Triangle and are interested in meeting with our group, please contact us. The officers for the 2017 - 2018 academic year are Bruno Kanieski (bkanies2@ncsu.edu), Matthew Jurjonas (mdjurjon@ncsu.edu), and Henrique Scolforo (hfscolfo@ncsu.edu).

Seminar on the state-of-the-art of forest management models, methods and decision support systems - the SuFoRun perspective

Authors/organizers: Jordi Garcia-Gonzalo (Forest Sciences Center of Catalonia - CTFC), José G. Borges (University of Lisbon), Marc McDill (Pennsylvania State University), Manuela Oliveira (University of Évora), and Carla Bellera (CTFC).

Summary: This international seminar focused on the presentation of models, methods and decision support systems available at SuFoRun (http://suforun.ctfc.cat) institutions that may be used by public administrators, forest owners and industry for forest management planning in a context of global change. This seminar was part of a series of annual meetings that are being organized under the SuFoRun international R&D project (http://suforun.ctfc.cat/).

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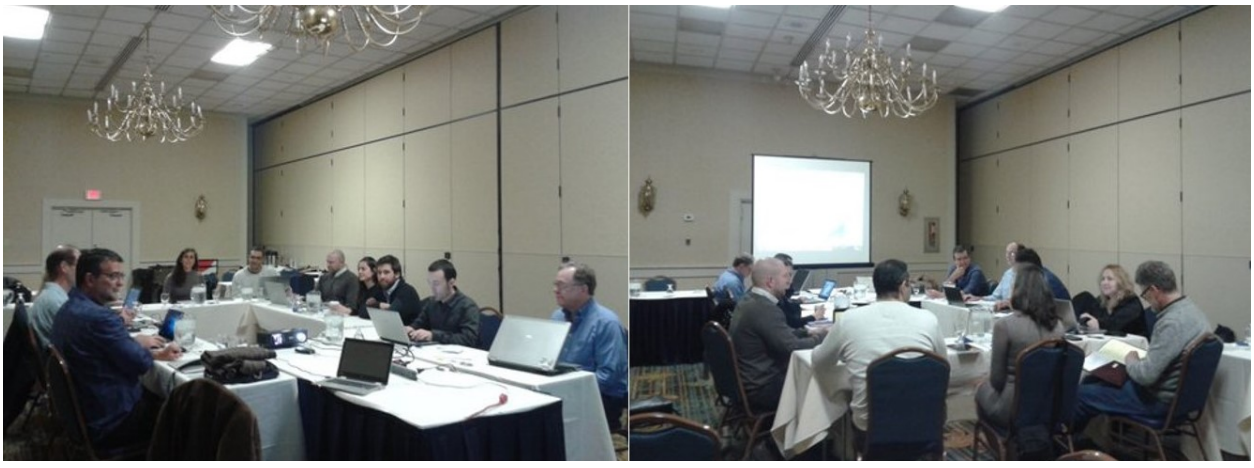
The seminar took place January 19th-20th 2017 in State College, Pennsylvania, USA. It was organized by the Forest Sciences Centre of Calanoia and the School of Agriculture of the University of Lisbon and it was sponsored by IUFRO Units 4.04.04 and 4.04.06. This seminar was the second of a series of annual meetings organized in the framework of the project 'SuFoRun', supported by a Marie Skodowska-Curie Research and Innovation Staff Exchange (RISE) within the H2020 work programme (H2020-MSCA-RISE-2015) under grant agreement No 691149 (http://suforun.ctfc.cat/). SuFoRun focuses on forestry and climate change interactions, including the development of adaptive forest management tools.

The seminar involved 20 participants from 14 countries in Europe and America. Its program encompassed presentations from research institutions in the SuFoRUn consortium which includes the Forest Sciences Centre of Catalonia and the Technical University of Madrid in Spain, the School of Agriculture of the University of Lisbon in Portugal, the University of Eastern Finland, the Swedish University of Life Sciences, the University of Freiburg in Germany, the Pontifica Catholic University of Chile and the University of Chile in Chile, the

Pacific Northwest Research Station, the University of Washington and the Pennsylvania State University in the USA, the University of S. Paulo in Brazil and the Centro Agronómico Tropical de Investigación y Enseñanza in Costa Rica. The first part of the seminar focused on the characterization of the state-of-the-art of forest management models, methods and decision support systems developed in SuFoRun partner institutions while the second part addressed specific ongoing research and potential synergies with the exchange program.

The seminar fulfilled its objectives. It provided a forum that facilitated the exchange needed to advance the knowledge about forest ecosystem management. It worked well as a venue to convey to researchers the open problems that require further study and research in the key areas to be addressed by this exchange program. These encompass a) forest modeling to acquire knowledge about forest ecosystem dynamics and disturbance (biotic and abiotic) regimes, b) development of forest management planning methods to address ecosystem services supply, to assess risks and to produce trade-off information and c) development of intelligent ecosystem management decision support systems as technological platforms needed to implement models and methods and comunicate information to stakeholders. A conference is being co-organized in Squamish, Seattle, with the University of Washington in August 2017 and a workshop is to be organized in Spain in September 2017 to further strengthen research collaboration in these scientific areas and to promote dissemination activities (http://suforun.ctfc.cat).

Conference webpage**: http://suforun.ctfc.cat/seminar-the-state-of-the-art-of-forest-management-models-methods-and-decision-support-systems-the-suforun-perspective/**



Participants at the seminar 'The state-of-the-art of forest management models, methods and decision support systems - the SuFoRun perspective', State College, USA, January 19th-20th (photos by José G. Borges).

A BRIEF ON MAASAI MARA UNIVERSITY

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Maasai Mara University motto is "eng'eno e puuan" which is Maasai for "knowledge is prosperity". The University is guided by core values of excellence, professionalism, teamwork, creativity and innovativeness, transparency and accountability, equity and social justice. Maasai Mara University is a Fully Chartered University located in Narok County, Kenya. It neighbors the World famous Maasai Mara National Reserve and the Mau Forest Complex which is the Water Tower from which major rivers including the Mara River which drains into Lake Victoria originate. Narok County is home to the culturally renowned Maasai people who represent the face of tourism in Kenya. The University's proximity to the Masaai Mara National Reserve and the Mau Forest Complex enables the institution to undertake increased research activities, in partnership with other scholars, environmentalists and funding agencies. This is aimed at contributing to the conservation of the natural resources and the long term national development goals.

A challenge shared by all universities is to help to generate the intellectual property which will create new jobs, and to educate and train people to work in fields where they will be valued both for their specialized knowledge, and for their ability to research, communicate and solve problems. To facilitate realization of this goal, the University offers postgraduate, undergraduate and diploma level academic programs distributed in five different schools, namely: School of Tourism and Natural Resources Management (3 departments), School of Education (3 departments), School of Science (4 departments), School of Business (2 departments) and school of Arts and Social Sciences (2 departments). These programs are offered after a thorough demand assessment, and are responsive to community needs and give the students and the community the capacity to solve real life and day to day social, economic, livelihood and environmental challenges. Other new programs currently being developed by the university are in the field of Nursing, Health, Law, Cultural Studies, Indigenous Knowledge, Citizen Science, and Alternative Energy, among others.

Maasai Mara University encourages interaction between researchers and local community through outreach activities which support sustainable development. To facilitate community related activities, the University established the Mara-Mau Outreach and Resource Centre. The center has helped the University to successfully reach out to the community and implement initiatives which involve the participation by members of the community and interactions between the community members and students. Through research and outreach programs, the University supports the economic, educational, social and cultural development activities of the community. The University contributes significantly to the conservation of natural resources by engaging the students in forest rehabilitation through tree planting especially in the highly threatened Mau Forest which is adjacent to the University. Through research and advocacy the University contributes towards the conservation of wildlife.

The University through Research and collaboration with stakeholders and other partners strives to contribute significantly to the restoration and scientific management of this critical resource for sustainability. Maasai Mara University is at the Gate of the Greater Maasai Mara-Serengeti Ecosystem 'the seventh Wonder of the World' which hosts the largest number of wildlife species on earth and which is under threat. The University is establishing Research and extension Programs in Wildlife and Environmental Conservation in the effort of protecting the endangered Maasai Mara-Serengeti Ecosystem.

Tourism is Kenya's second highest income earner - the University intends to collaborate with stakeholders and other partners to strengthen these programs by; Enhancing quality human resource production Diversifying tourism products i.e. Eco-Tourism, Cultural Tourism and Community Based Tourism and Promote sustainable development of tourism resources.

Maasai Mara University recognizes the importance of partnerships and cooperation with other institutions with similar objectives for purposes of internationalization of its programs. In this regard, the University has developed collaborations with International and local Universities including Clemson University, University of Maryland in Wildlife and Environmental Education, Chinese Academy of Sciences, Aarhus University. The University is presently exploring collaboration with Northern Arizona University in Forestry, Hotel and Hospitality and Nursing. These collaborations provide opportunities for joint research, staff and student exchanges and for our students to travel abroad for Graduate Studies.

The Brookfield's Forestry Business Division implements INFLOR Forest for managing forest assets in Brazil

The Brookfield's Forestry Business Division is committed to optimizing the processes to improve results, and adopts the INFLOR Forest (SGF) solution for administering 290 thousand hectares of forest plantations in Brazil. The deployed system releases integrated and highly-reliable information in a single platform that standardizes and structures the work of the six companies administered by the group, which act within the forestry industry.

The company's forestry activities in the country, which use the INFLOR Forest solution, were started 40 years ago and have pine and eucalyptus plantations distributed in seven states: Bahia, Espírito Santo, Minas Gerais, Mato Grosso do Sul, Paraná, Santa Catarina, and São Paulo.

The forest assets under management address the demand of the cellulose, industrial gases, civil construction, iron and steel, and furniture industries. The challenge was to incorporate, in a single database, all the processes that are part of those operations, facilitating the management and accelerating the closing of the monthly result.

For more information: http://www.inflor.com.br/en/brookfield_implements_inflor/

Norway, France urged to block DR Congo forestry project

Climate Change News reports on a large forestry project in DR Congo. The link:

http://www.climatechangenews.com/2017/07/14/norway-france-urged-block-dr-congo-forestry-project/

From the archives:

Firewood was stockpiled in Hakaniementori Square by the Finnish government during the two World Wars.
Photo from Helsinki History Museum. No known copyright restrictions.

https://forum.axishistory.com/viewtopic.php?t=172747

The SAF National Convention
November 15-19, 2017: Albuquerque, New Mexico

Carson National Forest. Photo credit: New Mexico Backroads.

Kiva Auditorium at the Convention Center. Photo: ABQ Convention Center

Early registration ends on September 27, 2017.
Information: http://www.eforester.org/safconvention

Online registration
is now available!
www.bit.ly/APFC27reg

We encourage you to register at your earliest convenience if you'd like to attend.

If you are having trouble accessing the registration form, kindly send an e-mail to RAP-APFC27@fao.org.

Find more information at **www.fao.org/asiapacific/events/detail-events/en/c/1448**

Food and Agriculture Organization of the United Nations

Asia-Pacific Forestry Commission

Forest Department - Sri Lanka

Wish to taste the best of the Polynesian Rainforest in Samoa? A warm welcome if you find yourself in Samoa.

With this greeting, yours is the invitation into our pristine environment, with the best greetings and good wishes from the South Pacific's rainforest in Samoa: Whenever convenient to you, you are invited to stop by to experience our unique tropical rainforest here in Samoa, which also hosts FAO's regional offices.

Just email me to kappenberger@gmail.com

Long live our IFWG !
With best regards

Marco Kappenberger

Request for Information on Orphaned Tropical Forest Data

We are compiling 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 its associated networks.

But other plots and inventories still need attention. We are looking for information on datasets that need to be digitized or moved to an up-to-date digital format. The goal is to make metadata on these datasets available on a publicly accessible website, and to push for getting the data itself appropriately curated and available to all.

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. 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 .

Reactivation of the International Society of Tropical Foresters

We are reactivating the International Society of Tropical Foresters which has been dormant for the last five years. The first step is to rebuild the list of people interested in ISTF. If you would like to connect with us, please send the following information to Teija Reyes reyesteija@gmail.com or Sheila Ward mahoganyforthefuture@gmail.com:

First and last name
Title
Email address
Web page (if any)
Country of origin
Country of residence
Organization or institution
Languages
Short description of areas of expertise (25 words or less)
Countries of professional experience

At present, we have three sources of information for International Tropical Foresters.

1) Blair Orr at Michigan Technical University has kindly continued the ISTF newsletter as a newsletter for the Society of American Foresters International Forestry Working Group, and is still sending it to the old ISTF mailing list. This newsletter can be downloaded at: http://www.orrforest.net/saf/

If you wish to subscribe to the newsletter, please send your email address to Teija Reyes reyesteija@gmail.com or Sheila Ward mahoganyforthefuture@gmail.com and they will send it on to Blair.

2) The old ISTF web page can be still be found at http://www.istf-bethesda.org/

3) You can join the ISTF facebook group page at: https://www.facebook.com/groups/2262122534/

We hope to have your participation in the new ISTF! Please forward this to others.

SAF Gregory Award

SAF staff and volunteers from the International Forestry Working Group received and reviewed 40 applications from 20 different countries for this year's Gregory Award. Thanks to the Gregory family and the continued generosity of SAF members, SAF is once again able to bring two outstanding individuals to the SAF Convention this year in Albuquerque, New Mexico.

Prabin Bhusal

- Assistant Professor at Tribhuvan University's Institute of Forestry, Department of Social Forestry and Forest Management in Pokhara, Nepal
- His abstract "Halting Forest Encroachment in Nepal Terai: What Role for Community Forestry?" was accepted for presentation at the SAF Convention

Neba Kingsly

- Lecturer at the National Forestry School in Mbalmayo, Cameroon

For more information on the award and to view past awardees, click here. Please also consider giving to the Gregory Award Fund. If you have specific questions or comments, please contact Danielle Watson at watsond@safnet.org.

Join an SAF Working Group

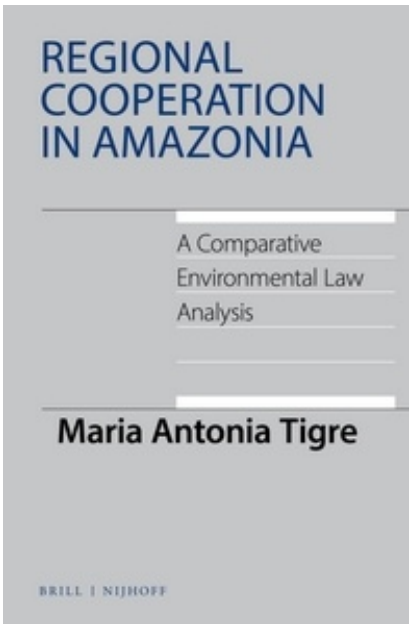
** Especially Because SAF Has Edited the Working Group Lists **

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 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.



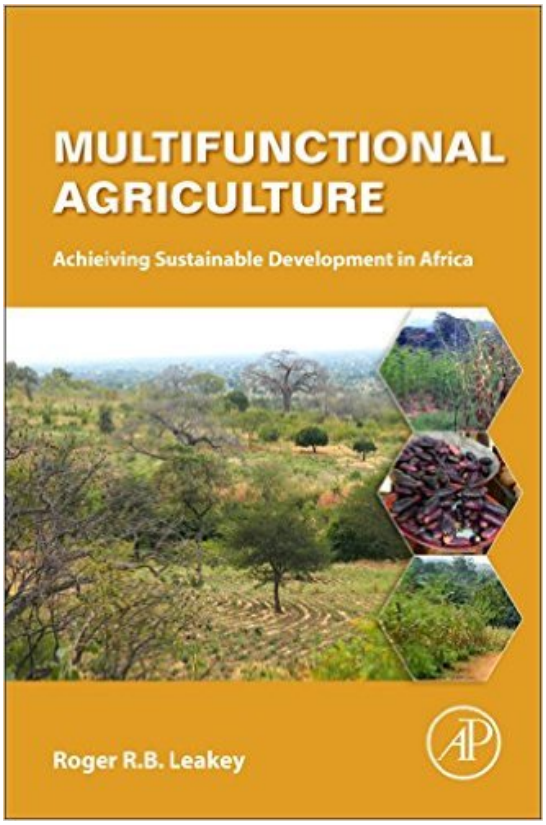
http://www.brill.com/products/book/regional-cooperation-amazonia

Regional Cooperation in Amazonia is forthcoming in September, 2017.

In *Regional Cooperation in Amazonia: A Comparative Environmental Law Analysis*, Maria Antonia Tigre provides a broad overview of the international, regional and national law applied to the Amazon rainforest and investigates efforts at regional cooperation for the protection of the Amazonian ecosystem. For the last four decades, cooperation among the eight countries in which the rainforest lies was primarily induced by the Amazon Cooperation Treaty (ACT). Originally adopted to ensure national sovereignty, the ACT gradually evolved towards a framework for sustainable development.

Based on the challenges faced by the treaty and its subsequent instruments, Maria Antonia Tigre analyzes ways in which the ACT can be more effectively applied, leading to practical results that reduce deforestation. These specifically relate to the enforceability of the right to the environment, the implementation of protected areas, and the development of financial mechanisms to fund initiatives.

Maria Antonia Tigre, LL.M. (2014), Elisabeth Haub School of Law at Pace University, is a senior environmental attorney at the Cyrus R. Vance Center for International Justice. She has published articles on the legal frameworks of forest-rich countries and climate change, including *Cooperation for Climate Mitigation in Amazonia: Brazil's Emerging Role as a Regional Leader* (2016).



Leakey, RRB. (2017). Multifunctional Agriculture: Achieving Sustainable Development in Africa. Academic Press.

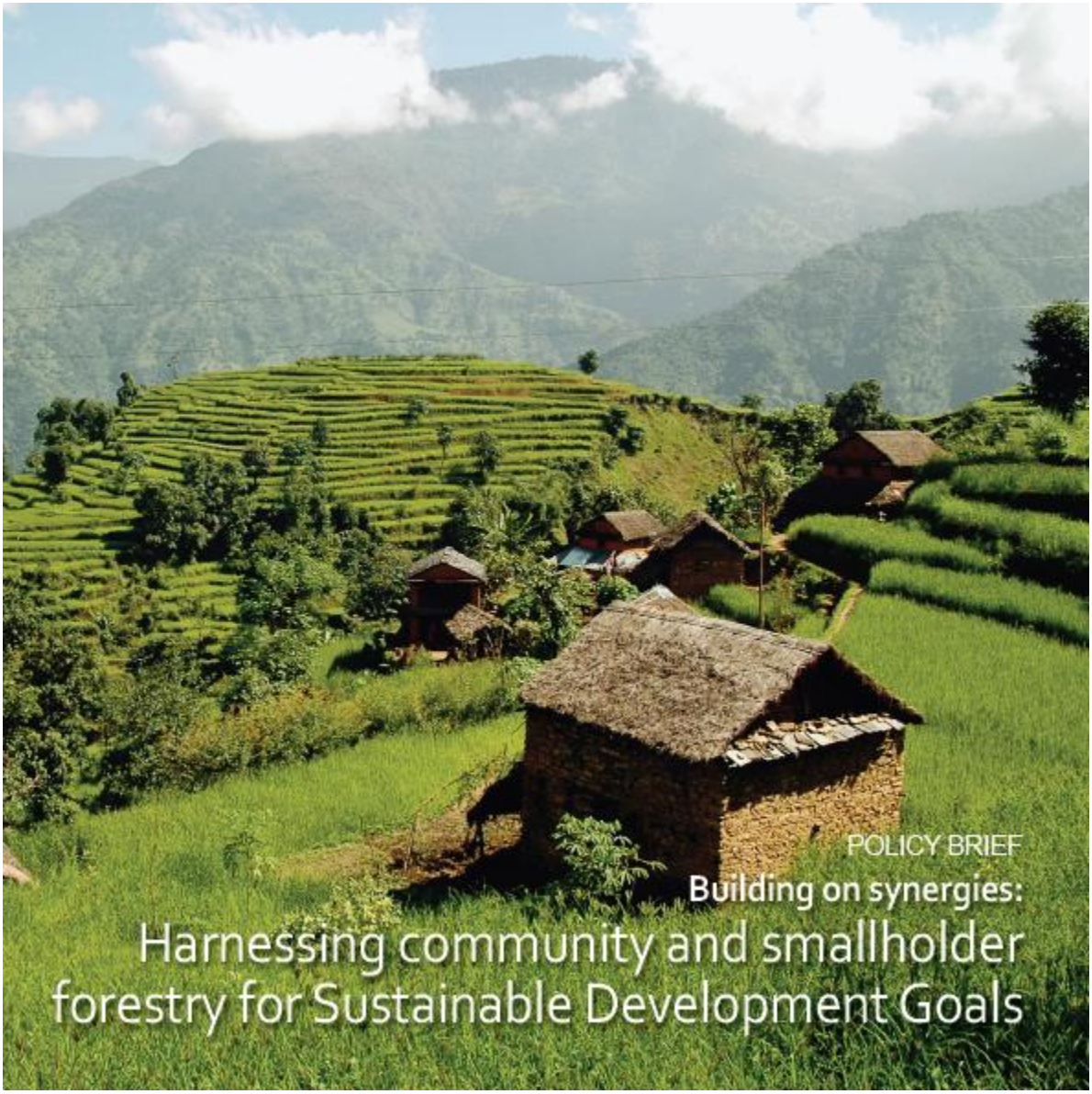
Description: In a world increasingly challenged by the need to integrate and understand highly specialized knowledge in a multidisciplinary way, this book is innovative and perhaps unique in addressing this challenge. It focuses on ideas, strategies, techniques and practices spanning many disciplines at the interface of agriculture with: forestry, horticulture, plant physiology, genetics, ecology, soil science, food science, economics, and the social and environmental sciences as delivered by intensified and enriched agroforestry. **Multifunctional Agriculture** addresses this complexity, using case studies and insights from the needs of African farmers whose livelihoods are constrained by complex interactions between social, environmental and economic factors and problems underlying agricultural sustainability in Africa. This book, therefore, provides an important resource for those trying to understand the role of agriculture in the achievement of the new Sustainable Development Goals by providing easily implementable, practical and effective methodologies and practices.

Two blogs on multifunctional agriculture:

http://scitechconnect.elsevier.com/multifunctional-agriculture-solution-planb-africa/
http://internationaltreefoundation.org/multifunctional-agriculture-last-solution-plan-b-africa/

Building on synergies: Harnessing community and smallholder forestry for sustainable development goals

International Union of Forest Research Organizations (IUFRO) special project World Forests, Society and Environment (WFSE) has published a new policy brief *Building on synergies: Harnessing community and smallholder forestry for sustainable development goals*.



This brief focuses on the important interlinkages between the Sustainable Development Goals (SDGs) and small-scale forestry. Forests are relevant for almost all of the SDGs, and through diverse pathways, can make important contributions to the attainment of these goals. Experience indicates that these contributions can be enhanced. Indigenous and local communities and smallholders, who use and manage a considerable share of the world forests, have a crucial role in harnessing this potential. Many SDGs and associated targets coincide with the conditions that

have been found to enable and support community and smallholder forest management and related livelihoods. Meaningful progress in these specific SDGs can contribute to positive feedback loops that support community and smallholder forestry and further boost progress towards the SDGs. Efforts to attain the SDGs can lead to synergies among the goals, but can also lead to trade-offs that can undermine the achievement of livelihood and conservation goals involving community and smallholder forestry participation. To realize the potential created by close interlinkages between community and smallholder forestry and the SDGs, it is necessary to anticipate and address inherent trade-offs among the SDGs and build on synergies among them.

The brief can be downloaded at the WFSE www-site: http://www.iufro.org/science/special/wfse/

Conservation of Tropical Rainforests: A Review of Financial and Strategic Solutions

Conservation of Tropical Rainforests: A Review of Financial and Strategic Solutions begins with the context of tropical deforestation and an overview of tropical ecology, global environmental policy and finance, then reviews each conservation financing instrument. These instruments include, but are not limited to:

- Domestic government budgetary expenditures for initiatives such as local, state, national parks and/or international peace parks;
- Tax deductions, tax credits, and real estate transfer fees for land trusts and conservation easements;
- Debt-for-nature swaps;
- Payments for ecosystem services such as forest carbon markets, biodiversity offsets and watershed protection payments;
- Green bonds and particularly landscape bonds or rainforest bonds; and
- Green procurement models such as sustainable commodity certifications and zero deforestation supply chain commitments.

These instruments were organized in chronological order based off when they were first used / developed. Furthermore, each of the chapters that is dedicated to a particular conservation financing instrument is organized as follows:

- Historical overview of instrument (i.e., who created the instrument, when first used);
- Mechanisms of Instrument (i.e., how does instrument actually work);
- Size of instrument (i.e., total countries and hectares covered; total dollars committed);
- 1-4 case studies of best example using instrument;
- Financial analysis (risk versus return analysis); and
- Policy analysis (what policy/policies help or hinder the instrument).

Published by Palgrave Macmillan as part of the Palgrave Studies in Environmental Policy and Regulation series. Forthcoming in September 2017. More information at:

http://www.palgrave.com/us/book/9783319632353

Leakey, RRB. (2017). Socially Modified Organisms in Multifunctional Agriculture - Addressing the Needs of Smallholder Farmers in Africa. *The Scientific Pages of Crop Science* 1(1); 20-29.

Abstract: To address on-going issues of hunger, malnutrition, poverty and land degradation in Africa, smallholder farmers are developing Socially Modified Crops as part of a 3-step approach to a multifunctional farming system that impact positively on the social, economic and environmental constraints to farm productivity responsible for the gap between potential and actual yield. Furthermore, these new crops also rehabilitate, diversify and intensify the agroecosystem, diversify local diets and generate income from trade and new value-adding business opportunities.

Preston, K., T.G. Pypker, and B. Orr. 2017. Women and fuelwood in Lupeta, Tanzania: constraints to alternative fuels and fuelwood management strategies. *J. of Sustainable Forestry*. online: http://dx.doi.org/10.1080/10549811.2017.1313165

Abstract: The women in Lupeta, Tanzania use fuelwood as the primary source of fuel. The choices and constraints women face in fuelwood collection were examined using walks with women and semi-structured interviews. Women primarily use fuelwood with limited charcoal use. They would prefer to use more charcoal but costs, limited income, competition and ownership of trees, and land constrains them in both fuelwood collection and alternative strategies.

New Webpage on Ecology of NW Belize

Information on the forest ecology of northwestern Belize and the Rio Bravo Conservation and Management Area of the Programme for Belize can be found at https://ecologynwbelize.org/. An field guide to the trees of NW Belize is available on the website (https://ecologynwbelize.org/field-guide-to-trees/).

For more information, please contact Nick Brokaw at mnvbrokaw@ites.upr.edu.

TROPICAL NOTES

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

Warriors scout lions

Traditional Maasai warriors (pastorist men aged 15 to 35) were given literacy training, skill enhancement and training in monitoring a species with which their communities have been in conflict for generations over 4,000 km^2, the African lion. The objective was to determine the quality of their monitoring, as to numbers, location, and movements. Scientists worked with the warriors. Data improved with training. The results led to recommendations to employ other local communities in rural Africa.

S, Dolrenry and others. Conservation and monitoring of a persecuted African lion population by Maasai warriors. [Conservation Biology 30(3):467-475 2016].

Black wattle (*Acacia mearnsii*)

An invasive Australian tree mostly produced profitably by farmers in Brazil and South Africa for pulpwood chips and bark tannin for processing leather snd other specialties, including foods. Plantation area in both countries is about 280,000 ha, and recent annual shipments of pulpwood woodchips and tannin were valued at $308 millions. A sustained demand is foreseen from Japan, China, and India.

E. S. Nambiar and othars, Acacia mearnsii, industry overview, current status, and key research and development issues. [Southern Forests: Journal of Forest Science (2008-present) 77 (1) 19-30 2015]

Post-logging silviculture

Along the Amazon harvesting of an average of 61m^3/ha in 1982 (22 tree species) was followed for 30 years by silvicultural refinement treatments and measurements in 41 0.25 ha plots. Stand basal areas were reduced by immediate logging damage and sylvicultural refinement by 19 to 50%. Harvesting substantially increased recruitment. Increment of future crop trees remained higher than in unlogged forest and increased further with follow-up refinement

treatments. An additional 30 tree species not harvested have become potentially commercial. Where stand stock has recovered more than 30% it supports a regulation second harvest (maximum of 30m^3/ha). A conclusion is that forest refinements are required after harvesting but should not be intensive and should anticipate commercial forest composition prospects.

L. de Avila and others. Recruitment, growth and recovery of commercial tree species over 30 years following logging and thinning in a tropical rain forest. [Forest Ecology and Management 385: 225-235 2017]

Semi-deciduous greater tree height

Data from thousands of 0.50/ha commercial forest inventory plots in the Cameroon were a source of corroboration of findings elsewhere contrasting the tree-diameter ratio in evergreen and semi-deciduous forests. For a given diameter trees tended to be taller in the semi-deciduous forest than in the evergreen forest. Similar relations were found for three tree species common in both forests. The data further showed that taller trees gave greater biomass per hectare to the semi-deciduous forest. An environmental control of tree height is mentioned as an explanation, the determinants to be explored.

P. H. Brose and others. Taller trees, denser stands, and greater biomass in semi-deciduous than in evergreen lowland central African forests. [Forest Ecology and Management 374:42-50 2016].

Horse skidding

In the forests of Chihuahua, Mexico horse skidding has persisted. In a region with 59 communities with logging permits and sawmills and considered large-scale, six of use horses 20-100 % for extraction of their volume. The El Largo Community in ten years logged 123,810 ha and removed 3,169,019 m^3 of timber entirely with horses. Respondents report that horse skidding is more cost-effective than mechanized skidding, generates more employment, and has less impact on forests and reduced carbon emissions. Further assessment might indicate that animal logging is socially and economically more just forest management.

D. B. Bray and others. Back to the future. The persistence of horse skidding in large-scale industrial community forests in Chihuahua, Mexico. [Forests 7(11):283 2016]

Miombo Woodland fate in Sub-Sahara

The Miombo Woodlands of Central Africa are disappearing rapidly with the expansion of agriculture. A study of 8,766 km^2 in southwestern Tanzania. found three intensities of human use (for timber, bark, and roots).In the low intensity use the diversity of the remaining woodland was not much different from unmodified woodland with a Shannon-Weiner index of 3.44.and carbon storage of 28 tonnes/ha. The presence of trees of *Brachystegia* declined 60% with utilization. With heavy utilization biodiversity index dropped to 2.86 and carbon storage to 14 tonnes/ha. A reduction of trees of DBH <10 cm means a loss in recruitment and sustainability. Rapidly expanding conversion to agriculture means clear conversion without these steps.

E. K. K. Jew and others. Miombo Woodlands under threat: Consequences for tree diversity and carbon storage. [Forest Ecology and Management 361:144-153 2016]

RIL and Amazon regeneration

A test of 144 plots representing 300,000 ha in the Central Amazon 11 years after reduced impact logging exposed the performance of seedlings of seven tree species. In the first 3 years logging enhanced growth of all species. However, by the 11^{th} year after logging the seedling mortality rates found in logged forest had been higher than in unlogged forest for five of the seven species, limiting regeneration and the structure of tropical forest communities. It was concluded that RIL could have detrimental effects on regeneration to be reduced by management.

M. R. Darrigo and others. Effects of reduced impact logging on forest regeneration in Central Amazonia. [Forest Ecology and Management 360:52-59 2016]

Mammals in Maputaland

Various Protected Area sizes, habitats, diversities and disturbance levels of grassland, forest plantation, four forest types, and two thicket types, each with 10-16 mammalian species, exist in the Maputaland Conservation Unit of South Africa. Between 2013 and 2014 camera-trap inventories of 39 mammalian species were completed. In the smallest Protected Areas most large mammals were absent. High occupancy was found for 16 species in grassland and plantations, 15 species in woodland, and 13 species in lowland forests. Abandoned and immature plantations had high occupancy where there was understory. Relative visibility affected the counts.

T. Ramesh and others. Native habitat and protected area size matters: protecting mammalian assemblages in the Maputoland Conservation Unit of South Africa. [Forest Ecology and Management 360: 20-29 2016].

Mangrove restoration

In southern China mangroves have been restored by *Sonneratia apetalia*, an introduced species of concern. A test was made underplanting three native species, *Kandelia obovata, Aegiceras corniculatum,* and *Bruguiera gymnorhiza*. Only *B. gymnorhiza* survived well, not only with the good illumination of two-year *Sonneratia* and a mud flat, and was still outstanding beneath 8-year-old *Sonneratia*.

Y. Peng and others. Early growth adaptability of four mangrove species under the canopy of an introduced mangrove plantation: implications for restoration. [Forest Ecology and Management 373:179-188 2016

Park Restoration results

In 1995 degraded land in the Kibale National Park of Uganda was dedicated to active restoration. It was protected from fire and replanted with 400 native seedlings (39 species) per hectare. The results were measured after 5 and 18 years. Part of the area formerly degraded had in 18 years an above-ground biomass in trees of >10 cm dbh of 40.6 mg/ha. Attainment of former above-ground biomass (419 mg/ha) was estimated to require an additional 96 years.

C. E. Wheeler and others. Carbon sequestration and diversity following 18 years of active tropical forest restoration. [Forest Ecology and Management 373:44-55 2016].

Logging effects in the Solomons

The Solomon Islands, isolated in the Pacific, were heavily logged during the last century. Assessment of recovery 50 years later at 11 study sites indicated a forest composition that did not appear to converge toward that in unlogged forests. A long-lived pioneer, *Campnosperma brevipetiolata*, retained forest domination, even after 50 years, apparently hindering recovery. Mature-phase forest tree species remain and could be favored by removal of the *Campnosperma*.

E. Katoval and others. Factors influencing tree diversity and compositional change across logged forests in the Solomon Islands. [Forest Ecology and Management 372:53-63 2016].

Seed dispersal in montane forests

Montane forest observations in Thailand, the Philippines, Malawi, and Nigeria support environmental, topographic and biotic factors that influence forest structure and composition. Seed size decreases with altitude. Wind-dispersed seeds increase with altitude. The proportion of bird versus mammal dispersed seeds increases with altitude. Primates switch diets from fruits to leaves with altitude.

H. Chapman and others. Seed dispersal ecology of tropical montane forests. [Journal of Tropical Ecology 32 montane and cloud forests:437-454 2016].

Birds and oil-palm plantations

A survey in eastern Amazonia was made of bird communities in 16 plots, 32 points in riparian vegetation, 128 in oil-palm, and 160 in forest habitat. Diversity and richness were both higher in forested plots than in riparian areas and oil-palm. In forested habitats the bird communities tend to be clustered, in the oil-palm overdispersed. The oil-palm plantation affects bird diet and foraging. Fragments of riparian and forest habitat in or near oil-palm plantations are important to bird survival.

S. M. Almeida and others. The effects of oil palm plantations on the functional diversity of Amazonian birds. [Journal of Tropical
Ecology 32 (6):510-525 2016]

Tourism in South-East Asia

Wildlife tourism for the purpose of watching and/or encountering mammalian wildlife is less popular in South-East Asia than in Africa because it is difficult to observe mammals in dense rainforests. In Endau Rompin National Park in Malaysia the footprints, nests, scratches, and disturbance traces of 149 mammalian species may be observed. However, visitors may not actually see wildlife during their stay.

Y. Aihara and others. Mammalian tourism in South-East Asian tropical rainforests: The case of Endau Rompin National Park, Malaysia. [Journal of Tropical Forest Science 28(2):167-181 2016].

Flower size and nectar

A measure of nectar volume of 150 flowering plants visited by hummingbirds in the Brazilian Atlantic Forest indicated a positive correlation between flower size and nectar volume. For long-billed birds the larger flowers provide more rewards. Within the flower size range there is variation responsive to genetic difference

Tavares and others. Nectar volume is positively correlated with flower size in hummingbird-visited flowers in the Brazilian Atlantic Forest.[Journal of Tropical Ecology 32 (4):335-339 2016]

Acacia form

In South Vietnam some plantations of the Acacia hybrid *(A. mangium x A. auriculiformis*) are subject to poor stem form and heavy branching. Tree age at the time of planting and fertilizer application have been considered to blame. A study compared no fertilizer, fertilized with 8, 16, and 45 g of NPK in the planting hole, and cuttings from plants 1 and 4 years old. The high dose of fertilizer significantly increased the proportion of the trees with stem bending and requiring singling and form pruning. High doses of fertilizer should be avoided.

P. V. Bon and others. Effects of stock plant age and fertilizer application at planting on growth and form of clonal Acacia hybrid. [Journal of Tropical Forest Science 28(2):182-189 2016]

Eucalyptus spacing effects

In Minas Gerais, Brazil hybrids of *Eucalyptus grandis x E.camaldulensis* were subjected to spacings of 1.5, 3.0, 4.5, 6.0, and 9.0 m^2/tree .Trees planted at 4.5m^2 or more open had wood 8% denser than trees planted at **1**.5m^2. Lignin content of wood spaced 6 to 9 m^2 was 12% higher than in wood spaced 3 m^2. Wider spacing produced materials considered better for energy production.

M.F.V. Rocha and others. Effects of plant spacing on the physical, chemical, and energy properties of Eucalyptus wood and bark. [Journal of Tropical Forest Science 28(3):243-248 2016]

Eucalyptus for energy

In the savanna region of Brazil at 17 degrees South short rotation eucalyptus growth was assessed for energy biomass. Intact plants were compared with coppice removed from sprouts 9 months after 3x3m plantation harvest. Between 38 and 40 months the yield of the coppice ranged from 56 to 149 % greater than

from the intact plants. The results indicate that by coppicing juvenile eucalyptus plants from dense stands it is possible to produce biomass for energy on a short rotation age.

F. C. de Souza and others. Growth of intact plants and coppice in short rotation eucalypt plantations. [New Forests 47(2):195-209 2016]

Cloud forest recovery

In the lower-montane forest of Veracruz, Mexico forest recovery was compared in an abandoned pasture, (P) a young secondary forest, (SF) and an old secondary forest. (F). Tree seeds/m^2 were 1,689 (P), 126(SF), and 265(F), giving rise to 6 tree species. When the grass was controlled 9 tree species developed. Grass removal triggered early forest removal allowed establishment of tree species with seeds already present in the soil.

G. Williams-Linera and others. Tropical cloud forest recovery: The role of seed banks in pastures dominated by an exotic grass. [New Forests 47(3):481-496 2016]

Eucalyptus and sewage

Eucalyptus grandis was exposed to a set of nutrients as follows: no treatment, conventional minerals (NPK) and 15t/ha of sewage sludge produced in wastewater treatment plants from three municipalities of the metropolitan region of Sao Paulo, Brazil. At 60 months of age of the trees the sludge increased the organic matter, nitrogen, and phosphorus in the 0-5cm soil layer and as well in the eucalyptus leaves. The fertilization with sewage sludge provided a rise of 50-90% in timber volume compared with the control.

De Vicente Ferraz and others. Soil fertility, growth, and mineral nutrition in a Eucalyptus grandis plantation fertilized with different kinds of sewage sludge [New Forests 47(6):861-876 2016]

Post-logging treatment

Seeds of 12 indigenous tree species were sown in logging gaps in Uganda. Their emergence was limited to less than 50% survival by vegetation and vertebrates, evident with experimental vegetation clearing and vertebrate control. Some species were successful, indicating that for them direct seeding has possibilities. Some vertebrates were maintained to control seed pests.

T. Piiroinen and others. The seed to seedling transition is limited by ground vegetation and vertebrate herbivores in a selectively logged rainforest. [Forest Ecology and Management 384: 137-146 2017]

Bamboo protects birds

A study of a forest in Acre, Brazil logged by reduced impact contained a portion of bamboo habitat (*Guadua spp*.). Of 25 bird species being compared, including those affected by logging, their population density was closely associated with elevated bamboo density. RIL provides the flexibility to avoid bamboo habitat during logging.

W. A. Chaves and others. Avian responses to reduced impact logging in the southwestern Brazilian Amazon. [Forest Ecology and Management 384:147-156 2017

Teak on degraded limestone

Teak was planted on a poor soil in Java and four years later were separately thinned 10, 25, and 50% and pruned 1/3, ½, and 2/3 of the live crown. Diameter growth increased with thinning intensity, especially in the first year. Standing stock in the thinned stands did not recover to pre-thinning levels for three years, although cumulative production (standing stock plus harvest) was highest with the heaviest thinning. Height growth rate after thinning declined because of the poor site. The effect of pruning was undetectable after three years. For private forests the thinning provided needed immediate harvest and good subsequent diameter growth.

Budiadi and others. Response of a clonal teak plantation to thinning and pruning in Java, Indonesia.{Journal of Tropical Forest Science 29(1): 2016]

Afforestation in Sahalian Benin

On degraded lands in the Sudano-Sahalian Zone of West Africa tree introduction can restore farming systems. Saplings of five woody species were planted on degraded land subject to manuring (1 km per plant) and water (0.5 liters of water per day). Survival after 15 months with two rainy seasons and one dry season was >60%, >94% for the fast-growing *Jatropha curcas, Leucaena leucocephala*, and *Moringa oleifera*. Slower growing were *Anacardium occidentale* and *Parkia biglobosa*. The five species were found all suitable for afforestation of degraded croplands. Their growth was boosted by irrigation and a supply of manure.

F. Noulekoun and others. Shoot and root responses of woody species to silvicultural management for afforestation of degraded croplands in the Sudano-Sahelian zone of Benin. [Forest Ecology and Management 385:254-263 2017]

Certification vs. biodiversity

Studies in Amazonia and the Congo leave doubts as to preservation of biodiversity by compliance with Forest Certification. A comparative study of Forest Stewardship Council Certified forests and those not certified in Tanzania, including State Forest Preserves, showed a positive relationship to conservation. The Certified forests had significantly higher tree species richness, diversity, and density than non-certified forests.

S. K. Kalonga and others. Forest certification as a policy option in conserving biodiversity [Forest Ecology and Management 361;1-12 2016].

Prescribed burning

After a million/ha fire in Victoria in 2003 prescribed burning was applied and studied. During the first three years fuels were visibly reduced. Up to 10 years after the fire the burning was effective only when the fire danger rating was low, for example, in the evening. Up to 10 years fires were more patchy and crowns less effected. After 10 years all effects of the prescribed burning had disappeared.

K. G. Tolhurst and others. Effects of prescribed burning on wildfire severity. A landscape-scale case study from the 2003 fires in Victoria.[Australian Forestry 79(4):1-14 2016]

Dung-beetle logging effects

In Borneo a study was made of 40 km of logging roads in rainforest to determine impacts as measured by dung- beetle assemblage results. It was found that logging significantly impacted to 34 km into the interior of the 170 km into the interior of the forest as an indicator of impacts on habitat, biodiversity, and environment generally. It is suggested that recognition of much of the remaining forest within these limits should lead to better road design. Specific recommendations were not included in the abstract.

F. A. Edwards and others. The impact of logging roads on dung-beetle assemblages on a tropical rain forest reserve. [Biological Conservation 205:85-92 2017].

Kadam early wood uniform

Kadam (*Neolamarckiana cadamba*) is a well formed fast growing pioneer tree in southeast Asia. It has a possible role in producing pulpwood. Rapid growing trees generally produce less dense wood. The separation of 63 4-year-old trees of this species into three groups according to speed of growth produced the following results:

Growth	DBH cm.	Ht. m.	Wood density, g/cm^3
Slow	10.3 ± 0.9	10.8 ± 1.1	0.29 ± 0.04
Medium	14.8 ± 1.7	13.3 ± 1.6	0.32 ± 0.05
Fast	21.9 ± 3.0	17.2 ± 2.2	0.30 ± 0.06

No significant differences in almost all anatomical characteristics and wood properties were recognized between the three growth categories, suggesting that these characteristics were independent of growth rate.

Y. Portiwi and others. Effect of radial growth rate on wood properties of Neolamarckiana cadamba. [Journal of Tropical Forest Science 29(1):30-36 2017].

Seasonal growth in Central Africa

Seasonality of growth and leaf change in *Baillonella toxisperma* (Moabi), *Entandrophragma cylindicum* (Sapelli), and *Erythrophleum suaveolens* (Tali) were determined over several months. These species have anatomically distinct annual growth rings. Their maximum rate of growth is from March to May, the rainy season for Moabi and Sapelli, and less than significantly so for Tali. Climatic determinants were temperature and hours of sunshine.

F. Fetéké, and others, Seasonal variations in diameter growth and leaf and reproduction phenology in three Central African timber species. [Bois et Forets des Tropiques 350 (4):1-23 2016].

Post-RIL Amazon regeneration

An assessment two years after logging the eastern Amazon found most of the natural regeneration in logging gaps. Of the tree species harvested reproduction of only 26% was found, and about 1% for another 28%, requiring enrichment planting and tending.

G. Schwartz and others. Natural regeneration of tree species in the Eastern Amazon: Short-term responses after reduced-impact logging. [Forest Ecology and Management 385: 97-105 2017]

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 Spring/Summer 2017 issue, Vol. 71

Forest management and freshwater pearl mussels: A practitioners perspective from the north of Scotland.

"This paper demonstrates how targeted practical forest management in northern Scotland has been developed and implemented to aid the protection and recovery of the endangered pearl mussel. The measures outlined are straightforward, good value in terms of cost and can easily be implemented by practitioners when planning forestry management." SF p. 21

Peter Cosgrove, Neil McInnes, Suzanne Dolby, Derry Gunn, Donald Shields, Cameron Cosgrove and Kenny Cortland. Lead author contact petercosgrove@albaecology.co.uk SF Pp. 14-21.

The Norwegian land use model: is it right for Scotland?

The Norwegian model of land use offers an alternative to conventional modes in upland Scotland (and possibly in parts of the northern USA and Canada having similar characteristics.) Scotland retains larger plantation forests than Norway along with sporting estates and hill farms. Southwest Norway has numerous smaller mixed farms with dispersed development. There are proven opportunities to adopt components of the model on estates in upland Scotland managed primarily for conservation and ecological restoration. Challenges emerge where livestock and field sports underpin rural income and employment. There are limited biophysical constraints. SF p. 26.

Scott McGWison,scottmcgwison@hotmail.com.
SF pp 26-33.

Other articles of interest:

Surface fire fails to promote the natural regeneration of *Pinus sylvestris* on Mar Lodge Estate in the Cairngorms. SF pp 34-39.
Online game changer for tree health. SF pp 40-41
UK Forestry: Where are we going and who is taking us there? SF pp 42-44

If anyone is traveling to Scotland in September, the Royal Scottish Forestry Society has several field trips scheduled then. For details visit the web site www.rsfs.org.

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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FAO InFO News
A newsletter from FAO Forestry

The Food and Agriculture Organization's Forestry newsletter is available at this link:

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.
