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MÉTODO SÍLVICOLA PENINSULAR, MEXICO
Peninsular Silvicultural Method

Slash and burn shifting agriculture means forest lands remain forested

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SUMMARY

The following is a brief presentation of a methodology for managing tropical forests in the Yucatan Peninsula of Mexico. It is called the "Método Sílvicola Peninsular" or MSP (Peninsular Silvicultural Method). Peninsular is in reference to the Yucatan Peninsula, although the method could be applied to any tropical forest.

MSP is a framework for forest management designed for the socially responsible stewardship of tropical forest resources. MSP takes into consideration successional dynamics and the role of light levels and natural disturbance regimes to foster regeneration of the most valuable timber species, when needed. Resulting management plans aim at maintaining an ever changing geographical mosaic as defined in a target forest model. MSP is designed to sustain a wide spectrum of forest functions and non-market resources, including game, floristic composition, and useful plants traditionally utilized by the ancestral Maya culture. Management decisions produced by MSP are drafted in a way that responds to the responsible oversight of the owner´s estate. This last feature is unique to Mexico, and it responds to the fact that all timber lands are owned by individuals, groups, or communities; there are no public timber lands, though some 6 % of continental Mexico is publicly owned.

CONTEXT

MSP is a method for developing management plans for silvicultural operations in multiple species in diverse private timberland situations. Here MSP is explained in the context of Campeche and Quintana Roo, two Mexican states that have large communal ownerships (>1000 ha in various communities). With minor modifications, MSP could be recommended for other areas with different land tenure, spatial distribution, ecology and geographical location. In the current scenario (2018) the forests of the Yucatan Peninsula have qualities that influence the recommended silviculture. Of particular importance is the considerable influence of communities in land management policies outlined by professional licensed foresters.

GENERAL DESCRIPTION

The Peninsular Silvicultural Method (MSP) is a framework for designing the silvicultural regime and harvest scheduling of tropical forests. Stand replacement (SR) occurs by group selection that entails the complete clearing of small areas (usually 0.5 ha) with a temporary establishment of agricultural crops by the traditional Maya system (corn, squash, beans, hot peppers and other crops). Site preparation is done by felling all trees and most shrubs, allowing the felled vegetation to dry, and then burning the site. The distance between two SR sites should be at least two tree heights. Other commercial and in-recuperation areas, not programed to receive SR treatment in the next cycle, will be thinned following improvement criteria of composition and tree quality, emphasizing tree resistance and resilience to disturbance factors, particularly hurricanes.

Cutting regulation uses information from a prescription inventory survey. This survey provides estimates of frequencies and spatial data about current presence of tree groups, and their structure in each piece of ground available for management. These areas are small, so mapping them is not practical. Therefore, annual cutting area is the actual planning unit on the ground. Marking rules are defined so as to provide field technicians with ample interpretative freedom within sufficient guidance about the recommended management intensity and desired frequency of treatments (no cut, stand replacement, improvement partial cut). A silvicultural simulation model (a theoretical one for the time being) provides prognosis about trends in current tree groups and successional stages, relative to a desired ideal forest model. These projections provide the logic for marking rules. They also feed input information for a financial analysis routine that strives to improve soil expectation value as defined in the Faustmann (1849) model. Land added values due to the array of alternative silvicultural treatments and natural disturbances are compiled for the entire forest, considering a cutting cycle (20 years). These values are placed in a matrix, next to other policy rules, management style preferences, such as risk aversion, and regulatory restrictions, logging and road restrictions. A heuristic search algorithm then selects several acceptable management plans, and summarizes their performance and features. Land owners then choose from these alternative plans the one they prefer to implement, after review and approval by regulatory institutions.

Two management plans for community forests in Quintana Roo have been approved as of September 2018 and will be implemented soon. At least four other plans are under review. If approved, forest area under MSP would reach over 50,000 ha.

REFERENCE

Faustmann, Martin. 1849. Calculation of the value which forest land and immature stands possess for forestry. In Faustmann and the evolution of the discounted cash flow; Linnard, W. Ed.; Document 42, Commonwealth Forestry Institute: Oxford, UK, 1969.

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Stand replacement by Slash and Burn shifting agriculture: crop stage.

Stand replacement by Slash and Burn shifting agriculture: early succession stage.

Towards a desired ideal forest model

Friends from Two Different Countries Share the Love of Forests
The Toerring Forest Story in Seefeld, Germany

Written by Candra Burns of Talking Forests

On a partly cloudy German morning, Talking Forests pulls up to a forestry office near the Seefeld Castle.

How did we get this opportunity? Tom Hanson, the District 1 board member representative of Society of American Foresters invited us to go on this tour. Tom serves Alaska, Inland Empire, and Washington State. His friend Armin is from Germany, but they own land in Washington State. Tom said "The family owns 5,800 acres in Whatcom County. I have managed that forest since 1980."

Tom's friend Armin manages the Toerring forests in Seefeld, Germany. Armin and also joined by Count Cajetan gave Talking Forests a tour of the land and the story behind growing, harvesting, and salvaging different types of trees on their property.

The first stop was a Douglas-fir regeneration unit where they planted 2,000 2-year old bareroot plugs per hectare to hopefully have a survival rate of which offers a sustainable return in the future. We examined a few trees and checked for browsing, insects, and antler rubbing. These are all things that can affect the growth rate of seedlings.

We then visited a out building made of mostly wood where they bring a portable mill to mill salvaged trees from the property. Armin showed us the lumber he recently produced out of an older Douglas-fir tree that fell on the property and the grain size and quality was on point. He also pointed out a fenced in Red Oak hardwood plantation that was trying to grow without getting browsed by deer. This may have been the first time we have seen Red Oak seedlings.

The well-maintained gravel road in this forested area was favorable as it was a smoother ride than what we are used to with potholes and erosion on the back roads in the states. We stopped at a sight that was not so favorable. A Spruce tree stand that was devastated by the Spruce beetle. Armin got his saw out to show us some damage done to the bark and cambium layer of the tree. He said he would have a crew out to cut some damaged Spruce trees here in a few weeks to salvage those trees.

We stopped by a unit of trees that had a good growth rate, evenly spaced and were pruned for optimal growth with very little understory. This is the tree farm model that we are used to seeing in the states. After rounding the bend in the road, we come to a hillside view of the Wörthsee and

Pilsensee Lake. The trees here have been susceptible to wind and deer antler rubbing, but some persist.

My favorite part of the tour was when Armin and Cajetan showed us the 39-meter-tall 100-year-old Douglas-fir plantation and which has a Darrington, WA genetic strand in them. We learned that they would like to plant Douglas-fir now and hopefully harvest it in a 50-year rotation much like the West Coast of the USA achieves. The Spruce beetle is devastating and they are going to use Douglas-fir as an alternative, but they have to create genetics of German descent for it to work. The salvaged Douglas-fir tree we mentioned earlier was from this amazing resistant stand of trees!

For more information about the Toerring Forest click here!

Figure 1. Douglas-fir regeneration unit with a 2-year old bareroot plug planted

Figure 2. Armin and also joined by Count Cajetan gave Talking Forests a tour of the Toerring land.

Figure 3. The out building made of mostly wood where they bring a portable mill to mill salvaged trees from the property.

Figure 4. Armin and Cajetan showing us the 39-meter-tall 100-year-old Douglas-fir plantation and which has a Darrington, WA genetic strand in them.

Figure 5. The only 39-meter-tall 100-year-old Douglas-fir in Germany!

Figure 6. Home milled 100-year-old Douglas-fir in Germany.

Figure 7. The stump from 100-year-old Douglas-fir in Germany.

The sequence diagram of approach in using allometric models for estimating aboveground tree biomass

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Aboveground biomass is a basic component in the calculation and monitoring of forest carbon stocks which is a key input in developing strategies for reducing greenhouse gas (GHG) emissions, especially carbon dioxide (CO2) from the land sector.

The reliability of forest carbon stock estimates and understanding the dynamics of carbon in forest ecosystems can be enhanced by applying current knowledge of tree allometry, in the form of biomass allometric models and volume allometric models.

The biomass allometric model can be used to directly estimate tree stand biomass, from tree measurement data (diameter or diameter and height combination) in forest stand inventory, or by adding density or wood density and biomass expansion factor (IPCC), 2003) or conversion biomass and expansion factor (IPCC, 2006) in using allometric models of tree volume. From the aggregation of individual tree biomass, forest standing biomass can be obtained.

Available tree biomass and volume allometric models are very useful for estimating forest biomass and carbon stocks, despite the estimated variability generated by the model. However, the accuracy of the estimated value depends heavily on data from the dimensions of the tree measurements in the field and the model used

This is a sequence diagram of the approach or methodology in using an allometric model to estimate the aboveground tree biomass and then estimate aboveground biomass (Figure 1). In general, the diagram in Figure 1 can be explained by the following approaches:

- **Approach-1** is used when the tree biomass allometric model is available for a species or ecosystem type to be estimated in a certain site (species or ecosystem and sitespecific model)
- **Approach-2** is used when the tree biomass allometric model for a species or ecosystem type to be estimated is not available at the site, but the biomass allometric model for the species or ecosystem type has been developed for another site.
- **Approach-3** is used when the tree biomass allometric model has not been developed for a species or ecosystem type (either in the site or in another site), but a tree volume allometric model specific to species or ecosystem type has been developed for the site to be estimated.

- **Approach-4** is used when the volume allometric model for a specific species or ecosystem type in a specific site (species or ecosystem and site-specific model) is not available, but the volume allometric model is available or has been developed in another site.

- **Approach-5** is used when the biomass and volume allometric models are not available for a specific species or ecosystem type, but the height data (besides diameter) is available from field measurement or inventory of trees in the stand.

- **Approach-6** is used in the condition where: (a) a biomass allometric model is not available for a tree species or ecosystem type to be estimated; however, (b) a volume allometric model or height data (besides diameter) is available, which can be used to estimate volume for the specific species or ecosystem type; and (c) the wood density data is available, but (d) tree BEF data is not available.

- **Approach-7** is used when the following conditions are present: (a) no tree biomass allometric model is available for a certain species or ecosystem type to be estimated, but (b) a volume allometric model or height data (besides diameter) is available, which can be used to estimate volume for the specific species or ecosystem type; and (c) wood density value is unavailable for specific species or species group (genus, family).

- **Approach-8** is used when the following conditions are present: (a) no specific tree biomass allometric models nor volume allometric models are available for the species or ecosystem type to be estimated, (b) no height data (besides diameter) is available for estimation of tree volume using a geometric formula approach, and (c) no data on wood density is available, either for species or species group (genus, family).

Diagram on following page.

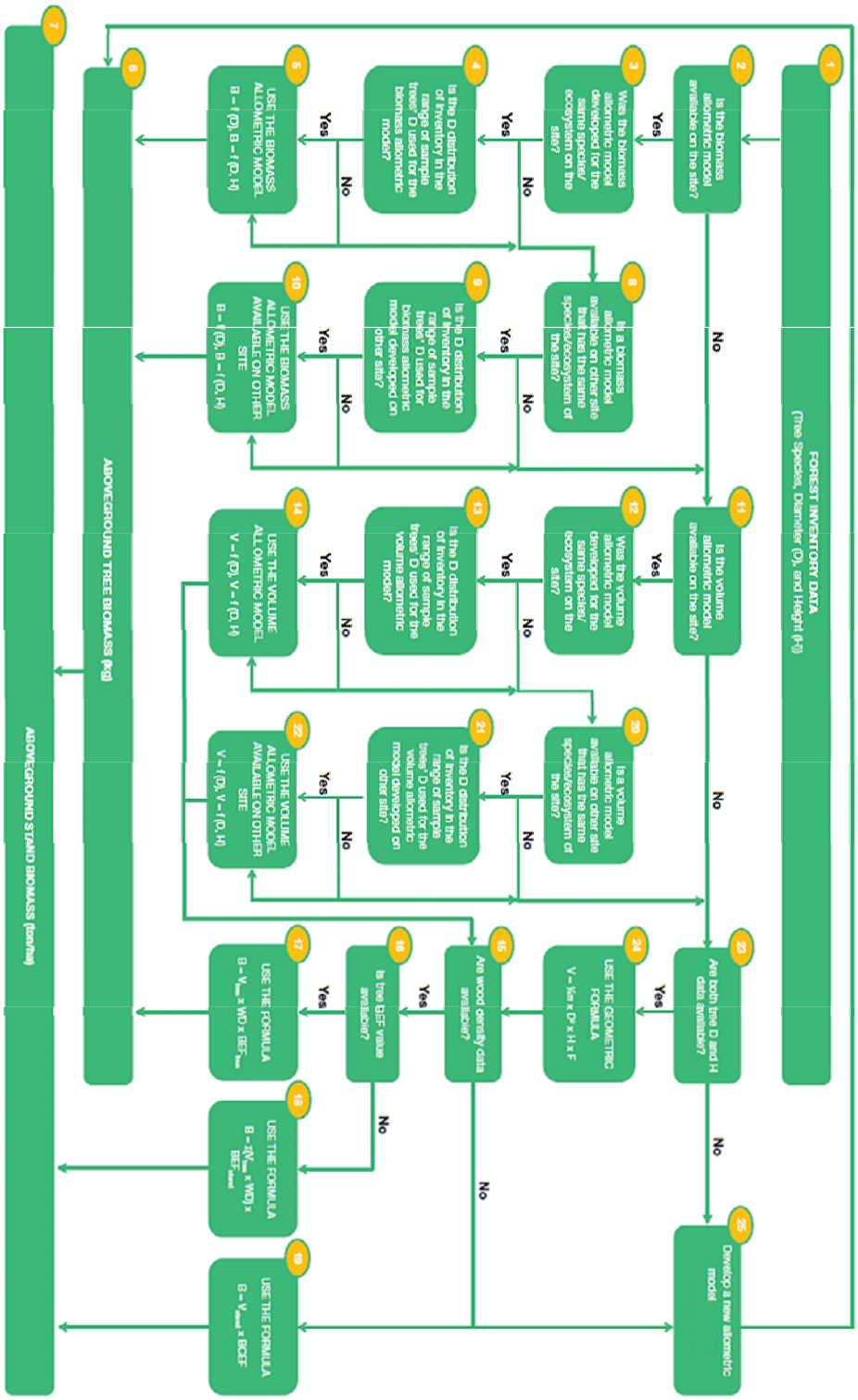

Figure 1. The diagram presenting the procedures of the use of available allometric models for estimating tree biomass.

FOREST PEST OR FOREST FAUNA: A MATTER OF PERSPECTIVE

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Innovation is not always a matter of a technological update, sometimes is just a new or different way of thinking, a different perspective. As forest resources are being more appreciated as an "ecological commodity" than a production to be sold or used, developing countries must optimize their management strategies and carefully assess the need to call a forest damaging agent, a pest.

As Sven Jorgensen (Jorgensen *et al*. 2006) stated "ecosystem theory is a prerequisite for wider application of ecological sciences in environmental management because with theory it becomes feasible to guide conservation or environmental management". In 2000, the Convention of Biodiversity adopted an Ecosystem Approach with 12 principles, which stress among others: 1) Ecosystem managers should consider the effects of their activities on adjacent and other ecosystems; 2) Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach; 3) ecosystems must be managed within the limits of their functioning; and 4) the ecosystem approach should seek the appropriate balance between, and integration of, conservation and use of biological diversity (Jorgensen et al. 2006). The Rio Declaration emphasized the importance of ecosystems, indicating that the world shall cooperate in a spirit of global partnership to conserve, protect, and restore the health and integrity of the Earth's ecosystems (United Nations 2002).

In developing countries, forest pest management or now the so-called forest health is too compartmentalized, and it is perceived as a "classic agricultural" system, where insects and microorganism are *de facto* pests or diseases and not a fauna o flora associated to the forest

ecosystem and as such, a functional part of it. This view brings consequences that not only are mistaken and fail to effectively control them, but cause contamination, disruption of the ecosystem and in some cases, pursue management results and products that are unsustainable.

In this assay, I analyze the need for the manager to define forest scenarios with specific goals or with well-defined products to be obtained and linking them to management and conservation of a forest resource. I proposed and discussed the need to keep separate the terms forest pest management and forest health, since in the reality of developing countries, these terms help to understand the continuity among the different forest scenarios and help the manager to focus in the need to assess the ecological and/or economical damage of an organism or abiotic agent, and of course to define their pest status (CCAD 2017).

Forest Scenarios

From an anthropocentric point of view and having a well-defined management objective, one can foresee forest resources in terms of scenarios. Those forest scenarios with basic natural structures such as forests ecosystems and those that are created, like plantations, reforestations, nurseries and urban trees. A classification of this kind is very useful since *de facto* every scenario is established in terms of either anthropogenic investment to exists or those that could or do not have such investment, but that its persistence does not depend on humans. Scenarios define different aspects of management, administration, investment and legislation of a specific forest resource, but most of all, defines the management objectives that are expected from them and consequently, the value that each individual tree within the resource really has, and then which agent is a factor that would affect its base line mortality (Teal and Castello 2011).

A tree's value is highly variable, not only as a commercial wood commodity, but also due to time and money invested during its growth. One can generally say that the investment for a tree to grow in a forest is, from a man's point of view, null or far lower that what is needed for one growing in a plantation o even less for as an urban tree. The latter's value is based not only to grow and maintain it, but also adds value to the property that is in and implies a high cost if that tree needs to be removed, since is a very specialized job and human and properties are at risk to be damage if the tree falls. Therefore, professional attention given to tree depends on its value and therefore intimately related to the type of forest scenario where that specific tree or trees are developing.

Based on the previous reasoning, one can explain the differential attitude and attention given to trees in forests in comparison to trees growing in other scenarios. Forests are natural ecosystems growing over large extensions, driven by their own dynamics and independent from humans, who do not make monetary investments to maintain them and, until very recently, are starting to value the ecosystemic services provided by them. This is quite the opposite for "created" forest scenarios, where their own creation implies a monetary investment, with is management and technical attention and personnel for maintenance and conservation. The value of an individual tree within these "created" scenarios increases as it grows and at the end there is a product, which could be wood, paper or non-wood commodity, meaning a monetary income. Plantation with goals as carbon sinks are a good example, besides contributing to a positive carbon balance, the planter gain financial incentives for their creation and maintenance.

In developing countries, investments in forest ecosystems are more a matter of legislation, conscious awakening, education and under-funded programs of vigilantes, forest fighters (Schweizer *et al*. 2018) and sometimes forest pest management with the moto "kill every herbivore that feeds on many trees". Money investment from the government, social and private sectors to produce an economy are on tree plantations. These are the major reasons why people care about those types of scenarios more than forest themselves.

All forest scenarios should have a management plan, which states clear and sustainable objectives. From these objectives, the manager could base and derived, among other things, forest pest and forest health aspects that are the guidelines to decide when and where a particular herbivore, either its population or their feeding habits, is a problem to reach management goals for that particular forest scenario.

Forest health and forest pest management

In some developed countries, the term "forest pest management" has been replaced by "forest health", with a wider reach. However, in these countries the first is the one they follow, focusing exclusively in the trees and not in the health of the ecosystem. More recently several Latin American countries have moved to the use of the forest health term, but what they do is legislated and operated forest pest management. In the best of times, this approach is what professional forest resource managers in those countries learn at Universities (CCAD 2017).

The use of the forest health concept is relevant within natural resources management. Nevertheless, its definition depends very much on the human perspective (Teal and Castello 2011). With a utilitarian purpose, forest health has been conceived as the production of forest conditions that directly satisfy human needs. From an ecosystem perspective, the concept is defined by resilience, recurrence, persistence and by biophysical processes that lead to an ecological sustainability (Trumbore *et al*. 2015). Definition and understanding of forest health also depend on the spatial scale, which brings ambiguity with the associated increment of surface and the number of trees involved (Kolb *et al*. 1995, Sugden *et al*. 2015). All these definitions are confusing and worse, several parameters are difficult to measure (Teal and Castello 2011). Manion and Griffith (2001 in Teal y Costello 2011) define a forest ecosystem as healthy, sustainable and mature, when it maintains stability between structure and size, through the balance between its growth and mortality. Using this concept as starting point, Teal and Castello (2011) developed the term baseline mortality that provides with an ecologically based method to assess sustainability of any given forest when determine if caused mortality by some disturbing agent conveys instability of the system. The authors sustain that any forest present several degrees of mortality and its occurrence does not imply an un-healthy system.

Given the state of forest management knowledge in developing countries e.g. Latin America and the Caribbean, it would be clearer at least for the moment, to keep both terms separate -- forest pest management and forest health -- and set them with an economic or ecological perspective, respectively. This is even more important on world regions where social and economic aspects define, *de facto*, the policy use and investment of and on forest resources, but also where

environmental aspects are set aside or in the best of cases are only legislated under unclear parameters and with non-adequate operative plans (Almonte and Sánchez 2016).

These two concepts would help to determine a specific value of a forest resource. Therefore, they should be the base upon where the pest status should be defined. In consequence, all this is tightly linked to the type of forest scenario where an organism is assessed as causing a disturbance and/or affecting management objectives (CCAD 2017).

Interactions between trees and herbivores

From an ecological point of view, there are many biotic agents that use and live on forest resources, among them the herbivorous insects. All these interactions between trees and herbivores had been shaped by evolution and even though these insects could have population outbreaks, many times they do not affect the existence of tree communities. On the other hand, there are insect herbivores that in fact impact basic tree functions (photosynthesis, sap conduction, mechanical support, etc.) to such extent that individual trees life is shortened of cut off drastically, but their impact at tree population level is not important. The system is resilient and look for a new level of stability and remains. Nevertheless, there are some insect herbivores that due to its persistence and incidence on vital function of the trees cause extent mortality that integrity of trees communities is at risk, meaning that the ecosystem function is threaten. Consequently, in these cases, to determine and assess forest health aspects (ecosystem functionality) to take an integral approach is strategic, requiring a profound knowledge of physiology, ecology and ecosystems (Kolb *et al*. 1995).

Pest Concept

From what was previously mentioned, derives the need for discussion of the forest pest concept. A pest only exists or occurs from an anthropocentric perspective and then takes only place within the forest pest management concept. Here the impact that a pest causes can be determined with certainty by man, being an effect on wood, foliage, seed or plant production, as is quite evident in plantations, reforestations, nurseries and urban trees scenarios.

As it was explained before, forest health concept, with exception of exotic organisms (that are not part of an ecosystem and then without a common evolutionary history), the population increase of an herbivore follows natural processes that at any given time, will return to its original state or reach a new level of balance. However, even in these natural systems man influence has been such that now we are witnessing the clear effects of global climate change, which had tipped the balance towards a generalized stress over large surface of the earth, contributing to large increases of some herbivores populations (among other biological phenomena) that the system might not be able to balance. We are here in an uncharted territory. The best example of this phenomena is the bark beetle induced pine tree mortalities all along North and Central America (Rivera Rojas *et al*. 2010, Bleiker *et al*. 2011, Kleinman *et al*. 2012, Bentz *et al.* 2014, Hart *et al*. 2014, Six *et al*. 2014).

Pest concept is crucial and should be located within the context of forest scenarios. It is a major task for managers to define when an herbivore is a “real” pest by assessing the concepts of forest

pest management or forest health. By doing this, they could realize that in many occasions there is no need to control or, what is very common in developing countries, to find out the crucial necessity of biological and ecological regional knowledge on the insect or the tree to be able to have an educated opinion to decide on the pest status. It is very unfortunately that many text books and professional programs shows a list of "pests and diseases" when, ecologically, they are showing associated organisms for a particular tree or tree communities and that under very specific management circumstances are truly pests. This had to change. Even by just the mere fact that human, material and monetary resources are limited, forest manager must prioritize to deal with real damaging agents of forest resources. Regional knowledge and cooperation are critical.

It is interesting to note as consequence of what it has been exposed here, one could immediately realise that, as with agriculture crops, one tree species in a high-density plantation is a very unstable system, which requires continuous attention during years. The attention is not only on the different processes required to grow a specific industrial product, but in checking every herbivore that might put at risk that profit. If the planted tree species is exotic, as is the case in many tree plantations in the world, this situation is critical. All these facts had set tree plantations as one of the most knowledge and technological -forest health related- demanding areas at world level (FAO 2009). For a while after the tree species is introduced, native herbivory take time to acquire a "taste for them" and could become a risk for the tree's growth, or simply it will never take place. However, that is dramatically the opposite if the herbivores are also exotic (from the same or similar ecological region as the trees), the chances of catastrophic tree damage and mortality are high. The examples are many and happened mainly in plantations and urban scenarios: *Scolytus multistriatus* (Coleoptera, Scolytinae) vector of Dutch elm disease (Smith and Hulcr 2015); *Anoplophora glabripennis* (Coleoptera, Cerambycidae) on urban trees in New York (Nowak et al. 2001), *Agrilus planipennis* (Coleoptera; Buprestidae) in *Fraxinus* spp on urban and forest areas of east Canada and United States (Hu et al. 2009, Kovacs et al. 2009); *Xyleborus glabratus* (Coleoptera: Scolytinae) on cultivated and wild Lauracea in Southeastern United States (Smith and Hulcr 2015); *Dendroctonus valens* (Coleoptera, Scolytinae) in China (Sun et al. 2013); and *Sirex noctilio* (Hymenoptera, Siricidae) in Europe, Africa and America (FAO 209), as some examples.

If the goals set by global plans and accords mark to do ecosystem management and the need to pursue sustainability, resilience and protection of biodiversity, there is strategic need to start thinking in terms of forest health, more than just forest pest management, which in turn will allow us to realize the tremendous need developed countries need to generate their own knowledge about those ecosystems, very especially the interactions between the forests and their major herbivores, the insects.

References

Altomonte H. and Sánchez R.J. 2016. Hacia una nueva gobernanza de los recursos naturales en América Latina y el Caribe, Libros de la CEPAL, N° 139 (LC/G.2679-P), Santiago, Comisión Económica para América Latina y el Caribe (CEPAL).

Bentz B., Vandygriff J., Jensen C., Coleman T., Maloney P., Smith S., Grady A., and Schen-Langenheim G. 2014. Mountain Pine beetle voltinism and life history characteristics

across latitudinal and elevational gradients in the Western United States. Forest Science, 60(3): 434–449.

Bleiker K.P., Carroll A.L, and Smith G.D. 2011. Mountain pine beetle range expansion: Assessing the threat to Canada's boreal forest by evaluating the endemic niche Final Report Ver. 1.1. Natural Resources Canada, Canadian Forest Service, Pacific Forestry Centre, Victoria, BC. Mountain Pine Beetle Working Paper 2010-02. 17 p.

CCAD 2017. Estrategia Regional de Salud y Sanidad Forestal para Centroménica y República Dominicana 2016-2026. FAO, Panama.

FAO. 2009. Global review of forest pest and diseases: A thematic study prepared in the framework of the global forest resources assessment 2005. FAO Forestry Paper N0. 156. Food and Agriculture Organization of the United Nations, Roma. 222 pp.

Hart S.J., Veble T.T., Eisenhart K.S., Jarvis D., and Kulakowski D. 2014. Drought induces spruce beetle (*Dendroctonus rufipennis*) outbreaks across northwestern Colorado. Ecology, 95: 930–939.

Hu J., Angelis S., Schuetz S., Luo Y. and Hajek A. 2009. Ecology and management of exotic and endemic Asian longhorn beetle Anoplophora glabripennis. Agric. Forest. 11: 359-375.

Jorgensen S.E., Fath B.D., Bastianoni, S., Marques J.C., Muller F., Nielsen S.N., Pattern B.C., Tiezzi E., and Ulanowicz E. 2006. A new ecology systems perspective. Elsevier, Amsterdam. 289 pp.

Kleinman S.J., DeGomez T.E., Snider G.B., and Williams K.E. 2012. Large-scale pinyon ips (*Ips confusus*) outbreak in southwestern United States tied with elevation and land cover. Journal of Forestry 110: 194–200

Kolb T.E., Wagner M.R. and Covington W.W. 1995. Forest health from different perspectives. In: L. G. Eskew, comp. Forest health through silviculture: proceedings of the 1995 National Silviculture Workshop, Mescalero, New Mexico, May 8-11, 1995. Gen. Tech. Rep. RM-GTR-267. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station: 5-13.

Kovacs K.F., Haight R.C., McCullough D.G., Mercader R.J., Siegert N.W. and Liebhold M. 2009. Cost of potential emerald ash borer damage in U.S. communities. Ecological Economics 2009–2019. 69(3): 569-678.

Nowak D.J., Pasek J.E., Sequeira R.A., Crane D.E., and Mastro V.C; Potential Effect of *Anoplophora glabripennis* (Coleoptera: Cerambycidae) on Urban Trees in the United States, Journal of Economic Entomology, 94(1): 116–122.

Rivera-Rojas M., Localtelli B. and Billings R. 2010. Cambio climático y eventos epidémicos del gorgojo descortezador del pino *Dendroctonus frontalis* en Honduras. Forest Systems 19(1): 70-76.

Six D.L., Biber E., and Long E. 2014. Management for Mountain Pine Beetle Outbreak Suppression: Does Relevant Science Support Current Policy? Forests 5, 103-133.

Sugden A., Fahrenkamp-Uppenbrink J., Malakoff D. and Vignieri S. 2015. Forest health in a changing word. Science, 349 (6250): 802-805.

Sun J-H., Lu M., Gillette N.E., and Wingfield M.J. 2013. Red turpentine beetle: innocuous native becomes invasive tree killer in China. Annual Review of Entomology 58: 293–311.

Schweizer D., Meli P., Brancalion P.H.S. and Guariguata M.R. 2018. Oportunidades y desafíos para la gobernanza de la restauración del paisaje forestal en América Latina. Documentos Ocasionales 182. Bogor, Indonesia: CIFOR.

Smith S.M. and Hulcr J. 2015. *Scolytus* and other Economically Important Bark and Ambrosia Beetles. In Bark beetles, F.E. Vega and R.W. Hofstetter (eds.), Academic Press.
Teale S.A. and Castello J.D. 2011. The Past as Key to the Future: A New Perspective on Forest Health. Pp. 3-16 In Forest Health: An Integrated Perspective. J.D. Castello and S.A Teale (eds.). Cambridge Univ. Press. 384 pp.
Trumbore S., Brando P. and Hartman H. 2015. Forest health and global change. *Science*, 349 (6250): 819-822.
United Nations. 2002. http://www.un.org/documents/ga/conf151/aconf15126-1annex1.htm Consulted July 15 2018.

Messages from the First Global Land Degradation Neutrality (LDN) Forum

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Land Degradation Neutrality (LDN) has been defined by the United Nations Convention to Combat Desertification (UNCCD) as 'A state whereby the amount and quality of land resources, necessary to support ecosystem functions and services and enhance food security, remains stable or increases within specified temporal and spatial scales and ecosystems.'[1] As land management practice and policy, it attempts to counterbalance the expected loss of productive land with the recovery of degraded areas. The concept is also related to the UN's Sustainable Development Goal (SDG) 15.3, which seeks to combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world by 2030.[2]

In Seoul, South Korea, the 1st Global LDN Forum took place on July 4 – 5, 2018, hosted by the Korea Forest Service, in partnership with the UNCCD. More than 200 participants from both governmental and non-governmental organizations, international organizations and academia attended the inaugural forum to discuss how the international community can best cooperate to achieve LDN.

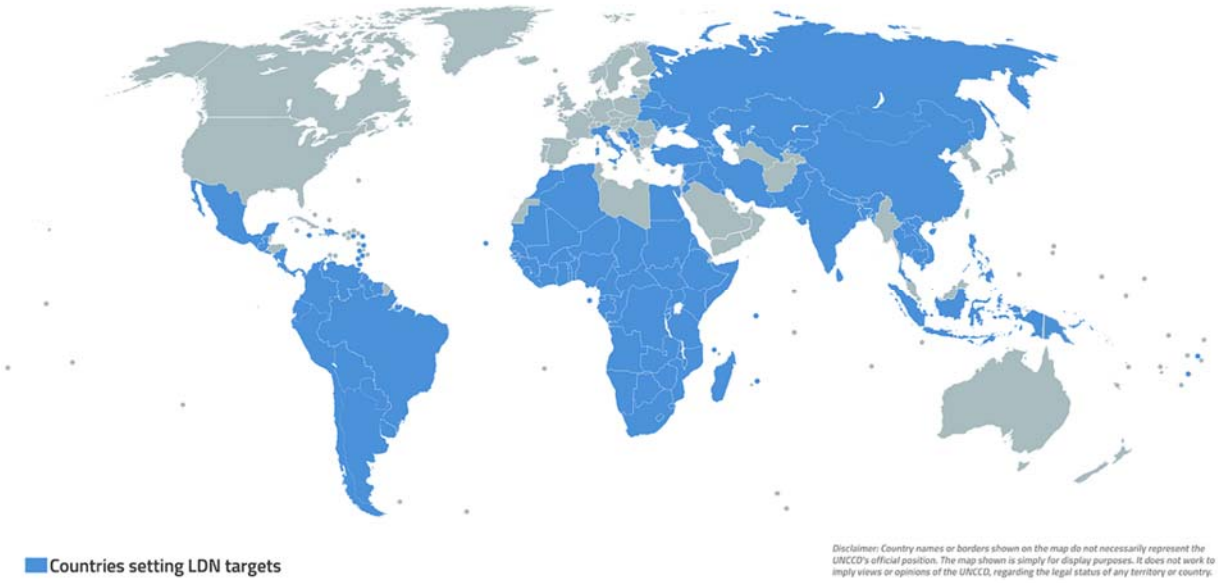
The forum left two messages, among others. First, global partnerships need to be strengthened for LDN implementation. For example, the participants discussed the need for sustainable funding for LDN, blended public-private financing and low interest loans for land stewards. Innovative approaches for financing LDN were also introduced such as the value proposition behind the investment mechanism of the LDN fund. Other presenters shared their experiences in implementation such as joint land restoration efforts in Brazil's Pantanal and Lake Chad. The 3S (sustainability, stability and security) Initiative of Gambia was also discussed, which addresses migration and conflict associated with natural resource degradation in Africa.

The second day of the forum centered on the Peace Forest Initiative, which aims to enhance trust and build lasting peace in post-conflict situations. Particularly the value of improving the living

[1] https://www.unccd.int/actions/achieving-land-degradation-neutrality
[2] https://sustainabledevelopment.un.org/sdg15

conditions of communities in cross-border regions through LDN was highlighted. Monique Barbut, Executive Secretary of UNCCD, emphasized the need for implementing LDN through a holistic approach towards land management, from the perspective of poverty reduction and food security as well as environmental conservation. Former secretary general of the UN, Mr. Ban Ki-moon, the President and Chair of the Global Green Growth Institute said "It would be worthwhile to explore potential partnerships among government agencies, international organizations, academic and research institutions, and even private firms to begin to identify projects that will simultaneously contribute to SDGs, LDN and post-conflict recovery,' which seems to sum up the messages of the forum.[3][4]

In fact, it was in the midst of recent news about joint reforestation projects between North and South Korea as well as concerns in East Asia over yellow dust due to desertification that the forum occurred. "I'd like to request international cooperation for implementing our Peace Forest Initiative with North Korea – this Forum is a starting point to take this timely and historic journey", said Jae Hyun Kim, Minister of Korea Forest Service. The event ended with a visit to the Demilitarized Zone between North and South Korea, trying to build an international consensus on the promise of peacebuilding through the restoration of North Korea's forest resources.[5]



Countries with LDN targets (https://www.unccd.int/actions/ldn-target-setting-programme)

[3] https://www.unccd.int/news-events/first-ldn-forum-proposes-land-based-solutions-peace-and-well-being
[4] http://gggi.org/gggis-assembly-president-and-council-chair-ban-ki-moon-urges-global-efforts-on-land-degradation-neutrality-and-supports-the-inter-korean-peace-forest-initiative/
[5] http://www.forest.go.kr

Lightning Strikes in Carbon-offset Forests

Reforest the Tropics manages a UNFCCC-AIJ program of applied research to improve offset forest in farms in the tropics. Sponsored and funded by U.S. emitters, we manage 73 forests in 13 farms in Costa Rica, a total of 200 hectares. Our research dates back to the '60s. Our formal offset forests have been established during the past 19 years.

Here are some observations on the effects of lightning based on observations in our offset forests.

1) Lightning kills trees and reduces the net sequestration of a forest. Dead trees left *in situ* eventually rot and release the sequestered CO2e back into the atmosphere. More research is needed on the effects of lightning on forests established to sequester CO2.

Below is a photo of an offset forest planted 17 years ago, recently struck by lightning.

In this photo, you can see about 4 trees killed by the strike. In the center amongst the dead trees is a very green, unaffected Klinkii tree (Araucaria hunsteinii).

a) The number of trees affected from different strikes on this farm has been from 4 to 31 trees. We assume that if a single tree is hit, the electric energy travels from one tree to the other through root graphs, killing neighbors.

b) Also notice that the Klinkii tree *was not* affected by the strike even though it was in the middle of the affected group. The trees in this mixed two-species forest that were killed by

lightning were Chanchos (*Vochysia guatemalensis*). This suggests that not all species are equally affected by lightning.

c) Our forests in this one farm cover 90 ha. We have observed that a certain area, relatively small, appears to be struck more often. This is the area that has been planted with this species, Chancho.

d) Other than Chancho, most of the tree species that we use in our mixtures have not been observed to be overly affected by lightning.

e) The RTT new designs of offset forests involve mixtures of up to 10 species, in part to assure the sustainability for long-term, 100-year storage, one of our major goals. In a mixture of species, the loss of a single species may not affect the eventual outcome since the remaining species fill in the loss and the forest continues to sequester CO2.

Here are some limited actions we have taken based on these observations:

- We limit the number of Chancho trees in our mixtures of tree species for offset forests for the above and other reasons. Obviously, not all species of trees are amenable to long-term carbon storage. Our main species for long-term carbon storage is the Klinkii tree.
- In the forests where we notice lightning damage, the farmer is notified to harvest the trees as soon as possible. This must be done quickly since insects and rot attack the dead tree quickly, degrading the quality of the wood. Each of the damaged trees in the photo above may have 3 or more commercial-size logs in the Costa Rican market for pallet wood.

We recognize that the frequency and effects of lightning strikes will differ on different sites. These comments are based on or observations of multiple species in different designs in a single farm.

Herster Barres
Reforest The Tropics
Web site: Reforestthetropics.org

Is the Twolined Chestnut Borer, a North America Beetle, Established in Turkey?

Robert A. Haack
Research Entomologist, emeritus
USDA Forest Service, Northern Research Station, Lansing, MI
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The twolined chestnut borer (TLCB; *Agrilus bilineatus*) is native to eastern North America, occurring from southern Canada, south to Texas and Florida and west to the Rocky Mountains. Recently, a few TLCB adults have been collected in Turkey in multiple years and at multiple sites that were more than 200 km apart (Jendek 2016, Hızal & Arslangündoğdu 2018),

suggesting that TLCB is established in Turkey. In North America, TLCB is a major pest of chestnut (*Castanea*) and oak (*Quercus*), often infesting and killing host trees weakened by drought, defoliation, and other stressors such as ice storms, hail damage, and late spring frosts (Haack & Acciavatti 1992). The life cycle of the TLCB is generally completed in one year, with adults emerging from infested trees in early summer and laying eggs on the bark surface, larvae developing in the cambial region and overwintering in the outer bark or outer sapwood, and pupating in spring.

The TLCB is a member of the beetle genus *Agrilus*, which has over 3000 species worldwide. Some *Agrilus* species have become major pests when introduced to new world regions, such as the emerald ash borer (*Agrilus planipennis*), an Asian species, which has entered North America and European Russia and become a major pest of ash trees (*Fraxinus*) (Haack et al. 2015). No information has yet been published on which trees species are serving as hosts for TLCB in Turkey, but it would likely be able to survive on European chestnut and all European oaks. Back in the 1980s, while I was working in southern Michigan, the TLCB infested and killed dozens of apparently healthy *Quercus robur* trees (pedunculate oak or English oak) that were planted as ornamentals and also in an experimental test plot along with two native oaks (*Q. alba* and *Q. rubra*) that were rarely infested.

Adult twolined chestnut borer. Note the yellow stripe on the upper side of each wing cover.

I was recently asked to prepare a datasheet on this insect by EPPO (European and Mediterranean Plant Protection Organization), which I accepted. The TLCB is an old “friend” of mine given that I studied this insect for my MS degree in Wisconsin some 40 years ago (Haack & Benjamin 1982). In October 2018, there will be an international conference in Austria entitled "Preparing Europe for invasion by the beetles emerald ash borer and bronze birch borer." The

bronze birch borer (*Agrilus anxius*) is native to much of Canada and the USA where it infests birch trees (*Betula*). The bronze birch borer has not yet been found in Europe, but given that the TLCB now appears to be in Europe, I am sure it will be part of the upcoming discussions in Austria. Hopefully more information will soon be learned about the TLCB situation in Turkey, especially which tree species are being using as hosts and if the TLCB is infesting primarily stressed trees or also apparently healthy trees.

Haack RA & Accavetti RE (1992) Twolined chestnut borer. Forest Insect & Disease Leaflet 168, USDA Forest Service, Washington DC. (https://www.fs.usda.gov/treesearch/pubs/10978)

Haack RA & Benjamin DM (1982) The biology and ecology of the twolined chestnut borer, *Agrilus bilineatus* (Coleoptera: Buprestidae), on oaks, *Quercus* spp., in Wisconsin. *The Canadian Entomologist* **114,** 385-396. (https://www.researchgate.net/publication/250369178))

Haack RA, Baranchikov Y, Bauer LS & Poland TM (2015) Emerald ash borer biology and invasion history. In Biology and Control of Emerald Ash Borer. (eds Van Driesche R, Duan J, Abell K, Bauer L & Gould J), pp. 1-13. FHTET-2014-09, USDA Forest Service, Forest Health Technology Enterprise Team, Morgantown, WV. (https://www.fs.usda.gov/treesearch/pubs/49254)

Hızal E & Arslangündoğdu Z (2018) The first record of two-lined chestnut borer *Agrilus bilineatus* (Weber, 1801) (Coleoptera: Buprestidae) from Europe. *Entomological News* **127,** 333-335.

Jendek E (2016) Taxonomic, nomenclatural, distributional and biological study of the genus *Agrilus* (Coleoptera: Buprestidae). *Journal of Insect Biodiversity* **4(2),** 1-57.

Planted Forests Are an Ally in the Conservation of Native Ones

Each hectare of planted forest contributes to preserve 0.7 hectares of a native one in Brazil, according to Ibá

From the seed through harvest, wood and its by-products are increasingly present in peoples' daily lives. For instance, it is used for making cribs, toys, doors, windows, furniture, energy generation, not to mention cellulose, paper and its by-products, as well as resins, paints, glues and other products. According to FAO (Food and Agriculture Organization of the United Nations), wood consumption is 3.5 billion m^3/year throughout the world, which equates to 875,000 km^2 of planted forests or 122 million football pitches.

It is estimated that there will be 9 billion people in the world by 2050, which should double or even triple the demand for timber according to the Brazilian Tree Industry (Ibá). In order to meet such demand in a scenario requiring low carbon footprint, renewable energy sources and zero net deforestation, several studies indicate that more 250 million hectares of planted forests will be needed throughout the world, according to data available on the Ibá website.

Therefore, growing renewable forests is critical to supply the demand for timber whilst preserving native ones. Today, for each hectare of planted forest there are 0.7 hectares of preserved ones in Brazil, whereas there are 0.25 in Chile and 0.05 in Australia, for instance (source: Ibá). According to the Brazilian Agricultural Research Corporation (Embrapa), 61% of the Brazilian territory is covered with native forests, a figure that surpasses by far those of African, Asian and European countries.

A forest nursery in Brazil (photo source: https://www.inflor.com.br/en/)

Planted forests play an important role in helping to preserve the native vegetation. In addition to the environmental aspect, the activity is relevant to the economy for it generates employment and income. And Brazil is at the forefront of this segment, developing technologies that make it stand out in the eyes of the world when it comes to productivity and sustainability of planted forests.

It is worth highlighting that the renewable forests grown here have been using the same land for 50 years. Thanks to genetic improvement and handling techniques, the forest-producing companies are seeking − and have been able to − produce more timber in a smaller area.

Technology is an important ally in this process, whether in production or in the management. Technological breakthroughs like genetic improvement and more productive handling techniques, besides the latest technologies, such as precision agriculture, virtual reality and other gadgets increasingly present in peoples' lives have allowed the development of management software with built-in state-of-the-art solutions for the sector.

That is how the growing of renewable forests in Brazil has been contributing to preserve almost six million hectares of natural ones as well as to put Brazil at the forefront of this segment.

Guilherme Brunoro
INFLOR (https://www.inflor.com.br/en/)

Université Laval receives nearly $CD 862,000 from the Quebec government for its project in Cameroon

The Faculty of Forestry, Geography and Geomatics of Université Laval is proud to announce that it will lead an international climate cooperation project in Cameroon over the next three years, thanks to a financial contribution from the Québec government of $CD 861 927 from the Green Fund under the 2013-2020 Action Plan on Climate Change administered by Ministry of Sustainable Development, Environment and the Fight Against Climate Change of Quebec.

The project will involve the development of agroforestry systems that are more resilient to climate change in three particularly vulnerable regions of Cameroon. Thanks to this project, the Faculty of Forestry, Geography and Geomatics of Université Laval will continue to strengthen its partnership with local universities and communities and put its expertise at the service of the development of agroforestry systems that are resilient to climate change in view of the socio-economic progress of Cameroon's most vulnerable local communities. The project will enable the Faculty to contribute to the training of highly qualified Cameroonian personnel in the field of climate change and to the achievement of the United Nations Sustainable Development Goals by 2030 "said Guy Mercier, Dean of the Faculty of Forestry, Geography and Geomatics at Université Laval.

Focusing on local capacity building, the project will be carried out in close collaboration with the University of Dschang, an agricultural and environmental training Centre, and ABIOGeT, a Cameroonian non-governmental organization. This partnership between universities and communities aims to ensure the transfer of expertise and the proactive participation of local populations in the development of relevant solutions adapted to their reality, so as to empower them to be the actors of their own community development.

As part of this project, Université Laval and its partners will work to build the capacity of Cameroonian farmers through training and technical support in the field. Research will also be conducted on the issue of carbon sequestration through the sustainable management of agroforestry systems, with a view to reducing greenhouse gas emissions. By the end of the project, the productive capacities of some fifteen agricultural cooperatives in the targeted regions will have been strengthened, and more than 1,500 farmers and about 60 nurserymen will have been trained in agroforestry best practices. The adoption of these innovative practices should help improve agricultural productivity and reduce the country's food and energy insecurity.

Submitted by Damase Khasa, professor of agroforestry and international forestry (Université Laval)

2018 SAF National Convention

Portland, Oregon • October 3-7, 2018

https://www.eforester.org/safconvention

Join us at the Asia-Pacific Forestry Week!

Asia-Pacific Forestry Week (APFW2019) will be held in **Songdo Convensia Convention Center, Incheon, Republic of Korea** on **17-21 June 2019**. It will be one of the largest and most important forestry gatherings in the Asia-Pacific region in 2019. ***"Forests for peace and well-being"*** is the overall theme of APFW2019, which reflects the positive dimensions of forestry and suggests the need to proactively integrate forestry into the wider context of environment, society, and sustainable development, under which economic, social, human and cultural dimensions are considered in a holistic manner.

The Korea Forest Service (KFS) will host the event together with the Food and Agriculture Organization of the United Nations (FAO). We encourage participation and support of partner organizations and collaborators including government, civil society, research, academia, and the private sector.

NEW GRANTS: CALL FOR APPLICATIONS 2019–2020 FACULTY FOR THE FUTURE FELLOWSHIPS

SCHLUMBERGER FOUNDATION FACULTY FOR THE FUTURE

The Schlumberger Foundation is accepting new applications for the 2019–2020 Faculty for the Future Fellowships **from September 5th to November 7th, 2018.**

The Faculty for the Future program, launched in 2004, awards fellowships to women from developing and emerging economies to pursue PhD or Post-doctorate studies in science, technology, engineering and mathematics (STEM) disciplines at leading universities worldwide.

The program's long-term goal is to generate conditions that result in more women pursuing scientific careers by lowering the barriers women face when entering STEM disciplines, thus reducing the gender gap. Faculty for the Future Fellows are expected to return to their home countries after completion of their studies to contribute to economic, social and technological advancement by strengthening the STEM teaching and research faculties of their home institutions, and to also pursue positions in the public sector where their newly acquired technical and scientific skills can help provide evidence-based support for STEM policy making. In so doing, they become powerful role models and help to inspire other girls and women to pursue scientific careers.

Since its launch in 2004, 683 women from 81 developing and emerging countries have received Faculty for the Future fellowships to pursue PhD and Post-Doctorate study in STEM in renowned universities worldwide. While all applications will be evaluated using the same criteria, applications would be particularly welcome from countries that are currently underrepresented to enable a broad geographical spread which is an important factor in the overall mission of this grant program.

The program also helps build a community for the Fellows through Forums, both online and in person. Faculty for the Future grants are based on actual costs for eligible expenses up to a maximum of USD 50,000 per year for a PhD and maximum of USD 40,000 per year for a Post-doc and may be renewed through to completion of studies subject to performance, self-evaluation, recommendation from supervisors and strong evidence of re-integration plans in the home country.

Candidates should have applied to, have been admitted to, or be currently enrolled in a university abroad when submitting their grant application. Candidates must hold an excellent academic record and illustrate their commitment to teaching and research or to using their scientific knowledge in public policy advocacy. Candidates should demonstrate leadership skills, community outreach interest and have a track record in encouraging young women into the STEM fields. Candidates should also prove their commitment to returning to their home countries to contribute to the economic, social and technological advancement of their regions, pursuing careers in the teaching and research faculties of their home institutions and also taking positions in the public sector.

ALL INFORMATION REGARDING THE FACULTY FOR THE FUTURE PROGRAM CAN BE FOUND AT:

www.facultyforthefuture.net

IF YOU MEET THE ELIGIBILITY REQUIREMENTS, APPLY ONLINE AS OF **SEPTEMBER 5TH, 2018:**

www.fftf.slb.com

The Schlumberger Foundation is a nonprofit organization that supports science and technology education. Recognizing the link between science, technology, and socio-economic development, as well as the key role of education in realizing individual potential, the Schlumberger Foundation flagship program is Faculty for the Future.

Schlumberger **Foundation** Faculty for the Future

RAINFOREST TRUST®

7078 Airlie Road
Warrenton, VA 20187
(800) 456-4930

Call for Proposals: Partnering with Rainforest Trust to Protect Key Biodiversity Areas
Deadline: Draft proposals 1st October 2018, final applications 1st November 2018

Rainforest Trust works with local conservation organizations across the tropics to create new protected areas. At the World Conservation Congress in 2016, Rainforest Trust launched the SAVES Challenge, our commitment to direct $100 million toward creating new protected areas to save the world's most threatened species. Through the SAVES Challenge, Rainforest Trust has the capacity to match, dollar for dollar, projects that target the establishment of protected areas for priority Key Biodiversity Areas (KBAs).

As a member of the KBA Partnership, Rainforest Trust has committed to identifying, mapping, monitoring and protecting the most important places for life on Earth. As an organization, we are especially focused on projects in KBAs with globally significant populations of Critically Endangered (CR) and Endangered (EN) species.

To this end, Rainforest Trust wishes to explore partnerships with local conservation organizations interested in establishing new protected areas in places that have either been formally recognized as KBAs or would trigger a new KBA on further evaluation. For more information on KBAs, visit www.keybiodiversityareas.org.

Proposal Requirements:

- The project must be based within the tropics or subtropics.
- The site must qualify as a KBA under criterion A1(a) (site regularly holds a globally significant proportion of the population of a Critically Endangered or Endangered species[1]).
- The site must currently be unprotected and not designated as a protected area.
- The project must be implemented by an organization nationally registered and legally authorized to work in the project country.

In addition, Rainforest Trust supports feasibility studies to assess the potential to create protected areas.
Rapid Protected Area Feasibility Awards:

- Assess whether a site qualifies as an A1(a) KBA;
- Evaluate land tenure of unprotected A1(a) KBAs;
- Evaluate the presence and abundance of CR and EN species within unprotected A1(a) KBAs;
- Gauge opportunities to designate governmental protected areas or to purchase privately-owned land;
- Assess community and government interest in protected area creation; and
- Identify next steps in proceeding with protected area creation.

Additional information regarding the SAVES Challenge, project requirements and an eligibility questionnaire can be found at www.RainforestTrust.org/SAVES-Conservation. Rainforest Trust's next deadline is 1st November 2018, we encourage interested applicants to start the online process as soon as possible and draft applications should be submitted on or before 1st October. Those interested in exploring opportunities to leverage this support should contact SAVES@RainforestTrust.org.

[1] See https://portals.iucn.org/library/node/46259, page 16

Mark your calendars!

The Yale Chapter of the International Society of Tropical Foresters is proud to announce the 25th Annual Conference, which will take place from January 31st to February 2nd of 2019, in Yale University, New Haven, CT, USA.

The ISTF 2019 Conference will share tools, worldviews, challenges and best practices in addressing global disturbances and transgressions through the resiliency of tropical forests and their people.

We will soon share further information on keynote speakers, panelists, agenda and much more.

Follow us on our Website, Twitter and Facebook to stay up to date on upcoming news.
We look forward to seeing you next year!
Sincerely,
2019 ISTF-Yale Planning Committee

Note – if anyone is interested or participating in the program development for the ISTF 2019 conference or in presenting, please contact Renata Lozano renata.lozano@yale.edu

World Forestry Institute Fellowships

World Forestry Institute (WFI) offers the 2019 International Fellowship Program, with applications open between July 1 and October 15. Get more information and apply via this link (https://www.worldforestry.org/institute/world-forest-institute/international-fellowship/).

TROPICAL DRY FOREST RESTORATION INTERNSHIPS AND COLLABORATION 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 on the Azuero peninsula in Panama. In 2019, we will be working National Geographic on a comparison between the social perceptions and ecological characteristics of forest regeneration and active reforestation strategies in a cattle ranching landscape. Opportunities are available on our tropical forest restoration crew from May-August, or in native and fruit species nursery management from September-March. We are also interested in exploring possibilities for collaboration with **professors** looking for field sites for tropical ecology and environmental courses. For more information or to apply for an internship please send a CV and cover letter to info@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.

Reforestation at the Azuero Earth Project.

International Society of Tropical Foresters News

Interested in being an ISTF officer or on the Nominating Committee? The International Society of Tropical Foresters (ISTF) is aiming to hold elections for officers in November or December 2018. If you would like to serve on the nominating committee, be a candidate for an office, or suggest someone else as a candidate for an office, please contact tropicalforesters@gmail.com . Pending final approval of bylaws by the membership, positions will include President, Vice-President, Secretary, Treasurer, and 3 regional representatives (one each from South America (including the Caribbean, Mexico, and Central America), Asia-Pacific, and Africa. We aim to have the new board in position for January 2019 to move forward with full reactivation of the organization.

Invitation to membership in ISTF. We hope you will join the Central International Society of Tropical Foresters (ISTF)! The Yale and NC State student chapters have faithfully been maintained, and the central ISTF is being reactivated after a five-year hiatus. ISTF was founded in the 1950s "in response to a worldwide concern for the fate of tropical and subtropical forests, [and] ISTF is committed to the protection, wise management and rational use of the world's tropical forests". With its focus on being a communication network, ISTF can help you connect with others interested in tropical forests and forestry. So far, over 480 people from around the world have rejoined. For now, the central ISTF is dues-free.

If you would like to join the Central ISTF, please contact tropicalforesters@gmail.com. This information will be shared among ISTF members, to establish communication and develop collaborations.

For more information on ISTF see:

- Blair Orr's continuation of the former ISTF News as a newsletter for the Society of American Foresters International Forestry Working Group. (Available at: http://www.orrforest.net/saf/)
- The old ISTF web page, still at http://www.istf-bethesda.org/
- The ISTF facebook group page at: https://www.facebook.com/groups/2262122534/
- Student chapter at Yale University, which sponsors the annual Yale ISTF conference (http://istf.yale.edu/ , https://www.facebook.com/yalefesistf/)
- Student Chapter at North Carolina State University (https://research.cnr.ncsu.edu/sites/istf/, https://www.facebook.com/NCSUISTF/)

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.

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:

A Dominion of Canada bank note, circa 1898.
http://www.wikiwand.com/en/Canadian_dollar

Forest and Water on a Changing Planet: Vulnerability, Adaptation and Governance Opportunities. A Global Assessment Report.

Published by the International Union of Forest Research Organizations (IUFRO).

Riparian vegetation and landscape in Mongolia, a country where freshwater resources are scarce - © Alexander Buck

Increasingly the world is facing water shortages. An estimated four billion people do not have sufficient access to safe and reliable water, and the majority of them live in areas with low forest cover. However, whereas the link between forests and climate is regularly considered in decision-making, that between forests and water remains under-represented.

In order to provide an authoritative source of information on forest and water links for policymakers and stakeholders, the Global Forest Expert Panel (GFEP) on Forests and Water started to systematically assess the scientific knowledge about the interactions between forests and water on a global level in January 2017. The Panel, jointly chaired by Professors Meine van Noordwijk, of ICRAF and Wageningen University, Netherlands, and Irena Creed, University of Saskatchewan, Canada, brought together more than 50 scientists from 20 countries representing a wide range of scientific disciplines. GFEP is an initiative of the Collaborative Partnership on Forests (CPF) led by the International Union of Forest Research Organizations (IUFRO).

In July 2018 the results of this comprehensive assessment were successfully presented at the United Nations High-Level Political Forum (HLPF) on Sustainable Development in New York. They are available as a peer-reviewed report entitled "Forest and Water on a Changing Planet: Vulnerability, Adaptation and Governance Opportunities" (published as IUFRO World Series 38) accompanied by a Policy Brief *"Forest and Water on a Changing Planet: Scientific Insights for Achieving the United Nations' Sustainable Development Goals"*. The primary global policy context for this report is shaped by the 17 Sustainable Development Goals (SDGs) defined by the United Nations in the Agenda 2030 of Sustainable Development.

The GFEP on Forests and Water set out to address a series of important questions: Would it help to plant more trees? Would this make water scarcity worse? Does it matter what type of trees? Does it matter where and how they are integrated into the landscapes? Are floods and droughts linked? To respond to these concerns, they focused on three key questions: "Do forests matter?"; "Who is responsible and what should be done?"; "How can progress be made and measured?"

While recognizing that the answers to the three questions would depend on the region of focus and require a timeframe and resources beyond those available, the involved scientists identified

globally relevant information on forest-water interactions and showcased implications for international policymakers. They specifically point out that the combined effects of climate change, reduced forest functions, and increased demand for water for human health and well-being deserve more explicit attention by governance systems at, at least, four scales: the local, the landscape, the national and the global (including transboundary) scale.

Water scarcity will inevitably increase in the future, as climate variability and change generate uncertainties in water supply, while a growing human population increases demand for water. Forests and forested landscapes regulate the provision of water and water-related ecosystem services. Preservation of existing native forests and better-informed management of planted forests, are especially critical in areas with low forest and tree cover.

Unfortunately, water is rarely considered a priority in forest management. This is perhaps, because the co-occurrence of forest and water is so common. But natural forests, in particular, contribute to the sustainable water supply for people in the face of growing risks. And, forests can be managed for resilience of water supplies to enable adaptation to change if locally relevant data and resources are available. Investments in data collection and interpretation are essential to support evidence-based risk management planning and adaptation.

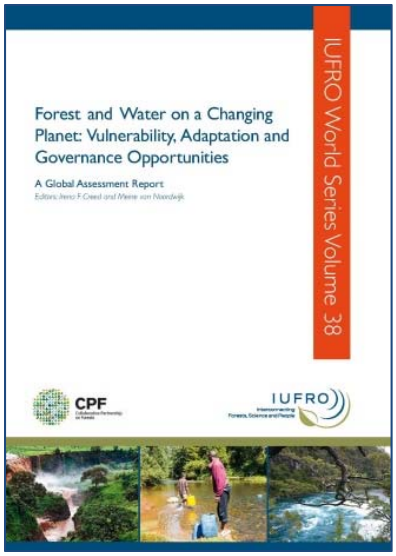
A similar lack of attention to the importance of forests and trees for water can be noted in international climate debates. In view of the vital role water plays, even in facilitating the continuous sequestration of carbon in standing forests, a lack of understanding of landscape-scale effects amongst the forest and water science communities and policymakers is of increasing concern. In areas of water scarcity, water should definitely be at the center of discussions of forest-climate interactions because carbon-centered forest strategies will have important consequences on water resources.

Forests can also disperse waters to relatively distant areas. Adding forest and vegetation cover, for example, to upwind coasts where moisture released in the air is likely to deliver water to drier inland areas represents one possible win-win strategy. Consequently, managing forest-water interactions will require the engagement of forest managers, water users and other stakeholders across hydrologically connected landscapes. Governments and other stakeholders need to work together on global water governance to promote resilient and reliable upstream-downstream and upwind-downwind water supplies. Water is a local as well as a global resource and changing water supplies have cascading effects that no longer respect political and national boundaries.

Changes in forest-water relations will affect the quality and quantity of related ecosystem services such as the supply of water or forest products and will have an impact on where, how and to whom these services will be available. Therefore, it is necessary to consider questions of distributional equity, fairness and justice in forest-water arrangements. Already marginalized and vulnerable communities should not be exposed to further risks. Regulations and rights-based approaches to climate-forest-water relations provide an essential foundation for innovation in forest-water governance.

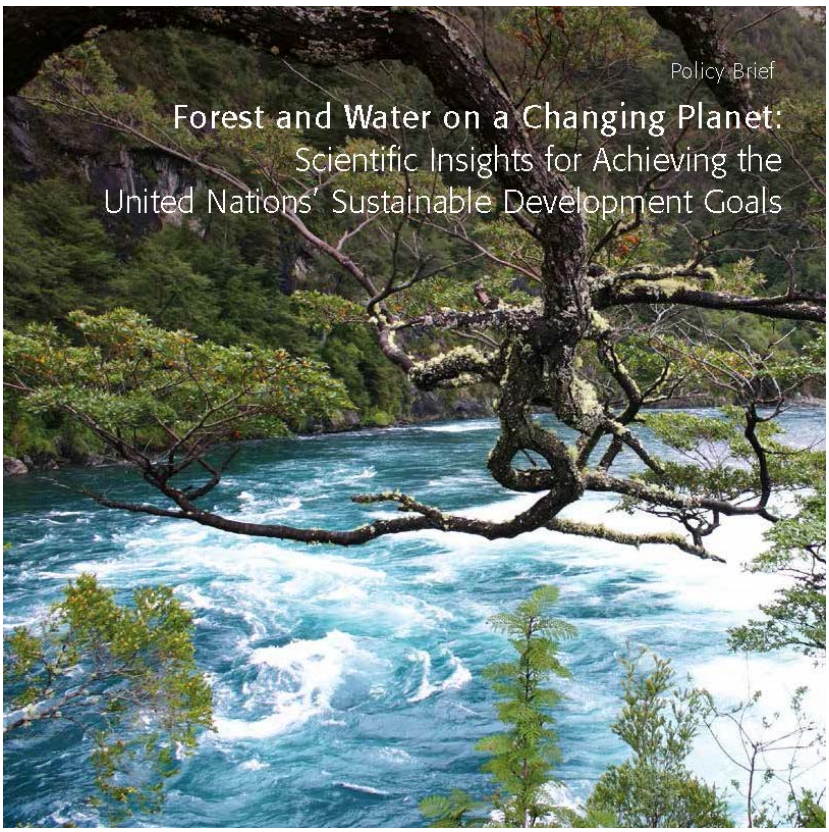
The assessment confirms that water is central to all of the 17 SDGs and to global prosperity as a whole; governments and other stakeholders that want to achieve SDGs need to understand the

centrality of water and its relations with social, environmental and economic outcomes. It also comes to the conclusion that international governance can play both a symbolic and a substantive role by creating norms (such as the SDGs), by providing fora in which norms can be discussed, negotiated and agreed upon, and by providing opportunities for assessing progress.



Irena F. Creed and Meine van Noordwijk (eds.), 2018. **Forest and Water on a Changing Planet: Vulnerability, Adaptation and Governance Opportunities. A Global Assessment Report.** *IUFRO World Series Volume 38. Vienna. 192 p. ISBN 978-3-902762-95-5 / ISSN 1016-3263 Published by: International Union of Forest Research Organizations (IUFRO).*

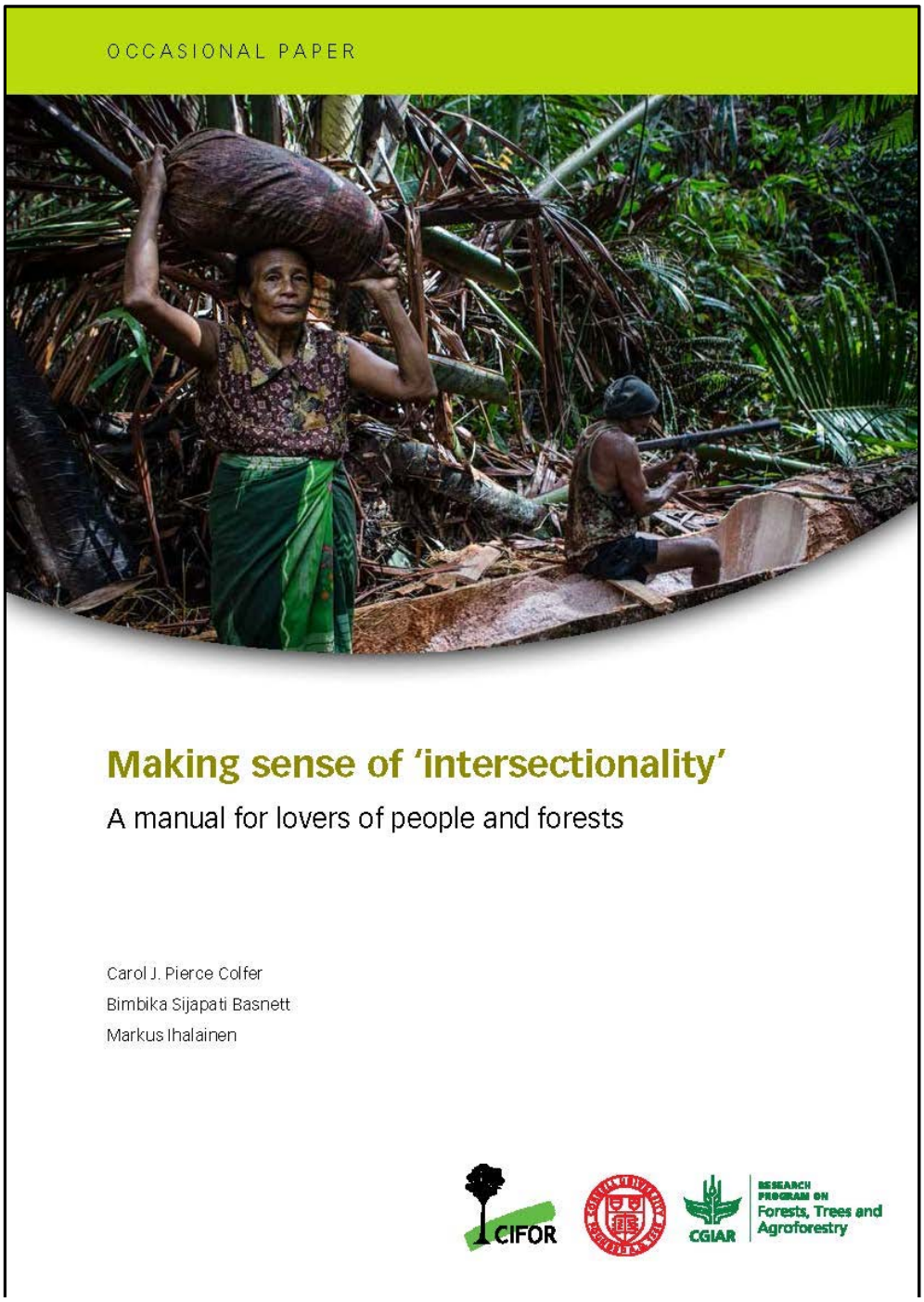
The report and accompanying policy brief are available electronically at: https://www.iufro.org/science/gfep/forests-and-water-panel/report/



Cover page of Policy Brief "Forest and Water on a Changing Planed: Scientific Insights for Achieving the United Nations' Sustainable Development Goals"

Colfer CJP, Basnett BS and Ihalainen M. 2018. *Making sense of 'intersectionality': A manual for lovers of people and forests*. Occasional Paper 184. Bogor, Indonesia: CIFOR.

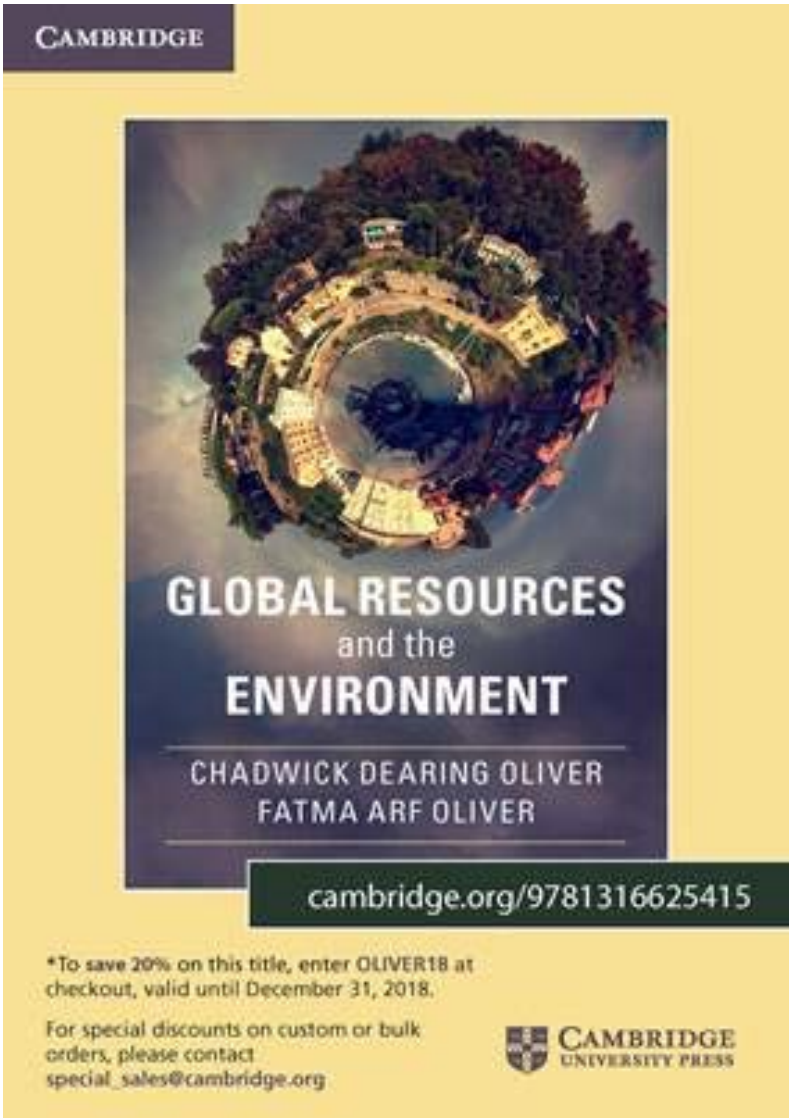
https://www.cifor.org/library/6793/making-sense-of-intersectionality-a-manual-for-lovers-of-people-and-forests/



Global Resources and the Environment

Global Resources and the Environment. 2018. Chadwick Dearing Oliver and Fatma Arf Oliver. Cambridge University Press. 512 pp.

Published in August, 2018, this book integrates people, the environment (climate and change, landforms, biodiversity), and Resources (water, food, energy, minerals, and forests). It uses copious data sets, figures, and photographs to separate the "myths" from the reality. The authors are cautiously optimistic, but shows pitfalls and things that need to be done. The book is intended for the mid-career professional who wants to learn and integrate many resources without needing to read many, separate books.



Stand Density for *Santalum album*.

Development of a stand density management diagram for *Santalum album* plantations in Karnataka, India

Abstract : Stand density management diagrams are average stand-level models that graphically display the relationship between stand yield, density, height and diameter throughout the various stages of forest development in even-aged stands. These are useful tools for designing, displaying and evaluating alternative density regimes in even-aged forest ecosystems to achieve a desired future condition. In this paper, we present a stand density management diagram constructed for sandalwood stands in Karnataka state of India. The relationship between stand density, dominant height, quadratic mean diameter, relative spacing and stand volume is exhibited in one graph. The relative spacing index was used to characterise the growing stock level. Two equations were fitted to the data collected from 19 sample plots measured annually for three years: one relates quadratic mean diameter with stand density and dominant height, whereas the other relates total stand volume with quadratic mean diameter, stand density and dominant height.

The article may be cited as:
Vindhya Prasad Tewari & Baragur N Diwakara (2018) Development of a stand density management diagram for *Santalum album* plantations in Karnataka, India. Southern Forests: a Journal of Forest Science 80(3): 251-259. (DOI:10.2989/20702620.2017.1379321)

The article is available online at https://doi.org/10.2989/20702620.2017.1379321 otherwise the interested may contact the first author at vptewari@yahoo.com or tewarivp@gmail.com

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Forest Concessions and sawmills in Acre, Brazil

Economic distance forest-sawmill as an indicator for the definition of forest concessions: A case study in the State of Acre (in Portuguese: Economic radius as an indicative for the definition of forest concessions: a case study in the State of Acre) ". This study was winner of the third place at the II Brazilian Forest Service Award in Economics and Forest Market Studies, 2015.

This study addresses the timber production, rationally, in the Amazon region. Its main objective was, by generating economic information on sustainable forest management (SFM), to cooperate in the formulation of policies seeking to promote, in the concession form of public forests, the use of these natural resources in this region. In this way, was adopted as study area forests located in the state of Acre. The data that supported this research were obtained from interviews with the sawmill owners that operated in that state in 2008. The adopted method identified the forest area to meet requests from local sawmills as the demand for round wood, as well as the economic distance (maximum economic forest-mill distance). The results allowed to conclude that: 1) The demand by land in the form of forest concession from the Acrean timber sector, adopting the SFM as a source of timber in logs, is about 800,000 hectares, in the case of group of

60 sawmills would be acting in the region; 2) The incremental cost for round wood, explored in managed area, is around of 146% higher than the cost of this log as exploited in land conversion; 3) Considering the lumber production and marketing costs, as well as its selling price, it can be said that 282 km is the maximum economic forest-mill distance, in the form of forest concessions, in the Acrean timber sector and 4) Using the concepts of land expectation value, it is possible only in economic terms, to a holder of a forest concession perform the MFS in this area and sell the round wood delivered at the sawmill yard, and earn a 6% interest rate per year, in this process, if the distance from the forest to the courtyard of the mill is less than 125 km.
Key-words: Forest economics. Sustainable forest management. Amazon region.

If anyone is interested in the book that contains this study and the other winning studies, please contact the address below.

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Using livelihoods and Sustainable Forest Management to reduce deforestation in the Bolivian Amazon.

Excerpted from the Kew Royal Botanic Gardens web page (https://www.kew.org/science/projects/forest-futures-bolivia):

The Bolivian Department of Pando covers an area of 6.4 million hectares of which 95% is still under forest. These forests are rich in biodiversity, with species that are rare elsewhere in the Amazon or endemic to Bolivia.

Immigration to the region, driven by economic, political and environmental factors, has placed increasing pressure on Pando's forests. These support a large forest-dependent population (40% of the total), are vital providers of ecosystem services, and constitute important buffers for the eastern Andean catchments from predicted impacts of climate change. Brazil nut harvesting and slash-and-burn agriculture are the principle ways in which natural forest supports livelihoods. Coupled with high rates of immigration, slash-and-burn farming is no longer sustainable.

Kew is leading a partnership with Bolivian academic and non-governmental organisations to develop and apply scientific approaches to more sustainable management of soils and forest in the region.

Treeline Dynamics and Climate Warming

Arekhi, M., Yesil, A., Ozkan, U.Y., and Sanli, F.B. (2018). Detecting treeline dynamics in response to climate warming using forest stand maps and Landsat data in a temperate forest. Forest Ecosystems 5(3). online at https://forestecosyst.springeropen.com/articles/10.1186/s40663-018-0141-3

Abstract:

Background. Treeline dynamics have inevitable impacts on the forest treeline structure and composition. The present research sought to estimate treeline movement and structural shifts in response to recent warming in Cehennemdere, Turkey. After implementing an atmospheric correction, the geo-shifting of images was performed to match images together for a per pixel trend analysis. We developed a new approach based on the NDVI, LST (land surface temperature) data, air temperature data, and forest stand maps for a 43-year period. The forest treeline border was mapped on the forest stand maps for 1970, 1992, 2002, and 2013 to identify shifts in the treeline altitudes, and then profile statistics were calculated for each period. Twenty sample plots (10 × 10 pixels) were selected to estimate the NDVI and LST shifts across the forest timberline using per-pixel trend analysis and non-parametric Spearman's correlation analysis. In addition, the spatial and temporal shifts in treeline tree species were computed within the selected plots for four time periods on the forest stand maps to determine the pioneer tree species.

Results. A statistically significant increasing trend in all climate variables was observed, with the highest slope in the monthly average mean July temperature (tau = 0.62, $\rho < 0.00$). The resultant forest stand maps showed a geographical expansion of the treeline in both the highest altitudes (22 m–45 m) and the lowest altitudes (20 m–105 m) from 1970 to 2013. The per pixel trend analysis indicated an increasing trend in the NDVI and LST values within the selected plots. Moreover, increases in the LST were highly correlated with increases in the NDVI between 1984 and 2017 ($r = 0.75$, $\rho < 0.05$). *Cedrus libani* and *Juniperus communis spp. were* two pioneer tree species that expanded and grew consistently on open lands, primarily on rocks and soil-covered areas, from 1970 to 2013.

Conclusion. The present study illustrated that forest treeline dynamics and treeline structural changes can be detected using two data sources. Additionally, the results will have a significant contribution to and implication for treeline movement studies and forest landscape change investigations attempting to project climate change impacts on tree species in response to climate warming. The results will assist forest managers in establishing some developmental adaptation strategies for forest treeline ecotones.

NTFP Collection in Four African Countries

Cooper, M., Zvoleff, A., Gonzalez-Roglich, M., Tusiime, F., Musumba, M., Noon, M., Alele, P., and Nyiratuza, M. (2018) Geographic factors predict wild food and nonfood NTFP collection by households across four African countries. *Forest Policy and Economics.* 96: 38-53. https://doi.org/10.1016/j.forpol.2018.08.002.

Available at: https://www.sciencedirect.com/science/article/pii/S1389934118300406

Abstract: Wild foods and other nonfood NTFPs are important for improving food security and supplementing incomes in rural peoples' livelihoods. However, studies on the importance of NTFPs to rural communities are often limited to a few select sites and are conducted in areas that are already known to have high rates of NTFP use. To address this, we examined the role of geographic and household level variables in determining whether a household would report collecting wild foods and other nonfood NTFP across 25 agro-ecological landscapes in Tanzania, Rwanda, Uganda and Ghana. The aim of this study was to contribute to the literature on NTFP collection in Africa and to better understand where people depend on these resources by drawing on a broad range of sites that were highly variable in geographic characteristics as well as rates of NTFP collection to provide a better understanding of the determinants of NTFP collection. We found that geographic factors, such as the presence of forests, non-forest natural areas like grasslands and shrublands, and lower population density significantly predict whether a household will report collecting NTFP, and that these factors have greater explanatory power than household characteristics.

Community Forestry and Sustainable Development.

de Jong, W., Pokorny, B., Katila. P., Galloway, G., and Pacheco, P. (2018) Community Forestry and the Sustainable Development Goals: A Two Way Street. *Forests* 9(6):331

Abstract: This paper analyses the contributions of community and smallholder forestry (CSF) to achieving the sustainable development goals (SDGs). A CSF-SDG positive feedback model is proposed; a model that holds that successful CSF positively contributes to 13 SDGs and 31 SDG targets. Recent CSF meta-studies have scrutinized factors leading to CSF success and found some 10 factors and conditions that contribute to that objective. If efforts towards reaching the SDGs support or enhance these factors leading to the greater success of CSF, this in turn would boost CSF contributions to the SDGs and their targets. As a result, CSF or active support for CSF, focusing on the 10 CSF factors that favor success, can be linked to 48 unique SDG targets. The analysis suggests that there is a significant opportunity to explore win-win options for efforts to support CSF and contribute to SDGs, but also for efforts to pursue the SDGs and targets that favor CSF, which will in turn boost the contribution of CSF to the SDGs. The case of CSF and

its feedback links with the SDGs suggests that it may be relevant to identify interactions between the SDGs and other socio-ecological realities and related research.

open access: http://www.mdpi.com/1999-4907/9/6/331, http://dx.doi.org/10.3390/f9060331

Forest Stewardship Audits in Indonesia

Hermudananto, Romero, C., Ruslandi, and Putz, F.E. 2018. Analysis of corrective action requests from Forest Stewardship Council audits of natural forest management in Indonesia. *Forest Policy and Economics* 96:28-37.

We used corrective action requests (CARs) issued by conformity assessment bodies (CABs) working under the Forest Stewardship Council (FSC) certification in Indonesia to explore differences among audited natural forest management units (FMUs). Specifically, we evaluate how FMU characteristics influenced the classes of CARs issued and the time elapsed before their closure. We analyzed 933 CARs from 22 FSC-certified FMUs reported by six CABs in 99 public summaries. The average number of CARs issued did not vary with type of audit or CAB, most focused on social and environmental issues, and most represented minor infractions that were rectified with procedural changes (i.e., improvements in planning, record keeping, and reporting). None of the measured characteristics of Indonesian FMUs helped explain the foci of assigned CARs. The elapsed time before CAR closure differed among CABs and type of audit, but decreased over time. Large FMUs established before 1998 that employed many workers and subcontracted logging took longer to close CARs than FMUs with the opposite characteristics. Finally, conclusions based on this analysis should be made in light of the limitations of analyses based on reports from auditors rather than on direct observations.

Link: (https://authors.elsevier.com/c/1XcCn4y2D1Khjd) or you may email the author at mailto:hermudananto@ugm.ac.id for the article.

Timber and Pulp Assessments

The 2018 SPOTT Timber and Pulp assessments have been released. This year's assessments saw the addition of 26 significant timber and pulp producers, providing a much larger snapshot of the state of transparency in the tropical forestry sector. In total, 50 companies were assessed against over 100 environmental, social and governance (ESG) indicators that provide a measure of company transparency. The 2018 assessment results show that the tropical forestry sector has much more to do to improve the public disclosure of its policies, operations and commitments, with an average score of just 31%. Only five of the 50 companies assessed demonstrated higher levels of transparency (scoring more than 66%).

TROPICAL NOTES:

Recent findings of ecology or management of forest and fauna that tropical foresters should understand

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

How much conservation area?

Policies for new protected areas commonly recommend larger areas. Yet conservation values re not distributed evenly over the land, making protection more effective in some places than others. Return on investment is called for, including a maximum of special habitat and living endangered animals per protected area. Not only do protection benefits vary but also protection costs. Ideal protected area size may vary as much for environmental values as those economic. Large protected areas offer a greater ecological return per dollar invested if the goal is to reduce forest fragmentation, whereas smaller areas may offer a greater return on investment offering protection to more species.

P. R. Armsworth and others. Is conservation right to go big? Protected area size and conservation-return-on-the-investment. [Biological Conservation 225 229-236 2018].

Logging vs. Brazil nut trees

The distribution of commercial Brazil nut trees (Berholletia excelsa) is not uniform in logged forests of the Peruvian Amazon Basin. In a 1,413 ha sample in three logged concessions in Madre de Dios. Juveniles were not found near either cut stumps or adults, but peaks were 300 m distant gaps, either natural or human caused.

C. A. Rockell and others. Spatial distribution of Bertholletia excelsa in selectively logged forests of the Peruvian Amazon. [Journalof Tropical Ecology 33 (2) 114-127 2017].

Nocturnal birds of Ecuador

The nocturnal birds of Ecuador include owls, nightjars, and potoos. A survey on 22 forest fragments in northwest Ecuador (3-34 ha) found 11 species (2 to 7 per fragment). Bird community similarity was not correlated with any measured environmental variable. Notwithstanding this, results indicate possible significance of elevation and fragment size and forest structure.

S. T. Walter and others.[Journal of Tropical Ecology 33 (6) 357-364 2017].

Leaf-cutting ants in dry forest

A 35.4 -ha sample was taken in Brazil, some near roads and some distant. Included were 131 active colonies (and 93 inactive). Three species of ATTA were encountered, *A. opaciceps, A. sexdens*, and *A.laevigata*. The density of active colonies sharply decreased from 15/ha along roads to only 3/ha at a distance of up to 300m.Active colonies generally occur with low vegetation. Anthropogenic disturbances promote the proliferation of leaf-cutting ant colonies in dry forest of Brazil that affect plant regeneration via herbivory and ecosystem engineering, as in the rain forests.

F. F. S. Siqueira and others. Leaf-cutting ant populations profit from human disturbances in tropical dry forest in Brazil. [Journal of Tropical Ecology 33 (5) 337-344 2017}.

Stimulation of Casuarina seedlings

Casuarina is one of the commonest trees along tropical beaches. *Casuarina equitisetifolia* fixes atmospheric nitrogen. To produce root nodules where actonomycete fixes nitrogen for all plant needs. Seedlings of *C. equisetiolifolia* were inoculated with Frankia strains and their growth performances, biomass, and tissue N content over control seedlings. Inoculated seedlings survived >95% and had improved biomass and N fixation.

Karthkeyan and others. Frankia strains for improving growth, biomass, and nitrogen fixation in *Casuarina equisetifolia* seedlings. [Journal of Tropical Forest Science 28(3) 235 -242 2016].

Bolivian timber growth

Precise delimitation of annual bands in tropical trees is vital for implementing precise management practices. Most prominent annual rings were found in *Amburana, Cedrela, Platymiscium, Centrolobium, Hymenaea, Adenanthera*, and

Ficus, from the dry tropical Cerrado forests of Bolivia. The number of rings between radii from a cross-section were used as reasonable estimates of dating error with each species. Given the difficulty of properly dating some tropical woods a combination of crossdated and non-crossdated tree rings could provide reliable information for sustainable forest management.

L. Lopez and others. Reliable estimates of radial growth for eight tropical species based on wood anatomical patterns.[Journal of Tropical Forest Science 28 (2) 139-152 2016].

Genetic gain of Cedrela

A progeny trial was established with 168 families and 19 provenances of southeast Mexico in Veracruz. A 56% gain in volume was obtained by using this criterion as the basis for selection, leaving 20% of the best trees still standing. Three-years-old volume selection could gain at 11 years 37.3%. At seven-years-old the gain was 54%

E. Hernandez and others. Early performance and genetic gain of *Cedrela odorata* families from wide-ranging sites in Mexico. [Journal of Tropical Forest Science 28 (4) 446-456 --- 2016}.-

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Commercial timber regeneration in Vietnam

Forest regeneration after logging is part of sustainable forest management. After 30 years of selective logging, regeneration of seedlings (height <2m), saplings (height >2m) and small trees (dbh <10 cm) and larger trees (dbh >10cm) were compared. High impact (30-50% extracted), low impact (<30% extracted) and unlogged forest After 30 years high impact logged density of larger tree sizes was significantly lower than in less intense impact. Densities of seedlings and saplings after high impact logging were significantly higher than in other forests. After 30 years the forest still recovering from logging.

TV Do NV Cam and others. Post-logging regeneration and growth of commercially valuable tree species in evergreen broadleaf forest of Vietnam [Journal of Tropical Forest Science 28 (4) 426- 435 2016].

Seed dispersal by birds

Observations covered 22 frugivorous bird visits to a tree of *Cabralea canjerana* on a fragment of in the Brazilian Atlantic Forest during a 9 year period. Quantitative seed dispersal efficiency depended on the frequency of visits to the

tree and the number of fruits removed per visit. The qualitative measure considers the possibility that seeds are dispersed on a suitable site for recruitment, varying among bird species and among years within bird species, especially with the main disperser a migratory species vireo chivi varied in fruit intake from 3.0 to 7.1. These considerations dictate variation in bird driven seed dispersal efficiency.

M. A. Pizo and others. Temporal dynamics in the effectiveness of seed dispersal by birds visiting a tropical trees. [Journal of Tropical Ecology 34 (4) 235-242 2018].

Parrot threats in America

Threats were found in 192 populations, facing 96 species in 21 countries. The major source of these threats is human, The international pet trade. The threat most closely associated with population decline is the capture for the pet trade. Other threats include small-holder farming, rural population pressure, and grazing by agroindustry and small-holders. Conservation actions have applied to less than 20% of the species. Conservation should approach the problem at a population level. Threats should concentrate on protection of wild populations to reduce the capture of wild parrots for pets.

B. Quillfeildt and others. Current threats faced by Neotropical parrot populations [Biological Conservation 214 278-287 2017].l

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Fire management

Decades ago wildfire damage was a serious source of forest loss in tightly spaced timber plantations of *Pinus taeda* in Australia. Fuel management zones have been identified wherein multiple thinning and pruning early in the rotation constrain fire intensity. Pruning and thinning fuel treatments significantly, relocated the ladder and canopy fuels to the surface layer. The effect was a short-lived increase in surface fuels and a long-time durability of the loss of the vertical continuity of fuels necessary to support crown fires. First thinning reduced fire intensity to less than one tenth and second pruning reduced crowning during high fire danger, from 25% to 0.

M. G. Cruz and others. The effect of silvicultural treatments on fire behavior]. potential in radiata pine plantations of South Australia [Forest Ecology and Management 397:27-38 2017]

Natural regeneration in western Amazonia

Eight years after selective logging the size class distributions of tree regeneration resembled those of unlogged areas. Densities were lower only in crown gaps. Eight years after logging densities of pioneer tree species were densest on secondary roads and landings. The regeneration was measured at the time of logging and one, measured at the time of logging and converged on unlogged values on skid trails, bole gaps, and crown gaps. Canopy openness did not exceed 10% after eight years. Soil bulk density was higher on landings only four years and disappeared by the eighth year. The total area disturbed by logging varied from 7.0 to 8.6%with nearly half (3.0-3.7%) directly from felling.

L. de Carvalho and others. Natural regeneration of trees in selectively logged forest in western Amazonia. [Forest Ecology and Management 392:36-44 2017]

Light gaps and regeneration

In secondary forest of Vismia in central Amazonia 21 light gaps of $100m^{2The}$ density defined significantly with the creation of the light were created to observe the regeneration. Density of reproduction declined significantly with the creation of the light gap. Six years later the number of seedlings (<1cm dbh) had increased 30%. The light gaps after six years, showed a marked increase in old-growth species originating from surrounding mature forests. Where succession is slow small-scale disturbance represents a feasible management tool to accommodate natural regeneration.

T. V. Bentos and others. Effect of light gaps and topography on Amazon secondary forest. Changes in species richness and community composition. [Forest Ecology and Management 396:124-131 2017].

Logging sedimentation endangers coral fish nursery

In one of the Solomon Islands that 25^{ths} of its habitat has been selectively logged in has been surrounded with coral reef fish and had lost 24% logging sedimentation. In a distinct island where there had been no logging mangrove protected damselfish. Nursery habitat was seen sustaining recruitment of reef fish populations.

R. J. Hamilton and others. Logging degrades nursery habitat for iconic coral reef fish. [Biological Conservation 210A:273-280 2017].

Natural teak recruiting favorable in Malaysia

The recruitment of teak shoots was followed for13 months in the Kabauing Reserved Forest in Myanmar. Openings resulting from tree felling brought no more recruitment of teak shoots than uncut forest. The highest density and greatest initial growth of teak were observed on log landings where illumination exceeds that of individual tree felling the soil has been disturbed. In order to increase the teak recruitment, gaps were repeated after 13 months and led to adequate teak recruitment.

R. N. Win and others. Effects of selective logging on the regeneration of two commercial tree species [Journal of Tropical Forest Science 24 (3) 2012].

Mid-term RIL effects on tree species of interest

Amazon post-RIL regeneration included long-lived pioneers - *Bagassa guianensis, Jacaranda copaiia,* partially shade tolerant *Hymenaea courbaril*, *Dipterix odorata,* and *Carapa guianensis*, and totally shade tolerant *Symphonia globulifera* and *Manilkara huberi* The regeneration was inventoried at the time of logging, a year after, three years after, and 6 years after. RIL created more gaps modifying the forest structure its effects still visible after 6 years. Plants growing beneath gaps had the highest height growth but it was not reflected by dbh growth. The Brazilian RIL can be considered a silvicultural technique to favor density and growth of selected species.

G. Schwar and others. Mid-term effects of reduced impact logging on the regeneration of seven tree commercial species in the Eastern Amazon. [Forest Ecology and Management 274 2012]

Elephant-seed dispersal disappearing in the Congo

In a lowland evergreen forest of the Cupette Centrate of the Congo 18 trees were found requiring forest elephant seed dispersal. Fourteen of these tree species are elephant-dependent and do not recruit enough young for self-replacement, either under the parent or beneath other trees. There is no alternative partner for seed dispersal for the majority of the trees which are actually elephant-dependent. The consequents of the loss of elephant-dispersed tree species are debatable until efficient conservation strategies appear.

D. Bealine and others. Doom of the elephant-dependent trees in the Congo tropical forest. [Route de Mende Montpellier, France 1919]

Fifty years of selective logging in Malaysia

A Malaysian forest logged in 1958 was compared with the Pasoh Forest Reserve (1998-2008). The logged forest had brighter understory light conditions. There was a sophistically faster rate of dbh growth in the logged forest. Recruitment rates were significantly greater in the primary forest. Mortality rates were about the same. The logged forest was still recruiting populations of early successional species. It was evident that 50 years was not long enough to restore the composition of the primary forest.

T. Yamada and others. Effects of 50 years of selective logging on demography of trees in a Malaysian lowland forest. [Forest Ecology and Management 310:531-538 2013**].**

Heron nesting in mangrove

The Western Reef Heron (*Egretta gularis*) has been found to nest in mangroves (*Avicennia marina*) in the Hara Biosphere Reserve, of the Persian Gulf. The most important nest-site selection of the herons was trees of grey mangrove (*Avicennia marina*). The most important nest-site preferences and abundances were the mangrove height and the diameter of the canopy. The study data of this nature can be used to predict the number of nests.

F. Etezadifar and other.Nest-site selection of the western reef heron (*Egretta gularis*) in relation to mangrove (*Avicennia marina*) structure in the Persian Gulf: Implication for management. [Forest Ecology and Management 310:74-79 2013].

Brazil nuts sustainable

Inventories of Brazil nuts ((*Bertholletia excelsa* seed) one of the most important non forest products of the Amazon are commonly restricted to the harvests of three Kayapo communities. High resolution satellite images plus ground truth and mapping suggest a much larger inventor of possibly three times as many seeds. The security of this finding indicates that the sustainability of the crop is not in danger.

M Beatriz and others. Brazil nut stock and harvesting at different special scales in southeastern Amazonia. [Forest Ecology and Management 319:67-74 2014]

Understanding intensive logging in Australia.

During 48 years since logging there have been changes in a subtropical rainforest since 70%basal area removal, application of herbicide, and enrichment planting.

Measurement of trees .10 cm dbh were taken in 1966 and 2014 in permanent plots, logged and undisturbed Disturbance from intensive logging was the underlying mechanism for changes in tree diversity and interactions at population levels. At first was reduced diversity, and basal area. Then diversity returned. After 48 years partial recovery of species abundance and density had occurred, although stand basal area was still lower than undisturbed areas.

In.G. Florez and others. Understanding 48 years of changes in tree diversity, dynamics, and species responses since logging disturbance in a subtropical rainforest [Forest Ecology and Management 393:29-39 2017].

Thinning mixed species and fuel hazard

In Victoria thinning is assumed to increase fuel from shrubs and bark. Fine fuel from slash disappeared by four years after thinning. Woody debris more than 10 cm in diameter remained for at least 15 years. Thinning may and should reduce vertical connection of fuels. By increasing the amount of woody material on the ground may slow complete extinguishment. Thinned forests may present less fire risk but prolong the burn-out time on the ground.

E. Proctor and other. Changes in fuel hazard following thinning operations in mixed-species forests of East Gippsland. [Australian Forestry78 (3) 2016].

Long-term *radiata* growth with phosphate fertilizer

A study was made on phosphorate-deficient clay soils in a second-rotation *Pinus radiata* plantation in the Lidsdale State Forest in New South Wales. Early growth responses occurred to phosphatic fertilizer when applied to individual trees at the time of planting, compared with slower initial growth when fertilizer was broadcast. It took several growing seasons for the trees to access the phosphorus. There were additional responses after application of nitrogen/phosphorus, as soon as the initial phosphorus deficiency was overcome. Then thinning resulted in significant increases in growth. It was concluded that productivity could be increased from $8m^3$/ha/yr to 16 m^3/ha/yr.

J. Turner and others. Long-term growth responses to Phosphatic fertilizers in a *Pinus radiata* plantation.[Australian Forestry 78(4):1-12 2016].

Women in agroforestry in Africa.

The soil and timber management of agroforestry in Africa is man's work, yet the handling and feeding of fodder and collection and processing of vegetables and fruits are typically women's work and more than that of the men. What they may

not do well is a result of inadequate resources. They are not part of the productive process but are very active at the other end, retailing harvests. The paper, interested in women's equity in agroforestry, recommends forming associations, improved processing and marketing, and improving women's access to opportunities.

E. Kiptot and other. Gender and agroforestry in Africa: a review of women's participation. [Agroforestry Systems 84(1) 35-58 2012]

Sissoo in Bangladash

Using data from 72 plantations across five regions of Bangladash volumes ranged from 52 to 80 ^{m3}/h. Sissoo volume was negatively associated with soil clay, suggesting that plantations in Bangladesh will yield less revenue earnings than they have historically.

S. Hossain and another. Merchantable timber production in Dalbergia session plantations across Bangladash: regional patterns, management practices, and edaphic factors. [Journal of Tropical Forest Science 25 (3) 2013].

Early thinning of Acacia hybrid

The Acacia hybrid may be capable of a log volume of >15 cm small end under bark at time of harvest. To reduce the time required early thinning was tested. A plantation established at 1,000 stems /h at 2.5 years old was thinned to 871, 600, 450, and 300 stems/ha. By 2 years thereafter diameter growth had accelerated. By 25 months after thinning there was no difference in treatments as to basal area increment among the treatments. The experiment showed that on sites supporting 25m^3/ha and thinned to 600 stems/ha trees had about 9 cm in diameter led to about 20% of the trees attaining minimum log size. Within 5 years from planting.

CL Beadle and others. Thinning increases sow-log values in fast-growing plantations of Acacia hybrid in Vietnam. [Journal of Tropical Forest Science 25(1) 2013].

Miombo Woodland in Zambia

The degradation of the miombo woodland from 1990 to 2012 was reviewed in Central Zambia, some of it from permanent sample plots. Losses were due to fires, harvesting, and conversion to agriculture. Although loss was due to 113 felled trees, and increasing biomass due to growth of remaining trees. The loss ranging from 3 to 4 T/ha/yr. The study found that negative trends in woody biomass accumulation rate is a good measure of degradation. Positive trends in

species diversity and standing wood biomass are useful indicators of forest recovery. Monitoring change requires repeated measurements.

E. N. Chichimayo. Forest degradation and recovery in a miombo woodland landscape in Zambia [Forest Ecology and Management 2012]

Eucalyptus response to silviculture

Thinning, pruning, and fertilizer application are important interventions used to grow solid wood products from eucalyptus plantations. Thinning, depending on initial spacing, stimulates growth. Pruning may improve timber quality but reduces growth. Pruning effects are greater in thinned. More studies and unfertilized plantations. Fertilizer effects depend on supplementation of site deficiencies. More studies will be required to determine interactions and their drivers.

D. I. Forrester. Growth responses to thinning, pruning, and fertilizer application in *Eucalyptus* plantations: A review of their production ecology and interactions. Forestry Ecology and Management 310 (1):336-347 2013].

Biomass in Tanzania miombo woodlands

Miombo woodland is a dominant vegetation type over about 9% of Africa. Quantification of carbon stored in miombo is of importance in the emerging carbon credit market. Samples above ground on four sites were collected from 167 trees ranging in dbh from 1.1 to 110 cm. Tree height made so small a contribution to variation that diameter at breast height was used alone. For the same tree size range, the model developed may apply elsewhere in the miombo woodlands.

W. A. Wugasha and others. Allometric models for prediction of above and below ground biomass in the trees of the miombo woodlands of Tanzania. [Forest Ecology and Management310 (1):87-101 2013].

FORESTRY IN SCOTLAND AND THE UK (4)

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 2018 issue, Vol. 72, No. 2

PRINCIPAL ARTICLES:

Upland native woodland restoration in Britain a progress report.

By Dr. Scott McG Wilson, 3 Thorngrove Crescent, Aberdeen AB15 7FH

Restoration of native woodland has been a priority in the British uplands over the past 30 years. Unlike the overseas territories where it has been primarily an 'accidental consequence' of decline in upland pastoralism , in Britain it has been an article of government policy and a stated aim of many public, charitable, and certain private sector landowners and managers.

Restoration has been modeled on 'past natural' vegetation of the mid-Holocene era, predating major human influence in the Neolithic era, about 5000 years ago. Restoration has been undertaken at a wide range of scales, including large catchment-wide projects, principally in Scotland. Notable successes to date have been in biodiversity enhancement, landscape amenity, and public engagement. Significant benefits for 'regulating ecosystem services' should emerge as new habitats mature, particularly in soil and freshwater conservation and carbon sequestration. Practical challenges with restoration have arisen in some cases due to climate exposure and soil infertility; imperfect selection of species, provenances and site preparation.

Despite aspirations, the contribution of woodland restoration to rural economics and employment has been more limited. Benefits may grow over time. Changes to the economics of competing land uses and rural grants occasioned by Brexit, may influence restoration rate and methods.

Of historical interest: The impact of WWI on the woods and forests of Scotland

Shortly after the outbreak of war in August 1914, the United Kingdom faced a potential crisis in timber supplies, a state of affairs that was only gradually appreciated.

This paper explores the important changes that occurred within forestry and woodland management in Scotland during the First World War, and how these changes were achieved. It considers the general situation of forest management and the state's role

before 1914, the demands that the war effort made upon Scotland's woodlands and the people who worked with them, as well as some consequences for how forestry was managed in the years immediately following the war.

NOTES

PLANT HEALTH CENTRE : Scotland's Plant Health Centre was launched 22 May 2018 at the Royal Botanical Gardens at Edinburgh. The centre is a focus for plant health expertise in forestry, horticulture, environment and agriculture with the goal of coordinating plant health knowledge, skills, needs and activities. The centre is funded by the Scottish government.

LARCH REMOVAL EXPANDED: Faced with continuing spread of *Phytophora ramorum*, Forest Enterprise Scotland (FES) has extended the felling of larch in Galloway to parts of Dumfriesshire and Ayshire in southwestern Scotland. Regulations to control the spread require all infected trees to be removed along with the uninfected trees around them. The forests affected are popular with visitors, but there is no alternative to felling to reduce the spread of the disease. The timber will be used to supply key markets as normal according to FES.

Note from the editor

Feel free to send this newsletter on to others.

Many thanks to the many contributors to this issue. The next issue is scheduled for December 2018.

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)

Sign up for the ITTO Tropical Timber Market Report

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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.

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