Society of American Foresters

International Forestry Working Group
Newsletter

Working Group B3

International Society of Tropical Foresters
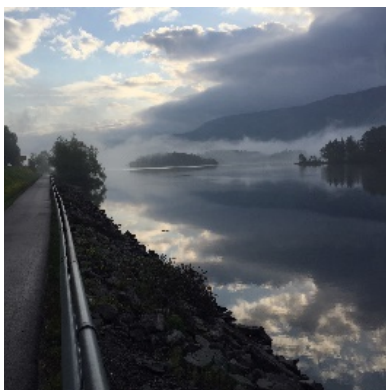
Contributed Articles

A Century of NFI in Norway

Gretchen Moisen and Rich Guldin

Norway has been conducting forest inventories for 100 years, and just celebrated this important anniversary with an exceptional conference: "A Century of National Forest Inventory – Informing Past Present, and Future Decisions". Held near the beautiful lake Tyrifjorden northwest of Oslo, this event was attended by over 200 inventory researchers and national inventory staff from 30 countries. Presentations featured historical context, current issues, emerging technologies, and sampling and statistical methodologies. Through inspiring keynote addresses, attendees quickly learned of Norway rich history and the role of inventory in the health of today's Nordic forests, and were challenged to find better ways to create and disseminate information to decision makers.

To mention some of the U.S. contributions, Rich Guldin (SAF) helped set the stage with his presentation on the history of the US Forest Inventory and Analysis (FIA) Program and the importance of collaborative relationships. Presentation by USDA Forest Service scientists

included those by Hans Erik Andersen (Pacific Northwest Research Station FIA) on using airborne and satellite remote sensing to support forest inventory in interior Alaska, Gretchen Moisen (Rocky Mountain Research Station FIA) on enabling small area estimation for forest inventory users, Mark Nelson (Northern Research Station FIA) on forest inventory contributions to monitoring biodiversity, Ron McRoberts (Northern Research Station FIA) on model-based inference for forestry applications, and Andrew Hartsell (Southern Research Station FIA) on using inventory data to model changes in tree species diversity in the South. In addition, Laura Duncanson (University of Maryland) discussed synergies between NASA's earth observation systems and national forest inventories and Mark Ducey (University of New Hampshire) presented two papers, one on potential roles for terrestrial laser scanning in national inventories and the other on what can be learned from national inventory data about regional harvest, stocking, and sustainability in complex forests.

The Sundvolden Hotel (established in 1648) was an excellent, thoroughly modern venue featuring local cuisine, spacious and naturally lit meeting spaces, and views of the surrounding natural beauty. Up at the podium, presenters found themselves surrounded by sweet smelling Norway spruce brought in for the event, and framed by three-story banners of tree rings depicting Norway's inventory history. A full day field trip, in the forest near Ringkollen, provided demonstrations of field data collection procedures in Norway, Denmark, Finland, Iceland, and Sweden (complete with spirited competition between the presenting countries, and a hearty lunch featuring local wild game—moose—atop a scenic lookout). Hats off to our hosts in the Norwegian Institute for Bioeconomy Research for their excellent planning and execution of this memorable event. IUFRO Division 4.00 – Forest Assessment, Modeling, and Management helped publicize the event.

THE POTENTIALS OF CAPE THREE POINTS FOREST RESERVE TO CONSERVE ENDANGERED PRIMATE SPECIES IN GHANA

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Introduction

Most African governments have focused the management of forest reserves mainly on the economic benefits of timber production to the neglect of their ecological and socio-economic benefits. Little is known on the status and trends of existing biodiversity and which species to protect or manage to ensure sustainable utilization in forest reserves. The resident primate species of the Guinea-Congolian Forest of West Africa are one of the groups of animals that features in the bushmeat market and pet trading. The population of this species has been declining within its range as a result of habitat destruction and hunting. It is against this background that a survey was conducted to search and count non-human primates in Cape Three Points (CTPFR) forest reserve through scans of forest canopies on transects walks.

Study Area

Cape Three Points Forest reserve was originally established, in 1949, as a protection area and has no records of ever being logged or farmed. The reserve is typical wet evergreen rainforest, with an opened upper and closed middle storey, and a restricted undergrowth. The forest lies in the moist evergreen zone and is one of the few patches of Atlantic forest remaining along the coast of Ghana located less than 5km from the coast and has some hilly features. It covers an area of 51km² and it's located between latitudes 4º46'N and 4º56'N; and longitudes 2º05'W and 2º55'W. Despite its small size, the reserve harbours a rich diversity of plants which has led to its designation as a Globally Significant Biodiversity Area (GSBA) and its bird population has also been noted of significant importance.

Methods

Transect distribution and survey

Transects were laid at systematic interval of at least 2km apart. Each transect was straight and run for a length of 5km long but where it coincides with hunter's trail it ran more than that. Navigation was by compass and a Geographical Positioning System (GPS) to reach the starting point of each transect. Transects which followed compass lines were measured with a GPS and laid out with minimal cutting and disturbance. A one minute of latitude and longitude grid consisting of cells, each was placed systematically over the map of the study site. The intersections of the lines then formed the mid-point of each transect and were oriented north-

southwards as a rule of the thumb (Figure 2). Some transects were longer than 5km when a particular transect coincided with a hunter's path. Survey walks were conducted two times for each transect during the course of the study to search for the primate species.

Censuses were conducted on foot by a team of up to four people (Figure 1), usually early in the morning (6:00-10:00) or late afternoon (15:00-17:00). The team walked slowly (1-2 km/h) while detecting and noting any signs of animal presence and human activities (Figure 4). The data recorded included all primates and every observation were noted on a data sheet and GPS waypoints were recorded. Start, stop and back times were also noted to calculate time spent surveying an area and tracks were logged in the GPS to calculate the distance walked/surveyed.

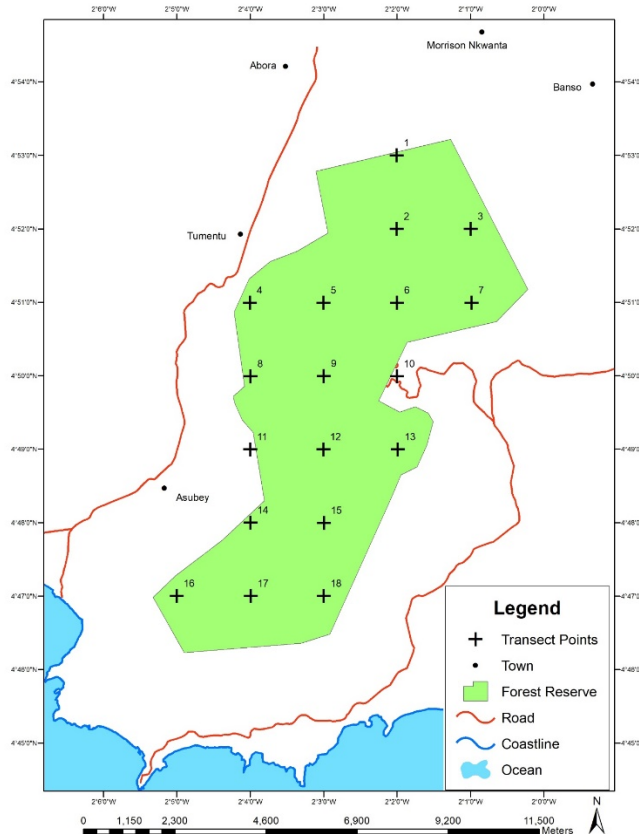*Figure 1: Survey team getting ready to start work*

Figure 2: Map of Cape Three Points Forest Reserve showing distribution of transects

Results and Discussion

Primate species encountered

Five primates were encountered during the forest transect: two of them White-naped mangabey (*Cercocebus lunulatus*) and Black & white colobus (*Colobus vellerosus*) are classified as Critically Endangered by IUCN red list while the remainder, Spot-nosed monkey (*Cercopithecus petaurista*) Lowe's monkey (*Cercopithecus lowei*) and Olive colobus (*Procolobus verus*) are classified as vulnerable. We observed five groups of Lowe's monkey distributed across the forest, through direct sighting and calls. The presence of Spot-nosed monkey was by sighting four different groups in the forest. Similar to Lowe's monkey, the species also was found to be common in CTPFR and distributed across the forest. Olive colobus was seen at only one time in a mixture of Lowe's and Spot-nosed monkey group foraging together. (Naturally, this species is very elusive and is often seen by chance). One group of White-naped mangabey was seen foraging on the floor of the forest but quickly escaped into the forest ticket when we approached them. Black and white colobus was heard twice in different locations on top of the emergent trees. One group was heard in the north-eastern portion and the other call was at the north-western side of the reserve.

Occupation of fringe community members

The main occupation of the people in the communities surrounding CTPFR is fishing and latex production from rubber plantation surrounding the forest reserve (Figure 6). There are also some oil palm plantations for palm oil production and domestic animals rearing. These activities engage most of the community members so much that they have little interest in activities that have the ability to hunt, capture or destroy lives of wild animals. Hunting and chain-saw lumber activities were encountered during our survey but the intensity was not so alarming (Figure 7).
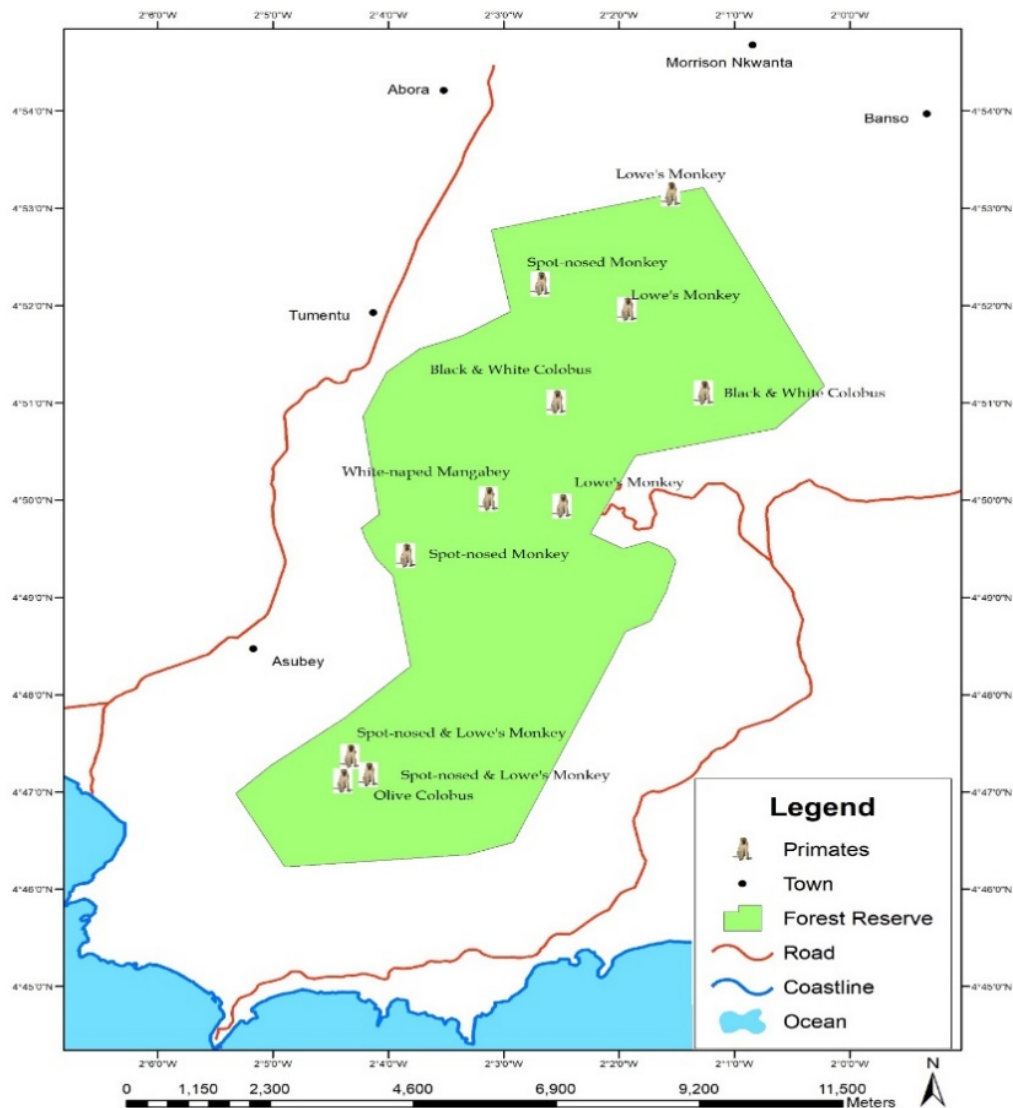

Figure3: Distribution map of primates encountered in CTPFR

Figure 4: Primates sighting and counting scene during the survey

Figure 5: Rivers flowing on forest floor of CTPFR

Figure 6: (A) A young rubber plantation surrounding the forest reserve; (B) Some tourism activities along the coast of Gulf of Guinea

Figure 7: (A) Wire snares with bait set to hunt wildlife in CTPFR; (B) Chain saw activities found in the reserve

Conclusions and Recommendations

The study made the following conclusions:

(i) The landform of CTPFR serves as incentive for wild animals' conservation. The anticlines and synclines with its associated river bodies do not promote neither hunting nor logging activities. It would rather serves as a good site to hiking and animal viewing, camping and recreation (Picture 2).

(ii) There was virtually no active protection activities that have been instituted by the management authority, to save the species found in this reserve from the attacks of unsustainable forest users. There were only two forest guards in charge of this reserve who hardly patrol inside the forest reserve.

(iii) The virgin nature of the vegetation serves as a good habitat to conserve endangered species. It is therefore, recommended that the status of CTPFR be changed from forest

reserve to a national park so as to be managed with that model and to receive the necessary protection. The government agencies and non-government organizations and conservations should intensify conservation activities in and around CTPFR.

Ecotourism activities can also be initiated in the reserve so as to boost the economic activities in the area. There are already existing tourism enterprises and heritage sites along the adjacent coast that can be tailored to CTPFR as a conservation area for ecotourism activities.

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Acknowledgements

An efficient management helps to meet the challenges in timber production

The use of applied technologies in order to boost productivity and management efficiency has reached the point of no return in the productive sectors

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Lack of adequate infrastructure to flow production, lack of tax incentives, the Brazilian tax complexity and the instability of the foreign exchange market are some of the main difficulties faced by the Brazilian forestry industry. The instability of the foreign exchange market has even destabilized the timber market of Brazil's Southern region in mid-2008, and the bad consequences thereof − given the degree of uncertainties − are felt by the sector to this day.

The productive sector, in turn, is also affected by events such as fires, frost, strong winds, thefts (in the field and on the road), poor production quality, operational losses, pest and disease incidence and inadequate forest management.

Given this scenario, which contributes to financially burden the production process, companies need to structure and organize themselves in order to meet the challenges that must be faced, guaranteeing a high quality and profitable timber production.

The forestry industry has been demonstrating a high development capacity, but the challenges highlight the importance of managing all forest chain processes more efficiently, including the planning process, the definition of the timber buyer market, the choice of the best materials and services suppliers and the efficient control during the purchase of inputs. The objective is to guarantee better prices and delivery times, the choice of machines and equipment more suitable to the topology and climatic conditions, among other variables.

In pine breeding in particular, the logistics of cutting and delivery to the furniture industry must be made just in time (JIT) in order to preserve the quality of the logs. Furthermore, it is necessary that the sales, planning and operational teams work in an integrated manner.

In a highly integrated process, the customer requests a product and the sales area of the company responds promptly, registering the order and confirming the delivery date. The planner, with solid information on the forest productivity, quality, strategy, logistics, etc., informs the operational team of the areas to be harvested; the operational team controls the shipment of each cargo, from loading, to issuing tax documents for each cargo, thus resulting in a highly traceable process.

In addition, the truck has a mobile phone with geographic positioning data that is sent to a central monitoring station. Finally, the customer can track the route and estimated time for the cargo delivery via internet and, once delivered, the customer approves the receipt and billing is released.

In this regard, companies use computerized systems to plan, record, analyze and manage the entire production process. They can also record and monitor the main costs related to the forest business, i.e., construction costs and maintenance of roads, weather conditions, fuel costs, topography, type of soil, exchange rate and labor. The management systems in this case, allow the company to flexibilize the allocation of these costs according to its needs.

The use of applied technologies in order to boost productivity and management efficiency has reached the point of no return in the productive sectors, and that is not different with timber production. The manager needs to have access to information, not only related to operational control and activities planning, he must also know in detail all the costs involved in the production process, from the prospecting of land to be acquired, rented or leased, to the timber delivery to its final destination. This all allows tasks, such as determining prices and profit margins and the best time to sell, to be more efficient.

Working successfully at the science-policy interface: IUFRO at UNFF-14

The United Nations Forum on Forests (UNFF), the major international policy platform for forest- and tree-related issues, held its 14th session from 6-10 May 2019 at the UN Headquarters in New York.

Several IUFRO officeholders were invited to take part in the thematic panel discussions: Prof. Elena Paoletti, Task Force Coordinator, spoke on the *"Forests and Climate Change"* panel. Dr. Pia Katila, Coordinator of IUFRO-WFSE contributed to the UNFF-14 panel on *"Forests, inclusive and sustainable economic growth and employment"*.

Dr. Monica Gabay, Coordinator of the Community forestry Working Party, and Dr. Mika Rekola, Coordinator of the Forest education Research Group Deputy Coordinator of the "Joint IUFRO-IFSA Task Force on Forest Education", were commissioned by the UNFF Secretariat to produce a "Background analytical study: Forests, peaceful and inclusive societies, reduced inequality, education, and inclusive institutions at all levels".

IUFRO Vice-President Dr. John Parrotta gave a presentation at an IUCN-organized side event: *"Better coherence and coordination for the SDGs and the UN Strategic Plan for Forests 2017-2030 – examples from forest landscape restoration efforts"*.

Furthermore, IUFRO's active role in the Collaborative Partnership on Forests (CPF) was highlighted. The launch of the Global Forest Expert Panels (GFEP) assessment report on Forests and Water was mentioned as one of the major accomplishments of the CPF in 2018, and the next GFEP assessment, on the topic of Forests and Poverty, to be completed in autumn 2020, attracted the interest of many UNFF member countries.

IUFRO Vice-President Dr. John Parrotta

On Drought, Desertification and Land Degradation:
Questions and Challenges

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Considering the effects of drought and the processes of desertification and land degradation, learning and sharing suitable public policies and advanced techniques for soil conservation, water resources management and control of agricultural and water-induced soil erosion in river basins, (besides soil mapping and a data structure model to store data from different sources and test of the developed dataset and stored data to reduce current and expected vulnerability of natural and human systems), to prevent droughts, loss of plant cover, land degradation and desertification, a whole set of policies should be pursued in view of an integrated ecosystemic approach (Pilon, 2018a).

Conservation of particular places and cultural practices depends of the values that people associate with those places and practices and of how the programme deal with a value approach. Faced with economical and political instability and state captured corruption, how to push power-holders to deliver better outcomes for people and planet, beyond highlighting best practices and innovation? How to deal with business organizations that can "chose and impose" the path to follow, whereas common citizens cannot do so due to unequal power between legal persons and natural persons? How to address the political and economic power asymmetries, in view of prevalence of mega projects, with intensive use of resources?

Besides governments and scientists, civil, non-profit societal organizations, other sciences qualified representatives, should be involved; the key challenges are conceptual, more civic and political than technical: conceptualize sustainability from a holistic, interdisciplinary approach; support a long-term strategy based on economic, environment and societal commitments towards new dynamics of global governance; empower participants for problem-solving and qualitative constructs to trigger change and development of an international network of sustainability leaders, academicians, journalists, students, youth movements, community groups and socio-cultural learning niches ("bioclusters").

Recognising that this should be a public agenda, how to hold everyone accountable, in view of institutional capacity, judicial neutrality, informational transparency, and social space for civic engagement? How do different values (e.g., use vs. preservation) and the framing of these values (e.g., ecosystem services vs. species) motivate policy makers to assign public resources to conservation programs and policies? What are the effects on areas that are intensively managed for production of commodities (such as food, timber, or biofuels) in view of conservation at the landscape scale? How does information to resource users affect individual behavior and support collective actions?

In view of decision making tools and delivering capacity, how to deal with the entanglement or enmeshment of normative orders and the interfaces between bodies of norms at international, national and local levels? How delivery units have been adopted by governments, what are the

degree to which they have contributed to meeting priority goals? How to look beyond singular areas when studying placed-based development processes, while stressing the opportunities to develop neo-endogenous development processes, scaling up what works? How to engage and support the media in order to develop awareness, public responsiveness and overall society participation?

Considering that authority in world politics is not located in a singular actor or "ruler", but in diverse and overlapping networks and institutions, how to ensure a partnership built on a shared and common vision? How to work with predisposing, enabling and reinforcing factors (precede-proceed model) in view of ecological, economic, political, social and educational diagnosis/prognosis, encompassing the nexus individuals, groups, society and environment? What factors shape individuals, groups and state compliance with local, national, and international conservation regimes? How does the effect vary with different means of approach and providing the information?

In a world where investors have as much or more power than nation-states, what will be the role of private property rights and government institutions as solutions to commons dilemmas? The equilibrium or disruption between the different dimensions of being in the world (intimate, interactive, social and biophysical), as they combine to induce the events (deficits/assets), cope with consequences (desired/undesired) and contribute for changes (potential outputs), is linked to opposite models of culture; in the ecosystemic model the dimensions preserve their singularity and support each other, in the non-ecosystemic model dimensions drift apart and collapse. The proposal relates to how taken for granted worldviews, values and perceptions affect how we define and deal with environmental problems, quality of life and the state of the world, encompassing ontological and epistemological issues (Pilon. 2018b).

It is proposed the creation of a network platform to connect transdisciplinary observatories in representative socio-ecological systems (SES) as model study areas in different drylands across the world, providing spaces for collective knowledge production, compilation and exchange in view of project design and policy making (Pilon. 2019), as well as the inclusion of training courses, with the participation of universities and public bodies, to develop operational policy instruments with respect to accepted standards, public information and reporting practices, in view of the state of the world, quality of life and environmental problems, specially those linked to the mission of the United Nations Convention to Combat Desertification.

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Challenges of Climate Change in Northern Nigeria

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Over the years, I have observed how the effect of climate change has really affected my country, Nigeria. About twenty years ago, in. my community, there use to be trees all around our houses and everywhere use to be cool but now the trees and the shades they- provided are gone. This makes me start imagining how a world without trees would survive.

In Nigeria, ecological problems are climate-related conflicts that continue to threaten the environmental sustainability in northern Nigeria. The Northern region of Nigeria is becoming hotter and unbearable as a result of the effect of climate change. People now live and carryout their business transactions in the baking heat of.the African sun because the few trees that are left are not even allowed to grow due to unsustainable harvesting for fuelwood production'-Desertification is spreading very fast at an alarming rate and everywhere is becoming a desert. About 351,000 square kilometers of land mass has been lost to desertification in Northern Nigeria. According to United Nations Environmental Programme (UNEP) the estimates will continue to drive increased competition over grazing land; and will escalate armed conflict between herdsmen and agrarian host communities. This is exactly what is currently happening in Nigeria. Rainfall is becoming very eratic and most crops are lost as a' result of inadequate rainfall and consequently food production output-.is greatly reduced. Even the streams, rivers are drying up and fish are' no longer in abundance as before. These problems pose a serious threat to both the lives of most residents and means of their livelihood (forest and wildlife resources). This, therefore, once again raises the fear of food security in Nigeria.

The Federal Government of Nigeria has earmarked some funds to be used for ecological projects. The ecological fund established in 1981 has the constitutional provision that two percent of the consolidated revenue of the federation and one percent of the derivation allocation be set aside for tackling ecological problems across the states of federation, such as, desertification, erosion, draught, flood, oil spillage, landslide, among others. The ecological fund is an intervention facility disbursed at the president's approval and projects to be carried out are recommended to the president by the National Committee on Ecological Problems, NCEP. Reports show that between 2007 and 2015. the ecological fund got an average of 48 billion naira yearly. Some states in Nigeria are been selected to benefit from this fund, but however there is need for the states from the Northern Nigeria especially the areas that are prone to desertification

to be further assisted. Government should make sure that this fund provided are used for the intended project. The people should be encouraged and educated on the need to plant more trees to save the region from the adverse effect of climate change, alternative for fuelwood should be provided for the people, so that together we can have a green environment where the present and future generations will all be safe.

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13 Bedar or the Day of Nature

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With the onset of the spring, people in Iran spend 12 days celebrating and visiting families and traveling. On the 13th of Farvardin (April 2nd) which is the end of the Nowruz holiday, people spend time in the heart of the mountains, forests, to celebrate, play and dance. That is why the 13th of Farvardin is the day of the month known as the day of nature. On this day, the majority of Iranians are resting under the shade of the trees and obtaining the ultimate energy from the pleasing atmosphere.

Family gathering on the day of nature.

On this day various ethnic groups of Iranians hold their own special celebrations, but the most common of these is going to the forest or green space, not staying at home, and knitting grass, cooking traditional dishes, bringing brunette(Brunette is the result of planting lentils or oats, a sign of refreshing and greenery) and 13 stones in the water to cast their wishes. Knitting grass

has a long history in Iranian culture. The Avesta (oldest Zoroastrian book) speaks several times of Kiomars and called him "the first king," and also the first man. The twins (daughter and son) of the twelve Kiyomarts married for the first time in the world. At that time, since theirs were the first marriages, they established the basis of their marriage by linking their two branches. Today the ceremony is carried out by young men and women who knit grass with the hope of a marriage contract.

Grass knitting.

13 stones cast on the water.

After their barbeque people, with the necessary training and a sense of social responsibility, people collect their garbage and then put out the fire. With this care people can enjoy the forest for many years, even if they do not do so as groups and associations. People support the protection of forest and the environment and many nature lovers in different forests and green spaces, protecting nature and forests by disposing garbage and putting out the fire.

Trash collection.

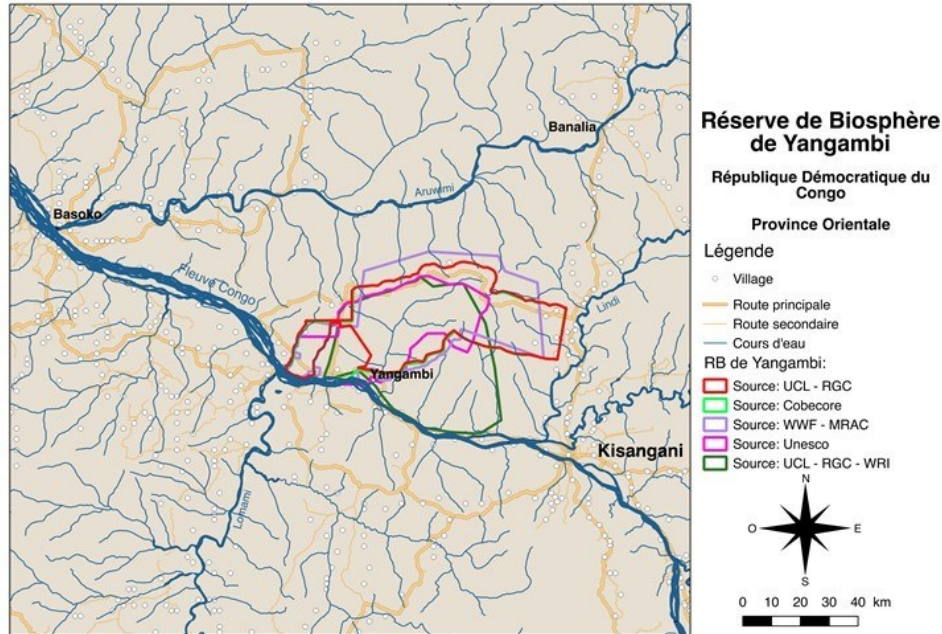# From research to action to protect the Congo Basin forests

Robert Nasi

The Democratic Republic of the Congo (DRC) is a country central to the work of the Center for International Forestry Research (CIFOR). It hosts over 60 percent of the world's second largest swathe of tropical forest, the Congo Basin, which is home to endangered gorillas, okapis, chimpanzees, bonobos and forest elephants, as well as thousands of species of birds and trees. It is also home to millions of people, many of whom depend on forests for their livelihood and energy needs.

However, prolonged conflict in parts of the country and ongoing unchecked natural resource exploitation leave DRC's forests at risk. Mining, unsustainable commercial logging, wood fuel harvesting, wildlife trafficking, and hunting have become pressing threats. This is why we must act now to preserve the country's vast forests.

CIFOR's project FORETS (*Formation, Recherche et Environement dans la Tshopo*) in northern DRC, is located at the very heart of the Congo Basin where the potential for impact is massive.

The project is funded by the European Union and has two main components: First, in partnership with the University of Kisangani (UNIKIS), one of the country's top higher education institutions, we are training graduate and doctoral degree students in sustainable forest

management. Second, we are working with potential investors, private companies, government institutions and development practitioners to kick off evidence-based initiatives to protect the Yangambi Biosphere Reserve and to improve the living conditions of the neighboring communities.

The Yangambi Biosphere Reserve is situated in the north of the Democratic Republic of the Congo along the Congo River.

FORETS has already supported about 300 postgraduate students, who will become the next generation of Congolese forest experts. From academia, civil society, private sector, or government, they will be leading projects and policies to support the sustainable management of their country's vast natural resources for the benefit of all Congolese now and for future generations.

Furthermore, to ensure that UNIKIS can continue to provide high quality education, CIFOR and partners are building or upgrading some of its infrastructure, including a 2,500-square-meter building on the site of the Faculty of Sciences. The building, which will house auditoriums and classrooms for hundreds of students from across the country, was built following the highest sustainability standards, and is designed to have a low carbon footprint.

Over the past 18 months, FORETS has also produced relevant knowledge to fully understand the challenges and opportunities facing Yangambi. The baseline assessments included a wide range of topics such as agroforestry and agriculture, wild meat and nutrition, wood fuel and energy, and logging and livelihoods. Our findings are now guiding the project's second phase, which will focus on implementing revenue-generating activities and public-private partnerships to translate improved knowledge into action on the ground, to promote a more sustainable management of the forest in and around the reserve.

A FOURTH PILLAR?

CIFOR's work is based on a three-pillar approach: rigorous scientific research, capacity development, and targeted outreach and engagement. What is unique about FORETS is that it not only covers these three pillars, but it goes one step further. The project connects science with implementation on the ground, aiming for our research to have a real, tangible impact to the benefit of the Congolese people.

How are we planning to do this? First, by working with the private sector, in particular small and medium enterprises (SMEs), to create economic development opportunities around the reserve. Second, by bringing students and scientists to Yangambi to produce applied research that addresses real issues and that can benefit the local communities and support the improved management of the Congo Basin. Third, by creating partnerships with a wide range of actors to create a cross-sectorial long-term vision on how to sustainably manage this landscape.

THE LANDSCAPE APPROACH IN PRACTICE

Looking at forests as part of a broader institutional and biological landscape is a top priority for CIFOR. Yangambi's farms, forests, water bodies, settlements and the reserve itself cannot be seen as isolated elements but are part of the wider landscape in which resource use is integrated. A landscape approach entails understanding and managing multiple objectives of diverse stakeholders, taking into consideration both the natural environment and the human systems that shape and depend on it.

We are working to break down the sectoral silos that hamper sustainable development and to bring together the different practitioners, activities, and interests that may positively affect forests if they follow a shared goal. Indeed, FORETS is a perfect example of CIFOR's landscape approach translated into practice.

Such practice in Yangambi means identifying policy options, investment opportunities and research priorities by integrating sectors and scales, negotiating competing interests and demands, recognizing changes in the landscape, and leveraging private and public capital for long-term investments. It is certainly a big challenge, but we expect to address the complexity of the processes affecting the landscape, making sure that we integrate multiple voices and multiple objectives.

THE WAY FORWARD

FORETS will continue its work until 2021 and I will regularly visit partners and project's activities to witness its impact. Through this unique project we have the opportunity to transform Yangambi's landscape and create lasting change for the benefit of the environment and of the people. FORETS has an amazing team on the ground, committed to continue building local capacity, conducting top-notch research, influencing decision-making, and making projects succeed. I look forward to seeing the fruits of our work.

FORETS is funded by the European Union and implemented in partnership with:

- *Institut National pour l'Étude et la Recherche Agronomiques* (INERA)
- UNESCO's Man and the Biosphere Program (MAB)
- *Institut Facultaire des Sciences Agronomiques* (IFA)
- Civil Society of Yangambi (SOCIYA)
- University of Kisangani (UNIKIS)
- Royal Museum for Central Africa
- Botanic Garden Meise
- Resources and Synergies Development (R&SD)
- International Institute of Tropical Agriculture (IITA)
- World Agroforestry Center (ICRAF)
- French Agricultural Research Centre for International Development (CIRAD)
- Centre for International Sustainable Development Law (CISLD)

Training compendiums on climate change in African forestry launched at AFF 10th anniversary celebrations

On May 22, 2019, the African Forest Forum (AFF) celebrated its tenth anniversary with the launch of eight forestry related training compendiums on basic science of climate change, carbon markets and trade, climate modelling and scenario development, and international dialogues and processes in climate change; as well as a book titled, *"The State of Forestry in Africa: Opportunities and Challenges.*

Established in 2007 as a non-political, non-governmental, and not for profit international organisation, the African Forest Forum (AFF) is an association of individuals with a commitment to the sustainable management, wise use and conservation of Africa's forest and tree resources for the socio-economic well-being of its peoples and for the stability and improvement of its environment. AFF undertakes its work in an objective and independent manner

For more than a decade, AFF along with its partners, has worked on the science-policy-development interface that is crucial for enhancing sustainable forest management (SFM) practices on the African continent, as well as proffering solutions to the many challenges afflicting the sector. In this regard, eight training compendiums were developed in a pedagogical manner to support capacity building and skills development on the continent to facilitate better handling of climate change issues in forestry. The compendiums were developed by several

expert teams and validated by forestry stakeholders at a workshop organized jointly with the University of Ouagadougou from 12-16 March 2018 in Burkina Faso. Thereafter, they were peer-reviewed by a number of experts before being edited for production. They were officially launched by AFF on May 22nd :

- [Basic science of climate change: a compendium for professional training in African forestry](#)
- [Basic science of climate change: a compendium for technical training in African forestry](#)
- [Basic science of climate change: a compendium for short courses in African forestry](#)
- [Carbon markets and trade: a compendium for professional training in African forestry](#)
- [Carbon markets and trade: a compendium for technical training in African forestry](#)
- [Carbon markets and trade: a compendium for short courses in African forestry](#)
- [Climate modelling and scenario development: a compendium for professional training in African forestry](#)
- [International dialogues, processes and mechanisms on climate change: compendium for professional and technical training in African forestry](#)

International dialogues, processes and mechanisms on climate change: compendium for professional and technical training in African forestry

The compendiums are tailored for different audiences, including those at professional and technical levels, as well as for guiding delivery of short courses. The latter also target extension agents and civil society organisations that interact with local communities; and this is the approach AFF has taken to get its information reach local communities.

The training compendiums are the first of their kind in Africa, and most likely in the world, and are based on demands by African forestry and related training institutions expressed through a need's assessment conducted by AFF. These compendiums will be complemented by six others under preparation on climate change adaptation and climate change mitigation in African Forestry. They are expected to provide educational and training information, organized in a pedagogical manner, that is crucial to a standard or uniform approach in building the capacity and skills on climate change issues related to forestry among African forestry stakeholders in the various African sub-regions. They will also provide guidance on addressing national and regional issues on climate change and forestry by other interested stakeholders.

In an effort to complement FAO's regular reports on the global state of forestry resources and on related aspects, AFF also launched the book on "The State of Forestry in Africa: Opportunities and Challenges" on May 22nd. The issue provides a broad overview of some of the most pressing concerns in the African forestry sector, with the intention that subsequent issues of this publication will dwell on other equally important concerns that could not be accommodated in this issue. AFF plans to produce such issues, with potential partners, once every 2-4 years, resources permitting.

Celebrating 10 years of commitment to Africa's forests and tree resources

The occasion, jointly organized by AFF, the Kenya Forest Service (KFS) and the Kenya Forestry Research Institute (KEFRI), was held at the Amani Gardens, Karura Forest grounds in Nairobi,

Kenya. It was attended by over 200 participants from across Africa and outside the continent, representing governments and public agencies, international organizations, the private sector, academic and research institutions, non-governmental organizations (NGOs), and community-based organizations (CBOs).

"We started this journey on December 06, 2007 when AFF was registered as a not-for-profit NGO in Nairobi Kenya, and with a grant from the Swedish International Development Cooperation Agency (Sida) in 2008, which helped us, among other things, to set up AFF as a platform that could support African forestry stakeholders to discuss and mobilise resources for improved management and use of their forest and tree resources. A second grant from the Swiss Development Cooperation Agency (SDC), has strengthened AFF as an institution that is gradually being recognized and respected as another key actor on the African forestry scene" said Prof Godwin Kowero, Executive Secretary-CEO at AFF.

L-R: Dr. Doris Mutta, Senior Programme Officer (SPO)-AFF; Prof. Godwin Kowero, Executive Secretary-CEO AFF; Mr. Gideon Gathaara, Conservation Secretary, Ministry of Environment and Forestry; Mr. Macarthy Oyebo, Chair AFF Governing Council; Prof. Demel Teketay, Chair AFF Members Forum.

In his opening remarks, Prof Godwin Kowero, emphasized the need for a new narrative for Africa, that captures the urgency of the environmental challenges facing the continent and the world at large, and the role of forests and trees outside forests at the centre of human, animal and plant survival on the continent. He also highlighted AFF's efforts on issues related to: management of trees and forests in different landscapes and in the context of climate change; forest certification; quality supply and management of tree germplasm; and forest and tree pests and diseases. He emphasized the role of AFF as a knowledge brokerage institution in generating and sharing information and knowledge. He underlined the work AFF has done in supporting African delegates with capacity to develop common positions, negotiation strategies, and

effectively articulating their issues in international forestry related dialogues. In view of this, it was noted that the wealth of information generated through these activities provided a sound basis to develop and expand the forestry sector in Africa.

Speaking on behalf of the FAO Regional Office for Africa, and the representative for the FAO Southern Africa office, Mr. Edward Kilawe, commended AFF as a key partner in promoting and developing forestry in Africa. He reiterated FAO's gratitude for the collaborative approach it has had with AFF that has enabled the institution to support Africa's regional and country strategies and policies on sustainable forest management and the 2030 Agenda for Sustainable Development.

Mr. Almami Dampha, a Senior Policy Officer with the Rural Economy and Agriculture Department of the African Union Commission (AUC), recognized the vision and foresight of the AFF founding members towards establishment of the institution. He also appreciated the Government and people of Kenya for providing a conducive environment to host the regional entity. Other partners equally acknowledged by him in supporting AFF included ICRAF, UNFF, UN agencies, FAO, RECs, and development partners/the donor community. He reaffirmed the commitment of AUC in working with all partners towards Agenda 2063- a socioeconomic transformation framework for the next 50 years

Ms. Ulla Andrén, the Regional Head of Development Cooperation in Sub-Saharan Africa at the Embassy of Sweden in Addis Ababa, Ethiopia, commended AFF for creating a collective voice for forestry on the continent and beyond. She encouraged further inclusion of women's leadership in the forestry sector for increased productivity and economic benefits. In the same token, Mr. Patrick Sieber, Programme Manager, Swedish Agency for Development and Cooperation (SDC), indicated a sense of pride in AFF's growth as an institution and re-affirmed commitment towards its long standing and rewarding partnership.

Mr. Macarthy Oyebo, Chair of the AFF Governing Council, provided an overview into AFF's journey over the past decade to become the leading platform of stakeholders in African forestry. In the process, he extended gratitude to all African governments, partners and stakeholders who enabled the institution to achieve its targets and also provided a conducive environment for its work. He also appreciated the kind financial support from the Swedish International Development Cooperation Agency (Sida) and the Swiss Agency for Development and Cooperation (SDC) to undertake a number of project activities in Africa. He further informed delegates that AFF had redefined its approach to conceiving and managing its work through a programmatic approach that is guided by its own strategy and the priority areas of action identified by the African forestry fraternity.

Mr. Gideon Gathaara, Conservation Secretary, Ministry of Environment and Forestry lauded the efforts of the African Forest Forum (AFF) for a decade of service to African forestry, and the achievements attained within the short period. He stated that deforestation and forest degradation remained challenges that hindered the ability of African countries to address poverty. For this reason, he took note of the considerable work AFF had done in providing useful information from its continent-wide studies. The development of such information, he further noted, could

support evidence-based decision making to improve management and wise use of forest and tree resources.

The Kenyan Forest Service choir entertains guests.

The celebrations were also marked by a number of events that included: a regional workshop on 'sharing of information, knowledge and experiences in African Forestry'; and two regional training workshops on (1) 'sustainable forest management and leadership for policy makers in Africa 'and (2) 'forest governance for Eastern and Southern Africa.' With an impressive list of speakers from many partners, the workshops showcased results obtained from the work of by AFF and its partners during the last five years.

Tree planting by Ms. Ulla Andrén, the Regional Head of Development Cooperation in Sub-Saharan Africa at the Embassy of Sweden in Addis Ababa, Ethiopia, Prof. Godwin Kowero, Executive Secretary-CEO AFF and presided over by Ms. Monica Kalenda, Senior Deputy, Chief Conservator of Forests, KFS

STONERIDGE COMMUNITY/PIERSON FOREST

Dr. H. Barres

The major purposes of this 1-hectare (2.5-acre) forest, sponsored by a group of Stoneridge Retirement Community residents and the Pierson Family, is to capture / sequester atmospheric CO_2 to mitigate climate change and to provide the farmer with periodic income. It was planted in June, 2010. In Costa Rica, the host farm is Hacienda Las Delicias owned by the Rojas Family. This biodiverse forest was designed and is managed by Reforest The Tropics in a UNFCCC-AIJ applied research program.

This 4-species forest has captured and stored 131 metric tonnes (144 short tons) of CO_2 in the form of wood in the forest stand. Current annual capture is 23.5 tonnes/year. The large tree in front of the sign is a Eucalypt hybrid, *E. deglupta*. Its purpose is to promote economic sustainability, allowing the farmer to thin the forest and sell the logs periodically for his income. Another tree in this mixture is the Klinkii tree (*Araucaria hunsteinii*), a rare tropical conifer whose purpose is the storage of sequestered CO_2 for at least 100 years in a permanent farm forest. The two other species are Cedar (*Cedrela odorata*) and Roble Coral (*Terminalia amazonia*). Both produce valuable wood for mid-term CO_2 sequestration and harvesting for farmer income

The Rojas family has agreed to put their forests into a trust so it will not be clear cut for a pasture in the future. Traditionally, farm forests are cut when trees reach a commercial size at about 12-15 years of age.
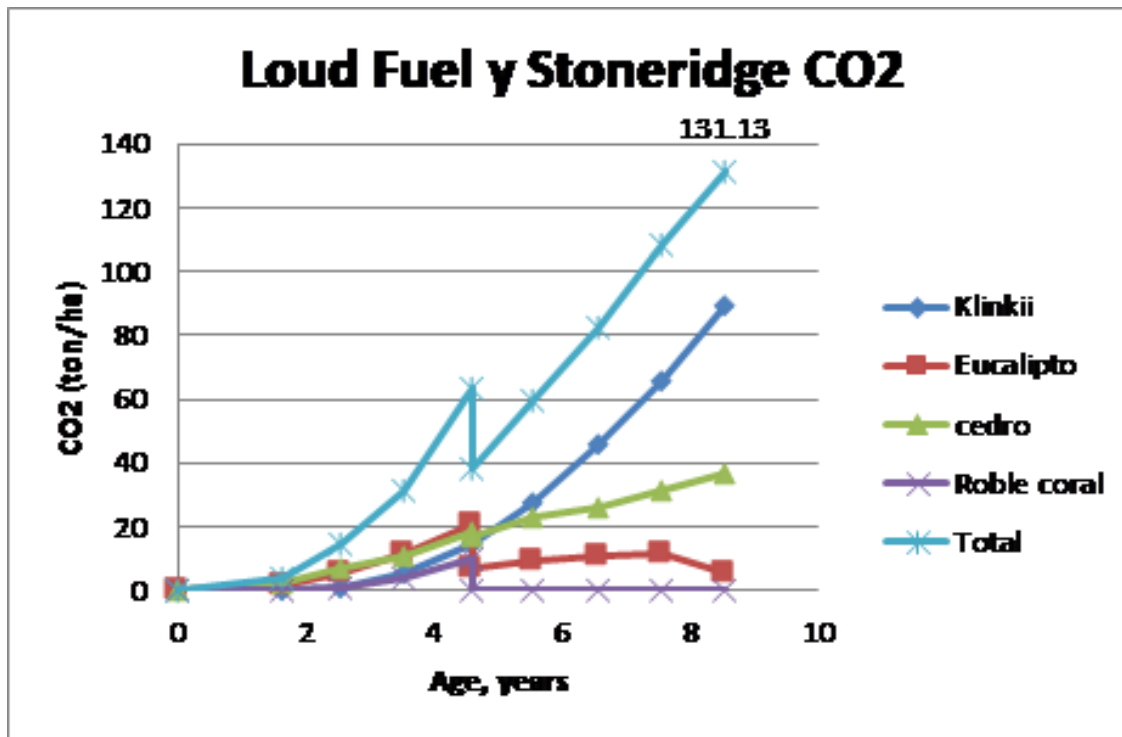
The forest at the time of planting, June 2010.

The forest today.

The graph shows the growth of the forest through the age of 8.53 years. Loud Fuel is an oil delivery company with a forest.

Research involves management, and identifying more tree species that can underplanted to store CO_2 for decades and that produce more valuable timber. Other important topics for research are the effect of termites and lightning strikes on carbon storage and defining and improving income to the farmers who lock up the use of their pastures in long-term carbon-offset forests.

The cost to capture and store a tonne of CO_2 in this RTT Model is about \$15-\$25 in the first contract. RTT manages 73 forests sponsored by over 100 U.S. emitters, 200 hectares (500 acres) on 13 farms in the Alantic Zone of Costa Rica. There is plentiful rain that promotes growth and prevents forest fires.

RTT also manages an environmental education program with many schools. Schools have the option of establishing a forest in the RTT Program to begin offsetting their inventoried CO_2 emissions. Other sponsors include businesses, social groups, churches, and families. Approved by the Costa Rican and U.S. governments, all projects come with a 25-year contract, the first of which in a series of 4 contracts to reach our initial 100-year goal towards permanency.

Measurements are done annually or bi-annually. Technical assistance is provided during the contract by RTT, a CT and Costa Rican based non-profit organization. For more information on participating in a new project, contact Greg Powell, Executive Director, gpowell@reforestthetropics.org or tel 860-572-8199 in Mystic, Connecticut.

Search for orphaned tropical forest datasets

Sheila Ward and Gillian Petrokofsky

We are collecting information on legacy data for tropical forests, including inventory and plot data, that are in danger of being lost. Many projects over the years have generated a lot of tropical forest data. But the information is scattered among different institutions and people, some still only on paper, some digitized but in older formats. There are other types of tropical forest data sets also in need of curation, including photographs and other records.

TROPIS and ATROFI-UK are two previous databases that compiled metadata on forest plots and inventories. The data for certain plots are available at www.forestplots.net and its associated networks. But other plots and inventories still need attention, re-discovery even. We would like to compile information on datasets that should be digitized or transformed to an up-to-date digital format. The goal is first to make metadata on these datasets available on a publicly accessible website, and then to try to secure the data itself by pushing for appropriate curation with open-access availability.

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

If you know of any such orphaned databases for tropical forests, please send a message to: Sheila Ward tropfordata(at)gmail.com or Gillian Petrokofsky gillian.petrokofsky(at)zoo.ox.ac.uk. Please pass this message on to anyone who might be interested.

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Examining the Relationship between Regulatory Quality and Forest Product Exports to India: A Gravity Model Approach

Joy Das

Shaun M. Tanger

P. Lynn Kennedy

Richard P. Vlosky

Abstract

The value of aggregate forest product exports to India has increased from about $1.5 billion in 2003 to about $5.4 billion in 2013. Although many of the forest product resources can be sourced from within India, the subcontinent must also source forest products from trading partners, in the form of wood product exports. This presents many economic challenges and opportunities for wood product markets and trade, as India is the second-largest importer of wood products in the world. In this study, we focus on the effect of regulatory quality on forest products exports by partner countries to India. Using a panel of trade flows during 2009 through 2013 of 143 partner countries exporting forest products to India, we estimate an augmented gravity trade model to capture the effect of relevant variables on the outflow of aggregate forest products and disaggregate paper and paperboard, wood pulp, fiberboard, veneers, sawn wood, industrial roundwood, and plywood products from partner countries to India. Results from the analysis are mixed; regulatory quality is found to have positive correlation with exports to India in some cases (paper and paperboard products and wood pulps) and no correlation in a few instances (fiberboard, veneer sheets, sawn wood, industrial roundwood, and plywood). Other explanatory variables such as the distance between the partner country and India, forest area of partner country relative to forest area of India, gross domestic product, population, and trade agreements are mostly found to have positive or negative significant effects on trade, varying across different sectors.

Forests in India supply a wide array of goods and services such as timber, fuelwood, fodder, wood products, pulpwood, sawn wood, veneer wood, paper, and other wood-based materials. India ranks 10th among the most forested nations of the world, with a total forest cover of 78.92 million ha. The forest area covers nearly 24.01 percent of the total geographic area of the country (Food and Agriculture Organization Corporate Statistical Database [FAOSTAT] 2013). Dense forests once covered almost all states of India, but forest cover has been significantly reduced over the last several decades. At a population of just above 1.2 billion, and with two-thirds of the population of the country depending on agricultural activities for their livelihood, the demand for forest products[1] in India is very high, and there are increasing pressures on domestic sources of forest products (Forest Survey of India 2013).[2] Given the population pressures and subsequent stress placed on domestic forests, India must also rely on a robust import market to augment the domestic demand for forest products

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[1] By stating forest product, we mean aggregate forest products that include roundwood, fuelwood, sawlogs, veneer logs, pulpwood, wood charcoal, wood chips, wood residues, wood pellets, sawn wood, veneer sheets, wood-base panels, plywood, particleboard, strand board, fireboard, hardboard, wood pulp, carton board, and paperboards, etc.

[2] During the period 2009 through 2011, the forest cover in India decreased by about 34,700 ha.

(http://www/fao.org/faostat/en/#data/FO). In the last decade, the value of forest product imports by India has increased from about \$1.5 billion in 2003 to about \$5.4 billion in 2013 (FAOSTAT 2015). Second only to China, India is the largest timber-importing country in the world (Flynn 2013). Relatedly, log imports in India have doubled since 2006 to meet the country's growing appetite for wood products (https://timberupdate.com/blog/timber-exports-to-india-expected-to-triple-by-2021). This number is expected to triple by 2021. Given the recent large increase in timber product imports and robust forecasts in the coming years, it is important to understand which factors affect the success of firm or country efforts to sell their domestically produced goods in other nations, a concept referred to as export performance.

In our specific case, a partner country's export performance may be a key indicator determining the dollar amount of forest products exported to other nations (i.e., India). Generally, and regardless of product or service, export performance is a country's conduct in leveraging its capabilities and resources at a global level at a given point of time (Beleska-Spasova 2014). Foreign market access, domestic infrastructure, and macroeconomic aspects such as exchange rates and tariffs are a few of the factors that determine export performance (United National Conference on Trade and Development [UNCTAD] 2005). The regulatory environment of the exporting countries has been shown to have an effect on export performance in other industries (Iwanow and Kirkpatrick 2007). Yet, to our knowledge, any possible effects of regulatory quality on exports in the forest products sector have not been examined before this study. Does regulatory quality matter in terms of forest products trade? If it does, there should be evidence for a country that relies heavily on forest product exports. If it does matter, then there are policy implications, given the forecasted growth in demand for forest products in India over the next decade and beyond.

Figure 1 shows the total value of forest product exports into India from major partner countries during 2009 through 2013. The United States, Malaysia, Myanmar, New Zealand, China, Indonesia, Canada, and Germany are the top eight exporting countries from which India imports the majority of the forest products.[3] The total value of these forest product imports accounted for about 0.29 percent of India's gross domestic product (GDP) in 2013 (Central Intelligence Agency 2015).[4] A rapid increase of wood products into the continent during the last decade is because of the increase in demand of raw materials used for rapid economic growth, industrialization, and growth of population in the country (Malik and Dhanda 2003). Figure 2 shows the forest product exports into India categorized by disaggregated sectors and by countries in 2013. Although the import of industrial roundwood has remained high (about 75% of the total imports of forest products in 2013), India has been slowly moving toward importing higher value-added products over the last couple of years.

Industrial roundwood (mostly nonconiferous) is imported from Malaysia, Myanmar, and New Zealand.[5] Paper and paperboard, wood pulp, fiberboard, sawn wood, veneer, and plywood are other major forest products imported by India (US Department of Agriculture 2014). We have used the FAOSTAT classification of aggregate forest products and the above-mentioned disaggregated sectors for our study, which is discussed later (see the Appendix for detailed descriptions).

Given that a third of the forest and wood product economy of India is brought in from other countries, which is complemented by a robust export of higher value-added products, understanding certain trade characteristics or qualities that influence the level of exports from the partner countries is vital to understanding characteristics that promote cost-efficient access to Indian wood product markets or, in other words, to facilitate export performance.

One such characteristic may be regulatory quality. Regulatory quality helps simplify trade across countries as it enhances the functioning of the government, policy implementation, and integration (Iwanow and Kirkpatrick 2007). Regulatory quality directly reflects the transaction costs associated with trade because it focuses on the policies implemented, investments in bureaucratic procedures, and is an important determinant of export performance (Iwanow and Kirkpatrick 2007). Regulatory quality enhances the value of trade between countries and can improve economic growth. It identifies flexibility in the labor market, along with smooth functioning of the banking and the business sector. As mentioned in Breen and Gillanders (2012), several researchers such as Banerjee (1997), Guriev (2004), and Freund and Bolaky (2008) find that factors such as poor institutions and associated corruption decrease the functioning of the government in the trading countries.

Iwanow and Kirkpatrick (2007) found that regulatory quality is reported to have a robust impact on the exports in several manufacturing sectors. Their study results indicated that a 10 percent increase in the value of regulatory quality among all exporting countries increases exports of the manufacturing sector all over the world by nearly 10 percent, ceteris paribus. Although studies have not focused on the effect of institutions and regulatory environment on forest products trade in particular as we have mentioned earlier, Bartley (2003) studied the institutional factors and regulations concerning certification issues in the forest products industry. He reported that the institutional factors help in ensuring free trade by mitigating private certification of forest products with the help of government and other parties. This further helps in export performance. However, the existing literature does not suggest anything about the institutional factors affecting the value of forest products traded and the share of exports of forest products by the partner countries to the importing countries.[6]

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[3] Percentage of India's forest product exports to India in 2013 from the United States is 12.92 percent, New Zealand is 8.58 percent, Canada is 8.19 percent, Indonesia is 7.89 percent, Myanmar is 7.41 percent, China is 7.41 percent, Malaysia is 6.94 percent, and Germany is 3/01 percent.

[4] The forestry industry contributes approximately 1 percent of the GDP of India (2011).

[5] Of the exports in this category 43 percent of the value comes from nonconiferous (tropical) and 45 percent from nonconiferous (nontropical). The remaining 12 percent is from coniferous sources.

[6] By partner countries, we mean all the countries that are exporting forest products into India. So we use the terms ''partner country'' or ''exporting country'' interchangeably throughout this article. Our importing country in the study is only India.
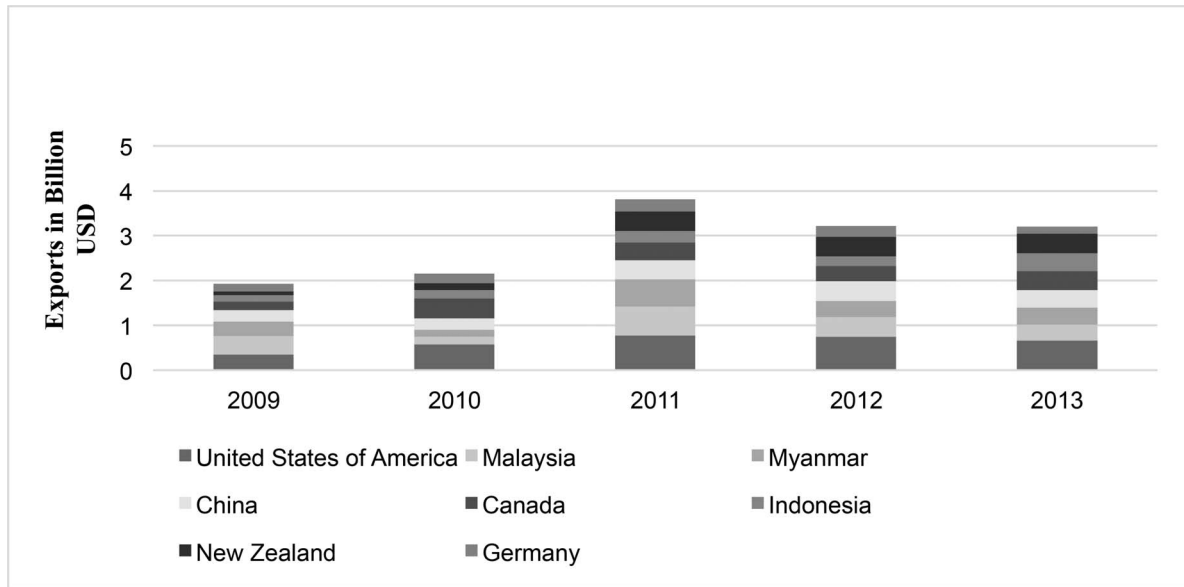
Figure 1.—Total forest products exports into India by major partner countries: 2009 through 2013.

The study explores the effect of regulatory quality on the value of forest products exported to India by partner countries. By applying an augmented gravity model, we attempt to estimate, empirically, if any relationship exists between the dollar amount of forest products exported to India and regulatory quality of that exporting country.

The World Bank defines regulatory quality as the index that captures ''perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.'' It has an index ranging from −2.5 (weak) to +2.5 (strong) (World Bank Group 2014). Regulatory quality directly reflects the transaction costs associated with trade because it focuses on the policies implemented, investments in bureaucratic procedures, and is an important determinant of export performance (Iwanow and Kirkpatrick 2007).

In the next section, we perform a literature review of related trade research in aggregate forest products, disaggregate wood pulp, paper and paperboard, sawn wood, veneers, industrial roundwood, and fiberboard, with an emphasis on research that utilizes the gravity model. After that, we detail relevant model specifications and cover the data used in the analysis, followed by the results of the empirical analysis and discussion of how those findings contribute and fit with the existing literature and a priori theoretical expectations. Finally, we conclude with a discussion of the implications and relevance of this study to global forest and wood products trade.

Literature Review

A standard gravity model states that the volume of trade between two countries is directly proportional to the size of
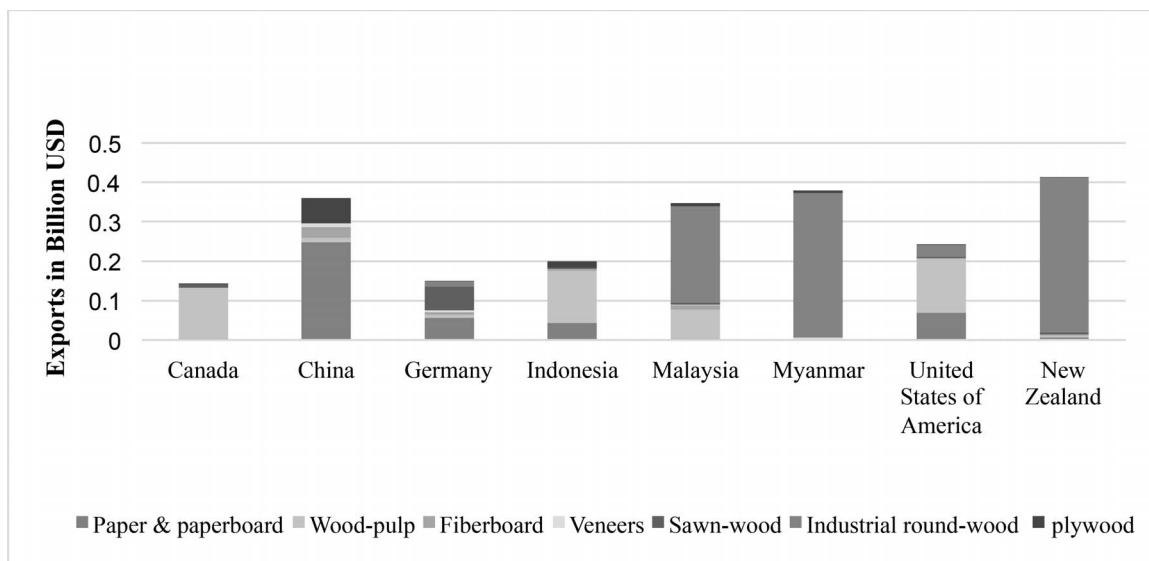

Figure 2.—Forest products exports into India by disaggregated sectors and countries—2013.

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the economy and inversely proportional to the trade costs (Tinbergen 1962). A country's GDP and population typically represent the size of the economy, whereas distance is taken as a proxy for trade costs, as these are reported to affect export performance by UNCTAD (2005). Li and Zhang (2008) have argued that distance has an important effect on the volume of trade as it determines the trade transaction cost and hence export performance. Relatedly, macroeconomic and policy-related factors such as exchange rate, tariffs, and other trade agreements (TAs) that affect export performance as mentioned above are also included in most gravity-model research in the forest products sector (Kangas 2001, Kang 2003, Kangas and Niskanen 2003, Zhang and Li 2009). Finally, we include a proxy of a country's forest resource endowment and production capacity (FAOSTAT 2006), for which we have taken the total area covered by forests in the partner countries as well as in India, which acts as a comparative advantage of the partner country relative to India in regard to the opportunity cost of wood production. There are several other variables that can alter trade costs such as existing TAs between two countries and regulatory quality, which are examined in this study. Besides GDP, the relative forest area is used as a proxy for the size of economy in context to the forest products industry. Anderson (1979), Bergstrand (1985), and Helpman and Krugman (1985) have provided the theoretical basis for the gravity equation. The gravity trade model is one of the most commonly used trade theories to examine bilateral trade (Haveman and Hummels 2004), and there is a rich and diverse literature that applies the economic gravity equation to relevant agricultural trade inquiry (Zahniser et al. 2002, Yang and Woo 2006, Disdier and Marette 2010, Peterson et al. 2013).

The applications of gravity models to test relevant questions in the trade of aggregate forest products and disaggregated wood products and paper and paperboard research are fewer in number in comparison with agricultural trade but robust nonetheless. Buongiorno (2016) makes a quick synopsis of the use of gravity models in forest and wood products research with respect to trade policy. Buongiorno et al. (1980) have investigated the multilateral flow of logs from the tropical regions and represented the influences of economic, and to a certain extent, political systems on multilateral trade with the use of a gravity model. Similarly, Akyuz et al. (2010) showed a high degree of integration between the European Union and Turkey with the use of gravity model. Relatedly, Buongiorno (2015) argued that the European trade of wood and derivatives was positively affected by the introduction of the euro, with the help of the gravity model, and in a subsequent paper, Buongiorno (2016) uses the model to estimate the value of trade of various wood commodities between countries. Kangas and Niskanen (2003) studied trade patterns between the European Union and Eastern European access candidates. Moreover, empirical gravity equations were built by Dai and Shen (2010) on the trade of forest products between China and other Asia-Pacific countries. An analysis of the gravity model on pulp and paper industries in China found that the imports of pulp and paper in China depend on the size of countries and the distance between them (Li and Zhang 2008). Zhang and Li (2009) explored determinants of China's wood products trade from 1995 to 2004. Hujala et al. (2013) estimated

augmented gravity models of trade flows for chemical pulp and recovered paper exports.

Data and Methods

The study hypothesizes that better regulatory quality of partner countries leads to larger values of forest products exported by them to India. In this study, we examine a 5-year panel from 2009 to 2013 for India and 143 partner countries that export forest products to India. This study applies the gravity equation (Tinbergen 1962, Pöyhönen 1963), where exports from country of origin i to destination j is explained with a log-log equation using, as predictors, economic forces in both the origin and destination of the traded goods, and forces either aiding or impeding the movement of traded products (Bergstrand 1985). The effect of regulatory quality on export performance, in terms of the total value of forest products exported to India, is examined by using an augmented gravity trade model. By augmented model we refer to the inclusion of regulatory quality and TAs as proxies of trade costs, along with distance between markets. We also consider relative forest area of trading countries as a proxy for commodity prices, along with traditional use of GDP and population variables as a proxy for size of economies. Regulatory quality directly reflects the transaction costs associated with trade because it focuses on the policies implemented and investments in bureaucratic procedures and is an important determinant of export performance. Regulatory quality has comparatively larger effects on trade relative to the other five institutional indices mentioned earlier in the study. An improvement in regulatory quality helps simplify trade across countries as it enhances the functioning of the government, policy implementation, and integration (Iwanow and Kirkpatrick 2007).[7]

We have also included a proxy for TAs to capture the effect of unobserved factors that may have been affecting forest product exports to India.[8] The relative forest area of partner countries as a percentage of India's forest area is taken as a control variable to proxy the relative size of the partner countries' forest products resource relative to India's.

The data that are usually observed at regular time intervals are called panel data (Cameroon and Trivedi, 2010). In our study, the panel is longitudinal in nature where the partner country's regulatory quality index and other variables are observed across time, i.e., during 2009 through 2013. As there are 143 partner countries that export forest products to India, the sequence is repeated 143 times, turning it to 715 data points. It is assumed that the regressors are exogenous in a pooled model. Considering the structure of the data and the variables involved in the model, we utilize several panel specifications, including a pooled

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[7] Given the nature of the regulatory quality statistic, where some countries have negative and some positive values, these measures were scaled up to result in positive indicators for ease in interpreting and comparing the respective country's regulatory quality index values.

[8] TA with India means that the partner countries and India have trade agreements (includes free trade agreements, regional trade agreements, and preferential trade agreements) signed and in effect during 2009 to 2013 in our study. It denotes a binary dummy variable, which is one if country j and India have TAs and zero otherwise.

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ordinary least squares (POLS) regression, random-effects generalized least-squares (GLS) regression, and a population average feasible generalized least-squares (FGLS) regression model to find the effect, if any, of regulatory quality on forest product imports by India.[9] A fixed-effects model could be run using the data, but we chose not to report them for two reasons. First, there is presence of time-invariant variable in the model, such as distance, and second, the main variable in the model, regulatory quality, has a very subtle change over time. Hujala et al. (2013) also hold this view for their analysis. Although the data are only for 5 years, the Breusch-Pagan Lagrange multiplier (LM) and the Hausmann test ratio recommend the use of random-effects model; we have also run a random-effects GLS regression and a population average FGLS regression. Unlike the random-effects GLS regression, the error terms in the population-averaged FGLS regression method control for the correlation over time for a given individual (within correlation) and possible correlation over individuals (between correlations; Cameron and Trivedi 2010). Last, we examine a population average Poisson panel model. The rationale here is that many of the partner countries in the model have multiple years where no trade (exports) occurs. Using the prior panel models mentioned merely drops these observations from the regression analysis, potentially biasing the results. A Poisson panel model or pseudo-Poisson maximum likelihood model (PPML) provides the same results if you are clustering variables (in our case partner country) to condition the model for unobserved characteristics within that variable that, in this case, affects the exports of forest products to India (Santos Silva and Tenreyro 2006).

All of the above-mentioned statistical methods were then performed using the following gravity equation. The standard gravity equation takes the following form:

$$Y_{ij}^t = \beta_0 + \sum \beta_k Z_{k,ij}^t + \epsilon_{ij}^t \qquad (1)$$

where Y_{ij}^t is the amount of exports from country i to country j or the value of trade flows at time t. $Z_{k,ij}^t$ ($k = 1, 2, \ldots, k$) denote gravity variables such as GDP, distance, population, etc. In our study, the augmented gravity equation takes the following empirical specification:

$$\ln Y_{ij}^t = \beta_0 + \beta_1 \ln \mathrm{REGPI}_j^t + \beta_2 \ln \mathrm{DIST}_{ij} + \beta_3 \ln \mathrm{GDPP}_j^t$$
$$+ \beta_4 \ln \mathrm{POPP}_j^t + \beta_5 \ln \mathrm{FORPI}_j^t + \beta_6 \mathrm{TA}_{ij} + \epsilon_{ij}^t \qquad (2)$$

where i and j are trading partners and India, respectively; j is fixed, and i considers each of the 143 partner countries that exports forest products to India. t denotes time. In this model, the period under observation is 2009 to 2013. The variables of Equation 2 are explained in Table 1.

The value of forest product exports is taken from the FAOSTAT (2015) data set. The data for the main variable of

Table 1.—Definitions of the variables with respective hypothesized directions.

Variable	Description	Hypothesized direction
Y_{ij}^t	Value of total forest product exports to India (j) from country i at time t	
REGP^t	Regulatory quality of partner country at time t	Positive
GDPP_j^t	Real gross domestic products of country i at time t	Positive
POPP_j^t	Population of country i at time t	Positive
DIST_{ij}	Distance between the capital city of India (j, New Delhi) and the capital city of country i	Negative
FORPI_j^t	Ratio of total forest area of country i to total forest area of India	Positive
TA	Denotes a binary dummy variable that is 1 if country i and India have trade agreements and 0 otherwise	Positive

the study regulatory quality partner country and India are taken from the World Bank 2014 database, and the variable is taken from the data set of Kaufmann et al. (2013). Likewise, the data for the traditional gravity equation variables in the model, such as GDP, population, and distance are taken from World Bank database (2014). Also from the same database, we have obtained data for forest cover of partner countries and India. We have calculated the percent share of India's forest area to exporting countries' forest area from those data. The TA data were obtained from Asian Development Bank database (Asia Regional Integration Center 2014). Summary statistics of the data used in the study are shown in Tables 2 and 3. There are a few missing values in the data set as apparent from the total number of observations reported in Tables 2 and 3. This was because of data limitations for several of the explanatory variables. All of the models, POLS, random-effects GLS, population average FGLS, and the population average Poisson (generalized estimating equation [GEE][10]) model, indicate that regulatory quality and size of economies of partner countries mostly have a significant positive effect on imports by India. While determining which model was most robust, we examined the Breusch-Pagan LM test that recommended the use of the random-effects model. Moreover, the FGLS model is the one that accounts for within and between correlations. However, these models do not allow us to include zero level of exports from exporting countries; to alleviate this, we use the population average Poisson model (GEE), clustered on the partner country to achieve the same results as the PPML recommended by Santos Silva and Tenreyro (2011a, 2011b). Although this model does not perform as well in the aggregate as the population average random-effects model (Wald chi-square), it does include the "missing" values for the years where a trading partner exported no value of wood products; therefore it is considered more appropriate, as it is less likely to have missing observation bias (all of these results are available upon request from the authors). Therefore all

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[9] In a pooled OLS model, the estimation of parameters are straight forward, which do not consider the correlation of a given individual over time with the error term. Hence, to get a more precise and robust estimate, a population averaged model is used that controls for within correlations and between correlations as mentioned earlier. These are done to obtain a consistent random effect estimate where the regressors are uncorrelated with the error term (Cameron and Trivedi 2010).

[10] In statistics, a GEE is used to estimate the parameters of a generalized linear model with a possible unknown correlation between outcomes.

Table 2.—Summary statistics of data used in empirical estimation, India.

Variable	No. observed	Mean	SD	Min.	Max.
Export of aggregated forest products to India (million)	715	32.85	93.42	0.00	775
Export of disaggregate paper and paperboard products by India (million)	530	7.16	24.30	0.00	247.31
Export of wood pulp by India (million)	335	9.98	28.38	0.00	159.69
Export of disaggregate fiberboard products by India (million)	365	1.33	4.04	0.00	31.77
Export of veneer sheets by India (million)	345	0.69	2.75	0.00	33.49
Export of sawn-wood products by India (million)	500	14.11	4.89	0.00	59.09
Export of industrial roundwood products by India (million)	575	10.98	55.24	0.00	589.47
Export of plywood products by India (million)	335	1.53	9.04	0.00	112.45
Regulatory quality of India	715	−0.39	0.07	−0.47	−0.30
Gross domestic product of India (billion)	715	1,730	189	1,370	1,880
Population of India (million)	715	1,220	219	1,190	1,250
Distance (km)	680	7,510.14	4,186.01	800	16,909

Table 3.—Summary statistics of data used in empirical estimation of partner countries.

Variable	No. observed	Mean	SD	Min.	Max.
Regulatory quality of partner country	710	0.005	1.02	−2.52	1.96
Gross domestic product of partner country (billion)	692	478	1,590	0.19	16,800
Population of partner country (million)	715	38.6	119	0.17	1,360
Distance (km)	680	7,510.14	4,186.01	800	16,909
Total forest area of partner country as a percentage of India's forest area	572	37.23	130.08	0	1,184.71

results are reported using this model selection and the analysis is done using the statistical software STATA, version 2011 (Stata 2011).

Results

Table 4 shows the effect of the explanatory variables on aggregate forest product exports.[11] Table 5 shows the effect of the explanatory variables on paper and paperboard, wood pulp, and fiberboard products. Table 6 shows the effect of the explanatory variables on veneer sheets, sawn-wood products, and industrial roundwood and plywood exports to India.

Table 4 reports the results for aggregate forest products. The population average Poisson (GEE) model reports that the regulatory quality of partner countries does not show a significant impact on the value of aggregate forest products exported to India by partner countries. However, for the disaggregate paper and paperboard products the population average Poisson (GEE) model (results reported in Table 5) shows that with a 1 percent improvement in regulatory quality of partner countries, the value of paper and paperboard products exported to India by partner countries significantly increases by about 2.87 percent. In the wood pulp sector (results reported in Table 5), with a 1 percent improvement in the regulatory quality of partner countries, the total value of wood pulp products exported to India by partner countries significantly increases by about 4.74 percent. However, fiberboard, veneer sheets, sawn wood,

industrial roundwood, and plywood products do not show a significant impact on exports to India.

Further, results reported in Table 4 show that the distance between the exporting country and India does not have any significant effect on the total value of aggregate forest product exports from partner countries to India. For the disaggregate paper and paperboard products (results report-

Table 4.—Regression results of augmented gravity model for dollar value of forest product exports to India.[a]

Variable	Pooled ordinary least squares	Random effect	Population average	Poisson
Regulatory quality of partner country	6.02*** (2.09)	2.96 (2.95)	3.95 (3.24)	0.44 (0.55)
Distance	−0.54** (0.22)	−0.51 (0.37)	−0.52 (0.38)	−0.10 (0.07)
Relative forest area of partner country to forest area of India	0.32*** (0.05)	0.30* (0.10)	0.31*** (0.09)	0.04*** (0.02)
Gross domestic product of partner country	0.49*** (0.12)	0.82*** (0.17)	0.73*** (0.18)	0.14*** (0.03)
Population of partner country	−0.13 (0.14)	−0.39* (0.23)	−0.32 (0.23)	−0.08* (0.04)
Trade agreement	0.42 (0.33)	0.48 (0.54)	0.52 (0.37)	0.12 (0.08)
Constant	−10.75	−8.16	−9.32	−0.45
n	457	457	457	510
R^2	0.38			
Root mean square error	2.16			
F statistic (6, 450)	62.95***			
Wald χ^2 (6)		107.65***	186.34***	117.81***

[a] Dependent variable = aggregate forest products. * $P < 0.1$, ** $P < 0.05$, and *** $P < 0.01$ (corresponding error statistics are reported in parentheses).

[11] As regulatory quality improves the expectation that exports will increase, it is to be noted that the range of regulatory quality index has a very narrow scale. A minor change in the value of regulatory quality can indicate a substantial change in the infrastructure, bureaucratic formalities, governance, transparency of financial institutions, a business-friendly environment in the country, and hence, a decrease in the trade transaction cost. This may account for the large coefficient relative to the other variables.

Table 5.—*Regression results of augmented gravity model for dollar value of forest product exports to India.*[a]

Variable	Paper and paperboard products	Wood pulp	Fiberboard
Regulatory quality of partner country	2.87*** (0.78)	4.74*** (1.56)	1.52 (1.24)
Distance	−0.36*** (0.07)	−0.11 (0.16)	−0.16 (0.15)
Relative forest area of partner country to forest area of India	0.06*** (0.02)	0.13** (0.06)	0.12*** (0.04)
Gross domestic product of partner country	0.19*** (0.05)	0.00 (0.10)	0.12 (0.08)
Population of partner country	0.02 (0.06)	0.11 (0.12)	0.00 (0.10)
Trade agreement	0.35*** (0.11)	0.38** (0.17)	0.57*** (0.22)
Constant	−7.36	−10.64	−4.13
n	387	242	276
Wald χ^2 (6)	260.41***	83.61***	76.88***

[a] Table shows population average Poisson panel results only. Dependent variables = paper and paperboard products, wood pulp, and fiberboard. * $P < 0.1$, ** $P < 0.05$, and *** $P < 0.01$ (corresponding error statistics are reported in parentheses).

Table 6.—*Regression results of augmented gravity model for dollar value of forest product exports to India.*[a]

Variable	Veneer sheets	Sawn wood	Industrial roundwood	Plywood
Regulatory quality of partner country	−2.37 (1.98)	1.47 (0.10)	−1.14 (1.27)	−0.82 (1.46)
Distance	0.11 (0.21)	−0.02 (0.12)	0.16 (0.13)	−0.56*** (0.13)
Relative forest area of partner country to forest area of India	0.04 (0.06)	0.10*** (0.03)	0.04 (0.04)	0.16*** (0.06)
Gross domestic product of partner country	0.19 (0.12)	0.07 (0.07)	0.15** (0.07)	0.25*** (0.08)
Population of partner country	0.05 (0.14)	−0.04 (0.08)	−0.05 (0.08)	−0.14 (0.10)
Trade agreement	0.30 (0.21)	−0.07 (0.15)	−0.24 (0.17)	0.68*** (0.21)
Constant	−0.24	−2.74	0.08	3.41
n	257	367	419	252
R^2				
Root mean square error				
F statistic (6, 159)				
Wald χ^2 (6)	54.79***	49.87***	33.03***	61.08***

[a] Table shows population average Poisson panel results only. Dependent variables = veneer sheets, sawn wood, industrial roundwood, and plywood. * $P < 0.1$, ** $P < 0.05$, and *** $P < 0.01$ (corresponding error statistics are reported in parentheses).

ed in Table 5) a 1 percent increase in the distance between the exporting country and India decreases the total value of exports from partner countries to India by about 0.36 percent. Wood pulp, fiberboard, veneer sheets, sawn wood, and industrial roundwood do not show a significant effect of distance on exports of the respective products to India. However, for plywood (results reported in Table 6) a 1 percent increase in the distance between the exporting country and India decreases the total value of exports from partner countries to India by about 0.56 percent.

For aggregate forest products, with a 1 percent increase in the relative forest area of partner countries to India, the total value of forest product exports from partner countries to India increases by about 0.04 percent. For the disaggregate paper and paperboard products (results reported in Table 5), with a 1 percent increase in the relative forest area of partner countries to India, the total value of paper and paperboard product exports from partner countries to India increases by about 0.06 percent. For wood pulp, with a 1 percent increase in the relative forest area of partner countries to India, the total value of plywood exports from partner countries to India increases by about 0.13 percent. For fiberboard (results reported in Table 5), with a 1 percent increase in the relative forest area of partner countries to India, the total value of fiberboard product exports from partner countries to India increases by about 0.12 percent. Veneer sheets and industrial roundwood do not show a significant result, whereas in the sawn wood sector (results reported in Table 6), with a 1 percent increase in the relative forest area of partner countries to India, the total value of sawn wood exports from partner countries to India increases by about 0.10 percent. For plywood, with a 1 percent increase in the relative forest area of partner countries to India, the total value of plywood exports from partner countries to India increases by about 0.16 percent.

Also, with a 1 percent increase in the GDP of a partner country, the total value of forest product exports from

partner countries to India increases by about 0.14 percent. For the disaggregate paper and paperboard products (results reported in Table 5), with a 1 percent increase in GDP, the total value of paper and paperboard product exports from partner countries to India increases by about 0.19 percent. Wood pulp, fiberboard, veneer sheets, and sawn wood do not show a significant result. For industrial roundwood (results reported in Table 5), with a 1 percent increase in GDP of partner country, the total value of wood pulp exports from partner countries to India increases by about 0.15 percent. For plywood (results reported in Table 5), with a 1 percent increase in GDP of partner countries, the total value of plywood exports from partner countries to India increases by about 0.25 percent.

The population of partner countries shows a significant effect on the exports of aggregate forest products. With a 1 percent increase in the population of partner countries, the total value of forest product exports from partner countries to India decreases by about 0.08 percent. However, the population of partner countries does not show any significant effect on paper and paperboard, wood pulp, fiberboard, veneer sheets, sawn wood, industrial roundwood products, and plywood exports from partner countries to India.

TAs neither significantly affect aggregate forest product exports nor does it affect the veneer sheet, sawn wood, and industrial roundwood exports from partner countries to India. For paper and paperboard products, with a TA, the total value of exports of the respective product by partner countries to India increases by about 0.35 percent compared with no TA. Similarly, with a TA, the total value of exports of wood pulp products by partner countries to India increases by about 1.38 percent compared with no TA.

Also, with a TA, the total value of exports of fiberboard products by partner countries to India increases by about 0.57 percent compared with no TA. Finally, for plywood, the total value of imports by India increases by about 0.68 percent with TA compared with no TA.

Discussion

Our results indicate mixed results as to the effect of regulatory quality on the value of exports to India. Although the regulatory environment does appear to have an effect on forest products trade, it is dependent on the disaggregated product being examined. It appears that the products that are the lightest to ship and perhaps cheapest per unit total value, are positively affected by regulatory quality, with quite dramatic effects, whereas the typically more expensive (and heavier per unit) products show no relationship. Why? India imports higher-valued products (not necessarily per unit costs but in overall total values) from far fewer countries than paperboard and wood pulp. That is to say the value of those products exported is spread among many countries, unlike sawn wood and the other disaggregated products that do not come from a large variety of countries; these also do not appear to be statistically influenced by regulatory quality. It has been observed that most of the disaggregated wood products that are imported by India come from only a limited number of partners such as industrial roundwood, which is exported to India mostly by Myanmar, Malaysia, and New Zealand. Likewise for veneers, the top 10 trading values come from three countries (Vietnam, China, and Italy); only Italy has a regulatory quality value of greater than zero. Thus, for these products (industrial roundwood— mostly hardwoods and veneers) the importance of streamlined rules vis-à-vis a stronger regulatory environment is not valued, but steady trade with a small set of partners is. It appears that where more competition exists for access to the Indian market, the more likely regulatory quality is to matter.

Distance is another key factor in trade, as the transaction cost (transportation cost in this case) goes up as the distance between the trading countries increases. However, in most cases distance does not matter. Distance adversely affects the total value of exports of only two forest products, plywood and paper and paperboard products.

The GDP of a country usually increases as its ability to export increases (Mofrad 2012, Olson et al. 2014). The positive coefficient of GDP of a partner country supports this proposition. Our results are in accordance with the standard gravity model, which states that the size of the economy (here GDP) has a positive effect on total value of trade between countries. However, several of the categories were not affected by the partners' GDP: wood pulp, fiberboard, veneers, and sawn wood.

Also, as production costs of forest products is highly dependent on the presence of forested lands, the area covered by forests in both exporting partner and India have significant effect on total value of forest product exports into India. As the relative forest area of a partner country increases relative to India, India imports more forest products from that country because of the comparative advantage of growing timber in the exporting country relative to India. The only categories where relative forest cover did not matter was veneer sheets and industrial roundwood. Interestingly, these categories are dominated by hardwood species. It appears then that relative forest area

plays a significant role typically in the import of softwood products because these products are mostly imported from forested countries such as the United States and Canada that have abundant forest cover. Relative forest area does not matter for products dominated by hardwood imports, i.e., veneers and roundwoods. Hardwoods are mostly imported from a very few countries such as New Zealand, Malaysia, and Myanmar; labor costs are low for the latter two and these countries are closely located to India. One explanation may be that although other large forested countries grow hardwoods (United States and Canada, for example), in many cases, they are cost prohibitive for India to utilize as finished solid wood products that they then export.

TAs increase bilateral trade (Baier and Bergstrand 2007). In line with our expectations, in our study, TAs do show a significant result for many of the disaggregated forest products (but not the aggregate category or the sawn wood, veneers, or industrial roundwood). Again, these are dominated by hardwood species (sawn wood exports to India are approximately 2:1 nonconiferous). As mentioned earlier, these products come from few countries (the majority of value); therefore it appears that being one of these partners matters, regardless of a trade deal.

TAs do not necessarily mean free trade; the data might be biased because of the presence of a few dominant trade partners for sawn wood, for which India does not have TAs. However, for roundwood they do have TAs with their dominant trade (export) partners. For roundwood only GDP of the partner is statistically significant in determining the value of exports to India.

Conclusions

The purpose of the study was to test empirically the effect, if any, of the regulatory quality of partner countries as being advantageous to exporting forest products to India. In some cases, the regulatory quality of exporting countries plays a positive significant role in forest product exports to India. Over and above distance, GDP and areas covered under forest are influential factors in forest product exports to India. Relative size of forests of the trading countries give a comparative advantage in deciding the price of forest products traded. As India continues to develop economically, paper and paperboard products and wood pulps would flow more easily if partner countries improved the regulatory quality. As for the other forest products, given their results, and the reasons for those results, it is difficult to make those same claims. However, if India has to depend on more and more trade partners for those products as population growth and the need for forest products increases, we may see a similar finding to that of wood pulp and paper products, which come from a larger variety of partners than the other products examined.

A puzzling finding of the study is that TAs, seemingly, do not always induce larger exports of forest products, in terms of aggregate value. For disaggregate sectors the effect of TAs is clearer and in most cases in line with expectations. The positive significant impact of TAs on exports for paper and paperboard, fiberboard, and plywood to India clearly implies more sensitivity of TAs on softwood-sourced forest products and not necessarily more highly value-added products.

As mentioned in the ''Discussion,'' the TAs do not necessarily imply free trade. It is also possible that using a simple dummy variable for the existence of a trade deal

between two countries is too simplistic to notice the effects on exports of products from each sector and the effects that removing or reducing trade barriers (i.e., tariffs on imported products) may have on exports.

Last, more analysis needs to be done on other factors of institutional quality as it affects export performance. Institutional quality is the status of institutional reforms of the country in question and its trading partners (Iwanow and Kirkpatrick 2007). It has six aspects, i.e., the rule of law, voice and accountability, government effectiveness, control of corruption, political stability, and regulatory quality (Kaufmann et al. 2013). We only tested regulatory quality for this study given the disaggregation of the different forest products, but it is possible that some of these other institutional factors could play an important role in forest product exports. Further, exports to all countries from all other countries may provide a clearer picture of the role of regulatory quality in the forest products trade literature.

Acknowledgments

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Appendix

Forest products include the following: roundwood, fuelwood, sawlogs, veneer logs, pulpwood, wood charcoal, wood chips, wood residues, wood pellets, sawn wood, veneer sheets, wood-based panels, plywood, particleboard, strand board, fiberboard, hardboard, wood pulp, papers, carton board, and paperboards (Source: Food and Agriculture Organization of the United Nations 2016).

Sawn wood

Wood that has been produced from both domestic and imported roundwood, either by sawing lengthwise or by a profile-chipping process and that exceeds 6 mm in thickness. It includes planks, beams, joists, boards, rafters, scantlings, laths, boxboards, and ''lumber,'' etc., in the following forms: unplaned, planed, end-jointed (e.g., finger-jointed), etc. It excludes sleepers, wooden flooring, mouldings (sawn wood continuously shaped along any of its edges or faces, like tongued, grooved, rebated, V-jointed, beaded, moulded, rounded, or the like), and sawn wood produced by resawing previously sawn pieces. It is reported in cubic meters solid volume.

Coniferous.—All woods derived from trees classified botanically as Gymnospermae, e.g., *Abies* spp., *Araucaria* spp., *Cedrus* spp., *Chamaecyparis* spp., *Cupressus* spp., *Larix* spp., *Picea* spp., *Pinus* spp., *Thuja* spp., *Tsuga* spp., etc. These are generally referred to as softwoods.

Nonconiferous.—All woods derived from trees classified botanically as Angiospermae, e.g., *Acer* spp., *Dipterocarpus* spp*., Entandrophragma* spp*., Eucalyptus* spp*., Fagus* spp., *Populus* spp., *Quercus* spp., *Shorea* spp., *Swietonia* spp*., Tectona* spp., etc. These are generally referred to as broadleaves or hardwoods.

Veneer sheets

Thin sheets of wood of uniform thickness, not exceeding 6 mm, rotary cut (i.e., peeled), sliced, or sawn. It includes wood used for the manufacture of laminated construction material, furniture, veneer containers, etc. Production statistics should exclude veneer sheets used for plywood production within the same country. It is reported in cubic meters solid volume.

Fiberboard

A panel manufactured from fibers of wood or other lignocellulosic materials with the primary bond deriving from the felting of the fibers and their inherent adhesive properties (although bonding materials or additives may be added in the manufacturing process). It includes fiberboard panels that are flat-pressed and moulded fiberboard products. It is an aggregate comprising hardboard, medium-/high-density fiberboard, and other fiberboard. It is reported in cubic meters solid volume.

Wood pulp

Fibrous material prepared from pulpwood, wood chips, particles, or residues by mechanical or chemical process for further manufacture into paper, paperboard, fiberboard, or other cellulose products. It is an aggregate comprising mechanical wood pulp, semichemical wood pulp, chemical wood pulp, and dissolving wood pulp. It is reported in metric tons air-dry weight (i.e., with 10% moisture content).

Paper and paperboard

The paper and paperboard category is an aggregate category. In the production and trade statistics, it represents the sum of graphic papers; sanitary and household papers; packaging materials, and other paper and paperboard. It excludes manufactured paper products such as boxes, cartons, books, and magazines, etc. It is reported in metric tons.

Open Forests

Open Forests (https://openforests.com/) provides a range of information on forest information technologies for sustainable forest management. A sample of that information can be found at the following links:

Free Storytelling Guide for forest landscape projects:
https://blog.openforests.com/storytelling-guide-for-landscape-projects/

An interview with Izabal Agro-Forestry, an outstanding agroforest project in Guatemala with deep insights into day to day management practices: https://forest-landscape-stories.simplecast.com/episodes/from-cattle-ranch-to-agroforestry

2019 WFI International Fellowship Program – Forestry Lightning Talks

Meet eight International Fellows from around the world who came to Oregon to see how we meet global forestry challenges. They hope to take what they've learned here to improve their communities back home. Fellows will be sharing their project findings and how they are planning to implement their new knowledge back home. What we do in Oregon is inspiring people to impact their own corner of the planet.

Join us for the International Fellows' final presentations!

When: Thursday, September 12
Where: World Forestry Center / Cheatham Hall, Portland, Oregon, USA
Time: 5:30 to 7:30 pm

FREE EVENT
Doors open 5:30 pm
Talks begin 6:00 pm

Event link:

https://www.worldforestry.org/event/2019-wfi-international-fellowship-program-forestry-lightning-talks/

INTERNATIONAL FOREST BUSINESS CONFERENCE

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Latest in forest science to be showcased in Brazil

From September 29-October 5, Curitiba, Brazil, will be the site of the 25th IUFRO World Congress. These congresses of the International Union of Forest Research Organizations have been held at approximately five-year intervals for the past 127 years.

"A World Congress aims to maximize interdisciplinary interaction and to create opportunities for scientists to interact with others with similar interests beyond their usual network," said Dr. Jerry Vanclay of Southern Cross University (SCU), Australia, and Chair of the IUFRO 2019 World Congress Scientific Committee (COC).

Dr. Jerry Vanclay

"At the Congress we expect to see a comprehensive overview of the state of our science in all aspects of forestry. In addition to updates from researchers, we'll have a series of plenary sessions that will take the form of a dialogue between global science and policy leaders," he said.

"That's the whole point of the Congress; to help us all get updated with the latest developments and insights in all aspects of forestry in all the themes and disciplinary divisions," he explained.

The five Congress themes – Forests for People; Forests and Climate Change; Forests and Forest Products for a Greener Future; Biodiversity, Ecosystem Services and Biological Invasions; and Forests, Soil and Water Interactions – are IUFRO's key research themes.

Read this and other Congress Spotlight articles:
https://www.iufro.org/media/iufro-spotlights/

Come and join us in Curitiba!
Find out about the Congress: http://iufro2019. com/

Seminario de Liderazgo de Mujeres en Conservación
I Edición, 21 - 30 de octubre de 2019

El Seminario, ofrecido en ESPAÑOL, es un programa intensivo de entrenamiento que dura 10 días y reúne a mujeres de diversas partes del mundo, que están a mitad de su carrera y que están en posición de hacer un impacto positivo considerable en los campos de la conservación de la biodiversidad, el manejo forestal, el manejo de las áreas protegidas, el cambio climático y el desarrollo sustentable en sus comunidades y alrededor del planeta.

Se lleva a cabo en la Unviersidad Estatal de Colorado, el Parque Nacional de las Montañas Rocosas, y en la ciudad de Washington D.C. Es organizado por el Centro para el Manejo de Áreas Protegidas y es desarrollado con la colaboración de la Oficina de Programas Internacionales del Servicio Forestal de los Estados Unidos, Pronatura Sur, e investigadoras de la Universidad Estatal de Colorado, entre otras. Existe una cantidad limitada de becas, por lo que las interesadas deberán de gestionar apoyo financiero parcial o total con instituciones como ONGs, fundaciones, agencias bilaterales y multilaterales, y las mismas agencias conservacionistas donde trabajan.

Fechas del Curso:

21 de octubre al 30 de octubre de 2019

Fechas de Inscripción:

Hasta el 24 de junio de 2019

CENTER FOR PROTECTED AREA MANAGEMENT
COLORADO STATE UNIVERSITY

Para más información sobre el seminario y fuentes de becas, consulte **https://conservation.warnercnr.colostate.edu/**

Diseño del Curso y Metodología:

El Seminario se realiza con un equipo multidisciplinario de expertas(os) con mas de 25 años de experiencia. Está orientado al desarrollo de habilidades, el intercambio de experiencias y el desarrollo de conocimiento a partir de la puesta en práctica de los temas. Las clases y conferencias ofrecen el marco teórico y conceptos, seguidas de ejercicios y discusiones grupales. Durante el seminario diversos estudios de caso serán revisados y el contenido será enriquecido con paneles de expertas y con reuniones y visitas a organizaciones globales líderes, como el Fondo para el Ambiente Mundial, el USAID, el World Wildlife Fund, UICN, Servicio Forestal de los Estados Unidos, entre otras.

Ejemplos de Temas Claves:

1. Dimensiones y herramientas del liderazgo, el liderazgo de las mujeres en el medio ambiente
2. La igualdad de género y la diversidad en la gestión ambiental y de organizaciones
3. Organizaciones y equipos efectivos y equitativos. Habilidades de gestión institucional
4. Planeación con base en resultados y administración de proyectos, teoría de cambio
5. Tendencias globales para la implementación de las convenciones internacionales en materia de biodiversidad y cambio climático
6. Habilidades para la negociación el cabildeo y la incidencia en políticas públicas.
7. Financiamiento al medio ambiente, entorno global, retos y herramientas de gestión de fondos.
8. Comunicación estratégica y construcción de redes de colaboración para la conservación.

Fechas del Curso:

El curso tiene una duración de 10 días, llevándose a cabo del 21 al 30 de octubre de 2019. Las participantes deben llegar a Denver, Colorado el 20 de octubre y deben salir de Washington D.C. el 31 de octubre.

Costo del Curso:

El costo del curso es de USD $6495, que incluye matrícula, transporte durante el curso, alimentación, y alojamiento. Se recomienda a las participantes traer por lo menos USD $150 para gastos personales. Este costo no incluye el trámite de visas y pasaportes, ni transporte aéreo internacional de su país de origen a Denver, Colorado y retorno desde Washington D.C.

COMMONWEALTH FORESTRY ASSOCIATION (CFA)

NIGERIA CHAPTER
5TH WORKSHOP

THEME: **IMPROVING SCIENTIFIC SKILLS IN NATURAL RESOURCES MANAGEMENT**

DATE: 2nd – 4th JULY, 2019

VENUE: TI FRANCIS AUDITORIUM, FEDERAL UNIVERSITY OF TECHNOLOGY AKURE, ONDO STATE, NIGERIA.

TIME: 10.00AM – 5.00 PM DAILY

e-mails: dejob_j@yahoo.com
kunletogun@yahoo.com
voyerinde@gmail.com

==

'TRAINING WORKSHOP ON APPLICATION OF ICT IN NATURAL RESOURCES MANAGEMENT'

The Training Workshop on application of ICT in natural resources management' is very expedient for scientists in the 21st Century.

LEAD PAPER: **STATUS OF NATURAL RESOURCES MANAGEMENT (Forest and Wildlife) IN NIGERIA**

"Commonwealth Forestry Association (CFA), Nigeria Chapter'' will be holding a three-day-workshop on '**Improving scientific skills in natural resources management'** at **TI Francis Auditorium, Federal University of Technology Akure, from 28-30th May, 2019.** This is the 5th Workshop of Commonwealth Forestry Association (CFA) Nigeria Chapter. It is a scientific oriented workshop that seeks to bring together forestry and allied natural resource scientists, graduates, development experts and policy makers from higher institutions and research institutes.

Commonwealth Forestry Association (CFA), Nigeria Chapter **is a non-profit association under the supervision of the CFA Headquarters, United Kingdom. Some Nigerians have been members since 1970s. However, the Nigeria Chapter of the Association was formally inaugurated on the 08 September, 2011 at the Federal University of Technology, Akure, Nigeria.**

CFA CHARTER AND BYE-LAWS
The Royal charter of 1 November 1921, as amended by Supplemental Charter of 28 November, 1962, provides that the name of the Association shall be the Commonwealth Forestry Association. The Charter and Bye-Laws which follow incorporate amendments agreed at the Annual General Meeting on 5 May, 1981 and which submitted to the Privy Council for the granting of a further Supplemental Charter.

CHARTER
The objects and powers of the Association were prescribed as follows:
i. To promote for the public, benefit the practice of Forestry both in the United Kingdom and throughout the world
ii. To advance education in the value of trees and forests for the conservation of wildlife, soil and water resources, amenity and recreation
iii. To promote research for efficient and sustained production of timber resources and into the inter-relationship between trees and site fertility both for Forestry and Agriculture, publishing the useful results of such research.
iv. To encourage the establishment and management of trees and forests as part of the overall wise and sensible use of land
v. To be a centre for the exchange and dissemination of information on all aspects of forestry and forest products or provide or promote or assist in the provision or promotion of other centres similarly engaged.

Programme of 5th CFA Workshop 2019
The programme of the workshop will span three days. To maximize the impact of the workshop, training on plenary sessions will be offered for all participants.

2nd July 2019

i. Opening Declaration of 5th CFA Workshop and Goodwill Message
   by the Vice-Chancellor, FUTA, Nigeria **Professor A. J. Fuwape**
           10.00 -10.15am
ii. Opening Speech by CFA President, Nigeria Chapter
   Professor B. O. Agbeja   10.15 -10.30am
iii. Text of Address by Chairman CFA World Wide
   Professor John Innes   10.30-10.40am
iv. Introduction of CFA Executive Officers in Nigeria
   by **Dr. R. O. Adejoba (**CFA Secretary**)**   10.40-10.50am
v. Photographs and Tea Break   10.50-11.20am

LEAD PAPER by **Professor Samuel Adeniran Oluwalana**
       11.30am -12.30pm
First Plenary Session to be chaired by Prof. V.A.J. Adekunle.
 vi. Training on 'Basic Statistical Analysis'
   1st Presenter: **Mr. F. N. Ogana**   12.30pm-1.30pm
   Questions and Answers   1.30pm-2.30pm
   Break   2.30pm - 3.00pm

Second Plenary Session to be chaired by Prof. A.C. Adetogun
  vii Paper presentation on Logical Framework Approach for
    Scientific Writing'
    2nd Presenter: **Prof. B.O. Agbeja**   3.00pm - 4.30pm
     Questions and Answers   4.30pm - 5.00pm
Announcement and Closing Remarks
by **Dr. Israel Osunsina** (CFA Social Secretary)   5.00pm-5.10pm

3rd July 2019

i. Opening Remarks and Recap of the previous day events by
  Dr. V.O. Oyerinde (CFA Financial Secretary)   10.00am-10.20am

Third Plenary Session to be chaired by Prof. A.O. Omole
  ii.   **Paper presentation on Effective Teaching Techniques**
  1st Presenter: **Prof. V.A.J. Adekunle**   10.20am -11.20 am
  Questions and Answers   11.20am -11.40 am

  iii 'Training on 'Modeling/programming language (R)'
  Dr. A. Agbonna / Mr. F.N. Ogana   11.40am -12.40 pm
Questions and Answers   12.40am - 1.00 pm
Tea Break   1.00pm -1.20 pm
  Workshop Training: GIS
  3rd Presenter: **Dr. Abiodun Akintunde Alo**   1.20pm-2.20pm
Questions and Answers   2.20pm -2.40pm
Participants are expected to come with their laptops for the training Workshop on GIS

First Parallel session   2.40pm-5.00pm
Logistic Model   **Prof. B.O. Agbeja**
Tree species identification/techniques…………. **Mr. M. Onadeji**
Herbarium techniques…………………………. **Mr. Omomoh**
Mensuration/ Equipment use………………… **Drs Alo and. Olusola**
Ornithology…………………………………. **Dr Omotoriogun**

4th July 2019
  . Opening Remarks and Recap of the previous day events by
  Dr. Adedayo   10.00am-10.20am
  ii ICT applications in natural resources management
   1st Presenter: Dr. Orimaye   10.20am-11.20 am
. Questions and Answers   11.20am-11.40am
  Second Parallel session   11.40 - 2.00 pm
  Wildlife photography/camera trapping technique………
  Dr. Adetola/ Dr Omotoriogun
  Wood sectioning/maceration……………...**Mr. Adeniyi**
  Genetic diversity………………………….**Dr. Lawal**

  Questions and Answers   2.00pm - 2.30pm
  Break   2.30pm -3.00pm
  Communiqué   3.00pm - 3.30pm
  Presentation of Certificates to Participants   3.30pm - 4.00pm

Registration Fee for CFA 5th Workshop

Workshop Registration fee of ₦5,000 should be paid on or before 03 May, 2019. Payment should be made through **online transfer into the Association's Account No**: **2028297837**

FIRST BANK PLC., University of Ibadan Branch. **Account Name:** *Commonwealth Forestry Association, Nigeria Chapter*. Kindly send scanned copy of the payment teller/deposit slips via e-mail to dejob_j@yahoo.com & voyerinde@gmail.com for documentation and accountability. The registration fee will cover training material (CD), tags, folders, teak break and certificate of participation for three days.

Accommodation

Each participant will be responsible for his or her accommodation. Hotel lodgings on ground in FUTA area are available on personal request. Kindly contact Dr. Lawal for booking

Name of Hotel	Tariff Range in Naira per Night
(1) Benny Rose Hotel	₦7,505 – ₦14,250
(2) Solab Suite	₦6,000 - ₦10,000
(3) Stateline Hotel, South Gate	₦2,500 - ₦4,500
(4) FUTA Staff Club	₦4,000 – ₦4,500
(5) EWM , FUTA Hospitality Guest House	₦1,500 - ₦2,000
(6) Scholars Lodge, FUTA	₦3,500 – ₦6,400

For further information, please contact any members of the CFA Executive Officers in Nigeria as shown below:

1. Professor B. O. Agbeja
   CFA President, Nigeria Chapter
   Department of Social and Environmental Forestry,
   University of Ibadan, Ibadan, Nigeria
   e-mail: olasinaa@yahoo.com Tel: 08055068312

2. Professor A. C. Adetogun
   CFA Vice-President, Nigeria Chapter
   Department of Forestry and Wildlife,
   Federal University of Agriculture, Abeokuta, Ogun State, Nigeria
   e-mail: kunletogun@yahoo.com Tel: 08054460372

3. Dr. O. R. Adejoba
   CFA Secretary, Nigeria Chapter
   Forestry Research Institute of Nigeria (FRIN), Jericho Hills, Ibadan, Oyo State.
   e-mail: dejob_j@yahoo.com Tel: 08077813828

4. Professor. A. O. Omole
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   Department of Forest Production and Products,
   University of Ibadan, Ibadan, Nigeria
   e-mail: omoomole@yahoo.com Tel: 08033855455

5. Dr. O. V. Oyerinde
   CFA Finance Secretary, Nigeria Chapter

Department of Forestry and Wood Technology
Federal University of Technology, Akure, Ondo State, Nigeria
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6. Dr. I. O. Osunsina
CFA Social Secretary, Nigeria Chapter
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7. Mr. A. O. Agbo-Adediran
CFA Assistant Secretary, Nigeria Chapter
Forestry Research Institute of Nigeria (FRIN), Jericho Hills, Ibadan, Oyo State.
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8. Professor S.A. Oluwalana
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9. Professor S.O. Akindele
CFA Ex-Officio, Nigeria Chapter
Department of Forestry and Wood Technology,
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SAF National Convention

Louisville, Kentucky
October 30-November 3, 2019
Goods from the Woods

From cellulosic nanotech to cross-laminated timbers and mass plywood, wood-based products are rapidly evolving and impacting our lives for the better. Today, in light of increasing global demands for wood fiber, as well as the ongoing loss of fiber to insects, disease, and wildfire, the role of foresters in managing the nation's forest resources has never been more important. Simultaneously, multiple social demands for ecosystem services from forested landscapes oblige multiple professions to interweave goals and objectives. The 2019 SAF Convention will highlight mega trends such as advanced wood materials and new products from cellulose, while acknowledging the legacy of American wood use in music, food, shelter, and culture. We hope you will leave convention with a renewed appreciation for how forestry and our affiliated professions are driving the world's transition toward a sustainable, de-carboned economy.

Convention and registration information: https://www.eforester.org/safconvention/Default.aspx

Join an SAF Working Group

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.

International Society of Tropical Foresters News

News from the International Society of Tropical Foresters (ISTF) 6-16-2019

Sheila Ward, ISTF Coordinator

1. ISTF Chapters. Thanks to the 77 people from 41 countries who have indicated interest in forming an ISTF Chapter. The strategy for developing your chapter proposals has been develop by the ISTF Board and sent to all those expressing interest. If you are interested in starting an ISTF chapter but have not told us yet, please fill out this survey (https://docs.google.com/forms/d/e/1FAIpQLSehc5LDeycz-91TY6SLZKFaAVs3lePFTSKjmtW_gmArgJIQwg/viewform) The support documents for developing ISTF chapter proposals can be accessed at this link (https://drive.google.com/open?id=1v37p7yimTQynFLp0yvz8AwS8pfJaoYL) . If you have any questions, please contact tropicalforesters@gmail.com.

2. Asia-Pacific Forestry Week 2019: Forests for Peace and Well-being. The Asia-Pacific Forestry Week (APFW 2019) will be held in Incheon, the Republic of Korea on 17-21 June 2019. The event will be hosted by the Food and Agriculture Organization of the United Nations (FAO) and the Korea Forest Service (KFS). APFW 2019 is one of the most important forestry gatherings in the Asia-Pacific region. More information can be found at www.fao.org/asiapacific/apfc/asia-pacific-forestry-week-2019/ or apfw2019korea.kr. ITSF will have a presence there and a side meeting was organized by two board members: Maria Paula Sarigumba (ISTF Secretary) and Patrick Durst (ISTF Asia-Australia-Pacific Representative).

3. Resources for Tropical Forestry. We need to develop the link library for ISTF, in preparation for the prospective new website. To start, let us focus on "how to" guides for various aspects of tropical forestry. If you have open access publications that explain how to carry out anything relevant to tropical forestry, from clonal propagation to reforestation to…, please send a message to tropicalforesters@gmail.com. Grey literature (government/organization/institution publications) is especially useful for this sort of thing. ISTF can handle publications in English, Spanish, and French. An already-compiled list of resources for tropical forestry and forests and links to those resources is available at [this link](https://drive.google.com/open?id=1kyuZX_kBgsCD-tDQTD0p1ONoOQyS7UnC3owivDDIBgI) (https://drive.google.com/open?id=1kyuZX_kBgsCD-tDQTD0p1ONoOQyS7UnC3owivDDIBgI) . The links include websites, elists you can join, and sources of (free) publications. If you have additions to make to this list, please send a message to tropicalforesters@gmail.com.

4. ISTF President visit to China. ISTF President W. Keith Moser visited with faculty and students at Beijing Forestry University and Nanjing Forestry University in March 2019. During the height of cherry blossom season in Nanjing, Dr. Moser spoke with several faculty in the Department of Ecology and Environmental Science about research opportunities in the subtropical regions of southern China and passed along an information sheet about ISTF. Moser also visited an experimental tea plantation on property owned by the college and discussed research directions with a professor of tea plantation management at the Nanjing Agricultural University. Faculty members were very interested in ISTF and promised to follow up with more questions about the organization and how ISTF can facilitate knowledge exchange and technology transfer.

5. ISTF linkages with other organizations. ISTF is forming collaborative linkages with other organizations concerned with tropical forests and forestry. So far, these include the Association des Forestiers Tropicaux et d'Afrique du Nord (AFT) , the Commonwealth Forestry Association (CFA), and Association for Tropical Biology and Conservation (ATBC). If you have suggestions for other organizations that ISTF can link with, please send them to tropicalforesters@gmail.com.

6. ISTF online resources. We are working on getting a new website up for ISTF. The current online resources for ISTF include:
1)   Blair Orr's continuation of the former ISTF newsletter as a newsletter for the Society of American Foresters International Forestry Working Group. (Available at: http://www.orrforest.net/saf/). If you fill out the table, we will add you to the list for receiving this newsletter
2)   The old ISTF web page, still at http://www.istf-bethesda.org/
3)   The ISTF Facebook group page at: https://www.facebook.com/groups/2262122534/
4)   The ISTF Linked-In page at: https://www.linkedin.com/groups/12150640/
5)   The ISTF twitter handle is @tropforester
6)   Student chapter at Yale University, which sponsors the annual Yale ISTF conference: http://istf.yale.edu/ , https://www.facebook.com/yalefesistf/
7)   Student Chapter at North Carolina State University:
https://research.cnr.ncsu.edu/sites/istf/ , https://www.facebook.com/NCSUISTF/

7. ISTF Board. The ISTF officers are: President: Warren K. ("Keith") Moser; Vice-President: Ruth Metzel; Secretary: Maria Paula Sarigumba; Treasurer: Mike Sterner; Tropical Africa Representative: Daniel Kofi Abu; Tropical America Representative: Rene Zamora-Cristales; Tropical Asia-Pacific-Australia Representative: Patrick Durst.

8. ISTF at IUFRO 25th World Congress

The 25th World Congress of the International Union of Forest Research Organizations (IUFRO) will be held on 29 Sept- 5 Oct 2019 at. Curitiba, Brazil. This is the first time that the IUFRO World Congress will be held in Latin America in IUFRO's 121-years of existence. "Awarding the Congress to Brazil is certainly also a strategic opportunity to promote IUFRO in Brazil and Latin America, where membership is proportionally lower than in other regions of the world. In addition, a much higher number of scientists from Latin American forest research institutions and universities will be able to participate in this Congress", explained IUFRO President Niels Elers Koch.

The Congress is being jointly organized with the Brazilian Forest Service and Brazilian Agricultural Research Corporation Embrapa. Curitiba, is the capital of the southern Brazilian state of Paraná, with a population of 1.8 million. Curitiba has an international reputation as a green, livable city, and serves as a role model for sustainable urban development with $64.50m^2$ of forests per citizen.

Joberto Freitas from the Brazilian Forest Service, Brasilia, adds, "We are proud to be the first Latin American country to host an IUFRO World Congress. This will not only provide an opportunity to enhance the participation of Brazilian institutions in international research agendas but also boost the national forest research agenda and further increase the political and societal importance of forest science in Brazil."

Please consider attending the 25th IUFRO World Congress. See the website http://iufro2019.com/ for more information.

Information on IUFRO can be found at www.iufro.org. The **International Union of Forest Research Organizations (IUFRO)** is the only worldwide organization devoted to forest research and related sciences. Its members are research institutions, universities, and individual scientists as well as decision-making authorities and other stakeholders with a focus on forests and trees.

The International Society of Tropical Foresters (ISTF) is organizing or co-organizing seven sessions for the Congress, including:

Sustaining iconic and high-value species in natural forests and plantations. ISTF CONTACT: Erich Schaitza, EMBRAPA, Brazil (erich.schaitza@embrapa.br)
Monitoring and assessing urban forest services and values at the national to local scale. ISTF CONTACT: Vindhya P. Tewari, Himalayan Forest Research Institute, India (vptewari@yahoo.com)
Small-scale sustainable energy alternatives for developing countries. ISTF CONTACT: Lamfu Fabrice Yengong, University of Buea, Cameroon, (lamfu2035yengong@gmail.com)

Advances in management and science for the high-value Meliaceae. ISTF CONTACT: Liu Jun, Research Institute of subtropical forest, Chinese Academy of forestry, China, (ywliu2005@163.com)

Improving high-value Meliaceae yields in plantations. ISTF CONTACT: Antonio Ferraz, Universidade Federal do Piauí, Brazil (acferrazfilho@gmail.com)

Discovery, curation, and uses of legacy tropical forest data sets. ISTF CONTACT: Sheila Ward, Mahogany for the Future, Inc., Puerto Rico (tropfordata@gmail.com)

Effective educational strategies for the next generation of forest professionals. ISTF CONTACT: Ruth Metzel, Azuero Earth Project, Panama, (ruth@proecoazuero.org)

Information for this article was taken from IUFRO Press Release
http://www.iufro.org/fileadmin/material/events/iwc19-press-release-brazil.pdf

9. ISTF membership. ISTF now stands at ~1240 members. Help us keep growing! If you have any contacts that you would like to invite to join ISTF, you can use the following message:

Dear friends:
We hope you will be interested in joining the International Society of Tropical Foresters (ISTF). With its focus on being a communication network, ISTF can help you connect with others interested in tropical forests and forestry. ISTF was founded in the 1950s and "in response to a worldwide concern for the fate of tropical and subtropical forests, ISTF is committed to the protection, wise management and rational use of the world's tropical forests". So far, over 1240 people from around the world have joined. For now, the organization will be dues-free (although this is under discussion). If you would like to join, please fill out the membership form at GoogleForms .

Questions? Email tropicalforesters@gmail.com

Sheila Ward, ISTF Coordinator

Dr. E. Lucy Braun (right) fords a stream during field research at Beechwood Camp, Hueston Woods, Ohio, in 1910. (Photo: Willard Sherman Turrell Herbarium, Miami University). *Dr. Braun (1889-1971) was the author of "Deciduous Forests of Eastern Northern America"* (*1950*).

Recent Publications and Research Notes

Opportunities and challenges for an Indonesian forest monitoring network

Given the current threats to Indonesia's forests, it is important that Indonesian and foreign scientists collaborate, with a consolidated scientist-led forest monitoring network having the flexibility to address ecological questions in a democratised and collaborative fashion, to jointly establish PSPs and analyse large datasets spanning Indonesia's forests.

This publication was the result of a follow-up of a workshop that has been held. This work was funded by the British Council through the UK Newton Fund.

https://link.springer.com/article/10.1007/s13595-019-0840-0

Abstract & Key message : Permanent sampling plots (PSPs) are a powerful and reliable methodology to help our understanding of the diversity and dynamics of tropical forests. Based on the current inventory of PSPs in Indonesia, there is high potential to establish a long-term collaborative forest monitoring network.Whilst there are challenges to initiating such a network, there are also innumerable benefits to help us understand and better conserve these exceptionally diverse ecosystems.

A forest burned three times in Indonesia.

Impact of Cultural Belief on the Preservation of Agunabani Sacred Forest in Okposi, Nigeria

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Abstract
Background and Objective: Sacred and/or "evil" forests are ecologically unique, rich in biodiversity and important for conservation on varying scale of landscape, community and species. However, cultural beliefs, indigenous knowledge, myths, traditional taboos (laws) and sanctions have been successfully used to preserve some sacred groves, forests and animals around the world. Information on most traditionally protected forests in Nigeria such as "Agunabani" is yet to be reported. The objective of this study was to investigate the impact of cultural beliefs on the preservation of Agunabani sacred forest in Okposi, Nigeria; with a view to providing a baseline information and outlining the challenges facing existence of the forest.

Materials and Methods: Random sampling technique was adopted; 120 questionnaires were randomly distributed to dwellers within 0-3 km from the buffer of the forest. The data were analysed using frequency, percentages and Kruskal Wallis Test of independence to examine the effect of some socio-demographic characteristics of the respondents on the forest preservation.

Results: About 94.2% of the respondents confirmed that among the taboos supporting existence of the Agunabani sacred forest was prohibition of hunting and cutting of trees within the forest. About 85% support the continuous existence and 97.5% were Christians. The result of the

Kruskal Wallis test revealed that foreign religion (Christianity) had significant effect ($p<0.05$) on the respondents' indigenous knowledge.

Conclusion: It can be concluded that cultural practices of the community still help in the preservation of Agunabani sacred forest notwithstanding the challenges of foreign religion. Hence, legal reservation of the forest and detailed conservation research is recommended.

Citation: Chukwu, O.*, Ezeano, C.I., Ezenwenyi, J.U. and Adeyemi, M.A. 2019. Impact of Cultural Belief on the Preservation of Agunabani Sacred Forest in Okposi, Nigeria, *Research Journal of Forestry* 13 (01): 9-13.
Available online at**:** https://scialert.net/qredirect.php?doi=rjf.2019.9.13&linkid=pdf

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Spatial Distribution of Nigerian Universities Offering Forestry Education using Geographic Information System

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 Abstract
The importance of forest to provision of food, medicine and shelter to man and maintaining a healthy environment cannot be overemphasized. Hence, handy information on the universities that offers forestry education is necessary. The study used geographic information system to spatially distribute Universities in Nigeria that offers Forestry Education. The list of all the universities registered as awarding Forestry Degree in Nigeria were obtained online from National University Commission (NUC) register and Joint Admission and Matriculation Board (JAMB) brochure. The corresponding coordinates of the universities were obtained using hand-held Global Positioning System and from satellite imagery. Quantum Geographic Information System was used to develop the universities spatial distribution. Only 31 out of the 34 universities identified as awarding forestry degree were on NUC list. However, 61.8% of these universities were owned by the Federal Government, 32.4% State Government and only 5.9% were privately owned. Out of the universities recognized by NUC, South-west geopolitical zone had the highest number (8), followed by South-South (7), North-west (5), North-Central (4), North-East (4) and South-East (3) with least. Non-uniformity was observed in the nomenclatures of forestry departments. Government and stakeholders should invest in forestry for increased manpower.

Citation: Chukwu, O.*, Ezenwenyi, J.U. and Mebude, K.O. 2018. Spatial Distribution of Nigerian Universities Offering Forestry Education using Geographic Information System, *World News of Natural Sciences* 20 (2018) 226-237.

Available online at:
 http://www.worldnewsnaturalsciences.com/wp-content/uploads/2018/07/WNOFNS-20-2018-226-237-1.pdf

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Ethnobotany and Mainstream Agriculture

Leakey, R.R.B. 2019. From Ethnobotany to Mainstream Agriculture – Socially-modified Cinderella Species Capturing 'Trade-ons' for 'Land Maxing'. In: Special Issue on Orphan Crops, Planta 0:000-000.
DOI: 10.1007/s00425-019-03128-z

Main conclusion
Over the last 25 years the process of domesticating culturally-important, highly-nutritious, indigenous food-tree species. Integrating these over-looked 'Cinderella' species into conventional farming systems as new crops is playing a critical role in raising the productivity of staple food crops and improving the livelihoods of poor smallholder farmers. This experience has important policy implications for the sustainability of tropical/subtropical agriculture, the rural economy and the global environment.

Abstract
A participatory domestication process has been implemented in local communities using appropriate horticultural technologies to characterize genetic variation in non-timber forest products and produce putative cultivars by the vegetative propagation of elite trees in Rural Resource Centres. When integrated into mainstream agriculture, these new crops diversify farmers' fields and generate income. Together these outcomes address land degradation and social deprivation - two of the main constraints to staple food production – through beneficial effects on soil fertility, agroecosystem functions, community livelihoods, local trade and employment. Thus, the cultivation of these 'Socially-modified crops' offers a new strategy for the Sustainable Intensification of tropical agriculture based on the maximization of total factor productivity with minimal environmental and social trade-offs.

Links to paper:
https://rdcu.be/bsDDp
http://link.springer.com/article/10.1007/s00425-019-03128-z

Email: rogerleakey@btinternet.com

A holistic approach to sustainable agriculture

Leakey, R.R.B. 2019. A holistic approach to sustainable agriculture: trees, science and global society. In: Agroforestry for Sustainable Agriculture (eds. María Rosa Mosquera-Losada and Ravi Prabhu), 000-000, Burleigh Dodds Science Publishing, Cambridge, UK.
http://dx.doi.org/10.19103/AS.2018.0041.25

Tropical Forest Disturbance and Indicator Taxa

Stork, N.E., Srivastava, D.S., Eggleton, P., Hodda, M., Lawson, G., Leakey, R.R.B. and Watt, A.D. 2017. Consistency of effects of tropical-forest disturbance on species composition and richness relative to use of indicator taxa, Conservation Biology 31: 924-933. doi:10.1111/cobi.12883

Modelling of climate conditions in forest vegetation zones in Malawi

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Research Abstract
Adverse impact of climate change on the environment has been widely reported. Malawi has not been spared from the adverse impacts of climate change as evidenced by recent floods and drought. This study was conducted to assess the impact of climate change on forest type, forest living biomass, basal area and number of stems. Holdridge Life Zone model and GAP Formind modified were used for the assessment. The results show that there are currently two forest vegetation zones occurring in Malawi (2011-2040). These include: tropical dry forest and tropical very dry forest. In mid-century (2041-2070) thorn woodland forest will emerge, while tropical dry forest will disappear in end-century (2071-2100). There will be a significant decrease in forest living biomass (1,000 kgha^{-1}yr^{-1}) and basal area (43.5%) from near century to end-century. On the other hand, there will be a significant increase (5 stemsha^{-1}yr^{-1}) in number stems from near century to end-century. The study has demonstrated that future climate change will be conducive to growth and expansion of very dry forest vegetation zone, which causes positive effects on reforestation planning and adaptive strategies in this region. Therefore, the study suggests the following as some possible strategies to adapt climate change: promotion of natural regeneration of tree species, promotion of tree site matching, production and promotion of new tree seed varieties; and seed banking for drought resistant tree species.

Keywords: Adaptation; Climate change; Vegetation zone; Forest biomass; Tree basal area

How to cite this article

Urban Forestry in Benin City – Willingness-to-pay.

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Abstract
Economic valuation of environmental services has emerged as a new and more direct argument and incentive for protection of trees and sustenance of environmental quality. This study's aim was to estimate the monetary value for conservation of urban trees and environmental services in Benin City, Nigeria. A Contingent Valuation Method involving a survey of 350 residents was adopted for the study. Flooding and erosion control, scenic beauty, provision of shade and regulation of local temperature received positive rankings and high scores. Thus, an average of US$1.20/month, which yielded an aggregate value of US$1 200 000 to US$1 860 00, was the amount Benin City residents were willing to contribute towards the conservation of trees. This study identified profession, years of residency and indigenous knowledge of ES as significant predictors that can influence willingness-to-pay. The findings provided quantitative data to demonstrate the importance of conserving trees to town planners, forest managers, policy makers and the urban community.

Keywords: Contingent valuation method; payment card; perception; residents.

Note: Obtain more information on this research paper via author contact email address.

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

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Homegarden Benefits

Soils under homegardens in Central Amazonia were compared with those of adjacent primary and secondary forest soils to a depth of 30 cm. They raised the pH of the average soil from 4.3 to 4.4. Management raised phosphorus from 5-14 mg/kg, decreased calcium 0.1 cmol kg, increased aluminum 3.0-3.2 cmol kg, organic carbon 11-13 g kg, calcium 0.24-0.38 cmol kg, magnesium and potassium were not significantly different from those of primary and secondary soils. The management of homegardens contributes to maintain or increase soil fertility.

Soil fertility management in indigenous homegardens of Central Amazona, Brazil. [Agroforestry Systems 92 (2) 4463-472 2018].

Pest management benefits (1)

Pest management in Australia has potential advantages because of a beetle that over time sweeps defoliation gradually across a vast plantation area. The Tasmanian leaf beetle (*Paropsistema bimaculate*) is capable of deforesting up to 50,000 ha of eucalyptus plantations. Ingenious pest management has been found capable of heading the insect off before it can deforest entire plantations. The areas saved by insect control may include large volumes of timber in production. They may be valuable.

TT. Wardlaw and others. Costs and benefits of a leaf beetle Integrated pest management (IPM) Program. ! Modelling changes in wood volume yields from pest management. [Australian Forestry Published online 2018] .

Mangrove growth in Taiwan

Major changes in the land surface between 1978 and 2012 in the Kuantu Nature Reserve, caused by overpumping of groundwater and sand induced by expansion of tidal creek and typhoon-induced erosion. Mangrove encroached salt march most rapidly during 1986 /94, a rate of 2.27 ha/year. The interplay between landform and vegetation is complicated.

L-C. Hsu and other. The current extent and historical expansion of mangroves in the Kuantu Nature Reserve, North Taiwan [Journal of Coastal Research 34 (2) 360-372 2018].

Bamboo rotation

Bambusa vulgaris bamboo is commonly used for fibre, fuel, and construction. Bamboo culms at different ages were assessed for density, porosity, shrinkage, swelling, fibre values, and strength in accordance with Pulp and Paper standards in Nigeria. The optimum technical rotation age for B. vulgaris cellulose is 2 years, for construction, 3 years, and for fuelwood harvesting may be at any age.

NA. Sadiku and other. Technical rotation age for naturally grown *Bambusa vulgaris* for fibre, fuel, and structural application. [Journal of Tropical Forest Science 29 (4)541-548 2017].

Logging/liana regeneration

In Belize, reduced impact logging of 2.9 m/ha in wet forest and 10 months later encountered lianas in the Fabaceae (seedlings)and Bignoniaceae (sprouts). The low intensity logging retarded lianas only on landings and did not change the composition of the liana flora.

S. Mesh and others. Logging impacts on liana regeneration and diversity in Belize.[Journal of Tropical Forest Science 29 (3) 343-348 2017].

Mass bamboo propagation

Dendocalamus asper is a widely-used bamboo in Malaysia apparently headed for scarcity as demand increases. There is an inadequate supply of plantation materials. Branch cuttings, including 3-4 nodes with a swollen base. These

H. Ma and others. Mass propagation of *Dendrocalamus asper* by branch cutting [Journal of Tropical Forest Science 30 (1) 82-88 2018].

Sustainability in Puerto Rico

Foreseen for this are small-scale harvesting 125 local forest products and handicraft production to an excellent potential market. Competition from imported crafts is seen as an initial constraint. To increase competitiveness and product quality small-scale producers must obtain institutional support for artisan development from government, non government sources, and associations of artisans to provide technical assistance, marketing, and financial services.

J. Ferero-Montana and others. Analysis of the potential of small-scale enterprises of artisans and sawyers as instruments for sustainable forest management in Puerto Rico [Journal of Sustainable Forestry 37 (3) 257-269 2017].

Forests and UN Sustainable Goals

The United Nations adopted Sustainable Development Goals (SDG) in September 2015. The UN sees key synergies between SDGs and tropical forests. Pathways of influence are suggested to improve social, environmental, and economic conditions in the rapidly developing tropical region.

L. Swamy and others. The future of tropical forests under the United Nations Sustainable Development Goals.[Journal of Sustainable Forestry 37 (2) 221-256 2017].

Illegal logging in Indonesia

Using timber and supply data for 1996-2010 there is demand for Indonesian timber from China and particularly Japanese construction, furniture, and housing industries. Indonesia is one of few countries with standing forests. Laws in China and Japan against imports of illegal timber are stronger than those of Indonesia reducing illicit harvesting.

Y. J. Ram Ranjan and others. [Journal of Sustainable Forestry 37 (2) 197-220 2018].

Sustainable mangrove

With alignment with UN Sustainable Development Goals, the Government of Bangladesh has established mangrove plantations to stabilize 120,000 ha of coastland. Local data indicate that mangroves facilitate accretion and prevent erosion more than non-mangrove areas in Bangladesh. This confirms that

mangroves have an important role to play in the sustainable development of coastal regions.

J. Chow and others. Mangrove management for climate change adaptation and sustainable development in coastal zones. [Journal of Sustainable Forestry 37 (2) 139-156 2017].

Forestry in Scotland and the UK.

Research Article

Creating a Permanent Irregular Forest: A Review of the Transformation at Faskally Forest, Perthshire.

Dr. Andrew D Cameron, Aberdeen University. a.d.cameron@abdn.ac.uk

Summary

The transformation of Faskally Forest (Located in central Scotland--*rr*) was started in 1953 to study the conversion of predominately even-aged planted stands into 'permanent' irregular forests. The transformation was initially based on the group system involving a planned sequence of gaps cut into the canopy and planted with a range of mainly coniferous species. Records of the transformation from the early stages until the 1990s are sparse, and the lack of information on management interventions make it difficult to relate to the development of the forest structure over this period. Increasing interest in transformations in the 1990s saw a return to active management. The forest at this time had taken on an approximately all-aged, all-sized appearance and the local foresters began to manage the area under the single tree selection system. More detailed objective data became available when a one hectare permanent sample plot was established in 1997 and complete inventories were carried out at six-year intervals to study the later stages of the transformation. The main concern at this time was the lack of regeneration and recruitment of saplings into the canopy. A phased opening of canopy to improve understory light levels resulted in a significant increase in regeneration with shade tolerating species dominating the regeneration pool. Shade tolerating species are also

gradually dominating the canopy where they are growing more quickly than light demanding species with increasing tree size-- a common feature of advanced selection stands. Light demanding species are showing the opposite trend (growing more slowly with increasing tree size) as a result of pressures of competition within the canopy limiting growth potential. Even with a gradual shift in species composition, Faskally has many of the attributes associated with advanced irregular forests and the transformation is probably close to, or indeed may have reached, a state that could be defined as 'permanent'. Future management of the transformation is discussed.

Phytophora ramorum update

First found in Scottish plant nurseries in 2002 and in gardens and parks in 2007 *Phytophora ramorum* has caused extensive damage and mortality mainly to larch trees in the wetter west of Scotland. Particularly favorable weather conditions in 2012 led to a major surge in the scale and intensity of infection in southwest Scotland leading to the establishment of a management zone.

By the end of 2013 approximately 5000 to 6000 hectares of larch were thought to be infected. Several larch species have been planted extensively in Scotland. Relatively low numbers of new infections were found from 2014 to 2017, but 2018 aerial surveys and field surveys confirmed a significant increase in the number of areas of larch containing infected trees. These were largely in areas where previous infections had been confirmed. It was impossible to fell all infected trees in 2018 so priority was given to infections occurring furthest from the management zone. The rest will be dealt with in 2019.

Travel Opportunities

If anyone is traveling to Scotland this summer, the Royal Scottish Forestry Society has several field trips scheduled. Go and meet your professional counterparts and forest owners. For details visit the web site www.rsfs.org.

For a large part of June I did not have access to some emails in bdorr@mtu.edu. If you had sent an email with an article to that email address and do not see it in the newsletter, I apologize. It is buried somewhere in an electronic dead end. Please let me know and resend the article and I will try to get it into the September newsletter.

Feel free to send this newsletter on to others.

Many thanks to the many contributors to this issue. The next issue is scheduled for September 2019.

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

The International Tropical Timber Organization (ITTO) releases the Tropical Timber Market Report two times per month. You can receive a free email subscription by signing up at their website:

http://www.itto.int/market_information_service/

IUFRO Electronic News

The newsletter is also available for download as a PDF or Word file at:
http://www.iufro.org/publications/news/electronic-news/.

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.

http://www.cfb.org.bo/noticias