CFA Newsletter

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Contents:

CFA Newsletter
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First online Commonwealth Forestry Conference points the way to the future

After three days of intensive and wide-ranging discussions the 20th Commonwealth Forestry Conference was brought to a close by CFA President, Professor John Innes. With the innovative online format, coordinated by the University of British Columbia, hailed by many participants as the way for the meeting to be held in the future, the CFC brought together more than 420 delegates (34% of them students) from 50 countries covering 17 time zones.

All of the sessions were recorded (another CFC first) and will be available on the CFC website at **cfc2021.ubc.ca** until January 31, 2022.

Highlights of the CFC included:

- 10 Keynote Speakers, 5 distinguished speakers for opening and closing ceremonies
- 2 Special Sessions with 11 invited speakers
- 180 Presenters (oral and poster presentations)
- 3 Minute Talk Challenge for students: 1 slide, 3 minutes each, 13 contestants from around the world

Conference topics included: Bioeconomy and Ecosystem services, Education and Careers, Communicating forestry to outside audiences, Climate change, Technology and Innovation, Indigenous and Community forestry, Conservation valuation, Old-growth management, and Urban Forestry, plus meetings of IUFRO Divisions 6 and 9: Social aspects, forest policy and economics.

Holding the meeting online meant that the CFC's carbon emission savings amounted to more than 200 passenger vehicles driving for one year, or one passenger vehicle driving for 3.5 Million kilometers!

Visit the CFC website at **cfc2021.ubc.ca** to see a range of outputs from the meeting.

Commonwealth Forestry Conference – Final Communiqué

The Commonwealth is home to 2.4 billion people, contains 813 million hectares of forests and 394 million hectares of other wooded land, and consists of 54 independent countries. From August 16th to 18th 2021 420 delegates from 54 countries are attending the 20th Commonwealth Forestry Conference hosted on-line from the University of British Columbia in Vancouver, Canada. Delegates wish to share the following insights from the Conference:

Commonwealth forestry leaders appreciate that forests are increasingly recognized for their contribution to effective and efficient solutions to some of the world's most pressing crises. In this critical year of international meetings of conventions of climate change, and biodiversity, delegates to the Commonwealth Forestry Congress encourage decision-makers to:

Acknowledge, highlight, and recognize the critical economic, social and environmental contributions of forest ecosystems to human well-being:

Understand that cross-sectoral and landscape-level approaches to forest management are crucial to sustainable development:

Recognize the broad array of opportunities and challenges facing different communities within the Commonwealth and worldwide, and the need to meet the needs and aspirations of the full diversity of people with interests in forests; delegates specifically:

1. Encourage the continued adoption of landscape approaches where local populations, especially Indigenous peoples, are fully engaged with decisions about their forests and where balanced approaches to achieving the multiple benefits from forest lands are carefully negotiated;
2. Urge cooperation, reduced duplication of effort and cross-sectoral collaboration between all parties, both governmental and civil society, implicated in decision-making on forests;

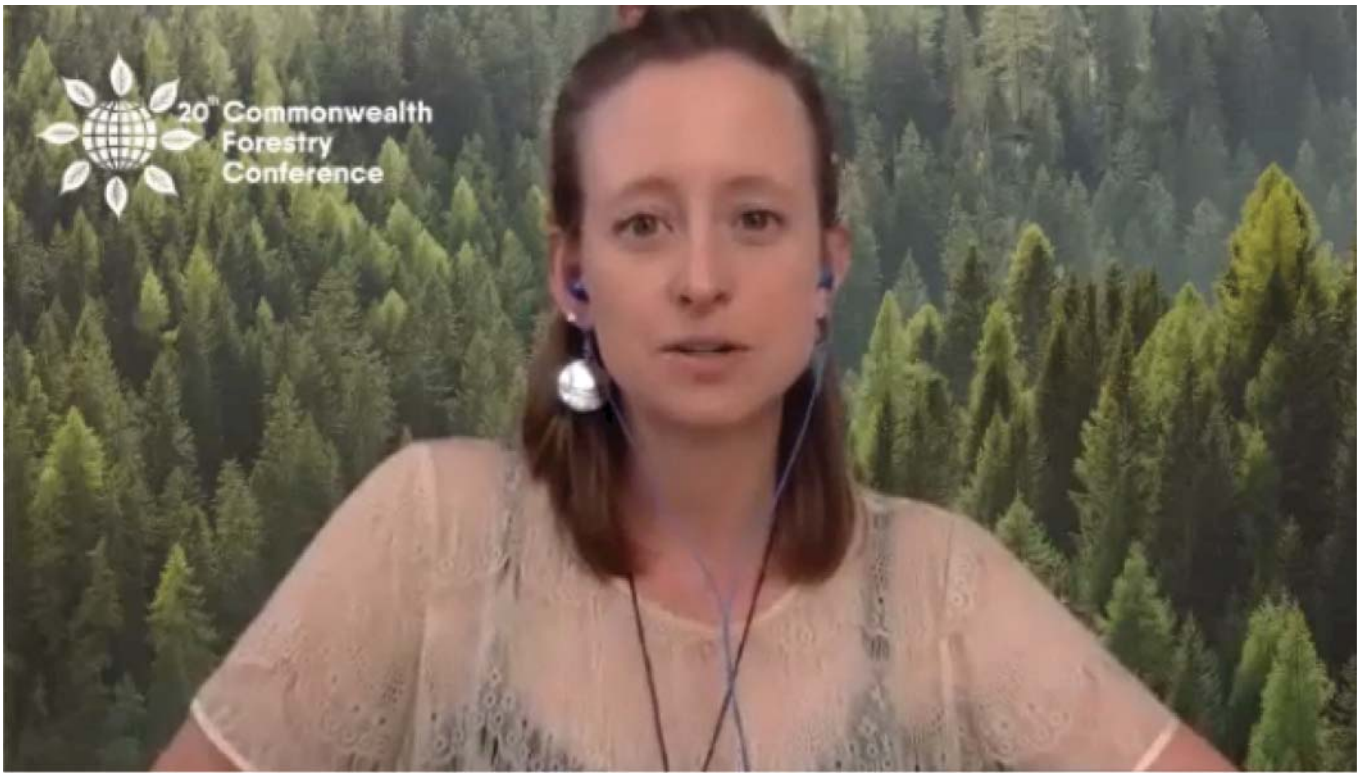
Recalling that the forestry institutions in Commonwealth countries have considerable professional competence in multi-functional forest management and have existing plans and strategies that need to be considered in designing forest-related initiatives;

The participants in the 20th Commonwealth Forestry Congress emphasize that:

1. **Forestry initiatives are playing an increasing role in efforts in mitigating and adapting to global climate change**. The CFC strongly encourages forest institutions to ensure that initiatives to reduce greenhouse gas emissions and sequester carbon should be undertaken in ways that are consistent with the broader goals of sustainable forest managements.
2. **Forests are a key element in the transition towards circular, bio-based economies.** The CFC welcomes this growing role of forests in meeting global energy and material needs and sees this as providing greater impetus for sustainable forest management.
3. **Fires are increasingly threatening forests and their dependent communities** globally, due to a combination of global climate change, historical forest management, and fire exclusion and suppression. The CFC highlights the need for governments and citizens to prioritize proactive fire management over reactive fire response. The CFC urges governments to embrace the leadership and knowledge of Indigenous and local communities. The CFC also encourages proactive management to help reduce fuel loads, diversify forest structure and composition at the stand and landscape scale, and reintroduce cultural and prescribed fire management, where appropriate, to maintain fire-dependent forest ecosystems.
4. Many countries are actively engaging in **managing forests in partnership with Indigenous peoples and local communities** for tangible and intangible benefits. The CFC strongly encourages Commonwealth countries to pursue these initiatives and to develop inclusive forest governance arrangements that are adapted to local contexts and draw on traditional and local knowledge.
5. Forests are home to 80% of the World's terrestrial biodiversity and we continue to lose biodiversity at an alarming rate. The CFC encourages an **increased consideration of biodiversity conservation as a major objective of sustainable forest management**.
6. The CFC applauds major **global initiatives to restore degraded and deforested landscapes** but recommends that increasing attention is given to ensuring that restoration efforts are adapted to local contexts and are planned with adequate inputs from local communities.
7. The CFC applauds the **increased attention given to urban forestry** and notes the physical and mental health benefits that are provided by urban trees and forests. Delegates note the importance of involving **urban communities as important stake-holders in all initiatives related to sustainable forest management**.
8. The CFC notes with concern that "learning poverty" remains unacceptably high in many Commonwealth countries and that it is expected to increase as a result of the pandemic. The CFC recognizes the **importance of both formal and informal education in forestry**, particularly for younger generations, and this will be hindered if learning poverty is not reduced. These are our future forest managers, and it is crucial that they are well-equipped intellectually to address the many environmental and social challenges that they will face.

Closing Keynote

By Sarah Dickson-Hoyle



Sarah is a PhD candidate and the current Future Forests Fellow at the Faculty of Forestry, UBC. Originally from Australia, she has over ten years' experience spanning natural resource management, carbon forestry and ecological consulting. As an interdisciplinary social scientist and ecologist, and settler scholar here in Canada, her research is being conducted in partnership with Secwépemc First Nations to understand community and land-based recovery following the 2017 wildfires in BC, and to support Indigenous-led restoration and fire management.

Good morning or good evening to everyone here with us virtually, wherever you are in the world. I am joining from Secwepemcúl'ecw, the traditional and unceded territory of the Secwépemc people in south-central British Columbia. And I am sharing these photos that you see rolling on the screen to give you a glimpse of this land and the people who I continue to work with and for through my research as a settler scholar, and to ground the thoughts I'll be sharing with you today in this context of place.

When I was invited to speak today to share my perspective, as a young forester, on the future of forestry, I have to admit I was a little hesitant. For one, I'm not sure how long into your 30s you can still claim to be a 'youth'. But more importantly, I've seen this set up one too many times. A young person is called upon to provide some much-needed energy or diversity to a conference stage; to offer hope and their vision for the future. We applaud them for their inspiring words, assure them the future is in good hands, and then we pat ourselves on the back and go back to business as usual.

So, when I did say yes, it was not to talk about the future. I want to talk about right now.

The recent IPCC report unequivocally states that human-induced climate change is already causing widespread and irreversible changes to our climate and ecosystems. We have just over ten years to enact transformational change. We need deep reductions in emissions if we are to avoid the devastating impacts of a greater than 1.5 degree rise in global temperatures.

10 years.

We are not doing enough.

Here in BC, as in many places around the world, these impacts of climate change are already being felt.

As I speak, over 260 wildfires are burning throughout our province. The town where I am based for fieldwork is surrounded on all four sides by out-of-control fires. Each day I step out into a thick haze of smoke or ash raining from the sky; I watch helplessly as colleagues are evacuated, as whole communities are lost.

I have walked across streambeds dried up in the drought, and through fields of grass scorched in the record-breaking heat wave. I have seen forests that were once open and are now infilling with spindly saplings, and burnt stands of over-dense pine plantations that challenge Canada's claim to be a world leader in fire and sustainable forest management.

We are not doing enough.

At the same time, I have witnessed incredible strength and resilience.

We have watched the forest floor rebound with life and growth after fire – an abundance of traditional food and medicine plants that speaks to the longstanding interconnections between people, ecologies and fire in these landscapes.

I have seen First Nations mobilize to protect their communities and non-Indigenous neighbours from wildfire, their fire knowledge keepers working hand in hand with government agencies to lay down good fire. This is what my friend and advisor Ron Ignace, Elder and longstanding Chief from the Secwepemc Nation terms 'walking on two legs', Indigenous knowledge and western science in balance, guided by an Indigenous worldview.

And every day I continue to learn from my colleagues in community and my incredible field crew, who have taught me that looking forward also means looking back – understanding the ecological and cultural histories of these lands and recognizing the depth of knowledge found in Indigenous communities.

The IPCC report comes at a critical moment in our history. This year marked the start of the United Nations Decade on Ecosystem Restoration. The so-called generation restoration tasked with preventing and reversing ecosystem degradation on every continent and in every ocean. No small task – but then again, restoration is, fundamentally, a hopeful practice.

Simultaneously, governments worldwide have committed to implementing the United Nations Declaration on the Rights of Indigenous Peoples. Here in Canada – as in other settler colonial countries in the Commonwealth – we are once again grappling with the history and ongoing impacts of colonization on Indigenous peoples and territories. Next year also marks the start of the UN Decade on Indigenous Languages. As Ron Ignace says, reconciliation without the revitalization of Indigenous languages, knowledges and lands is not reconciliation at all. I would argue the same is true for restoration.

A little over 10 years ago, the Commonwealth Forestry Conference was held under the ambitious theme of 'tackling climate change'. In closing, they emphasized the need for leadership at all levels of society, and called on us, as foresters and forest scientists, to take action to bring about change.

I don't think I'm alone in saying that change has not come fast enough. We are still not doing enough.

You might be thinking: 'but we're scientists and foresters – not policy makers or politicians!' And you'd be right in thinking that individual action alone isn't going to solve the climate crisis. We also need to individually and collectively push our governments and industries to make change at the scale needed: to divest from fossil fuels, promote renewables over pipelines, address biodiversity loss, and return stewardship of the land to Indigenous peoples.

But if you were trained in a time or paradigm that taught you to believe that good science is 'objective'; that our role is merely to observe the world around us and report fundamental truths, I hate to break it to you – science is always political. The questions we choose to ask, the knowledge we deem valid, the projects we fund – these all reflect what we, as individuals and as a society, value.

The next time this conference meets, we will be halfway through that critical ten-year period. So I'll leave you today with a challenge – to take what you have learnt these past two days and use it to advocate for change – in your institutions, in your disciplines, in your communities.

In calling on us to take action, the 2010 Commonwealth Forestry Conference was acknowledging that scientists are, and should be, activists.

When we meet again in five years, I challenge you to come back with clear evidence that we are finally doing enough.

Forest Scenes

Iwokrama: Celebrating decades of sustainable forest management

Thirty years ago, the idea of creating a one-million-acre rainforest laboratory to test models of conservation encompassing sustainable use was birthed when the Government of Guyana through then HE President Hugh Desmond Hoyte presented to the Commonwealth an opportunity to partner on this novel approach of forest conservation. The Commonwealth accepted the challenge and in 1996, HE President Cheddi Jagan assented the Iwokrama Act of 1996, the legislation that cemented the establishment of the Iwokrama International Centre for Rain Forest Conservation and Development (IIC).

Its mission is to:

"To promote the conservation and the sustainable and equitable use of tropical rain forests in a manner that will lead to lasting ecological, economic and social benefits to the people of Guyana and to the world in general, by undertaking research, training and the development and dissemination of technologies."

May 2021 represents 25 years since this important step was taken and the Iwokrama Forest currently represents one of five areas in Guyana with 'Protected Area Status'.

The Iwokrama Act mandated that the area be zoned almost equally into a Wilderness Preserve (WP) and Sustainable Utilization Area (SUA), the latter to test models of business and other sustainable use activities while the WP was left mainly as a control site and also for areas deemed spiritual or cultural spaces for the Indigenous Makushi people that have used the forest for hundreds and perhaps even thousands of years.

Key Partnerships

While there are many protected areas globally, what sets Iwokrama aside is the unique partnerships it has forged nationally and internationally. At the international level, the Government of Guyana has a Memorandum of Understanding (MoU) with the Commonwealth, and the IIC has an International Board of Trustees (IBOT) and HRH Prince Charles, the Prince of Wales as its Patron. The IIC also shares several MoUs and partnerships

Aerial view of the Iwokrama River Lodge and Research Centre. (Photo: Iwokrama)

with national government agencies, NGOs, academic institutions and business entities. However, it is the collaborative management governance partnership that is shared with the 20 Indigenous Makushi communities that makes the IIC stand out.

The North Rupununi District Development Board (NRDDB) is the body composed of the leaders of all the 20 communities and it is through this body that the IIC executes its co-management of the Iwokrama Forest though an MoU and Collaborative Management Agreement.

Canopy walkway (Photo: Iwokrama)

Financial sustainability

Conservation is not cheap and Iwokrama has been challenged over the years to keep the doors open and fund raising follows a very multifaceted approach including an annual grant from Government of Guyana, donor projects, corporate contributions and so forth.

Part of the Iwokrama 'Experiment' revolves around the business of conservation. As the first Chair of the Iwokrama's IBOT, Mr MS Swaminathan expressed in the early days, 'Conservation without money is simply just a conversation' and one of the mandates of Iwokrama is to work towards raising funds for running core activities and one such means is through sustainable business enterprises. Since early 2000's, Iwokrama has spent time laying the ground work for the three sustainable businesses run today including Ecotourism, Timber and Learning Services.

Early start in Conservation Management – young people of the Fairview Wildlife Club (Photo: Iwokrama)

Tourist Cabin (Photo: Iwokrama)

Ecotourism has steadily grown since 2002 and Iwokrama is touted as one of the feature places to visit in Guyana. Boasting two lodges along with one located at the only Canopy Walkway in the region, tourism was a key income generator prior to the Covid-19 pandemic bringing in close to a quarter of income in recent years. In keeping with the mandate to test innovative business models, one of the lodges is run by the IIC in partnership with three other tourism entities (one of them being a local indigenous community).

Sustainable timber harvesting commenced in 2007 with a joint venture partner and communities, and one year later was certified for forest management by international standards. The model is intended to demonstrate that good forest management practices can be successful and introduce new technologies, to the timber industry in Guyana, regionally and internationally.

The Learning Services Unit provides services for researchers, students and volunteers. The unit as is involved in training focused on management of protected areas and natural resources including rangering, visitor management, collaborative, sustainable forestry, climate change and others. The Unit also facilitates research expeditions, university and school visits from Guyana and other countries.

Monitoring and Research

Iwokrama's management system includes a robust monitoring programme. Since the reserve has public access via a public road through the forest and rivers that comprises most of the borders it is important to keep a check for illegal activities and other impacts. The past year especially since the Covid19 pandemic, the main challenge has been illegal gold mining along one of the reserve borders. Iwokrama's monitoring team also provides integral support to Iwokrama's Science/Research Programme.

Iwokrama is one of the best studied areas in Guyana with baseline inventories and faunal surveys in the earlier days to an established Science Programme which is currently in the third phase. Many research gaps still exist making it an ideal site for enquiring minds especially related to Iwokrama's sustainable use activities. Over the past decade, six new species to science have been discovered in the Iwokrama Forest.

Human Capacity Development

One of the most impactful success stories of the Iwokrama progamme is the capacity building it has offered through training programmes and on the job training over the three decades. Former staff of Iwokrama can be seen positioned internationally and locally in key positions that have quite significant conservation influence including national agencies and NGOs such as the Protected Areas Commission, WWF Guianas, Conservation International-Guyana, International Society for Biodiversity of the Guiana Shield to name a few. Also, noteworthy is that several staffers and trainees (former and present) can be found in leadership positions in many Indigenous communities around the country. This is hugely significant as Indigenous peoples in Guyana own a significant portion of natural resources and therefore in positions of influence that can be very impactful on conservation in their own territories.

The Future

Through the challenges for three decades, Iwokrama has survived and this significant 25th year of becoming a legal Centre is significant. We can look back on the many lessons learned, and perhaps some of the greater lessons came from where failure was part of the process. Restrictions implemented due to the Covid19 pandemic have had significant impacts on our businesses and operations, closing tourism for 10 months in 2020 and severely restricting forestry activities. The restart has been slow and perhaps will take time to re-build to pre-covid levels and better as international markets begin to reopen. As we continue towards becoming a Centre of Excellence, we must not forget that Iwokrama forged many new paths in science, business and capacity building and that one of our greatest strengths is that people are at the centre of our conservation practices. The 'people first' concept along with sustainable use of resources is the best approach.

Dr Raquel Thomas
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Mining related forest and woodland change across the Ok Tedi and Fly River floodplains of Papua New Guinea

Field reconnaissance by sea kayak through a Melaleuca woodland

The vast floodplains of the Ok Tedi and Fly River extend over approximately 3,500 square kilometres and at first sight from the air appear to be an uninhabited wilderness of intact forests, woodlands and swamps. However, natural resources of the riverine landscape support several small, but remote subsistence communities that are dependent upon the landscape for their livelihoods and wellbeing. The forests, woodlands and swamps provide numerous essential materials for house construction including posts, bearers and roofing materials, trees to make dugout canoes, medicinal and food plants, household items, hunting tools and fibres to weave traditional string bags and mats. The extensive lagoons and waterways provide an abundance of food for communities including native Barramundi, Black Bass, Catfish, freshwater prawns and an overwhelming abundance of the introduced Tilapia, and freshwater and saltwater crocodiles. Grasslands support substantial populations of game, including bandicoots, small wallabies and the invasive Rusa deer that have spread from the neighboring West Papua. The game provides an important source of local protein and income, with deer meat and fish traded across the border.

The Fly River system provides for an important transport route throughout the floodplain. In addition to the daily movements of dugout canoes, the main channel provides an essential transport route for copper concentrate from the giant Ok Tedi mine, and general freight to Kiunga, the main river port of Western Province, located approximately 360 miles inland. The Ok Tedi mine is located in the Star Mountains at the head waters of the Ok Tedi, a major tributary which joins the Fly River 20 miles downstream of Kiunga. The mine has been a success for the nation in terms of revenue generation and employment of skilled Papua New Guinea nationals, however ongoing operations since the 1980's have progressively increased its footprint on the environment across the lower Ok Tedi and middle Fly River floodplains which has impacted over 1,150 square kilometres of forests and woodlands.

The open cut copper mine produces an average of 60,000 tonnes/day of ore and a peak of 240,000 tonnes/day of overburden. Associated with this has been an increase in sediment load in the Ok Tedi, rising from a natural load of 3–5 Mt/year to a mine impacted load of 45 Mt/year from 1985–2000 (Pickup & Marshall 2009). Riverine waste rock and tailing disposal was approved in 1984 by the PNG Government after the failure of the foundations of a proposed tailings storage facility. Between the commencement of riverine waste disposal in 1984 and the end of 2019, 754 Mt of tailings and 1275 Mt of waste rock have

Flooding at the junction of the Fly and Strickland rivers across the middle Fly floodplain

been discharged to the river system. Much of this waste is retained in the upper reaches of the Ok Tedi, however the finer particle sizes (-63 micron) are transported down the Ok Tedi and, if unmitigated, into the Fly River (Pickup, 2019). Over the same period, the ongoing tailings disposal and losses from erodible dumps resulted in considerable riverbed aggradation and associated overbank flooding of the lower Ok Tedi and Fly River floodplains. This change to the natural flood regime resulted in higher frequency and duration of flooding, and subsequently resulted in forest dieback that was first observed at Iogi, in the Lower Ok Tedi in 1992, and progressed downstream into the Middle Fly from 1996 (Marshall 2003) and continues today. The decline in forest and woodland health is attributed to flooded anaerobic soils depleting oxygen uptake by roots and microorganisms, resulting in root death followed by canopy dieback, and eventually, tree mortality. This process in exacerbated by increases in the duration of flooding due to deposition of sediment at the mouth of the tie-channels and on levee banks which prevents floodplain water from draining out.

As a major mitigation project for riverbed aggradation and forest dieback, a dredge operation was commissioned in the lower Ok Tedi in 1998 to reduce sediment loads reaching the lower Ok Tedi and the Fly River system. The dredge removes 10Mm^3 of sand annually, which comprises approximately 60% of the sediment load while the remaining 40% silt material, which cannot be captured by the dredge enters the lower Ok Tedi and the Fly River. After two decades of dredging, costing over USD55M per annum, the riverbed levels have reduced by 2 to 4m in the lower Ok Tedi, and have stabilized throughout the Middle Fly. Overbank flooding and the associated forest dieback have decreased compared to 1996/97 period and recovery of some forest species have been observed in the lower Ok Tedi and upper middle Fly River. Forest and woodland dieback are expected to continue but at a slower rate. Dredged sand is stored in engineered stockpiles on the east and west banks at Bige covering 1,000 ha of land that had been impacted by the dieback. Completed sections of the stockpile are being progressively rehabilitated to forest with native species and early monitoring results have indicated positive trajectory towards a self-sustaining vegetation (Geosystems Analysis 2021).

Dieback monitoring across the floodplain was implemented in the 1990's using satellite imagery however it was not until 2017 that widespread detailed field studies were undertaken to understand the impacts of changes in the flood regime on forests and woodlands. From 2017 to 2019 an extensive monitoring system was established incorporating the use of transects and unbounded plots to monitor stressed and healthy forests and woodlands. Transect establishment included the permanent tagging of all live trees for re-measurement to monitor changes in stand structure and tree health. Unbounded plots were established to monitor species changes in all plant lifeforms from ground layer to emergent trees, including epiphytes and climbers. Of the 1,150 square kilometres of the impacted forests and woodlands that were mapped in 2018 (Marshall 2019), 70% is alluvial forest and over 12% is inundated low lying hill forest, 8% is swamp woodland, 5% is low lying seasonal forest and the remaining 5% is mostly successional forest and mixed swamp woodland/swamp grassland (Rogers and Kelimbua, 2019).

Field work in such a remote area is logistically and physically challenging. A dedicated live aboard research vessel, the Fly Explorer and motorized dinghies and sea kayaks are used to conduct the studies. All work is undertaken with prior agreement of local landowners who are often engaged to assist with navigation and transect establishment. Frequently, transects were established and measured from sea kayaks by the field team that have been trained in basic sea kayak skills and rescue

Forest dieback in a Lophostemon suaveolens dominated forest

Stumps of an alluvial forest that is now a permanent lagoon

procedures. The use of sea kayaks to survey and establish vegetation monitoring transects in the floodplains is probably a first in PNG.

In some areas impacts have been severe with the conversion of tall and diverse alluvial forest to lagoons and swamp grasslands, evidenced by the presence of tree stumps near the surface. Alluvial forest, although subject to a natural flooding cycle in the wet season appears to be most susceptible to increased frequency and duration of flooding. Approximately 1,000 square kilometres of alluvial forest have succumbed to dieback, with only occasional stands remaining in a highly stressed/dieback condition (Rogers and Kelimbua, 2019). The main exception to this is in the lower Ok Tedi where alluvial forest had been subject to severe dieback but is now partly recovering to form a secondary forest, currently dominated by pioneer species and Pandanus. Recovery is occurring as a result of the dredging operation. Impacts are also evident in the Melaleuca dominated swamp woodlands which occur in low lying basins and at the fringes of seasonal forest. Melaleuca woodlands are adapted to seasonal flood cycles but are still susceptible to prolonged flooding. When stressed, numerous trees show dieback in the crowns, or have died, but species diversity is less impacted. At the fringes of the Melaleuca stands, extensive low lying plains of tall, large diameter *Lophostemon suaveolens* occur before seasonal forest dominates. The expansion of the flood impacted area is currently causing uproots of the largest *Lophostemon* with increased waterlogging. Low lying seasonal forests have also been impacted where previous flooding events were not part of the natural disturbance regime. Emergent and canopy trees do not survive, however understory species respond with extensive adventitious roots reflecting long duration flood levels.

The extent of forest decline is expected to continue with the ongoing operations of the mine. The affected communities and the Government are aware of and receive compensation for these impacts. Ok Tedi Mining Limited (OTML) has established compensation agreements with 158 affected communities under its Community Mine Continuation Agreement (CMCA). In 2020, OTML paid PGK44 million in compensation and PGK816 million since the start of CMCA in 2001. OTML engages the Ok Tedi Development Foundation, a subsidiary of OTML, and works closely with the Fly River Provincial Government to support community livelihood and wellbeing through sustainable development programs.

OTML is committed to maintaining the monitoring program in the floodplains, and to extend the study to incorporate hyperspectral data from satellites to classify vegetation types to better understand the important terrestrial flora and fauna resources for riverine dependent villages. This will help understand the dynamics of forests and woodlands and changes in the availability of associated key flora and fauna resources is having on community wellbeing and livelihoods.

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Nigeria Wasting Potentials in Forestry Subsector, Says Ajayi

As an expert, how do you assess the government's policies in Forestry subsector?

If you check the books properly, the government has good policy for the management and conservation of Forest Products and Biodiversity vis-a-vis the animals, insects and edaphic organisms in the Forests. But sad enough, there is lack of appropriate implementation for the preservation and conservation of Forest resources. The lack of implementation of some of these policies has been allowing illegal activities thereby affecting the functionalities of these policies. If we have good policies, our Forest and woods will be used optimally while fruits and other products can be appropriately channeled for sustainable growth and economic expansion, ending poverty and hunger, Enhancing human well-being, and building resilience. The best way out of this remains that, our governments should take proactive approaches and must look back to regulate every activities in the Forests by enforcing appropriate tools and Forestry laws. Good policies and implementation will ensure that we have a Forests that can add values to our social, environment and economic growth, food security, prosperity, mitigate climate change, now that the present government is pursuing diversification in Forest sector for great Change, in order to break away from sole reliance on crude oil. I am of that view that our Forests must be well focused so that we can maximize our gains from the vast and enormous Forest potentials we have across our nation.

What are this potentials the Forests can offer?

There are many benefits that are derived by human from the Forests. Forests provides shelter and home for wild animals, birds, insects and soil fauna. It aids the ecological process of regulating predation by providing hiding place so prey can hide

Professor Babatunde Ajayi, is a former bureaucrat and now a Professor of Wood Products and Bioresources Technology in the Department of Forestry and Wood Technology, Federal University of Technology Akure (FUTA), Akure, Ondo-State. He tells journalists that Forestry potentials were not maximally utilised in Nigeria while also mulling modern policies through which waste in the sector could be converted to wealth to buffer the diversification efforts of governments

from predators or predators can hide and ambush their prey. Forests also provide nests for birds to lay eggs. Forest provide a wide range of economic and social benefits including contributions to national economy through employment, processing and trade of Forest products including non-timber Forest products; provision of energy and investments in the Forest sector. Forest host and protect cultural, spiritual site and provide opportunities for recreation and cultural enrichment. Forests purify the atmosphere, regulate shelter, and filter water supply, mitigate floods and erosion, serve as wind break, sustain biodiversity and genetic resources. Aside from provision of medicinal leaves, roots and herbs for improved human health, staying in the Forest environment boosts the immune system, lowers blood pressure, reduces mental stress, improves mood, and accelerates recuperation from surgery or illness.

As an academia, what role do you think the Universities can play to ensure that our environment are protected and Forest potentials are well utilized?

As academia, we have sold our lives into lecturing, research and community services. We conduct research for our institutions, Governments and private organizations for the growth of the economy. There are so many research in some of our universities that are lying there untapped and these could have been of tremendous benefits to our economy if they have been applied on the management of our Forest. In FUTA here where I work, there are so many research we have carried out in the Department of Forestry and Wood Technology, but we have no robust relationship with our host State-Ondo, and the nation at large, despite that the state has huge economic potentials in the subsector. I believe that some of our research ought to be put into use. We are supposed to be partners in progress for sustainable development of our nation. We have on our archives research on how best to use the Wood Products and Forest Biodiversity to turn around our economy and better ways of managing our Forests in line with best global practices. Another major role of the Universities is the training of man power in organization and management of Forest resources. Sensitization of the general public through seminar and workshop are also being done. Universities also put in resources to discharge community services such as technical training for indigenous people, consultancy and establishment of pilot project for studies.

Can you tell us about your research and how it can benefit Nigeria if adopted?

My research focuses on the use of conventional biomaterials (Wood) and non-conventional bio-materials from agricultural wastes, common weeds, waste paper and other wastes prevalent in the world environment to produce value-added panel products using Portland cement, recycled plastic, car battery case and/or pozzolan as binder, through the application of developed simple, innovative and adaptable technologies in the manufacturing processes. Output from these research is capable of: converting waste materials (biological and non-biological) to value added panel products; curbing environmental pollution and siltation of water ways; promoting sustainable use of natural resources; increasing prosperity through sales of wastes material; restoring economic mother trees for seed production; protecting edaphic resources against caking of the soil; and conserving bio-diversity.

The menace of poverty, hunger and environmental degradation can be mitigated with the production and utilization of these nature friendly value added construction panels. These panel products can conveniently stand as alternatives for wood products to meet the demand for sustainable construction materials for core and low cost housing in rural and urban areas; and increase farmers' income, prosperity, as well as alleviate poverty. These products are versatile because they can be suitably made from a wide range of non-conventional raw materials sourced locally (e.g. maize stalk and cob, groundnut shell, palm kernel chaff, rice husk, water hyacinth, Luffa cylindrical etc.) using recycled plastic, car battery case, cement and/or pozzolan as binder. Their utilization in building construction (partitioning, ceiling, furniture, flooring etc) will reduce the pressure on existing Forest resources and increase the income of the community inhabitants.

The adoption and commercialization of these research outputs will empower rural populations (farmers and indigenous people) to improve their incomes in an environmentally sustainable manner through the sales of wastes derived from post-harvest processing for utilization in the manufacturing of affordable panel products. This will create a new orientation in design, technology and industrial development in sourcing, processing, manufacturing and utilization of raw materials and new products. It will conserve Forest biodiversity sustainably and mitigate climate change through the provision of value added panel products.

You are deeply involved with United Nations and other agencies on issue of global warming. How prepared is Nigeria to stem the negative effects of the occurrence?

It is not gainsaying the fact that the effects of deforestation, desertification and bush burning are causing serious climate

change globally. Global warming is now a threat in all countries of the World. But while other nations are ready to mitigate the effects on the environment, Nigeria seems not to be ready. I grew up in the Forest and I went to the Forestry School in Ibadan and I studied Forestry up to the university level. I saw Forest when Forest was Forest. In the olden days, if you stay in the Forest and rain was falling, it won't touch the soil neither will it make your cloth drench. But because of massive destruction to our Forest and ecosystem, we are now witnessing all manners of environmental hazards (erosion, siltation of water ways, flooding, pollution, heat waves, forest fire, excess greenhouse gases (GHG) in the atmosphere etc). So, for our government to be ready to deal decisively with global warming, there should be aggressive afforestation policy at the Federal, State and even our Local Governments. Also, individuals and corporate organizations should also join in initiating some of these projects, because government can't do it alone. When we talk of afforestation policy, we are not talking about the planting of Gmelina and teak everywhere, but you have to plant based on the type of animals and the species that are rampant in that particular zone. Some can engage in Social Forestry, that is planting trees and fruits within the city or planting some guinea Savana grasses, so that we can use the fodder to feed animals, but the end result must be to maintain and sustain our Forests. It is only in Nigeria where natural forest of about 500 species are clear felled to plant a single species for pulp or poles. I kicked against this unwholesome practice when I was in the civil service. How can someone cut down about 500 species of trees to plant Teak? This is a very bad practice. Teak is a very dangerous plant. It doesn't allow its own seed to germinate or grow under it talk less of seeds of other species. But when seedlings of other trees are germinating in natural enviroment, they are destroyed to plant teak, this is a bad policy. Though, there are still natural Forests in Nigeria like the Akure Forest reserve fondly referred to it as Queen's Forest. Universities and research institutions conduct research in this forest because trees there are protected naturally. It is a strict nature reserve where trees are allowed to grow and die on their own. But today, all those large expanse of Forests were being encroached and destroyed indiscriminately by activities of illegal loggers and farmers. This has become a serious worries to Nigerian Forestry Association and other Academic institutions, because we learnt over 100 trees were being cut at a time in that protected Forest Reserve.

What are your involvement with United Nations (SDGs) and other agencies?

I have had many engagement with the United Nations through invitations to attend and/or present at many of their events including: UN Framework Convention on Climate Change (UNFCCC) in Durbar, South Africa, 2011 and Doha, Qatar, 2012. I also have the privilege to attend the 2017 High-Level Political Forum on Sustainable Development of the UN at the invitation of the Division for Sustainable Development, United Nation Department of Economic and Social Affairs (UN DESA) on 2017 Partnership Exchange with a theme "Eradicating Poverty and Promoting Prosperity in a Changing World". My research products have been displayed at the Exhibit on Innovative Wood Products during the 68th session of the UN Economic Commission Europe/FAO at the UN Office Geneva, Switzerland, held in conjunction with Society of Wood Science and Technology, in October, 2010 and to mark the 2011 International Year of the Forest. In 2010, I was invited by Center for International Forestry Research (CIFOR) to attend a small gathering of eminent scientists during the XXIII IUFRO World Congress. I have attended other notable world gatherings of eminent scientists and environmental conservationists such as the World Forestry Congress in Quebec, Canada in 2003; and Buenos Aires, Argentina, 2009.

Recently my written input was presented and accepted at the Session 2: Effective paths towards the SDGs: STI for Ending Poverty and Hunger, Enhancing Human Well-being and Building Resilience of 6th Multi-stakeholder Forum on Science, Technology and Innovation for the Sustainable Development Goals held on 4–5 May, 2021. The document titled: Nature Based Construction Panels from Agricultural Residues: A Panacea to Poverty, Hunger, and Environmental Degradation was published on UN website (www.sdg.un.org).

Are there no laws regulating our Forest reserves? Why this encroachment?

There are Forest laws promulgated by governments to safeguard, protect and conserve our Forest resources. If you look at the provisions of these laws, which I knew quite well, if anyone cuts down trees or destroys shrubs or plucks fruits, leaves and roots, he can be fined, made to forfeit property or go to jail. There was Forestry Law Cap 56, it was referred to as Cap 40 before. Section 44, 45 and 47 detailed various penalties for any form of illegal felling activities and other prohibitions. Under this law, if you destroy the Forest, you will go to jail. However, there have been incessant violation of these laws even by state actors. For instance Government have introduced various anomalies into the Forestry sector vis-a-vis certification of consultants to collect Forest revenue; employment of non-Forester into the Forestry sector; using the Forest as a major source of revenue generation; flitching and selling seized illegally felled logs back to the illegal fellers; allocation of plots to farmers in the gazetted Forest reserves; and destabilization of Forest host communities. Other illegal activities include reuse of Log permit, violation of Forest law by politician/civil servant, inadequate monitoring of Taungya Farming System; installation of illegal chiefs in Forest Reserve; and indiscriminate engagement of uncertified individuals in Forest reserves.

With the lack of implementation of statutory laws, the entire world is collapsing gradually. The atmosphere is becoming warm on daily basis because of low oxygen in the atmosphere. Again, there is serious melting of ice at the Arctic region and various level of the ozone layers had been destroyed. The globe is warm and the climate is changing thereby constituting crisis to all of us.

It has become necessary and important to punish and prosecute apprehended illegal fellers. Commensurate penalties must be applied and this must not be compromised. This is the only way by which encroachment and illegal felling of trees in the Forest Reserve can be curbed. Effective implementation of these laws will prevent further damage to the fragile and cracked legacy; save the Forest from the embarrassment from National and International Organizations that co-owned some of the Forest as the State Laboratory for various form of studies and investigations.

Ondo and Ekiti have huge Forest potentials but they were underutilized. How can these trends be reversed?
I have been in this profession from my young age. I have spent virtually all my productive years in the Forest business. I was also born and grew up in the Forest, attended primary, Secondary in the Forest, I studied Forestry in the University to get involved Forest activities as a professional and academia respectively. The reason why the two states have not been able to tap their Forest potentials maximally was that they are playing politics with Forests by manipulating all the existing structures. Today, in those states sawmill operators, timber contractors and others are going to the free Forest area and Forest reserves to fell trees indiscriminately. Going by Forestry laws, there are areas where you can only cut five trees, there are areas where you have to cut one tree and plant four in replacement. Again, there are game reserves in our Forest reserves, so you can't kill animals in those areas. The government were receiving all these reports and looked away pretending as if nothing was happening until it now becomes irreversible. Governments should stop playing politics with the Forests and do what is right. Consultants that are given the rights to manage the Forests lack the requisite expertise and technical background. Most of them have business orientation and not the mentality of a Forester, which is conservation. At professional whose major responsibility and goal is to ensure the protection, proper management, and sustainable utilization of Forest resources for economic gains, research, ecotourism, ecological studies and climate resilience should be saddled with management of Forest Reserves.

How do you think government can turn around our economic fortunes through conversion of Waste to Wealth in this subsector?
You are just touching my heart with this question. There are a lot of gains in the Forestry value chain and it can add values to our economy if fully harnessed. In 1982, I produced a particle board using urea formaldehyde as binder and I was given a national recognition. The depletion of wood resources and accompanying saw dust gave me the impetus to conduct research on the possibility of using agricultural wastes to producing particle board for flooring, partitioning, furniture and other industrial and household use. I investigated the use of groundnut shell, rice husk, beans coat, maize stalk and other agricultural wastes using urea formadehyde, recycled plastic, car battery case, cement and pozzolan as binder. Through these exploits, I have earned national and international recognition. Nigeria can become gain enormous economic benefit if my research outputs are up-scaled and commercialized.

What advantage has your membership of some local and international organizations brought to Nigeria?
I am an Editorial Member of so many Forestry organizations. My involvement at the international level enabled me to facilitate a collaboration on Academic Interchange Agreement between FUTA and Federal University of Lavras, and University of Sao Paulo, Brazil, respectively. My membership and activities at international gatherings has earned Nigeria a reputation in the area of technology, innovation and science of forestry, wood and bio-resources management and utilization. I have also presented research outputs emanating from Nigeria in all the continents of the World. Also, I recently produced a technical paper to UN on Sustainable Development Goals towards 2030. All these were geared towards exposing our policy makers on how best they can explore our Forest potentials to empower our people and reduce poverty.

Desertification is now a serious issue in our nation and globally. How do you think this can be resolved?
When I was growing up as a student of Forestry, I toured the Shelter Belt Project from Sokoto to Maiduguri where trees were planted along the road to check desert encroachment. I don't think those trees are there now. The best way to stop desertification is to plant trees. The reason why we are having so many environmental problems is because of the destruction of emergent and lower strata trees. As a result, when rain falls, it touches the soil and when it becomes saturated, then flooding will occur. The trees and animals also store water, but all these have been destroyed. What we now have is what we called a Cake soil that cannot hold water. The volume of water keep rising giving rise to erosion and flooding. Then, the idea of bush burning and deforestation should be discouraged. Today, we have more carbon dioxide in our atmosphere than oxygen. This accounted for why we have the greenhouse effect and all manners of dangers of disease outbreak (emergence of COVID-19 and delta variants) apart from environmental crisis.

Can we also use the instrumentality of laws to check some of these environmental problems?
Yes, we can. Those who are flouting Forestry and environmental laws should be dealt with. Like I had earlier said, what we are getting now is government playing politics with the Forests. They have abandoned forest laws. If they arrest anyone, the government officials will quickly release him, because of politics. The culprits are no longer being punished. Government was the entity that established the laws and also breaking them, this is the problem. In Ekiti, Ondo, Osun and other states, people are working in protected zones in Forest reserves despite that going there was prohibited. Some of these reserves were even being allocated to farmers to plant arable crops rather than allowing the trees to live in perpetuity. This is where government should tap the knowledge of academia on how best to implement our laws, so that Nigeria can derive the best economic and social gains from our Forest potentials. Law is made for lawless individuals, irrespective of your position, you are bound to submit to the law.

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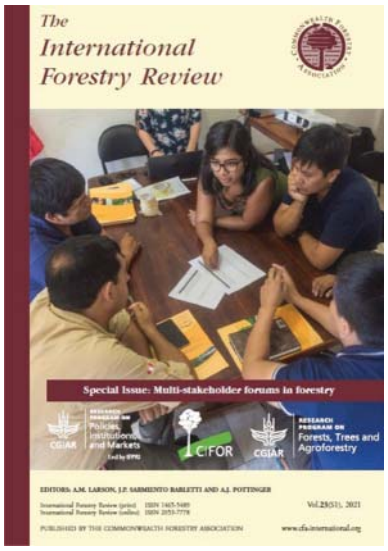
Publications

International Forestry Review – Special Issue: Multi-stakeholder forums in forestry

Publisher: CFA



HIGHLIGHTS

- Multi-stakeholder forums (MSFs) have received renewed attention in global development and conservation circles given the urgency totransform unsustainable land and resource use to address the climate emergency.
- There is nothing particularly new about MSFs, as extensive research and practice on the participatory paradigm has emerged since the 1970s; yet there is little apparent learning from these past experiences.
- The seven papers in this Special Issue examine a total of thirteen MSFs organized to address unsustainable land and resource use in forest landscapes in Brazil, Ethiopia, Indonesia, and Peru.
- Contributors examine the power inequalities that are inherent to MSFs, providing more evidence for the importance of having a deep awareness of such inequalities when engaging MSFs as researchers, organisers, participants, supporters, and funders.
- The evidence and analysis suggest that to get closer to transformational change, MSFs cannot be taken for granted – they should be thoughtfully considered, with substantive, grounded efforts to level the playing field, as part of a strategy for change.

Multi-stakeholder forums (MSFs) have become a popular mechanism in global development and conservation circles, given the urgency to find transformative approaches to address climate change and unsustainable development. In this current context, it is important to take stock of MSFs, an example of a participatory mechanism that is emerging as a new 'solution'. The papers in this Special Issue of the *International Forestry Review* derive from a multi-country comparative research project carried out by the Center for International Forestry Research (CIFOR) that aimed to understand how best to support MSFs organised for more sustainable land and resource use. The seven papers assess the potential of MSFs for more equitable decision-making in regard to land and resource use sustainability, and engage with scholarly debates over these forms of participation. The papers approach MSFs from different theoretical perspectives and analytical interests, yet all engage with issues that stem from the power inequalities that are inherent to these forums. The papers provide more evidence – and a warning – that to get closer to transformational change, we need MSFs that do more than simply bring people to the table.

Download at www.ingentaconnect.com/content/cfa/ifr/2021/00000023/a00101s1

Contributions of community forestry to COVID-19 response and recovery in seven Asian countries

Publisher: RECOFTC

Contributions of community forestry to COVID-19 response and recovery in seven Asian countries

RECOFTC

Since the World Health Organization declared the COVID-19 pandemic on 11 March 2020, close to 3 million people have lost their lives and economies around the world have buckled. To date, marginalized people have suffered most. But amid the chaos, there are optimistic signs that communities with the rights to use and manage a nearby forest have better weathered the storm of COVID-19.

RECOFTC and the Food and Agriculture Organization of the United Nations teamed up to conduct this study to inform policymakers and others on the value of community forestry, especially in times of crisis. To do this, RECOFTC spoke with hundreds of people across seven Asian countries with different community forestry regimes: Cambodia, Indonesia, Lao PDR, Myanmar, Nepal, Thailand and Viet Nam.

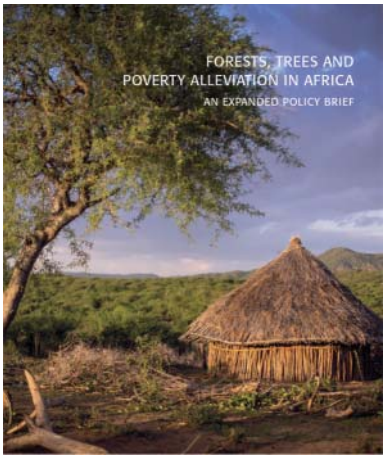
The study shows that strengthening community forests now will help build the resilience of marginalized people to endure the ongoing social and economic disruption. The study also makes a strong case for putting support for community forestry into post-pandemic recovery plans.

Download at www.recoftc.org/publications/0000391

Forests, Trees and Poverty Alleviation in Africa: An Expanded Policy Brief

Editors: Daniel C. Miller, Doris N. Mutta, Stephanie Mansourian, Dikshya Devkota and Christoph Wildburger

Publisher: IUFRO



A new policy brief entitled, *Forests, Trees and Poverty Alleviation in Africa* was successfully launched on 9 July 2021 during a virtual side event of the UN High-Level Political Forum on Sustainable Development (UN-HLPF). This expanded policy brief published by IUFRO's Global Forest Expert Panels (GFEP) Programme was prepared by 20 scientists and in consultation with 207 local stakeholders from various groups, including policymakers, international development organizations, civil society and other interest groups.

This expanded policy brief contributes to the implementation of the 2030 Agenda for Sustainable Development by highlighting the nexus between SDG 1: No poverty and SDG 15: Life on land, as well as links to other relevant SDGs.

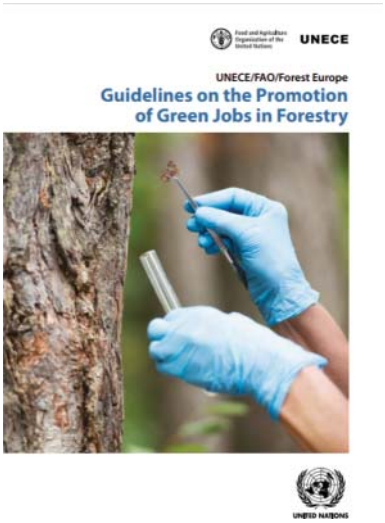
The publication outlines the most important scientific evidence of the nexus of forests, trees, and poverty in Africa, explain the context, and highlight key conclusions to be taken into account by stakeholders across Africa.

If you missed the launch, you can watch it here: https://www.youtube.com/watch?v=E7-XzejkxmI

Further information and the policy brief are available for download at: https://www.iufro.org/science/gfep/regional-activities/forests-trees-and-poverty-alleviation-in-africa/

Guidelines on the promotion of green jobs in forestry

Publisher: FAO

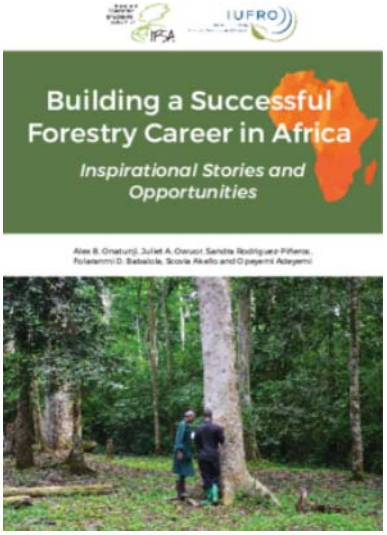


This publication is intended to assist stakeholders in the forestry sector to successfully navigate the transition to a forest sector that is fully engaged in the green economy. New and increasing opportunities for providing forest-based services and products, growing business and revenue as well as creating jobs arise from this transition. Application of the guidelines will assist in ensuring that the forestry workforce is fit for purpose and forestry is able to attract workers in the 21st century's labour market.

Download at unece.org/info/publications/pub/352394

Building a successful forestry career in Africa

Publisher; IUFRO



New book by the Joint IUFRO-IFSA Task Force on Forest Education provides inspiration and tips for the next generation of African foresters.

Are you looking for a degree that allows you to develop your capacities, discover your passion, contribute to society, earn a living, and become a successful professional?

A forestry or forestry-related degree could be just right for you!

This book:

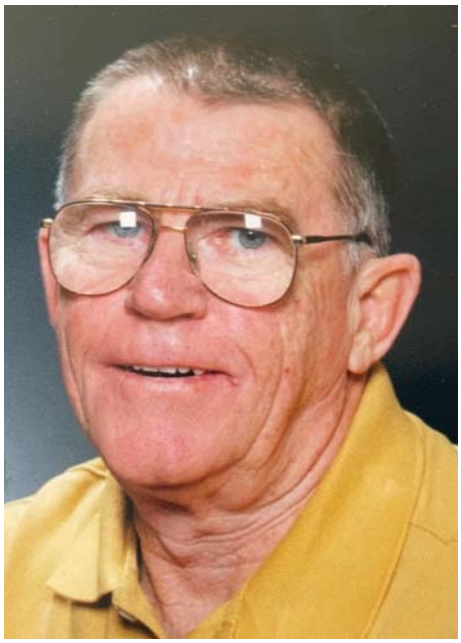
- features 23 inspiring stories of selected students, and young and established forestry professionals from 12 African countries, who have defied all odds with purpose, passion, as well as determination, and made giant strides in building a successful career in the forest sector;
- provides information about universities in Africa offering forest-related degree programmes, and local and international organizations providing networking opportunities to forestry students and early career professionals;
- gives valuable tips on securing scholarships to pursue forestry programmes; and
- provides insights into exciting forestry career opportunities beyond the forests

This book is an output of the Young African Forestry Professionals Publications project (YAFP), an initiative of the Joint IUFRO-IFSA Task Force on Forest Education and IUFRO-SPDC.

Download at: **https://www.iufro.org/fileadmin/material/publications/other-publications/building-a-successful-forestry-career-in-africa.pdf**

Obituaries

Peter Eddowes
1935–2021



Peter Eddowes (PNG's wood technologist) passed away on the 18th of July 2021 and has been cremated.

A wealth of PNG scientific wood technology has now gone.

Peter Eddowes joined TPNG Forests in June 1961 as a forest ranger. Peter then moved to TPNG Forests – Forest Products Research Centre Hohola. He became the Department of Forests chief wood technologist rising to Officer in Charge of the Timber Utilization and Marketing Section. He authored the book, "Commercial Timbers of Papua New Guinea".

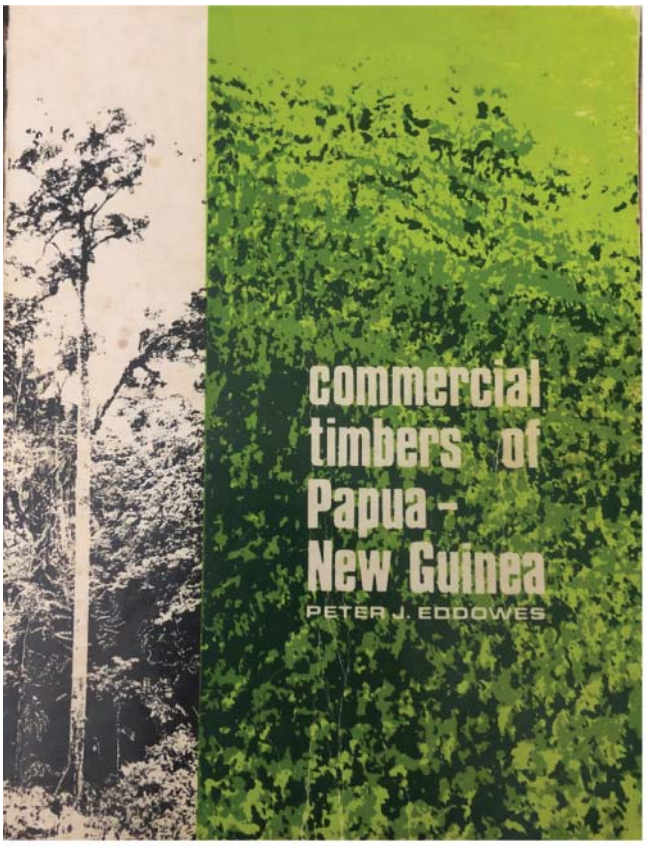
In 1981, Peter left the PNG Department of Forests. He went into private practice in PNG and worked with the Forest Industries Council till 1993.

After 1993, Peter returned to Australia where he was actively involved in private consulting and timber importation activities from PNG.

For some years, wood technologist Peter Eddowes has been working on his forthcoming publication titled "*The Forest Resources of Papuasia*" covering the major and minor commercial timber species of Papua New Guinea and including species from Irian Jaya and the Solomon Islands.

His wife Gabbie advises that his son Matthew is co-ordinating activities to ensure the book is published.

Prepared by **Dick McCarthy**



Around the World

UAE: Dubai firm plans to develop 'forests' in deserts

Dake Rechsand, a Dubai-based company offering sustainable solutions in desert farming, plans to develop green cover in deserts using the innovative Miyawaki forest model and the company's ground-breaking technology: Breathable Sand.

Dake Rechsand has partnered with management consulting firm Investment Hub for a presentation, where sustainability advocates, thematic investors, and CSR-focused companies will be offered an opportunity to be part of a potential green revolution in the Middle East.

Developed by renowned Japanese botanist Akira Miyawaki, the eponymous model revolves around the regeneration of forests through shrubs, trees, and canopy layers; using a methodical approach involving soil analysis, resource analysis, and maintenance plan for the short term.

Following successful implementation, practitioners can achieve a green cover that is 30 times denser and grows 10 times faster than a typical meadow.

In addition, a matured Miyawaki forest boasts high survival rates, and can harbour 18 times more biodiversity, compared to the average achieved using conventional methods. These figures have been substantiated by more than 3,000 real-world instances of forests grown globally, using the Miyawaki model. However, due to arid climate, desert conditions, soil salinity, and water scarcity in the Middle East, this model was not considered feasible in the region; but this was before the emergence of Breathable Sand.

The water-retentive properties of Dake Rechsand's Breathable Sand reduce irrigation requirements for optimal plant growth, by nearly 80%, when compared to conventional practices. At the same time, its air-permeability ensures sufficient oxygenation of roots; optimizing nutrient supply, and reducing the amount of fertilizer used. In fact, Breathable Sand has been used to successfully green around 2,000 sq km in one of the world's most arid and hot deserts, in China.

Chandra Dake, CEO and Founder of Dake Rechsand said: "The Miyawaki model holds the answers to some of the pressing issues in the Middle East, and the world at large. It will enable the sustainable expansion of green cover at a scale previously unimaginable. And, in doing so, it will make a massive contribution to offsetting GHG emissions, and addressing climate change. Our goal for this year is to plant 200,000 trees, and follow up with another two million trees by 2022.

"With increased investor participation and multi-stakeholder engagement, we can scale up to ten million trees, which will have a profound effect on regional and global sustainability parameters".

The impact of a fully-matured Miyawaki forest is as follows:

- It has the potential to reduce local temperature by two degrees Celsius
- It can result in a noise reduction of 10dB
- A forest cover in an area of 5,000 square meters with 15,000 plants can absorb 300–350 tons of CO2 per year
- The CO2 absorption is 30 times compared to monoculture plantation, hence more lucrative for carbon trading

tradearabia.com

Canada: Invasive earthworms are remaking our forests, and climate scientists are worried

For the past 300 years, a slow-motion invasion has been unfolding under our feet. Year by year, a plethora of invasive earthworms have been quietly burrowing their way through our forests' leaf litter, grasslands and backyard gardens.

Although earthworms are beneficial for growing food, research shows they are harming our forests, and could potentially be contributing to climate change.

Earthworms are not native to most of North America. Until about 10,000 years ago, a vast ice sheet covered the northern third of the North American continent. Scientists think it killed off the earthworms that may have inhabited the area before the last glaciation.

Earthworms were reintroduced to North America with the arrival of European settlers in the 18th century. There are now more than 30 species of non-native earthworms in Canada, according to Michael McTavish, a postdoctoral research fellow at the University of Toronto specializing in the ecology of non-native earthworms. "By physically changing the soil environment, earthworms affect everything from decomposition of organic matter, to nutrient cycling, carbon storage. . .how water moves through [the soil]," said McTavish. "They just kind of affect everything across the board."

Although they're usually perceived as friendly helpers in the garden, elsewhere, they can be a surprisingly destructive force.

Threatening forest diversity

Earthworms are ecosystem engineers, meaning they play a huge role in shaping their environment. Normally, microbes and other soil-dwelling organisms such as mites, nematodes, millipedes and fungi break down organic matter in Canadian forests. They turn leaves and wood bits into soil and free up the nutrients that were once bound in organic matter. In the absence of earthworms, the litter layer, which is composed of old leaves and detritus that has built up on the soil floor, breaks down very slowly.

When earthworms move into our forests, they have the potential to rapidly change these ecosystems by devouring the leaf litter. They break down plant matter in much the same way as other invertebrates, but they do it much faster. In essence, worms speed up decomposition, which can be a bad thing for ecosystems used to taking it slow.

"When earthworms move in, you have a fundamentally different soil environment," said McTavish. "So you can get changes in pH, in the texture and density, and nutrient enrichment. The problem is that the species that we have present in our forests are not used to those kinds of conditions." According to McTavish, the soil environment becomes inhospitable to native plants, allowing non-native plants to thrive.

Erin Cameron, an environmental science professor at St. Mary's University in Halifax who studies invasive earthworms, found that earthworms cause a 50 per cent decrease in abundance in native soil invertebrates. Now, to the great concern of climate scientists, invasive earthworms are expanding their range northwards, in boreal forests that have lacked native earthworms since the last ice age.

The boreal forest is losing carbon

Justine Lejoly, a soil scientist with the University of Alberta in Edmonton researching the effects of earthworms on soil carbon dynamics, says the earthworms' voracious appetite has serious implications for the boreal forest's capacity to store carbon.

The boreal is special. In warmer climates, the floor of a typical forest is a mix of mineral soil and organic soil. In a boreal forest, those components are distinct, with a thick layer of rotting leaves, mosses and fallen wood on top of the mineral soil.

This spongy layer of leaf litter contains most of the carbon stored in the boreal soil. *Dendrobaena octaedra*, the small earthworm responsible for invading most of the North American boreal, is the type that loves to devour leaf litter and stay above ground, releasing carbon. "Boreal forests are known to be a very important terrestrial reservoir of carbon," said Lejoly. "If we lose that organic matter, it means that there is a lot of carbon that's not going to be stored in those forests anymore."

Lejoly estimates that only around 10 per cent of the boreal forest currently has earthworms, but she projects that by 2050, most of the boreal forest will be invaded – which means the boreal forest soil could potentially lose most of its carbon stock.

Cameron modelled the potential effects of earthworms on carbon stored in the forest floor. Her models found that when earthworms were present, the forest floor's carbon stock was reduced by around 50 to 94 per cent after 125 years, but most of that reduction occurred in the first 35 to 40 years.

This means that boreal forests may potentially be emitting a lot more carbon, in the form of carbon dioxide, into the Earth's atmosphere, than they are absorbing. Already, rising temperatures are releasing carbon from forests, by thawing permafrost and increasing the number of forest fires.

Second wave of invasion

More recently, several species of Asian earthworms have made their way to the continent, and they have soil scientists particularly concerned. Originally from Korea and Japan, they are known as "jumping worms," "snake worms," or "crazy worms" – named for their distinctive thrashing when disturbed. They are ravaging soils throughout the U.S., and have crossed the border into Canada.

McTavish fears that jumping worms pose an even greater threat than their European predecessors. Jumping worms have many of the same effects, except that they grow larger, recycle nutrients even faster and exist in dense colonies, sometimes numbering more than 100 individuals per square metre of ground.

Jumping worms are known to quickly churn the top layer of soil, turning it into something that resembles coffee grounds from all the worm droppings.

Managing the invasion

Invasive earthworms have been found everywhere from Ontario to Alaska. Their rapid spread across the continent is largely due to human activity. Earthworms, left to their own devices, can only spread around 10 metres per year. But invasive earthworms can easily travel a couple hundred kilometres in one day by roads, anglers, tire treads, boats and even gardeners.

McTavish says this means it's key to educate the public about invasive earthworms, and limit the transfer of soil and earthworms between different areas. For example, David Legros, the chief naturalist at Ontario's Algonquin Provincial Park, says the park has begun asking visitors going fishing to stop dumping their leftover bait.

"The problem is there's no way of removing them from an area once they invade," said Cameron. "So, any action or management really has to be done in terms of restricting introduction."

cbc.ca

US wildfire pollution linked to more covid-19 cases and deaths

Polluted air caused by smoke released from the record-breaking wildfires in the US last year has been linked to a strong increase in covid-19 cases and deaths.

Francesca Dominici at Harvard University and her colleagues say 19,742 recorded covid-19 cases and 748 covid-related deaths can be linked to spikes in tiny particulate matter, PM2.5, released by the blazes in California, Oregon and Washington.

Links between long-term exposure to dirty air and greater risk of death and severe illness from covid-19 have already been well-documented. But the new research puts numbers on how short-term exposure to pollution, in this case from wildfires, may have made the pandemic's health impact worse.

"What this is saying is, number one, especially for the counties affected by wildfires, people should absolutely get vaccinated and wear a mask," says Dominici.

The team looked at daily data on covid-19 cases and deaths and PM2.5 levels between March and December 2020 in 92 counties which cover 95 per cent of the population in California, Oregon and Washington. They then accounted for other possible explanations for links, including looking at the weather and Facebook data on how much people moved around, and considered a counterfactual world without the fires.

Across the counties as a whole, they found each extra 10 micrograms of PM2.5 per cubic metre of air over 28 days was linked to an 11.7 per cent increase in coronavirus cases, and a 52.8 per cent increase in covid-19 deaths. Some counties saw PM2.5 levels higher than 500 micrograms per cubic metre for days in a row due to fires, well above the level deemed "hazardous" by US environmental authorities.

The impact of pollution on covid-19 cases and deaths varied widely between areas. Dominici says that is probably because "the trajectory of the pandemic within each county was very, very different". The team thinks cases increased due to PM2.5 exposure because it led to more severe illness. This might also have had an impact even on people with mild illness. For instance, people with what would ordinarily have been an asymptomatic infection might have developed symptoms.

There are some caveats. Dominici says there may yet be other explanations for the link that the team didn't account for. And the amount of PM2.5 people were estimated to be exposed to, using smoke satellite images, may not reflect their true exposure.

Nonetheless, the research implies there is another motivation to cut the carbon dioxide emissions which are projected to worsen wildfires in the western US as the world warms. "This also provides another reason why tackling climate change is so important," says Dominici.

newscientist.com

Sweden: The EU Commission got its forest strategy wrong

The EU Commission recently published its new controversial forest strategy. The strategy, if it comes into force, will have negative implications for Nordic forestry. Among many aspects of forestry discussed in the strategy is the matter of how to best harvest the wood.

The Commission seems to advocate continuity forestry, without regeneration felling (which is when the greater part of a forest is felled where most of the trees are fully grown) and by doing so ignoring the complex biology of the Nordic forests. Recent experience of such an approach to forestry, as advocated by the Commission, has had clear negative consequences, however.

Forestry without regeneration felling, or continuity forestry, means that the largest trees in a forest are successively harvested. New trees are expected to regenerate among the remaining trees. This model was applied on a large scale in Sweden from around 1920 to 1950. The labour cost was low and the large trees were more valuable. The high cost of creating new forests was avoided. Many of the forestry administration's leading representatives also advocated this type of forestry.

But the result was catastrophic. The remaining trees were unable to form new productive forest areas, and instead enormous areas arose that were sparsely grown with mainly spruce and birch.

It was the often-brutal dismantling of these residual forests in the Northern parts of Sweden that created the giant clear-cut areas that in turn sparked the debate about the regeneration felling and Swedish forestry.

Learning from failure

Why did the continuity forest management – or close-to-nature forestry – work so badly? There were several reasons:

- The level of felling was excessive. The remaining stock of trees were not enough to act as a base for new forests. The genetic quality was impoverished by consistently removing the best trees.
- There was harvesting in cold areas with poor fertility where leftover tree remains did not decay, but were instead left behind in an increasingly thick layer where new forest plants could not establish themselves.
- The necessary nutrient circulation that occurs, for example, after a fire or a regeneration felling did not get started and the ground was depleted. Light-loving tree species, mainly pine, could not be regenerated among the remaining trees.

Today we know more. It is possible to run clear-cut-free continuity forestry but only locally. You have to stick to tree species that can grow up in shade, primarily spruce and beech.

The forest that is left must be able to sustain production. The soil should be so fertile that the necessary nutrient circulation can take place without the soil being laid bare or burned.

Learning from history

Historically, we have always had bare forest land in Sweden. Before human influence, it was fires, storms, and insect infestations that created these bare areas, which in turn allowed pine and birch to establish themselves. Later, forests were felled for mining, shipbuilding and housing, while more and more land was used for cultivation and grazing.

In today's sustainable Nordic forestry, the active establishment of new forest and consequently regeneration felling is an important component.

The foundation for our modern forestry was already laid around the year 1800. At the time, Heinrich Cotta of the Academy of Forestry in Tharandt, Germany showed that an analysis of the effects of forestry must encompass the entire forest, i.e. bare-forest areas, newly planted forests, young forest, middle-aged forest, and older forests at the same time.

If you only look at a bare clearing, no forest grows and the clearing leaks carbon dioxide by leaving parts of the felled trees to rot. But if you look at the forest as a whole, rejuvenation is absolutely necessary to revitalise the forest and keep the growth rate up. And it is the effect of forest management on the entire forest that is crucial for growth and carbon sequestration.

The art of harvesting

Over time, you theoretically achieve the highest growth, and thus the highest carbon bound in an entire forest, by harvesting each stand when its average growth rate (total volume produced divided by age) starts to decline. This normally occurs a few decades after a typical harvesting age today.

The fact that harvesting takes place earlier is partly due to the fact that the risk of damage – storm, rot and insects – rises with increasing age, and partly because in many cases it is possible to increase growth by replacing the existing stock of trees with new ones that grow better.

For example, replacing spruce on weak, dry soils with pine. In the current situation of climate change, it is also important to be able to build new forests with a plant material that is better suited to the conditions than that which is locally available.

Continuity forestry means that you harvest less trees but more frequently, maybe 10–20 percent of the volume every 10 years. During a normal Swedish cycle time – 80–90 years – you harvest a given forest area about 8–9 times, while in today's forestry thinning is done 1–3 times before a regeneration felling.

Today's cost-effective harvesting technology is also not suitable for continuity forestry. It damages soil and roots and requires large volumes from each felling. Instead, small, lightweight machines have to be brought in, which in turn results in greatly increased felling costs.

In order to make such forestry work on a large scale, the price of timber and thus forest products must be greatly increased which will in turn lower the competitiveness of the sector in a global market.

It is simply not possible to operate continuity forestry on a large scale on commercial terms in the Nordic region. The method may be justified where there are strong drivers other than the economy, for example in recreational areas, or where there are rare and disturbance-sensitive species.

However, in order for the method not to eventually lead to more and more spruce forest, open spaces must also be created in these areas where pine and/or birch forest is preferred.

euobserver.com

Gabon becomes first African country to get paid for protecting its forests

- *Gabon recently received the first $17 million of a pledged $150 million from Norway for results-based emission reduction payments as part of the Central African Forest Initiative (CAFI).*
- *Gabon has 88% forest cover and has limited annual deforestation to less than 0.1% over the last 30 years, in large part possible due to oil revenues supporting the economy.*
- *With oil reserves running low, Gabon is looking to diversify and develop its economy without sacrificing its forests by building a sustainable forest economy supported by schemes such as CAFI.*

In 2019, Norway committed to pay $150 million to Gabon to protect its forests under the Central African Forest Initiative (CAFI). After independent verification of the country's deforestation rates in 2016 and 2017, Gabon recently received its first $17 million payment, making it the first African country to receive a results-based payment for reducing emissions from deforestation and forest degradation (REDD+).

"I think it's good news," said Denis Sonwa, senior scientist for the Center for International Forestry Research (CIFOR), Cameroon. "It shows that REDD+ is technically possible, but for it to become a reality we need some sort of dynamic domestic policy."

CAFI was founded in 2015 as a collaborative agreement between six central African countries – the Central African Republic, the Democratic Republic of Congo, the Republic of Congo, Gabon, Equatorial Guinea and Cameroon – and six financial partners: the European Union, France, Norway, Germany, South Korea and the Netherlands.

CAFI is based around the REDD+ mechanism developed by the parties to the United Nations Framework Convention on Climate Change (UNFCCC). The idea that underpins REDD+ is that developing nations should be able to financially benefit from the ecosystem services that their forests provide, such as carbon storage and as reservoirs of biodiversity. The REDD+ concept has been around since 2005 and trialed in various forms, with varying degrees of success.

With 88% of the country covered in tropical rainforest and an average deforestation rate of less than 0.1% over the last 30 years, Gabon is what's known as a high-forest, low-deforestation (HFLD) country – one of only 11 in the world to claim this status. The forests of Gabon have immense biodiversity, with more plant species than all West Africa's forests combined. Gabon is also one of the few places left in the world where forest elephants can roam all the way from forest to sea and can be found sauntering along the beach.

"In terms of carbon emissions, we were actually positive," Lee White, Gabon's minister of forests, oceans, environment and climate change, said in a BBC interview. "We absorb 100 million tons of carbon dioxide over and above our annual emissions."

Gabon's situation is unusual. Discovery of oil in the 1970s radically changed the country's fortunes and the dynamics of its society. In 1970, urbanization in Gabon was 30%; by 2020, more than 90% of Gabon's population lived in urban areas, compared to a sub-Saharan Africa average of 41%. Gabon also has a very low population density, with just eight people per square kilometer (about 21 per square mile) compared to the average of 45 per km2 (117 per mi2) for sub-Saharan Africa.

This rare combination – low population and high urbanization, supported by oil revenue – has limited the human impact on Gabon's forests. Oil has been the foundation of Gabon's economy, accounting for 80% of exports and 45% of GDP between 2010 and 2015. However, oil reserves are now running low, and with oil prices unstable, Gabon's government is looking for new ways to power its economy.

With limited agricultural land available, Gabon has to import food – $591 million worth in 2018 alone. The country wants to generate more income from its forests as well as preserve them, and CAFI is one part of that plan.

"We're trying to come up with a new development model for a high rainforest country that preserves the forest but allows us to develop," White said.

To be financially as well as ecologically sustainable, the timber industry needs to make and retain as much value as possible in-country. Since 2010, Gabon has only allowed timber to be exported once it has been processed to some degree. Gabon has also adopted a sustainable approach to forestry to minimize degradation, with timber companies required to harvest on a 25-year cycle to allow regrowth. In 2018, President Ali Bongo also declared that all forestry concessions must be FSC-certified by the end of 2022.

Recognizing that Gabon's deforestation rate is already low, CAFI's payments to Gabon focus on reducing CO_2 emissions from degradation through sustainable forestry practices. CAFI will also pay for the CO_2 Gabon's natural forests sequester, hoping to give the forests value as they stand, beyond timber. The money received from Norway will be put toward further developing Gabon's sustainable forest model.

With oil exports of $4.7 billion in 2019, Gabon faces an uphill struggle to replace oil revenues in a sustainable manner. As well as sustainable forestry, oil palm has featured prominently on Gabon's diversification agenda, raising concerns over potential forest conversion.

It's still early days for CAFI's other initiatives. CAFI committed to investing $200 million into programs designed to address deforestation in the Democratic Republic of Congo in 2016. Since the deal was signed, instability in the country has hampered CAFI's efforts, and the discovery of oil beneath the peatlands of the Cuvette Central have raised concerns about the effectiveness of any deals signed. CAFI has not yet made any significant commitments to the other four partner countries.

It remains to be seen if the other countries can emulate Gabon's success in achieving results-based payments for protecting their natural forests or whether Gabon can diversify away from oil while keeping its forests intact.

What is undeniable is the value of the Congo Basin and the global consequences if countries like Gabon cannot find a way to achieve the development they need without sacrificing their rainforest.

"The Gabonese and Congolese forests help to create the rainfall in the Sahel, so if we lose the Congo Basin we lose rainfall across Africa," White said. "If we lose the carbon stocks in the Congo Basin, which represent about 10 years of global emissions of CO_2, we lose the fight against climate change."

mongabay.com

UK: Plant trees without plastic protective tubes, scientists suggest

Reforestation projects in the UK should consider planting new trees without the common plastic guards designed to protect saplings, a new study suggests.

The polypropylene tubes help young trees survive their first five years by keeping animals at bay, but plans to markedly increase Britain's forest cover to combat the climate crisis could mean vast quantities of plastic filling the countryside.

Comparing plastic and bio-material sleeves with unprotected planting, scientists from University College London found reforestation without the tubes was preferable.

Their study is published in *Science of The Total Environment*.

It analysed scenarios including planting unprotected trees, planting them with plastic tubes that were fully recovered and recycled, and planting them with guards made from polylactic acid-starch blends (PLA) and bio-polypropylene (bio-PP), which are not fossil fuel-based.

Scenarios that involved leaving the plastic and bio-based sleeves to break down were also investigated.

Even though someone would have to plant two unprotected trees to ensure one made it to the five-year mark – compared to 1.18 with plastic sleeves – this approach came out on top, and not just because of its low carbon emissions.

In fact, the difference in carbon emissions between the various planting methods was deemed negligible when considering the amount of CO2 a tree can sequester over 25 years.

The key is that plastic tree shelters become brittle over time, meaning that when removed they can shatter and leave small particles. And, given the scale of reforestation efforts, fully recycling millions of plastic tubes is inpracticable.

Researchers wrote: "It should be noted that the recovery and recycling of plastic tree shelters are not straightforward and may never be. After five years of growth of vegetation around the trees, species such as grasses and brambles, often get entangled with the tree shelters.

"This occurs concurrently with the embrittling of the plastic, which means that removal after five years often results in the cracking and shattering of the tree shelter as it is pulled out of the entangled vegetation.

"Currently, this embrittled plastic, even if all the small pieces can be collected, has a negative value for recyclers and is only suitable for incineration.

"The monetary cost of such a collection in terms of manpower for a site with hundreds or thousands of 5-year-old tree shelters . . . further adds to the practical difficulties."

Polypropylene tubes were, however, found to perform better than ones made from bio-material. The environmental impacts associated with manufacturing the latter further contributed to the researchers' decision not to endorse their use.

Last month, the Woodland Trust said it planned to stop using new plastic tree protectors by the end of 2021. The charity aims to plant 10 million trees per year until 2025.

independent.co.uk

Global: Planting forests may cool the planet more than thought

Planting trees and replenishing forests are among the simplest and most appealing natural climate solutions, but the impact of trees on atmospheric temperature is more complex than meets the eye.

One question among scientists is whether reforesting mid-latitude locations such as North America or Europe could in fact make the planet hotter. Forests absorb large amounts of solar radiation as a result of having a low albedo, which is the measure of a surface's ability to reflect sunlight. In the tropics, low albedo is offset by the higher uptake of carbon dioxide by the dense, year-round vegetation. But in temperate climates, the concern is that the sun's trapped heat could counteract any cooling effect forests would provide by removing carbon dioxide from the atmosphere.

But a new study from Princeton University researchers found that these concerns may be overlooking a crucial component – clouds. They report in the *Proceedings of the National Academy of Sciences* that the denser cloud formations associated with forested areas means that reforestation would likely be more effective at cooling Earth's atmosphere than previously thought.

"The main thing is that nobody has known whether planting trees at midlatitudes is good or bad because of the albedo problem," said corresponding author Amilcare Porporato, Princeton's Thomas J. Wu '94 Professor of Civil and Environmental Engineering and the High Meadows Environmental Institute. "We show that if one considers that clouds tend to form more frequently over forested areas, then planting trees over large areas is advantageous and should be done for climate purposes."

As anyone who has felt a cloud pass over the sun on a hot day knows, daytime clouds have a cooling – albeit transient – effect on the Earth. In addition to directly blocking the sun, clouds have a high albedo, similar to ice and snow. Clouds, however, are notoriously difficult to study and have been largely discounted from many studies examining the effectiveness of natural climate change mitigation, including reforestation, Porporato said.

To consider reforestation in the context of cloud coverage, Porporato worked with lead author Sara Cerasoli, a Princeton graduate student in civil and environmental engineering, and Jun Ying, an assistant professor at Nanjing University of Information Science and Technology who previously was a postdoctoral fellow in Porporato's research group. Their work was supported by the Carbon Mitigation Initiative based in HMEI.

Porporato and Yin previously reported that climate models underestimate the cooling effect of the daily cloud cycle. They also reported last year that climate change could result in increased daily cloud coverage in arid regions such as the American Southwest that are currently ideal for solar power production.

For the latest study, Cerasoli, Porporato and Yin investigated the influence of vegetation on cloud formation in midlatitude regions by combining satellite data of cloud coverage from 2001–10 with models related to the interaction between plants and the atmosphere.

The researchers modeled interactions between different types of vegetation and the atmospheric boundary layer – which is the lowest layer of the atmosphere and interacts directly with the Earth's surface – to determine whether cloud formation is differentially affected by vegetation type. They focused on regions in the 30–45 degree latitudinal range, roughly from the subtropics to the hemiboreal zones such as the northern Midwestern United States. They considered the effects of both reforestation – restoring lost tree cover – and afforestation, which entails planting forests in areas that were previously treeless, though this may come with other environmental costs.

The team found that for midlatitude regions, the cooling effect of clouds – in combination with that of carbon sequestration – outweighed the solar radiation that forested areas absorbed.

The models showed that clouds form more frequently over forested areas than over grasslands and other areas with short vegetation, and that this enhanced cloud formation had a cooling effect on Earth's atmosphere. The researchers observed from the satellite data that clouds also tend to form earlier in the afternoon over forested areas, which results in a longer duration of cloud cover and more time for clouds to reflect solar radiation away from the Earth.

The findings could help develop policies for allocating land for reforestation and agriculture – wetter midlatitudinal areas such as the eastern United States or southeastern China are well-suited to reforestation and afforestation, but also are appealing for agriculture. One approach would be to pair midlatitudinal reforestation with the distribution of drought-tolerant crops for regions less suited to reforestation, the study authors reported.

However, the authors urged that we must be cautious when making the leap from science to policy. "We can't just consider climate change, but must also consider other factors, such as biodiversity and the fact that land is also needed for food production," Cerasoli said. "Future studies should continue to consider the role of clouds, but should focus on more specific regions and take their economies into account."

"The first thing is to not make things worse," Porporato added. "So many things are connected in the earth system. The nature of interactions between, for example, the water cycle and climate mean that if you change one thing, it's very difficult to predict how other parts of the system will be affected."

The paper, "Cloud cooling effects of afforestation and reforestation at midlatitudes," was published Aug. 9 in the *Proceedings of the National Academy of Sciences*.

phys.org

Global: Up to half of world's wild tree species could be at risk of extinction

Global study calls for urgent action to prevent ecosystem collapse, with farming the biggest cause of die-off

Between a third and half of the world's wild tree species are threatened with extinction, posing a risk of wider ecosystem collapse, the most comprehensive global stocktake to date warns. Forest clearance for farming is by far the biggest cause of the die-off, according to the State of the World's Trees report, which was released on Wednesday along with a call for urgent action to reverse the decline.

The five-year, international study found 17,510 species of trees are threatened, which is twice the number of threatened mammals, birds, amphibians and reptiles combined. This was 29.9% of the 58,497 known species of trees in the world. But the proportion at risk is likely to be higher as a further 7.1% were deemed "possibly threatened" and 21.6% were insufficiently evaluated. Only 41.5% were confirmed as safe.

The problem was evident across the globe. Brazil – home to the planet's most diverse forest, the Amazon – had the most (1,788) threatened tree species, including big-leaf mahogany, rosewood and eugenia. In China, the world's sixth most biodiverse nation, magnolia, camellia and maple were among the 890 species at risk.

Tropical island states, notably Madagascar, are disproportionately affected, particularly ebony and rosewood, but even in Europe – which is relatively poor in terms of natural diversity – there has been an alarming decline in numbers of whitebeams and rowan. In North America, pests and diseases are causing severe losses of ash populations.

Botanists describe trees as "the backbone of the natural ecosystem". Although only 0.2% of species have become extinct so far, the authors say an accelerating decline could have dire knock-on effects. Humans are directly affected by the loss of carbon sequestration, oxygen production, timber for construction, fuel for fires, ingredients for medicine and food, buffers from storms, and the wellbeing that comes from shade and beauty. Arguably more important are the indirect impacts on natural life-support systems. In many parts of the world, trees are the pillars of a healthy ecosystem. Without them, other plants, insects, birds and mammals struggle to survive.

"Trees are essential . . . it's like a Jenga tower. Pull the wrong one out and the ecosystem falls apart," said the report's lead author, Malin Rivers, the head of conservation prioritisation at Botanic Gardens Conservation International (BGCI). "When I look at these numbers, I feel we need to act now."

The report identifies the main threats to trees. Farming (crops 29% and livestock 14%) takes top place, followed by logging (27%), housing and other commercial development (13%), fire (13%), mining (9%), pulp plantations (6%) and invasive species (3%). Climate change (4%) is bottom of the list, though this does not include the pressure it adds on fire and agriculture.

Gerard T Donnelly, the president of the Morton Arboretum in Illinois, US, hoped policymakers would use the groundbreaking study as a conservation tool: "This report makes clear that the world's trees are in danger. It was developed through years of vigorous research and collaboration among the world's leading tree conservation organisations and will guide further scientifically informed action to prevent tree extinctions."

BGCI has recommended an expansion of protected area coverage for threatened species, planting campaigns that focus on the highest-risk populations, closer global collaboration, more funding for conservation efforts, and greater efforts to back up species in botanic gardens and seed banks.

The group has launched the GlobalTree Portal, an online database tracking conservation efforts at the species, country and global level. "For the first time we know which species are threatened, where they are and how they are threatened so we can make better-informed conservation decisions," Rivers said. "These species are not extinct yet. There is still hope. There are still ways to get them back from the brink."

theguardian.com

Indonesia: Jakarta issues new regulations on parks and tree protection and management

With support from Cities4Forests and WRI Indonesia, Jakarta recently issued two major new policy changes. The new regulations on parks and tree protection and management will:

- Support Jakarta's commitment to **reduce emissions by 30% by 2030**
- Create new **legal protections for urban trees** by regulating licensing and tree removal
- Integrate **data about Jakarta's urban forest** into city planning decisions
- Establish the city's **first spatial database on urban trees** to improve management
- Commit Jakarta to grow **200,000 more trees by 2022**
- Set standards and definitions that will allow for the establishment of **new parks and other green open spaces**
- Prioritize **networks of green spaces** in park development planning
- **Increase park accessibility** by mandating that each Jakarta neighborhood must have at least one park.

cities4forests.com

India: Telangana to turn barren lands to forests by dropping seeds from drones

The Telangana government aims to turn barren and empty forest lands to lush green abode of trees by dropping seeds from drones. The state government is set to launch a drone-based afforestation project named 'Hara Bahara.

Under the project, the government, in partnership with city-based startup, Marut Drones, will drop seed balls in barren lands and empty forests using drones. Fifty lakh trees will be planted in about 12,000 hectares of land in forests across the state under the project, an official release said on Monday. Minister for IT and Industries KT Rama Rao unveiled 'Seedcopter Drone' by Marut Drones and launched poster campaign for 'Hara Bahara'.

Seedcopter, an aerial seeding solution for rapid and scalable reforestation, will bring community, science and technology together for an inclusive, sustainable and long-lasting solution, the release said.

This project uses drones to disperse seed balls over thin, barren and empty forest lands to turn them into lush green abode of trees. The process begins with a field survey and mapping of the terrain area to understand the ecosystem and demarcate the areas needing urgent attention.

The seed balls are prepared by the local women and welfare communities which are dispersed via drones in the targeted areas. Further, the area is continuously monitored to track the growth of plants sown, according to the release.

"Forests are essential to maintain a clean and habitable environment for human life, and emerging technologies have potential to support the afforestation efforts. Being already at the forefront of using drones for new use-cases, we are initiating Hara Bahara to plant seeds increase the forest areas across all the districts of the state," Rama Rao said.

outlookindia.com

USA: Randy Moore named first African American leader of U.S. Forest Service

Veteran forester Randy Moore has been named chief of the U.S. Forest Service, the first African American to lead the agency in its 116-year history. Moore, 66, replaces Vicki Christiansen, who has led the agency since 2018.

The Forest Service, a division of the Agriculture Department, oversees 193 million acres of public lands in 154 national forests and 20 national grasslands. Moore has been a regional forester for the California-based Pacific Southwest Region since 2007, with responsibility for 18 national forests in California and Hawaii.

He will take over from Christiansen as head of the 30,000-employee agency when she retires July 26. They'll be working together on what's already shaping up as a severe wildfire season in the West, where an epic drought, complicated by climate change, has made putting out fires more challenging and strained firefighting resources throughout the region.

In the Pacific Northwest, where an extended heat wave has triggered record-breaking temperatures in Oregon and Washington state, fire crews have been positioned in high-risk areas, and cities and counties have imposed burn bans.

Agriculture Secretary Tom Vilsack, who appointed Moore, called him "a catalyst for change and creativity" in carrying out the Forest Service's mission to sustain the nation's forests.

As a regional forester, Moore has been on the forefront of dealing with the effects of climate change, notably leading the region's response to the dramatic increase in catastrophic wildfires in California over the past decade, Vilsack said.

Before heading the Pacific Southwest region, Moore was regional forester in the Milwaukee-based Eastern Region, where he oversaw forests in 20 states, including Illinois.

He sttarted his federal career in 1978 at the USDA's Natural Resources Conservation Service in North Dakota and has worked at national forests in Colorado, North Carolina and Missouri, a national grassland in Kansas and as an administrator in Washington.

Moore's appointment comes as Congress and the Biden administration push to increase firefighter pay and convert at least 1,000 seasonal wildland firefighters to year-round workers as fires have grown more severe. President Joe Biden has called for an increase in pay for federal firefighters, who start out making as little as $13 an hour.

"That's a ridiculously low salary to pay federal firefighters," Biden said. "That's going to end in my administration."

chicago.suntimes.com