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Botanical breakthrough: scientists map the backbone species of tropical forests

A groundbreaking study by UCL and international scientists has discovered that just 2.2% of tree species account for half of the trees in tropical forests globally. This uniform pattern across diverse regions like Africa, the Amazon, and Southeast Asia suggests a fundamental mechanism shaping these ecosystems.

Scientists have found that a small number of tree species dominate tropical forests worldwide, challenging previous notions about the diversity of these ecosystems.

A major international collaboration of 356 scientists led by UCL researchers has found almost identical patterns of tree diversity across the world's tropical forests.

The study of over one million trees across 1,568 locations, published in *Nature*, found that just 2.2% of tree species make up 50% of the total number of trees in tropical forests across Africa, the Amazon, and Southeast Asia. Each continent consists of the same proportion of a few common species and many rare species.

While tropical forests are famous for their diversity, this is the first time that scientists have studied the commonest trees in the world's tropical forests.

The scientists estimate that just 1,053 species account for half of the planet's 800 billion tropical forest trees. The other half is comprised of 46,000 tree species. The number of rare species is extreme, with the rarest 39,500 species accounting for just 10% of trees.

Lead author Dr. Declan Cooper (UCL Geography and UCL Centre for Biodiversity and Environment Research) said: "Our findings have profound implications for understanding tropical forests. If we focus on understanding the commonest tree species, we can probably predict how the

whole forest will respond to today's rapid environmental changes. This is especially important because tropical forests contain a tremendous amount of stored carbon, and are a globally important carbon sink."

He continued: "Identifying the prevalence of the most common species gives scientists a new way of looking at tropical forests. Tracking these common species may provide a new way to characterize these forests and in the future possibly gauge a forest's health more easily."

The researchers found strikingly similar patterns in the proportion of tree species that are common, at close to 2.2%, despite the tropical forests of the Amazon, Africa and Southeast Asia each having a unique history and differing contemporary environments.

The Amazon consists of a large region of connected forest, while Southeast Asia is a region of mostly disconnected islands. People only arrived in the Amazon around 20,000 years ago, but people have been living in African and Southeast Asian forests for more than twice that length of time. In terms of the contemporary environment, African forests experience a drier and cooler climate than the other two tropical forest regions.

Given these striking differences, the near-identical patterns of tree diversity suggest that a fundamental mechanism may govern the assembly of tree communities across all the world's tropical forests. The researchers are not yet able to say what that mechanism might be and it will focus future work on identifying it.

The estimates of common species derive from statistical analyses, which does not provide the names of the common trees. To overcome this, the scientists used a technique known as resampling to estimate which are the most likely names of the common species. Their list of 1,119 tree species names, the first list of common species of the world's tropical forests, will allow researchers to focus their efforts on understanding the ecology of these species, which in turn can give scientists a short-cut to understand the whole forest.

Most common tropical forest tree species:

Continent	Scientific name	Local Names
Africa	Gilbertiodendron dewevrei	Limbali, otabo, agbabu, ekpagoi-eze
Africa	Greenwayodendron suaveolens	Africa Teak, atorewa, ẹ́wáé, nchua, eleku, agudugbu
Africa	Anonidium mannii	Junglesop, imido, asumpa, ọ̀ghẹ́dẹ́gbó
Africa	Petersianthus macrocarpus	Stinkwood tree; soap tree abalé, tun-tue, pèh, ésiv, kpa
Africa	Santiria trimera	adjouaba à racines aériennes, damzin, an-thanjka, kafe, poh, gólógóló.
Africa	Strombosia pustulata	itako, afina, poé, mba esogo
Africa	Tabernaemontana crassa	Adam's-apple flower, k-poŋgbo, opuko, patié patié, pete-pete
Africa	Staudtia kamerunensis	Niové, ichala, ọbara-okisi, íyìp ókōyò
Africa	Strombosiopsis tetrandra	Bwika, Mbazoo
Africa	Dichostemma glaucescens	Mangamba, Mongamba
Amazonia	Oenocarpus bacaba	Bacaba, Turu Palm
Amazonia	Eschweilera coriacea	matamatá
Amazonia	Iriartea deltoidea	bombona
Amazonia	Pentaclethra macroloba	pracaxi
Amazonia	Euterpe oleracea	açaí palm
Amazonia	Astrocaryum murumuru	murumuru
Amazonia	Geissospermum sericeum	quina-quina branca, pao pereira
Amazonia	Eperua falcata	bootlace tree, bi udu, wapa
Amazonia	Euterpe precatoria	mountain cabbage; açai, açaizeiro, açaí-do-amazonas, palmiche, wassaï, huasaí, manaca
Amazonia	Rinorea racemosa	branquinha
Southeast Asia	Shorea multiflora	yellow meranti
Southeast Asia	Tristaniopsis merguensis	Hill Tristania
Southeast Asia	Cotylelobium melanoxylon	Resak hitam; Khiam khaao; Resak tempurong; Giam tembaga
Southeast Asia	Dehaasia caesia	Magasil, Medang
Southeast Asia	Streblus ilicifolius	Jungle Holly, Merlimau
Southeast Asia	Shorea xanthophylla	seraya kuning barun
Southeast Asia	Shorea parvifolia	light red meranti, white lauan
Southeast Asia	Elateriospermum tapos	Perah, Buah Perah, Pogoh Nut, Tapos
Southeast Asia	Ixonanthes reticulata	Pagar Anak, Ten Men Tree, Inggir Burong, Nyiran Burong
Southeast Asia	Gluta oba	Rengas

Senior author, Professor Simon Lewis (UCL Geography and University of Leeds) said: "We wanted to look at tropical forests in a new way. Focusing on a few hundred common tree species on each continent, rather than the many thousands of species that we know almost nothing about, can open new ways to understand these precious forests. This focus on the commonest species should not take away from the importance of rare species. Rare species need special attention to protect them, but quick and important gains in knowledge will come from a scientific focus on the commonest tree species."

The researchers assembled forest inventory data from intact tropical forests that hadn't been affected by logging or fire. In each of 1,568 locations, teams identified and recorded every tree with a trunk greater than 10 centimeters in diameter, in a patch of forest, usually one hectare, which is a square of forest measuring 100 meters on each side.

Professor Lewis has been collecting and collating this data for 20 years. The effort is a collaboration of the largest plot networks across the Amazon (Amazon Tree Diversity Network; RAINFOR), Africa (African Tropical Rainforest Observatory Network, AfriTRON; Central African Plot Network), and Southeast Asia (Slik Diversity Network; T-FORCES), brought together for the first time for the published analysis.

This collaboration across hundreds of researchers, field assistants, and local communities resulted in a total of 1,003,805 trees sampled, which included 8,493 tree species, across 2,048 hectares, equivalent to almost eight square miles of forest. The teams inventoried 1,097 plots in the Amazon totaling 1,434 hectares, 368 plots in Africa totaling 450 hectares, and 103 plots in Southeast Asia totaling 164 hectares.

Reference: "Consistent patterns of common species across tropical tree communities" by Declan L. M. Cooper, *et al.*, 10 January 2024, *Nature*.
DOI: 10.1038/s41586-023-06820-z

scitechdaily.com

Forest Scenes

Canada's logging industry devours forests crucial to fighting climate change

A portion of boreal forest in northern Quebec. (Credit: Renaud Philippe for The New York Times)

A study finds that logging has inflicted severe damage to the vast boreal forests in Ontario and Quebec, two of the country's main commercial logging regions.

Canada has long promoted itself globally as a model for protecting one of the country's most vital natural resources: the world's largest swath of boreal forest, which is crucial to fighting climate change.

But a new study using nearly half a century of data from the provinces of Ontario and Quebec – two of the country's main commercial logging regions – reveals that harvesting trees has inflicted severe damage on the boreal forest that will be difficult to reverse.

Researchers led by a group from Griffith University in Australia found that since 1976 logging in the two provinces has caused the removal of 35.4 million acres of boreal forest, an area roughly the size of New York State.

While nearly 56 million acres of well-established trees at least a century old remain in the region, logging has shattered this forest, leaving behind a patchwork of isolated stands of trees that has created a landscape less able to support wildlife, according to the study. And it has made the land more susceptible to wildfire, scientists say.

Though Canada claims to hold logging companies to high standards, scientists involved in the peer-reviewed study, which was published in the academic journal Land, said their findings show that the country allows unsustainable practices that have deeply degraded the forest.

Scientists not involved in the study said it provides a groundbreaking understanding about what decades of commercial logging has done to the boreal forest, which refers to northern woodlands made up mainly of evergreen trees.

"This is the first time that we have this kind of a clear view for two of the largest provinces in Canada," said Christian Messier, a forest ecology professor at Université du Québec à Montréal, who was not involved in the study. "I think the approach, the methodology, was the most novel aspect of this paper."

Under Canada's forestry standards, logging companies can clear vast areas of all trees and vegetation and are required to replant the land or demonstrate that the forest will naturally regenerate.

But, scientists say, without the thick bark of older trees, younger trees are more vulnerable to wildfire, and logging companies typically replant species more suitable for the timber industry rather than those resistant to fire.

"The Canadian government claims to have managed the forest according to the principles of sustainable forest management," said Brendan Mackey, the study's lead author and a professor and director of a climate research group at Griffith University in Brisbane, Australia. "But its notion of sustainability is really tied to maintaining and maximizing wood production and ensuring the regeneration of commercially desirable trees. That has a lot of implications for biodiversity."

Canadian officials did not directly address questions about the study's findings, providing only a written statement broadly citing the country's efforts to preserve the boreal forest.

That policy focuses on "conservation, recreation, habitat, water quality, economic development and the relationship Indigenous peoples have with the land and forests," said the statement from Carolyn Svonkin, a spokeswoman for Canada's minister of energy and natural resources.

Peter Wood, a lecturer on forest resources management at the University of British Columbia in Vancouver, who was not involved in the study, called its findings "shocking," adding that they highlight "what is at stake as we focus our logging on some of these older and more intact areas."

The enormous and ecologically vital boreal forest extends through North America, northern Europe and Siberia, but the largest portion is in Canada.

Beyond being an important natural habitat for many animals and plants, the boreal forest locks up huge amounts of climate-warming carbon dioxide. The world's boreal forests are estimated to collectively hold 703 gigatons of carbon in trees and soil. The world's tropical forests, by comparison, store about 375 gigatons of carbon.

Prime Minister Justin Trudeau, who came to office eight years ago on a pledge to aggressively tackle climate change, has long promoted Canada's boreal forest as essential to the world's well being.

"Canada is home to one of the largest continuous forests in the world and we have a responsibility to protect it," Mr. Trudeau told the U.N. Climate Summit in 2021. "We've seen the impact of global temperatures rising – they've been rising twice as fast in Canada as elsewhere in the world – on those forests. We have a responsibility to be stewards of them."

To conduct the study on the boreal forest in Quebec and Ontario, researchers obtained publicly available inventories of harvested trees from the provinces and linked them to maps and satellite imagery to create a detailed picture of the cumulative impact of logging.

"This study starkly shows that where logging has occurred, there are fundamental characteristics of the forest that have not returned," said Jennifer Skene, a climate policies analyst for the Natural Resources Defense Council, which helped finance the report's research.

Replanting land after cutting older trees yields younger forests that are ecologically compromised, Professor Mackey said. They hold less carbon, are generally more vulnerable to disease and insect infestations and are poor habitats for the many animals and plants that depend on old forest homes to thrive or, in some cases, to survive.

As part of the study, Professor Mackey and other researchers looked at the effects of logging on large groups of woodland caribou – animals that require large areas of older forest and that are affected by human disturbance. Logging roads, for example, make it easier for predators to hunt caribou, researchers said.

Of the 21 herds within the two provinces' boreal regions that researchers studied, 19 were at a high or very high risk of becoming unable to support their population.

While in other parts of the world, deforestation, or the removal of trees for uses like farming and cattle ranching, has become a major threat, the challenge in Canada is different.

"There's been no deforestation in that sense," Professor Mackey said. "But there has been a high level, ecologically speaking, of forest degradation."

"You still maintain a forest cover and you might still maintain the forest in a land-use sense over time," he added. "But you have degraded some aspect of its ecological quality."

And most ecologists regard degradation as the consequence of the type of large scale clear-cutting that is nearly the universal method of logging in Canada.

"Forest degradation is the more important metric for Canada because it really captures more of what's actually happening," Mr. Wood said. "Canada has downplayed the impact of the forest industry."

nytimes.com

Diverse forests are best at standing up to storms

Mixed forest stand in Solböle, Southern Finland, that would be more resistant to storms. It hosts both broadleaf and conifer species. (Photo credits J. Barrere)

European forests with a greater diversity of tree species are more resilient to storms, according to new research published in *Functional Ecology*.

A new study by researchers at the French National Research Institute for Agriculture, Food and Environment (INRAE) reveals that in Europe, the forests that are most resilient to storms are those with a greater diversity of tree species and dominated by slow growing species with high wood density, like oaks.

The researchers also found that the positive effect of tree diversity on resistance to storms was more pronounced under extreme climatic conditions, such as the hot-dry conditions of the Mediterranean region and the cold-wet conditions of northern Scandinavia.

Our study argues for forest management practices that promote diversity and slow growing tree species such as oak.

In recent decades, Europe has experienced more frequent and severe windstorms and these are now reported to be main disturbance agent for forests, both in terms of area and timber volume. Not only does this put timber production at risk but also other ecosystem services that forests provide, such as habitat and carbon storage.

The researchers say their findings can aid in predicting the impact of increased storm frequency and intensity on forests and point to how we can make forests more resilient.

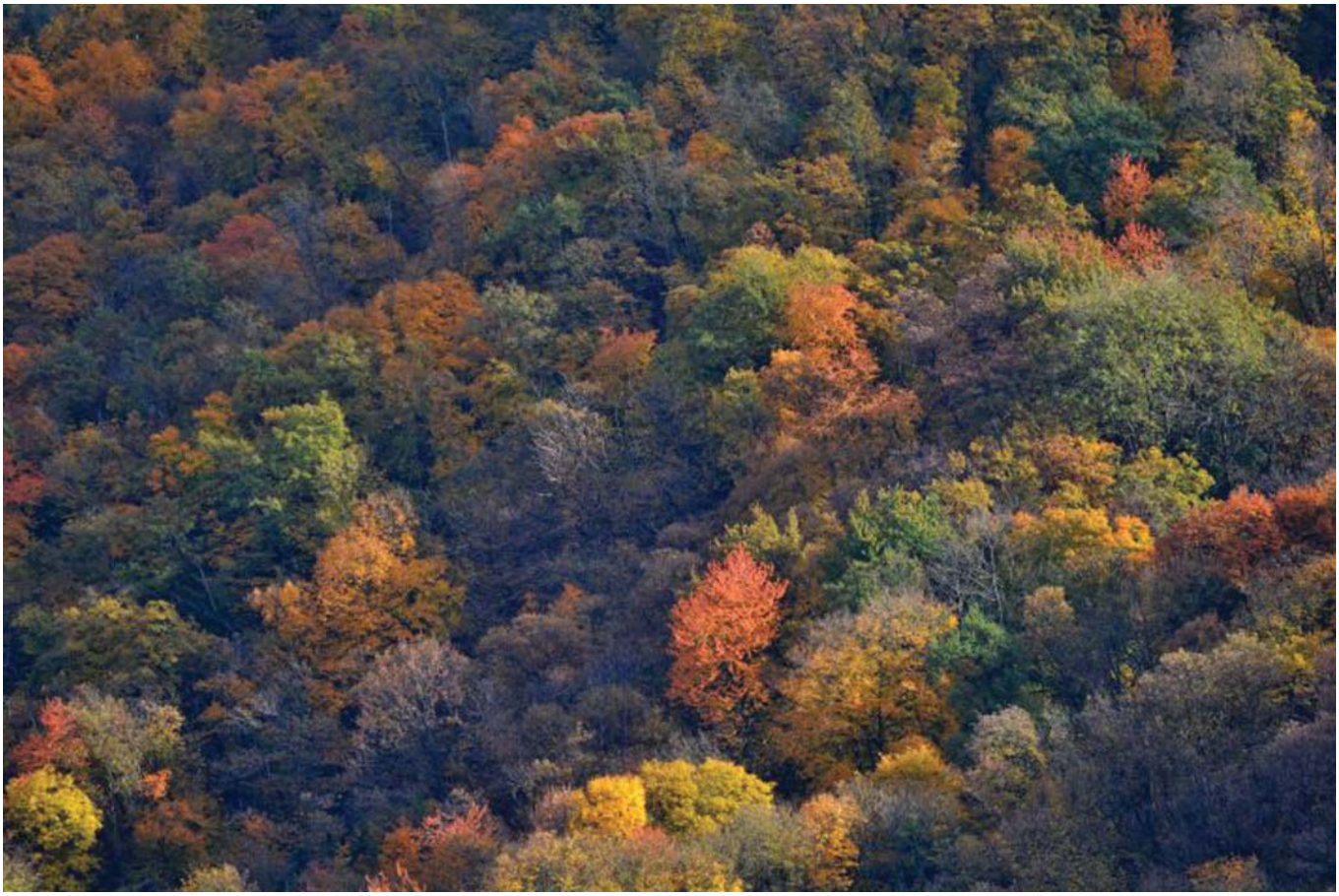
Dr Julien Barrere, researcher at INRAE and lead author of the study said: "An important takeaway from our study is that monocultures of fast growing species such as pine, although valuable from an economic point of view, are more susceptible to storm damage. In a context of increasing storm losses across the continent, our study therefore argues for forest management practices that promote diversity and slow growing tree species such as oak."

Modelling the impact of storms

In the study, the researchers created a model to simulate the dynamics of hundreds of forests after a storm, calibrating the model with data from 91,528 real-life forest plots in Spain, France, Germany, Sweden and Finland. "Our simulated forests varied in both climate conditions, ranging from Mediterranean to Boreal, and in composition, i.e. in tree species diversity and identity." explained Dr Barrere. "This allowed us to quantify the relationship between forest composition and resilience to storm disturbance, and how this relationship changes along the European climatic gradient."

The researchers caution that because this is a modelling study, field work is still needed to support the findings. Dr Barrere said: "Although modelling studies like ours are essential for drawing conclusions about forest dynamics due to the long timescales in nature, the results must be interpreted with a clear understanding of the model hypotheses and complemented by field studies."

The researchers call for future studies to look at forest resilience over longer time scales with multiple disturbance events,



Belledone, a Mountain forest in autumn. (Credit G. Loucougary)

rather than just single storms. Dr Barrere added: "This study focuses on the response of European forests to a single storm event. While this is a necessary first step, the current context advocates for studies that focus on the resilience of forests to disturbance regimes rather than single disturbances."

Read the full study here

M., & Kunstler, G. (2024). Forest storm resilience depends on the interplay between functional composition and climate Insights from European-scale simulations. *Functional Ecology*, 00, 1–17. https://doi.org/10.1111/1365-2435.14489

britishecologicalsociety.org

Ireland: The strong case for moving away from monoculture

An EPA-commissioned review identified a need for 875,000 more hectares of forest by 2050, or roughly 33,000ha per year. That's more than double the area existing today

Last year, the Government published Ireland's Forest Strategy to 2030 which will be financed by an unprecedented €1.3 billion in public money. It comes after a time of crisis for the forestry industry and, some would say, more importantly, an intensifying crisis of climate breakdown and biodiversity loss.

For decades, forestry has been beset with disagreements about everything from where forests should go to the types of trees that are used. It is fair to say that the model of planting single-species blocks of non-native conifers, particularly Sitka spruce, has not proved popular.

However, all agree that regardless of the type of forest, we simply don't have enough of them. A review commissioned by the Environmental Protection Agency published early in 2023 concluded that, just to meet net-zero emissions of greenhouse gases from the land use sector by 2050, we will need an additional 875,000 hectares of forest, or roughly 33,000ha per year. That's more than double the area that exists today.

While there is an urgent need to transform the quality as well as the quantity of forests, the new Forest Strategy is primarily focused on expansion. It sets a target of increasing forest cover from today's 11.3 per cent to 18 per cent by 2050, at a rate

Schoolchildren from Our Lady Immaculate Schools join members of Dublin City Council and the Darndale Together Implementation Oversight Group planting 3,000 native trees, including oak, birch, willow and hazel, across 4,500 sq m at Darndale Park, Dublin. The 'urban forest' is part of an EU funded city tree-planting initiative. (Photograph: Alan Betson/The Irish Times)

of 8,000ha a year: modest compared to what's needed, but ambitious compared to the rate at which we are moving. But can it deliver?

Ireland would not be the first country to set its mind at reafforestation. The most notable example in the world must be Costa Rica, which was dealing with high levels of deforestation in the 1980s and early 1990s. Nevertheless, the small Central American country managed to turn things around, increasing forest cover from a low of 21 per cent to over 60 per cent today. This impressive feat was achieved not by establishing monoculture plantations but by allowing the native forest to regenerate itself. In fact, no country that has substantially expanded its forests in recent centuries has done it through planting trees.

Even the native forest scheme prevents the planting of trees above specified elevations, immediately ruling out the restoration of our upland forests. Little of this makes sense

In early 2021, a conference of scientists hosted by the Royal Botanic Gardens in Kew, London, on Reforestation for Biodiversity, Carbon Capture and Livelihoods produced 10 golden rules for restoring forests. Chief among them was to "use natural forest regrowth wherever possible". The delegates went so far as to declare that they were "alarmed at the predominance of large-scale planting of monocultures of exotic tree species. . . which have been shown to have detrimental impacts on native biodiversity and ecosystem services and often sequester less carbon than natural forest". The latter claim is increasingly supported by scientific evidence. One opinion in the journal Nature suggested that natural forests were 40 times more effective than plantations at storing carbon.

The UK charity Rewilding Britain, meanwhile, has estimated that just allowing existing areas of forest in England to expand using natural regeneration would create an additional 405,000ha of native woodland. This form of forest expansion is very low-cost, ecologically coherent in that it restores the web of life and not only trees and, because it is diverse, provides resilience in the face of pests, fires and climate change. Indeed, even many commercial foresters themselves around the world look for natural regeneration to avail of lower costs and lower risk of catastrophic losses.

Even in Ireland, the most recent Forest Inventory demonstrates that between 2006 and 2022, 37,000ha of new forests have spontaneously emerged. The Government has acknowledged the benefits of this free and ecologically appropriate form of forest expansion by creating a scheme dedicated to "rewilding/emergent forest". Yet, landowners who want to avail of natural regeneration to grow new forests will receive a mere €350 per hectare, the lowest of all the payment rates by far.

On top of this, to be eligible for this scheme, the area to be rewilded must have potential for tree canopy closure within six years, which is far too short a time frame. Any gaps in the emerging scrub need to be planted with up to 1,100 stems/ha of native trees from nurseries, a stipulation that overlooks the benefits of natural regeneration, as the self-seeding of trees would naturally close any such gaps over time. To round it off, the entire scheme is limited to areas of mineral soil, immediately excluding the 20 per cent of the country that has peat soil. Even the native forest scheme prevents the planting of trees above specified elevations, immediately ruling out the restoration of our upland forests. Little of this makes sense.

Oak tree saplings planted by Coillte in Cahermurphy, East County Clare. (Photograph: Bryan O'Brien/The Irish Times)

Marina Conway is chief executive of Western Forestry Co-Op, which was established in 1985 to encourage more farmers to plant trees. She has seen a big shift in the last couple of years so that now she says "80–90 per cent of our inquiries are for native forests". This scheme is based upon planting saplings of native tree species, and the rates are generous, with an annual premium of €1,103/ha per year for 15 years (20 years if you're a farmer), and an upfront grant of €6,744/ha. Meanwhile, interest in plantations of Sitka spruce has fallen away, she believes, for a variety of reasons, including bad press. Premiums for these forests are only €746/ha per year.

Conway says there's a "huge amount in this Forestry Programme for people, and there's really good options". She says interest in reprofiling existing monoculture forests to make them more diverse, eg through methods such as continuous-cover forestry, is "massive".

"But," she says, "my main concern is delivery." She fears that "we have made the process so difficult and so cumbersome that it's hard to see how it can be delivered". She notes many of the schemes are not open, while the level of "forensic environmental investigation" is placing too high a burden of proof on applicants to show that no environmental harm will arise, irrespective of the existing type of land. "It feels like there's absolutely no trust here as to the foresters' level of professional judgment," she says.

A new "native tree area" scheme allows landowners to establish up to 1ha of native trees without going through the licence system. Conway says interest for this has been "off the scale. . . every meeting held around the country about it was packed". However, this too is for mineral soil only, needlessly excluding swathes of the country.

Ray Ó Foghlú is the farm programmes co-ordinator with Hometree, a recently formed charity that promotes the establishment of native woodland. He says "there will always be a place for woodland planting" which, be believes, is "well looked after" in the new Forest Strategy. "But the big omission is the promotion of woodlands naturally regenerating". While not a panacea, he adds, "it should be catered for – if there is a big missed opportunity, it's that".

Will Ireland achieve what no other country has managed? Despite the welcome levels of ambition and investment, it is difficult to see how it will

Due to changes in how farm subsidies are paid out, farmers are no longer being penalised for having scrub and emerging forests on their land, which is positive, but Ó Foghlú believes, "It's really unfair that if a woodland emerges that's not planted, the remuneration for the farmer is a fraction of what it would be if that was a greenfield site that was planted with trees.

"It shows that there is still a skewed perception of ecological benefits over other benefits. We know that the best way to expand our old woodlands is through natural regeneration. Yet if you do this you will only get a fraction of what you would if you cleared that scrub away and put saplings in the ground, and that seems wrong to me," he adds.

An old oak tree in Cahermurphy Oak Wood, a temperate rain forest remnant in the Slieve Aughty mountain range of East Clare and South Galway. (Photograph: Bryan O'Brien/The Irish Times)

Ó Foghlú agrees with Conway that even for the good schemes the process is too slow, and this can result in farmers exploring options other than forestry.

Will Ireland achieve what no other country has managed? Despite the welcome levels of ambition and investment, it is difficult to see how it will. The trees themselves will grow nearly anywhere – Ireland was once 80 per cent forest – but the bureaucracy seems to think that nature itself is not required to meet our objectives.

By Pádraic Fogarty
irishtimes.com

Japan's thirst for biomass is having a harmful impact on Canada's forests

When you walk through a fresh clearcut in British Columbia, you are surrounded by a "one-dimensional, dead landscape," says Michelle Connolly of Conservation North, a volunteer conservation group based in the Canadian province.

The forest's soft, mossy ground, the birdcalls and the cool moisture in the air are gone. In their place, twigs and debris lay everywhere, occasionally interspersed with pieces of garbage. Sound and movement from plants or animals have almost ceased, except for the buzzing of insects. The smell of burned piles of slash – wood debris not profitable enough to bring to a mill – hangs in the air.

"That's the story of conventional forestry in BC," Connolly says.

Last month, Connolly visited Japan to share how such scenes are linked to the nation's "green" energy: A portion of BC's razed forests are being used to make wood pellets, a type of biofuel that Japan is importing and burning in increasing quantities as an alternative to fossil fuels.

The Japanese government claims wood pellets are "carbon neutral" because trees absorb carbon dioxide throughout their lives and, therefore, do not result in a net increase of atmospheric carbon dioxide when burned. The Agency for Natural Resources and Energy, which is in charge of Japan's biomass policy, did not respond to a request for comment.

Experts in the field, however, warn that this kind of carbon accounting is dangerously misguided.

Research by British think tank Chatham House details how woody biomass fuels like wood pellets release a large amount

An old growth forest near Fort St. James, British Columbia, Canada, in an area where pellet producer Drax is permitted to cut. (Credit: CONSERVATION NORTH)

of carbon dioxide during combustion – even more than coal – due to having lower energy density. Burning trees for electricity increases atmospheric carbon dioxide in the near term, precisely when the world most needs to reduce greenhouse gas emissions. And when forests are cut, their ability to absorb and sequester carbon is halted for decades.

The Japanese government plans to have biomass contribute 5% of Japan's power needs by 2030, putting it on par with wind. Hydrogen and ammonia, the government and industry's controversial long-term bet to decarbonize the power sector, are expected to only contribute 1% by that year.

Japan began seriously investing in woody biomass after the 2011 Fukushima nuclear disaster triggered a sudden shortage of zero-emission energy, as the nation took all of its reactors offline. Beginning in 2012, generous government support for renewable energy projects led to 434 approvals for power plants designed to run either partially or fully on woody biomass, although only 191 had come online as of June 2022 and many don't use imported pellets.

Still, the country's wood pellet imports from Canada shot up accordingly, from 76,000 metric tons in 2013 to 1.4 million in 2022, representing 31% of Japan's total pellet imports that year (other top sources of pellets include Vietnam, the U.S. and Malaysia).

Japan received 40% of all Canadian wood pellet exports in 2022, according to Canadian government statistics. Over the first 10 months of 2023, that figure rose to 55%, with practically all of that coming from BC.

However, Connolly and other experts warn that BC's overstretched and declining forestry sector may not be able to provide Japan with a steady supply of wood pellets for long – and, for the present, it is leaving a trail of environmental destruction in its wake.

Unknown exploitation

Wood pellets are enmeshed in BC's forestry industry, and proponents claim that pellets help utilize waste generated from producing other products, such as lumber. The catch, according to Connolly, is that "BC's forestry system is fundamentally unsustainable."

The province has experienced roughly a century "of forest exploitation, and the last 60 years of that has been ultra-aggressive," she adds.

Forest land accounts for roughly two-thirds of BC's total area, and that's a large area – the province is three times the size of all of Japan. It's unknown exactly how much of the province's 600,000 square kilometers of forest remain untouched by logging, but experts and activists warn that such "primary forests"

Drax's Meadowbank pellet mill in British Columbia in 2022. Piles of logs and, in the background, what appears to be woodchips await processing into wood pellets. (Credit: MIGHTY EARTH)

are dwindling. Although BC does release figures for "old growth" logging, primary forests represent a wider category of ecosystems that don't contain signs of human disturbance but whose trees might not fit the definition of "old growth."

The results of a government-initiated strategic review of old-growth forests in BC noted in 2020 that the province's "economy is heavily dependent on trees harvested from primary forests of old trees." This is especially true of logging in the province's interior, where "large-scale commercial cutting of primary forests" began 50 or fewer years ago and where it can take "several decades" for replanted trees to be ready for a second harvest.

BC's pellet industry is located in the interior. As a result, wood pellet feedstock likely comes from clearcut primary forest, whether a pellet mill uses byproducts such as sawmill waste or whole trees sourced directly from a logging site.

Connolly's home city, Prince George, lies in an area of the BC interior where forests are currently being harvested – in part, for pellets.

From 2017, 9% of the output of the 80,000-square-kilometer Prince George timber supply area has been set aside for "bioenergy stands" – trees fit for logging for pellets – defined as "mature, damaged pine-leading stands" with relatively low marketability as saw logs.

However, Andrew Weaver, a professor at the University of Victoria's School of Earth & Ocean Sciences and a former member of the province's Legislative Assembly, told The Japan Times that even harvesting such "damaged" stands could set a dangerous precedent. After being cut, replanted trees will take decades to grow, during which time the wood pellet industry will need more raw materials. The impacts of climate change also make a future second harvest less predictable, Weaver added.

Connolly argues that BC's remaining primary forest would be better left as-is.

Primary forests are the best habitat for much of BC's wildlife, especially large-bodied mammals, including critically endangered caribou, as well as bears that make dens in large tree trunks. They also keep watersheds clean, an essential ecosystem service that benefits both animals and people (Vancouver, the province's economic capital, has banned logging in its watersheds since the 1990s).

In addition, primary forests contribute significant carbon sinks, with much carbon dioxide stored in large, old trees and undisturbed soil and peat. Scientists note that primary forests are more effective at storing carbon than single-species plantation forests; it can take centuries for a replanted forest to store as much carbon as the primary forest it replaced.

Currently, U.K.-headquartered Drax – a utility at home and a pellet producer in Canada and the U.S. – controls eight of 12 BC pellet mills, roughly 80% of the province's total wood pellet production capacity.

At its mills, huge piles of trees await processing. Although the company previously claimed to only use "sawdust and waste wood," a 2022 investigation by BBC Panorama found evidence that Drax was also sourcing directly from primary forests.

A pile of timber waste following a clearcut near Mackenzie, British Columbia, that had been designated for Pinnacle Renewable Energy, a pellet producer that was later taken over by Drax. (Credit: CONSERVATION NORTH)

Drax responded to the BBC investigation by saying that 80% of its source material is "sawmill residues" and the rest is "waste material" from forests at risk of fire or disease.

"In Canada, good forest management includes managed removals, which create less dense stands of trees and reduce what's left lying on the forest floor, helping to protect from fires, pests and diseases, and preserving biodiversity," a Drax spokesperson told The Japan Times in an email. "We support good forest management by providing a market for this material and turning it into something useful – sustainable biomass – which can be used as fuel for renewable, low carbon power."

During her trip to Japan, Connolly felt that Japanese audiences – including wood pellet stakeholders, media and members of the general public – were puzzled and disappointed to learn how BC's primary forests are being turned into wood pellets.

"It was actually really emotional for me to see people's faces fall," Connolly says.

A finite amount of wood

Although wood pellets are often billed as a "sustainable" resource, there may be a limit on the amount of pellets BC can provide Japan, warned Ben Parfitt, a resource policy analyst for the Canadian Center for Policy Alternatives who also covered forestry in BC for many years as a journalist. Parfitt traveled to Japan with Connolly to speak about wood pellets.

BC's logging industry, which pellet manufacturers rely on, is shrinking. Roughly 51.3 million cubic meters of timber were logged in 2022, down from 76.6 million in 2013, according to data Parfitt compiled from government statistics. Many companies are moving their operations to the southern U.S., where trees grow faster in a milder climate on already extensive forest plantations. The number of sawmills in BC is also decreasing, down from 111 in 2005 to 64 in 2023.

In Parfitt's view, the logging industry is contracting primarily because it logged too much, too quickly. "They have run out of the easiest-to-access and cheapest fiber," he said.

With logging in decline, Parfitt predicted increasing competition for resources going forward.

"That's pretty much where, I think, the rubber hits the road," he concludes. "There's a finite amount (of wood) out there."

In a public event during his visit to Japan, Parfitt highlighted both Drax's overwhelming control of BC's wood pellet industry and the fact that the company itself consumes vast quantities of wood pellets at its own power plant in the U.K. As competition for resources intensifies, the decisions Drax makes going forward could potentially have a big impact on Japan's wood pellet supply, Parfitt warned.

The company itself brushed off such concerns, saying in its statement to The Japan Times that it responsibly manages its commercial agreements and closely analyzes market issues affecting itself and its suppliers.

"The majority of the sustainable biomass we supply to Japan is sourced from British Columbia in Canada where the forests are sustainably managed and subject to environmental regulation, careful management and third-party certification," the Drax representative wrote.

Still, Parfitt is not alone in his concern over the future of Japan's supply of BC wood pellets. Weaver too sees BC's relatively slow-growing forest resources as "mismatched" with the wood pellet industry and its eager customers in Japan. Wood pellets aren't anything more than a "short-term fix" for the country's energy needs, he said.

Going forward, Weaver suggested that Japan, known abroad as a nation of innovators, could show more international leadership in renewable energy.

"Burning wood is literally what our ancestors and Neanderthals did many hundred thousands of years ago," he says. "Surely we're better than that."

japantimes.co.jp

No food in forests: Invasive species and altered habitats in Karnataka's Western Ghats are creating a food crisis

The crisis may be fueling conflicts between humans and wildlife, prompting animals to venture into human settlements

A lantana plant. (Photo: iStock)

In Western Ghats, the pervasive invasion of non-native plant species is swiftly displacing indigenous vegetation, triggering a profound ecological imbalance. This insidious takeover is instigating a pressing food crisis as the invasive plants disrupt the natural habitat of crucial prey species. The ensuing scarcity compels wildlife to venture into human settlements, intensifying conflicts between communities and animals.

The scenic patches of the Western Ghats, particularly those adjacent to major roads like national highways, state highways and major district roads, are witnessing a transformation. The natural vegetation is being replaced by exotic species like *Simarouba glauca*, as well as economically valuable ones like coffee, areca, red sanders, teak, mahogany and rubber.

Invasive species such as *Lantana, Eupatorium* and *Parthenium* are causing additional ecological disruption. These aggressive invaders are decimating traditional forest fruit-bearing trees such as wild mango, wild jack, wild plantains, forest jack, and various berries, which are critical sources of food for animals, rodents and simians.

As invasive species establish themselves and spread, the Western Ghats' flora and fauna are changing dramatically. Large mammals, particularly leopards, are venturing into human habitats in search of food. The loss of habitat and the transformation of vegetation, combined with an increase in the population of large carnivores, contribute to escalating conflicts.

Lantana has invaded 87,224 hectares (863.62 square kilometres) of Bandipur National Park (BNP), accounting for approximately 75 per cent of the park's total area. The dense growth of the invader ranges from 20 per cent to 80 per cent in different pockets, restricting the movement of animals. In some areas, the weed has grown so lushly that even a herd of elephants behind it would remain hidden, according to conservationist Giridhar Kulkarni.

In the 1990s, the BNP was a grazing ground for many herbivores like gaur, chitals and four-horned antelopes, said Jenu Kuruba community leader Narasimha, who also works as a forest watcher. "The grazing areas would often turn into hunting grounds for tigers, dholes (wild dogs) and leopards. The *Parthenium* started appearing in smaller numbers in mid-2000s and the forest officials and the village forest committees (VFC) jointly tried to weed it out," he said.

But the efforts were in vain – after a monsoon season, *Lantana* had also invaded the park, said Narasimha. "Over 1,200 tribal villagers from 60 villages were in the weeding campaign along with the forest department, but it still failed. There was not a part of BNP without *Lantana* by 2017," he said.

After the takeover of the grasslands by the invasive plants, the resident herbivores either migrated or perished, the community leader said. "The prey animals no longer wander the region freely. The villagers are still trying to weed out *Lantana*," Narasimha said.

Over 40 per cent of the land area in Biligiri Rangaswamy Temple Tiger Reserve, Karnataka is also overtaken by *Lantana*, said Deputy Conservator of Forest Santhosh Kumar.

Lack of food and restricted movement has resulted in wild animals entering human settlements. In the last three years, Nagarahole National Park in Karnataka has witnessed an increasing number of wildlife incursions into human habitation – about 100–120 per year, said Nagarholay Bheemappa, VFC member from the park's K Gudi division. Meanwhile, VFC networks reported 41 cases from 2006 to 2011.

"Leopards enter villages and pick up dogs and cattle, whereas larger carnivores, such as tigers, attack humans and cattle," he said.

Habitat destruction caused by linear projects, mining, encroachment and irregular tourism are the primary causes of increased human-wildlife conflict, according to Kulkarni. "The connectivity between wildlife corridors used by large mammals – especially elephants, tigers – has also been lost in many areas," he pointed out.

Elephant migration routes in Hassan, Kodagu, and Mysuru districts have also changed as agricultural and commercial plantations have expanded. The Alur-Brahmagiri migration route, one of Karnataka's longest, passes through densely populated areas as well as newly developed agricultural pastures.

Bamboo and wild plantains are the traditional food of the elephants; these are now in short supply on this migration route for various environmental reasons due to human-made infrastructure corridors, including pipelines, power transmission lines, roads, and irrigation projects. The jumbos stick to their migration route, consuming whatever comes their ways – banana plantations, arecanut trees, pineapple gardens, pepper vines and even paddy crops.

Ganesh Naika of Sullia taluk says, "Ours is the last village in Karnataka before the elephants enter Kerala; the corridor has

undergone changes all the way till Wayanad. Recently, elephants were also seen devouring paddy on this route. It has also enhanced the chances of human-elephant conflicts and during the last three years, 12 people have been killed in different places in Sullia," Naika claimed.

In the face of this ecological upheaval, several rainforest complexes, including Nagarahole, Anshi National Park, Kudremukh National Park and Bhimgad Wildlife Sanctuary, are proactively addressing the invasion of invasive species. Initiatives such as yearly seed dispersion and grassland development programmes are underway to mitigate the impact and restore a semblance of balance.

The forest department is encouraging planting local fruit and berry-yielding trees to retain wildlife inside the national parks, said AV Satish, assistant conservator of forests. The forest department has also created nurseries of forest trees in more than 45 locations. "In fringe areas, we plant wild mangoes, *Nerale* (black plum), jackfruit and wild jack varieties to prevent animals from foraging in human habitation," he said.

Lantana infestations date back 200 years and are a problem in all four states of Western Ghats, said senior wildlife official and former executive director of Chamarajendra Zoological Garden, Mysuru, BP Ravi. "The only way to make way for the growth of natural grasslands is by manually removing them with human hands. Once the grasslands come back to their natural expanse and growth pattern, the herbivores will remain inside the forests, and even the predatory animals will stay put in their habitats."

Former Principal Chief Conservator of Forests Vinay Luthra, however, disputed the notion that a lack of food is the sole cause of wildlife incursion. He emphasised, "The wildlife incursion into human habitations is not a new phenomenon, it has been happening forever. When extra high-calorific food is available just around the corner, wildlife, particularly elephants, will invade it irrespective of the food inside the forests," he said.

downtoearth.org.in

Turning Nepal's forests into fortune

Nepal is committed to preserving forest coverage, but the focus must be on effective implementation.

In the late 1970s, the World Bank made a grim prediction that the forests in Nepal's hilly regions would disappear by the 1990s. Fortunately, that did not happen as the government made necessary course corrections by launching community forestry programmes. Since then, the forest cover has nearly doubled, with forests now accounting for almost 45 percent of the country's total land area.

In the early decades, the community forestry (CF) programme achieved multiple objectives simultaneously. Initially, CF aimed to meet the basic needs of communities by actively participating in forest management. CF then evolved to support the livelihoods of community members by allowing them

to produce non-timber forest products (NTFPs) for additional income. Furthermore, CF evolved to establish strong local institutions by forming community forest user groups (CFUGs), promoting good governance and addressing power, gender and governance issues at the local level. Evidence shows that CF supports women's empowerment and lays the groundwork for integrating gender-inclusive strategies and policies.

While CFs successfully achieved their early objectives, they failed to evolve to meet the present socio-economic needs of the country. However, I feel that the entire forestry sector in Nepal is running on the legacy of the "success story" of community forestry in the 1990s and early 2000s.

Community forestry in Nepal

Today, community forestry in Nepal has received international praise for doubling forest coverage from 26 percent in 1992 to 45 percent in 2016. They cover one-third of the country's total forest area and are managed by 22,000 community forest user groups, comprising 3 million out of 56 million households in Nepal. However, this increasing forest coverage comes with forgone opportunity costs as Nepal imports wood and furniture worth around $129 million annually.

After achieving the goal of protection-oriented community forestry for increasing forest cover, the focus should now switch to prioritising harvesting and regeneration to increase the economic well-being of people. The underutilisation of forest resources is prevalent in Nepal, and the failure to establish community forestry enterprises has proven costly for the country's local communities and the national economy. Although successful regarding carbon storage and climate mitigation, the policy resulted in unintended consequences for rural development, such as the exodus of youth from rural areas to cities or foreign countries for employment opportunities.

REDD+ initiative in Nepal

When a country fails to harvest its tangible forest products sustainably, it should focus on reaping the economic benefits of forest conservation. One such benefit comes from reducing emissions from deforestation and forest degradation (REDD+). REDD+ is a result-based payment mechanism where a country gets paid for its verifiable emission reduction, usually represented as a unit of carbon credit (one credit equals one ton of carbon dioxide equivalent).

REDD+ implementation could provide much-needed climate finance for forest countries like Nepal. Moreover, it could be an essential source of income for indigenous and local communities to develop alternative climate-resilient livelihoods. Nepal started its REDD+ journey in 2011 by implementing pilot projects in three districts covering 10,266 Ha and 104 CFUGs. Since then, the country has completed multiple preparatory works to enable participation in the international voluntary carbon market, including developing a National REDD+ Strategy, a Benefit Sharing Plan and establishing the REDD Implementation Center (REDD IC) under the Ministry of Forest and Environment.

Currently, Nepal has signed the Emission Reduction Purchase Agreement (ERPA) with the Forest Carbon Partnership Facility of the World Bank and is in the process of signing the agreement with the Lowering Emissions by Accelerating Forest Finance (LEAF) coalition coordinated by Emergent. For the World Bank, Nepal aims to sell 9 million credits from the Terai Arc Landscape, allowing it to earn as much as $45 million ($5/credit) within 2018–24. According to a document submitted by Nepal to the LEAF coalition, Nepal aims to deliver 30 million credits in the 2022–26 period and could earn as much as $300 million ($10/credit). It will only receive that money once it delivers these credits, which will be verified and issued using rigorous standards.

To benefit from the rapidly evolving voluntary carbon market, implementing entities like the REDD IC must demonstrate high adaptability and adjustability to changing circumstances. The absence of adaptive governance explains why Nepal has not received payment from the World Bank despite signing the ERPA almost three years ago. However, Costa Rica and Ghana, which started their REDD+ journey simultaneously, have already received payment from the World Bank. Nepal can learn valuable lessons from these countries. The longer the delay for making necessary progress, the greater the erosion of trust with carbon credit purchasers. This could have significant costs for Nepal, potentially affecting the future price it will receive for its carbon credits. Therefore, Nepal should consider implementing multiple strategies to accelerate its progress and achieve its REDD+ objectives.

Lessons for Nepal

While Nepal's commitment to increasing and preserving forest coverage is clear, the focus must shift from policy creation to effective implementation. This shift is crucial for producing tangible benefits for the communities safeguarding these forests. For effective implementation of policies, it is imperative to ensure the retention of strong institutional memory that facilitates actions. The person leading the REDD IC should serve longer tenures, ideally five years, to oversee an entire cycle of REDD+ projects, aligning with the crediting cycle. Additionally, if leadership roles lack tenure assurance, individuals may hesitate to take decisive actions.

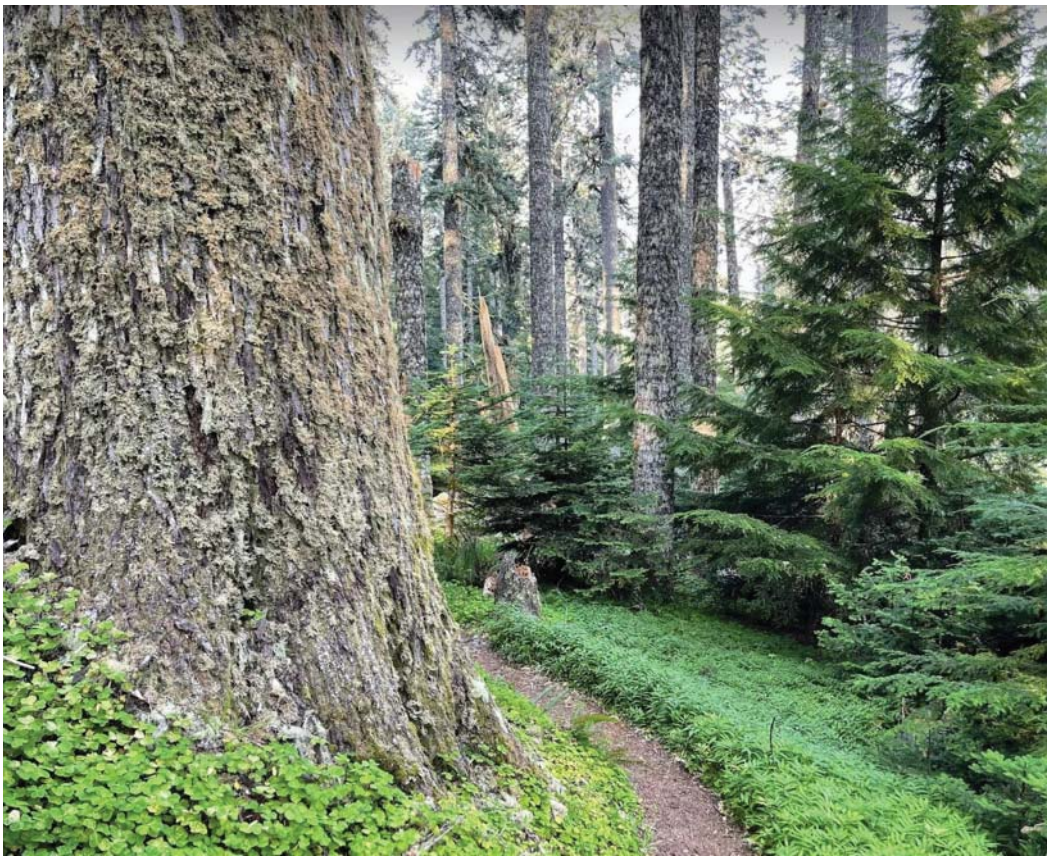
Second, strong coordination and collaboration with relevant departments must be ensured. In particular, REDD IC should closely engage with the Forest Research and Training Center (FRTC) under the MoFE. The synchronisation of activities these departments undertake annually can benefit the engagement. For instance, FRTC can schedule its once-in-10-years Forest Resource Assessment to overlap with the REDD+ cycle and consider changing its frequency from once in 10 to five years. Furthermore, the FRTC should establish a dedicated sub-team to provide technical support to the REDD IC in meeting the standards set by organisations like ART TREES, which issue carbon credits.

Lastly, the REDD IC should create an online platform to transparently track Nepal's projected emissions reduction goals, total carbon credits issued, the companies to which carbon credits are sold, total finance received and the utilisation of funds. This platform should use user-friendly data visualisation techniques to improve accessibility and information dissemination. This would address the lack of informative content about REDD+ on the REDD IC's website.

Nepal, renowned for its effective community forestry program globally, should promptly implement strategies to support the communities engaged in conserving biodiversity and addressing climate change worldwide. These communities deserve recognition and fair rewards for their crucial role in safeguarding Nepal's ecosystems and contributing to global environmental efforts.

By Subash Pandey
kathmandupost.com

Old forests are critically important for slowing climate change and merit immediate protection from logging



An old-growth forest of noble fir trees at Marys Peak in Oregon's Coast Range. (Credit: Beverly Law)

Forests are an essential part of Earth's operating system. They reduce the buildup of heat-trapping carbon dioxide in the atmosphere from fossil fuel combustion, deforestation and land degradation by 30% each year. This slows global temperature increases and the resulting changes to the climate. In the U.S., forests take up 12% of the nation's greenhouse gas emissions annually and store the carbon long term in trees and soils.

Mature and old-growth forests, with larger trees than younger forests, play an outsized role in accumulating carbon and keeping it out of the atmosphere. These forests are especially resistant to wildfires and other natural disturbances as the climate warms.

Most forests in the continental U.S. have been harvested multiple times. Today, just 3.9% of timberlands across the U.S., in public and private hands, are over 100 years old, and most of these areas hold relatively little carbon compared with their potential.

The Biden administration is moving to improve protection for old-growth and mature forests on federal land, which we see as a welcome step. But this involves regulatory changes that will likely take several years to complete. Meanwhile, existing forest management plans that allow logging of these important old, large trees remain in place.

As scientists who have spent decades studying forest ecosystems and the effects of climate change, we believe that it is essential to start protecting carbon storage in these forests. In our view, there is ample scientific evidence to justify an immediate moratorium on logging mature and old-growth forests on federal lands.

Federal action to protect mature and old-growth forests

A week after his inauguration in 2021, President Joe Biden issued an executive order that set a goal of conserving at least 30% of U.S. lands and waters by 2030 to address what the order called "a profound climate crisis." In 2022, Biden recognized the climate importance of mature and old-growth forests for a healthy climate and called for conserving them on federal lands.

Most recently, in December 2023, the U.S. Forest Service announced that it was evaluating the effects of amending management plans for 128 U.S. national forests to better protect mature and old-growth stands – the first time any administration has taken this kind of action.

These actions seek to make existing old-growth forests more resilient; preserve ecological benefits that they provide, such as habitat for threatened and endangered species; establish new areas where old-growth conditions can develop; and monitor the forests' condition over time. The amended national forest management plans also would prohibit logging old-growth trees for mainly economic purposes – that is, producing timber. Harvesting trees would be permitted for other reasons, such as thinning to reduce fire severity in hot, dry regions where fires occur more frequently.

Forest biologist Beverly Law with an old-growth Douglas fir in Corvallis, Oregon. (Credit: Beverly Law)

Remarkably, however, logging is hardly considered in the Forest Service's initial analysis, although studies show that it causes greater carbon losses than wildfires and pest infestations.

In one analysis across 11 western U.S. states, researchers calculated total aboveground tree carbon loss from logging, beetle infestations and fire between 2003 and 2012 and found that logging accounted for half of it. Across the states of California, Oregon and Washington, harvest-related carbon emissions between 2001 and 2016 averaged five times the emissions from wildfires.

A 2016 study found that nationwide, between 2006 and 2010, total carbon emissions from logging were comparable to emissions from all U.S. coal plants, or to direct emissions from the entire building sector.

Logging pressure

Federal lands are used for multiple purposes, including biodiversity and water quality protection, recreation, mining, grazing and timber production. Sometimes, these uses can conflict with one another – for example, conservation and logging.

Legal mandates to manage land for multiple uses do not explicitly consider climate change, and federal agencies have not consistently factored climate change science into their plans. Early in 2023, however, the White House Council on Environmental Quality directed federal agencies to consider the effects of climate change when they propose major federal actions that significantly affect the environment.

Multiple large logging projects on public land clearly qualify as major federal actions, but many thousands of acres have been legally exempted from such analysis.

Pacific fishers (Pekania pennanti) are small carnivores related to minks and otters. They live in forests with large, mixed-tree canopy covers, mainly on federal land on the West Coast. A subpopulation in the southern Sierra Nevada is listed as endangered. (Credit: Pacific Southwest Forest Service, USDA/Flickr)

Across the western U.S., just 20% of relatively high-carbon forests, mostly on federal lands, are protected from logging and mining. A study in the lower 48 states found that 76% of mature and old-growth forests on federal lands are vulnerable to logging. Harvesting these forests would release about half of their aboveground tree carbon into the atmosphere within one or two decades.

An analysis of 152 national forests across North America found that five forests in the Pacific Northwest had the highest carbon densities, but just 10% to 20% of these lands were protected at the highest levels. The majority of national forest area that is mature and old growth is not protected from logging, and current management plans include logging of some of the largest trees still standing.

Letting old trees grow

Conserving forests is one of the most effective and lowest-cost options for managing atmospheric carbon dioxide, and mature and old-growth forests do this job most effectively. Protecting and expanding them does not require expensive or complex energy-consuming technologies, unlike some other proposed climate solutions.

Allowing mature and old-growth forests to continue growing will remove from the air and store the largest amount of atmospheric carbon in the critical decades ahead. The sooner logging of these forests ceases, the more climate protection they can provide.

By Beverly Law, Oregon State University and William Moomaw, Tufts University
theconversation.com

Forests of South East Asia are more resilient than previously thought

A new study led by geoscientist Rebecca Hamilton at the University of Sydney is challenging long-held views on the ecological history of South East Asia.

Contrary to the previous belief that dry savannahs dominated the region during the Last Glacial Maximum more than 19,000 years ago, the team discovered a varied landscape of closed and open forest types.

Resilience of tropical forests

The research, published in the journal *Proceedings of the National Academy of Sciences*, has significant implications for understanding the resilience of tropical forests to climate change.

Dr. Hamilton emphasizes the importance of this discovery in the context of accelerating climate change. She notes that maintaining a diversity of forest types is key to conserving the region's ecosystems.

Transformation of forested areas

"Our work suggests that prioritizing protection of forests above 1,000 meters ('montane forest') alongside seasonally dry forest types could be important for preventing future 'savannization' of Asia's rainforests," she said.

Savannization refers to the transformation of forested areas into savannah ecosystems, characterized by open wooded plains. This process can be triggered by climate changes, human activities, or natural ecological shifts.

Focus of the study

"The dominant paradigm is that large tracts of Southeast Asia's lowland rainforests were replaced with a 'savanna corridor' during the cooler, more seasonal climates of the Last Glacial Maximum," wrote the study authors.

"This interpretation has implications for understanding the resilience of Asia's tropical forests to projected climate change, implying a vulnerability to savannization."

"A savanna corridor is also an important foundation for archaeological interpretations of how humans moved through and settled insular Southeast Asia and Australia. Yet an up-to-date, multiproxy, and empirical examination of the palaeoecological evidence for this corridor is lacking."

Paleoenvironmental sites

To investigate, the researchers analyzed records from 59 paleoenvironmental sites across tropical South East Asia. The team challenged the savannah model, which postulated a vast, uniform grassland expansion during the Last Glacial Maximum.

Instead, their analysis of pollen grains from lakes and other biochemical indicators revealed a coexistence of forests and expanding grasslands during this period.

Study implications

"We put forward the idea that these seeming discrepancies can be reconciled if, during the cool and seasonal climate of the Last Glacial Maximum, montane forests (above 1,000m) persisted and expanded in high-elevation regions, while lowlands experienced a shift to seasonally dry forests, which have a naturally grassy understory," Hamilton explained.

The research not only offers a revised perspective on the ecological past of South East Asia but also provides valuable insights into the potential resilience of the region's tropical forests in the face of ongoing climate change. It highlights the critical need for preserving a diversity of forest landscapes to safeguard these ecosystems for the future.

earth.com

In Uganda, refugees ravaged the forests. now, they're restoring them

People, part of the Nakivale Green Environment Association, plant trees inside Nakivale Refugee Settlement in Mbarara, Uganda, on Dec. 5, 2023. Refugees are helping to plant thousands of seedlings in hopes of reforesting the area.

Enock Twagirayesu was seeking sanctuary when he and his family fled violence in Burundi, and they found it in Uganda, the small East African nation that has absorbed thousands of refugees from unsettled neighbors.

Twagirayesu's family has grown from two children when they arrived more than a decade ago to eight now, a boon for the family but also a marker of the immense pressure the Nakivale Refugee Settlement has put on the landscape near the Tanzania border.

What was wide forest cover two decades ago is now mostly gone, cut down for cooking fuel. When Twagirayesu saw women digging up roots to burn a few years ago, he knew it was time to act. "We saw that in the days to come, when the trees are finished, we will also be finished," he said. "Because if there are no trees to be used for cooking even the people cannot survive."

He and two other refugees began planting trees in 2016, and Twagirayesu, who had sewn for a living back home, turned out to have a gift for mobilizing people. That early group quickly grew, and he now leads the Nakivale Green Environment Association to carry out what Twagirayesu calls the urgent business of reforesting. "A tree is not like beans or maize, which you plant and tomorrow you will get something to eat. Planting trees is challenging," he said.

Deforestation is a national issue in Uganda, where most people use firewood for cooking, trees are often cut to make charcoal for export and some forests fall to illegal logging. The country has lost 13% of its tree cover since 2000, according to Global Forest Watch.

Nakivale, sparsely populated by locals, is one of the few territories in Uganda that could accommodate many refugees. More than 180,000 live there now, with regular new arrivals. They come from neighboring countries such as Congo, where sporadic violence means an influx of arrivals heading toward Nakivale. There are Rwandan refugees still living in Nakivale who first arrived there shortly after the 1994 genocide. After the

refugees are registered, they are allocated small plots of land upon which they can build homes and plant gardens.

Nsamizi Training Institute for Social Development, a local organization, is supporting the tree-planting activities of Twagirayesu and others. The institute's yearly goal is to plant 300,000 trees, with about 3 million planted in recent years, said Cleous Bwambale, who oversees monitoring and evaluation for the institute.

On one recent afternoon, a group of refugees were busy planting thousands of pine seedlings on the rocky, steep side of a hill facing the Kabahinda Primary School. In scorching heat, they attacked solid ground with pickaxes and hoes before carefully tucking the seedlings into the earth. Nearly all the workers have children enrolled at the government-owned but donor-supported school.

Deputy Headteacher Racheal Kekirunga said heavy rains in the valley bring the school to a standstill as stormwater races down the hill and runs through the yard, forcing teachers and students to stay inside.

"We hope that when we plant these trees it will help us to reduce on the running water that could affect our school, and our school gardens," Kekirunga said. "Especially our learning and teaching. When the rain is too heavy, you must wait until it reduces and then you go to class."

The Nsamizi institute, serving as an implementing partner in Nakivale for the U.N. refugee agency, collaborates with mobilizers like Twagirayesu in four parts of the 185-square-kilometer (71-square-mile) settlement, according to the U.N. refugee agency. The institute encourages refugees with small cash payments for specific work done, maps out plans to reforest specific blocks of land and provides seedlings.

Twagirayesu said his group has planted at least 460,000 trees in Nakivale, creating woodlots of varying sizes and ages. They include pine, acacia and even bamboo. That success has come despite fears among some in the settlement that the authorities, wanting to protect mature woodlots, one day might force the refugees to go back home.

"We got a problem because some people were saying that when they plant trees, they will be chased away," he said. "Teaching people to plant trees also became a war. But right now, after they saw us continue to plant trees, saw us getting firewood, they began to appreciate our work."

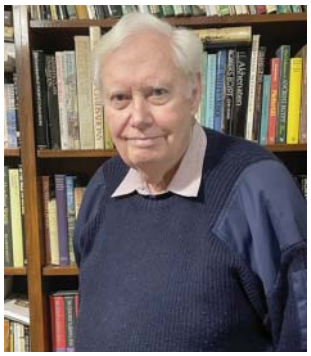
Twagirayesu said that while he isn't done yet as a tree planter, "when we are walking in the places where we planted trees, we feel much happiness."

voanews.com

Obituary

Jeremy Wilfred LEECH AM Dip For (AFS), B.Sc (Adel), M.Sc, PhD (ANU), FIFA, RPF

Jerry Leech, exceptional Forestry Systems practitioner and consultant, born 24th December 1940, died on 26th November 2023.



Jerry LEECH contributed to the foundation of the Australian plantation industry through contributions to the measurement of forests, yield regulation system design, innovative models of plantation growth and yield, forest valuation, and mentoring and training resource modelling and planning staff. His exceptional academic skills and knowledge of the modelling of the South Australian plantation resource, led to extensive consultancies around Australia and overseas for the FAO.

In 1959 he became a Woods and Forests Department cadet; completing his Diploma of Forestry with Distinction (Australian Forestry School 1963) and Bachelor of Science (University of Adelaide 1964). In 1974 he completed a Master of Science from ANU 'Tree volume and increment models for Radiata Pine Thinnings'; a PhD (1978), titled "Radiata Pine Yield Models" undertaken with his friend and mentor, Professor Ian Ferguson (1994 Jolly Medal).

Jerry's Masters was included (with Jolly Medal recipients, Norm Lewis (1974) and Andy Keeves (1987)) in the 1976 Woods and Forests Department publication, 'Yield Regulation in South Australia'; a case study of a yield regulation system, also used to educate undergraduate foresters.

Jerry had a long association with Professor Ian Ferguson, co-authoring numerous articles, including the Australian Standard for Valuing Commercial Forests. Jerry contributed to the development of quantitative forestry with 26+ refereed publications, 8 books, 80+ consultancy reports and publications.

Jerry was a Principal Fellow/Associate Professor of the School of Forestry, Institute of Land and Food Resources at the University of Melbourne, Adjunct Professor of Southern Cross University; Life Member of the Commonwealth Forestry Association. In 2009 Jerry was awarded the CFA SE Asia-Pacific Regional Medal of Excellence. He was also a Fellow of the Institute of Foresters of Australia and 2021 NW Jolly Medal winner.

In 2022 Jerry became a Member of the Order of Australia (AM) for significant service to forestry, education, and community.

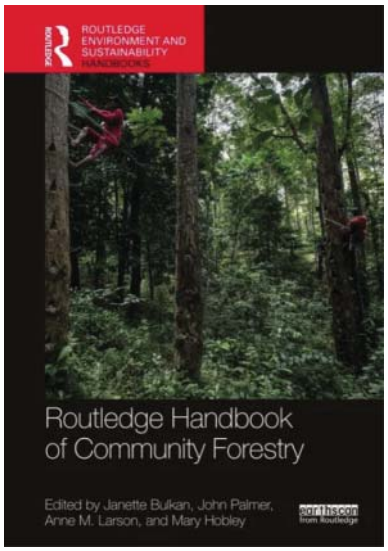
Jerry will be much missed by his large circle of colleagues and friends in Australia and overseas.

Author: Jim O'Hehir

Publications

Routledge Handbook of Community Forestry

Editors: Janette Bulkan, John Palmer, Anne M. Larson and Mary Hobley



Its 33 chapters examine case studies drawn from all continents, and written by 86 co-authors. The volume includes reviews of aspects of community forestry at a country level (including Australia, Cambodia, Cameroon, Laos, Liberia, Myanmar, Nepal), and provincial/state level (Quebec and British Columbia in Canada, California in the USA). There are case studies of community forestry by Indigenous and non-Indigenous communities – with authors stressing the importance of being in trusting relationships with collaborators, and understanding history and context.

Some chapters focus on logging at industrial and non-industrial scales, others on non-timber forest products. Many of the chapters examine multi-level governance and collaborations from local to global scales. There are critical treatments of voluntary, third-party forest certification, gender, politics and power and traditional ecological knowledge. Some chapters look at the re-centralization of State power over community forestry, elite capture of community forestry, and urban forestry.

The 552-page volume was edited by Janette Bulkan, John Palmer, Anne Larson and Mary Hobley. 66 peer-reviewers also contributed to the peer-review process.

The *Routledge Handbook of Community Forestry* is an Open Access publication. Chapters can be read and/or downloaded here: https://www.routledge.com/Routledge-Handbook-of-Community-Forestry/Bulkan-Palmer-Larson-Hobley/p/book/9780367488697

Science for the Planet: Why we need to preserve Maritime Forests

Tree-ring scientist Nicole Davi explains the critical role maritime forests play in protecting our coastal communities from storms. The tree-ring records she's building will help us understand how these ecosystems are responding to climate change.

While collecting cores from oak trees on Fire Island National Park, Nicole Davi, a dendrochronologist who works at the Climate School's Lamont-Doherty Earth Observatory, explains the critical role maritime forests play in protecting our coastal communities from storms. The tree-ring records she builds will help us understand how these ecosystems are responding to climate change.

"I love maritime forests. I think they're beautiful and just so dynamic and complex – there are so few of them," Davi says. "They're also right behind the ocean. I think of them as being on the front lines. I'm really interested in how climate is impacting these trees through extreme events like hurricanes, multiyear droughts and strong storms."

Watch on YouTube at www.youtube.com/watch?v=A4ZSD669gGM

Around the World

Peru: Germany, Norway and the United Kingdom make statements on Peruvian Forestry Law

Due to the "potential impacts" on the environment, Germany, Norway and the United Kingdom have expressed their views on the amendments to the Peruvian Forestry and Wildlife Law, enacted by the Peruvian Congress last week.

The joint declaration, in which Canada also participated, joins a series of statements from different national and international institutions such as the Interethnic Association for the Development of the Peruvian Rainforest (AIDESEP), producers' associations, the Ombudsman's Office, the Ministry of the Environment, among others. The Executive observed the regulation and the President of the Council of Ministers, Alberto Otárola, announced a new debate on this issue.

The international pronouncement was made in the framework of the Joint Declaration of Intent (JIU) on cooperation to reduce greenhouse gas emissions due to deforestation and forest degradation, of which Peru is a partner, and by which it assumes international commitments in defence of the Amazon. The norm also collides with the United Nations Sustainable Development Goals (SDGs).

"As donors, we look forward to discussing with the Peruvian authorities how these changes would affect initiatives to protect and sustainably use forests, as well as the rights of indigenous peoples," they said in their statement.

Articles 29 and 33 of Law 29763 were amended to authorise complementary provisions promoting forest zoning. These reforms "will accelerate the rate of destruction of the Amazon, legalise and encourage the deforestation of forests and leave indigenous defenders even more unprotected," AIDESEP said in another communiqué.

pressenza.com

Ghana: Forestry Commission seeks to boost ecotourism through new wildlife Law

Ghana's Wildlife Resources Management Bill 2022, which seeks to boost ecotourism, job creation, and economic growth, is awaiting Presidential assent, Mr Nyadia Sulemana Nelson, the Deputy Chief Executive of the Forestry Commission, has said.

Briefing the media on the Commission's activities for 2023, Mr Nyadia Sulemana Nelson said the Bill sought to revise and consolidate all laws relating to wildlife and protected areas to conform with existing policies and emerging trends in the natural resources sector and ensure the effective implementation of international conventions on wildlife.

The Bill also seeks to attract private investments into the establishment and management of zoos and private wildlife sanctuaries and giving legal backing to local communities in wildlife management through the creation of CREMAs.

"The private sector has already demonstrated interest in participating in the development of the sector, and since the government cannot do it alone, we need to create the enabling environment to attract the necessary private investments into the sector, with a strong regulatory framework," Mr Nelson said.

The Deputy Chief Executive said Ghana had great potential in ecotourism, with abundant resources that it could harness to become one of the major ecotourism destinations in the world.

On his part, Richard Gyimah, the Director for Stakeholders, Ecotourism, and Wildlife at the commission, explained that private participation in the wildlife sector in establishing zoos and wildlife parks would be in partnership with the Commission.

"We always say the private sector is the engine of growth, so this is another area we have identified that the private sector can partner with the government to induce growth in the country. Already, we have been partnering with some private operators, but the law provides the legal backing to deepen that," Mr Gyimah stated.

Mr Gyimah believed private investment would expand the subsector and create more jobs for tour guides, zookeepers, rangers, and the entire hospitality industry, adding that private participation would also provide access to more wildlife species for researchers and academic institutions and boost ecotourism in Ghana.

He said private sector participation would also help bring ecotourism in Ghana to international standards and generate more tourism revenue and foreign exchange.

"With private sector participation, we believe these revenue numbers will increase, and we will increase the revenue accruing to the state," he said.

Statistics showed that the sector has seen remarkable growth in activities, especially after the end of the COVID-19 pandemic.

From 300,000 visitors to ecotourism sites in 2022, the number has increased to nearly 400,000 in 2023, and the commission aims to attract at least 500,000 visitors in 2024.

Also, he said the visits generated 4.5 million Ghana cedis (374,000 U.S. dollars) in 2022 and 6.0 million cedis (499,000 dollars) for the commission this year.

In 2024, the Commission plans to supervise the successful completion of reclamation and revegetation activities in mined-out sites within the Denyau Shelterbelt, Supuma and Afao Hills Forest Reserves, submit Legal Acquisition Findings (LAF) for Rosewood to CITES Secretariat, Geneva and obtain approval for Rosewood quota and a US$7 million funding for private plantation development as well as cut sod for Koforidua Zoo project.

gbcghanaonline.com

Australia: Prescribed burning could be making Aussie forests more flammable

Disturbing natural forests with activities such as logging and prescribed burning can make them more flammable, landmark research from The Australian National University (ANU) and Curtin University has found.

To be better prepared for future bushfire seasons, the new research calls for a greater connection between forestry and fire science to understand how fire prevention strategies affect the natural environment.

"We've understood for a long time now that logging can make bushfires worse, but it's only in the last few years that evidence is showing that prescribed burning could be doing the same thing," lead researcher Professor David Lindenmayer, from ANU, said.

Co-author Associate Professor Philip Zylstra, from Curtin University, said: "If they're too tall to catch fire, plants calm bushfires by slowing the wind beneath them. If disturbance kills those taller plants, replacements regrow from the ground and add to the fuel.

«Fire sensitive species thrived for millions of years because so many forests naturally create these less flammable environments.»

Prescribed burns are a fire mitigation tool used with the aim of reducing fuel load to minimise the intensity and severity of fires.

However, while prescribed burns can sometimes decrease flammability in the short term, the way they disrupt forest ecosystems can create longer periods of additional flammability.

"Very frequent burning close to homes or control lines could create defendable spaces, but large, remote and infrequent burns maintain the landscape at maximum fire risk because they undermine the natural controls that forests place on fire,» Associate Professor Zylstra said.

"We know that old forests tend to be cooler, more moist and more sheltered. By limiting disturbance, forests can reach an appropriate age where they can be better protected from the increased frequency and severity of Australian bushfires."

The study challenges the notion that broadscale interventions are necessary to manage fire risk. The researchers argue that these are grounded in simplistic models that don't account for long-term dynamics.

The research introduces a unified framework that enables the prediction of areas where disturbance is likely to cause a surge in flammability and bushfire risk.

This predictive approach allows for better informed and targeted management strategies.

"We need to invest heavily in rapid response remote area firefighting specialists and embrace new technologies that allow us to detect fires and suppress them faster," Professor Lindenmayer said.

Advances in drone technologies and the application of AI can help detect small fires and even contain them before they develop.

"We need to be thinking about forestry and fire management in a more holistic way and look to limit actions that could be increasing flammability," Professor Lindenmayer said.

The research is published in the journal *Biological Reviews*.

anu.ed.au

Indonesia: U.S. and Indonesia sign landmark agreement in support of Indonesia's forestry and land use goals

In a landmark move to bolster global environmental sustainability and climate resilience, the Indonesian Ministry of Environment and Forestry (KLHK) and the United States Forest Service (USFS) have officially signed a Memorandum of Understanding (MOU) supporting Indonesia's Forest and Land Use (FOLU) Net Sink 2030 plan. USFS Chief Randy Moore and KLHK Minister Siti Nurbaya Bakar signed the MOU at a ceremony in Jakarta on Tuesday.

The critical agreement signifies a commitment from both nations to work collaboratively on sustainable forest management, forest carbon governance, forest and land fire control, and education and training. This collaboration aligns with the global urgency to address climate change and environmental degradation, recognizing the crucial role of forests in carbon sequestration and biodiversity conservation.

"The United States Forest Service looks forward to expanding our collaboration with The Ministry of Environment and Forestry to help reach Indonesia's ambitious goals for 2030, in support of global efforts to combat climate change," said USFS Chief Randy Moore.

The United States Forest Service, with its extensive experience in forest management and wildfire control, will provide technical expertise and support to Indonesia in these areas. This partnership is expected to enhance Indonesia's capabilities in managing its forest resources sustainably while contributing significantly to the FOLU Net Sink 2030 objectives.

Under the MOU, the two parties will exchange knowledge and best practices in sustainable forest management, aiming to reduce emissions from deforestation and forest degradation. They will also collaborate on forest and land fire management.

Additionally, the agreement includes a strong focus on education and training. Capacity building initiatives will be developed to empower local communities and stakeholders, ensuring that the benefits of sustainable forest management are widespread and inclusive.

The MOU is expected to pave the way for more robust and effective forest management practices in Indonesia, contributing to global efforts to mitigate climate change and enhance biodiversity conservation.

id.usembassy.gov

UK: Work to recreate lost rainforest in Devon

The National Trust plans to create vast new areas of temperate rainforest in the south-west of England. More than 100,000 trees will be planted in north Devon to create swathes of humid woodland that will be home to plants facing extinction.

Experts say the area's heavy rainfall and high humidity levels provide a unique moisture-rich environment. Other projects to recreate the lost rainforests of Britain are already ongoing.

Temperate rainforests once covered large areas of the western coast of Britain.

But the habitats have deteriorated due to air pollution, invasive species and diseases and are now one of the most endangered in the UK.It is hoped the consistently wet climate in north Devon will allow for a unique variety of plants and animals to thrive, including rare ferns and pine martens.

John Deakin, head of trees and woodlands at the National Trust, said: "Temperate rainforests used to be expansive wooded habitats along the western seaboard of the UK, but now all that's left are fragments." Mr Deakin said the rainforests now covered "only 1% of Britain" and were "limited to small patches in Devon, Cornwall, North and West Wales, Cumbria, the West of Scotland and parts of Northern Ireland".

He said: "As a result, the rare specialist plants that depend on this habitat now desperately cling to the remaining fragments for survival, with some of the woodlands we care for in north Devon containing nearly the entire global population of some of these species, such as the Devon whitebeam. "Without urgent action, these unique plants could soon be facing extinction."

The National Trust project will cover 50 hectares of land with 50,000 trees to be planted at Arlington Court, 38,000 on Exmoor and 20,000 between Woolacombe and Hartland. Further south in Devon, on Dartmoor, rare species of moss and lichen have been identified at Lydford Gorge in the past few years. Work is underway there to save lichen growing on dying trees by transplanting them to other parts of the forest and by planting new trees. Threats to the habitats include deforestation, climate change, air pollution and ash dieback.

Devon Wildlife Trust is hoping to double the area of temperate rainforest by reconnecting broken fragments of forest. Other projects to reintroduce rainforest habitats are also in progress on the Isle of Man and in north west Wales.

The National Trust scheme is part of the Plant a Tree fund which has planted more than one million trees since it launched in 2020. Among those planting trees at all sites will be community groups, including local primary schools.

bbc.co.uk

USA: New study reveals a concerning reason why the Earth's forests are changing: 'It's clear that we must adapt quickly'

Trees produce the oxygen we breathe and promote biodiversity in our ecosystems. However, the planet's climate is getting too hot for some forests to sustain themselves.

What's happening?

Through "thermophilization," U.S. forests are evolving to handle warmer temperatures caused by heat, drought, and climate change.

According to a recent study in the Proceedings of the National Academy of Sciences (PNAS), forests might not be able to adapt to the hotter, drier climate fast enough while staying healthy.

"Our forest ecosystems and communities are struggling to keep up with the stresses of climate change, whether it's fire, drought, or insect infestations, it is clear that we must adapt quickly," Homer Wilkes, USDA undersecretary for natural resources and the environment, said in a statement.

Why is this such a problem?

Trees absorb carbon dioxide through photosynthesis. The more trees are planted through reforestation, the more we can mitigate the damaging effects of planet-warming air pollution. By extension, reforestation will promote biodiversity and cleaner air quality.

"Healthy, resilient forests are critical to helping us respond to the climate impacts being felt by communities across the country, because they store carbon, provide clean air and water, and sustain biodiversity," Tracy Stone-Manning, director of the Bureau of Land Management, said in a statement.

According to WeForest, a climate change nonprofit pushing for reforestation, it's possible to restore the ecosystem.

"Reforestation is the process of replacing or replanting trees to regenerate woodlands and forests that have been destroyed through natural and unnatural causes," the official WeForest website says. The organization adds that reforestation is "one of our most powerful weapons" to combat warming temperatures.

What's being done?

Despite the concerning news, there are still plenty of ways to help our forests.

According to Wilkes, the "USDA and our federal, tribal, state, local, and community partners are working together" to protect forests for future generations with the changing climate.

news.yahoo.com