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Why forestry students don't become foresters in Nigeria

Which profession do forestry students in Nigeria choose after university?

Recent estimates suggest over 5 million people work in the forestry sector in Nigeria but skilled-labour employment opportunities are hard to find. The combination of difficulty in getting jobs and poor prospects for career development in the forestry, and forestry-related, sector has meant that although hundreds of forestry students graduate from various forestry schools annually the high unemployment situation across the country[1] has left many graduates either jobless or choosing to work in fields unrelated to their studies.

Forestry education in Nigeria started at the Federal College of Forestry (FCF), Ibadan, in 1941 and by 2018 a total of 59 institutions (34 universities and 25 colleges and polytechnics) offered forestry-related degree programs with an estimated 6,000 to 10,000 undergraduate students enrolled in forestry-related programs across various Nigerian universities in 2019.

Although over the past 20 years, studies have reported a general decline in enrolment into forestry education programs in developing and developed countries there has been an improvement in enrolment trends in Nigerian universities as a result of universities' admission arrangement, which re-assigns students with less competitive results to less popular programs in order to match the admission quota for those programs.

However, recent research based on a survey undertaken in 2021 of forestry students who graduated from the Federal University of Technology Akure – FUTA, Nigeria (a top-ranking forestry school in Nigeria), in 2016 shows that 84% of forestry graduates were in non-forestry-related jobs, and the remaining 16% were in forestry-related, academic jobs as lecturers, researchers, and graduate students. An estimated 90% of respondents acknowledged that forestry graduates

[1] Due to Nigeria's high unemployment rate (33.3 percent in 2020, or 23.2 million of the approximately 70 million people who should be working in Nigeria are unemployed), graduates from all disciplines are having trouble finding jobs. (National Bureau of Statistics, 2021).

were moving to non-forestry jobs mainly because of the lack of job opportunities in the forestry profession. Other reasons included earning a living, lack of interest/passion in the forestry profession, or the respondent originally being compelled to study forestry against their wishes.

Despite these challenges, career success stories emerge from a very few young forestry professionals in Nigeria, which suggests that hope is not lost. However, government authorities need to invest in the revival of moribund forest industries and/or establish new, large-scale advanced technology industries to create green jobs for forestry graduates and thus address the unemployment challenge alongside creating economic prosperity.

Samuel Adeyanju

A summary of the paper '*Where are the foresters? The influx of forestry graduates to non-forestry jobs in Nigeria'* by **Samuel Adeyanju, Opeyemi Adesuyi, Chinedu Offiah, Olamidayo Fasalejo and Babatunde Ogunlade** presented at the XV World Forestry Congress, Korea, May 2022 (*The lead author is a member of the CFA Advisory Group*)

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Association News

Discussion following March's leading article *Response to COP26 and deforestation pledges* by Roger Leakey

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It was with great interest that I read Roger Leakey's article ***Responses to COP26 and deforestation pledges*** in the March issue of the CFA Newsletter. His article presents thoughtful, well-documented and forward-looking arguments for paying much greater attention to misguided (or at least short-sighted) policies and investments fueling the "failures of agriculture and the breakdown of agroecosystems" which drives an estimated 90% of tropical/subtropical forest loss and continues to exacerbate land degradation worldwide. I also share Prof. Leakey's concern about the common lack of policy support for coordinated planning and development among typically siloed sectors that is clearly necessary for reconciling food security and poverty reduction with the conservation and sustainable use of forests and other natural ecosystems. The need for integrated, cross-sectoral approaches is especially important if we are to deal effectively with climate change and its impacts, as well as the biodiversity crisis and land degradation, which erode natural capital while foreclosing options for future generations.

The forest science community has an important role to play by providing decision makers and spatial planners with the knowledge required to make informed choices about the environmental, social and economic costs, benefits, and trade-offs, of forest and land management options aimed at enhancing food security and nutrition, coping with climate change, or making progress on other development priorities. IUFRO, for example, leads the development of independent, interdisciplinary, peer-reviewed global scientific assessments on the relationships between forests and priority areas of policy makers through the Collaborative Partnership on Forests' Global Forest Expert Panels (GFEP) initiative (https://www.iufro.org/science/gfep/). Recent GFEP assessments have focused on a number of the SDGs, including: a decade of REDD+ impacts on forest, biodiversity and people (2022), forests and poverty (2020); forests and water (2018), and forests and food security and nutrition (2015). A forthcoming (in 2023) assessment will focus on forests and human health. The eighth GFEP assessment on Forests and Human Health is currently ongoing and is planned for publication in early 2023.

Through this and similar efforts to engage with policy makers as well our colleagues in fields, we can all do out part to make good on the ambitious environmental commitments and pledges made by our governments, such as those make last November in Edinburgh at COP26.

Keith Openshaw
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I was pleased to read the ***Response to COP26 and deforestation pledges*** by Prof. Roger RB Leakey in the March 2022 issue of the CFA Newsletter. In Figure 1, he notes that population growth is a cause of deforestation, he notes that agriculture is both a culprit and a saviour. Fig. 2 is a simplifies diagram of Land degradation with the option to reverse this. Fig. 3 gives the option of new Research Agenda and Fig. 4 gives the path to Reboot Tropical Agriculture, with agro-forestry playing a prominent part. However, foresters, agriculturalists and environmentalists should think outside the box.

Dr Leakey highlights Africa where efforts have to be concentrated, but Asia and South/Central America should not be neglected. Table 1 gives the estimated population increase for the regions of the World from 2020 to 2100. The estimated population increase in Sub-Saharan Africa between 2020 and 2100 is nearly 2.7 billion!

However, an underlying cause for the present hiatus in committing to the 2100 target is little mentioned, either by countries

Table 1. Estimated word population by region from 2020 to 2100.

Units Million

Year	2020	2030	2050	2100	2100–2020
World	7,795	8,548	9,735	10,875	3,080
Africa	1,341	1,688	2,489	4,280	2,939
SSA[1]	1,094	1,400	2,118	3,775	2,681
Asia	4,641	4,974	5,290	4,720	79
China	1,439	1,464	1,402	1,065	-369
Indian Sub-c[2]	1,817	1,972	2,228	2,041	224
Asia –China	3,207	3,510	3,888	3,655	448
LA &C[3]	654	706	762	680	26
LDCs[4]	6,636	7,368	8,541	9,680	3,044
LDCs-China	5,202	5,984	7,139	8,615	3,413
Dev. C[5]	1,159	1,180	1,194	1,195	36

Note. [1] SSA =Sub-Saharan Africa. [2] Indian Sub-c. = India, Pakistan, Bangladesh. Sir Lanka, Nepal and Bhutan. [3] LA&C = Latin America and the Caribbean. [4] LDCs = Less developed countries. [5] Dev. C = Developed Countries.
Source. Population Pyramid 2021.

or world bodies, and that is population increase. By 2100, the estimated population of the world will be 10.875 billion (of which 99% will be in Less Developed Countries – LDCs) as compared to the 2020 estimate of 7.795 billion (85% in LDC) – an increase of 3.080 billion (Population Pyramid 2021). 3,044 million of this increase will be in developing countries. (Table 1). If China is omitted from the LDC total, then the estimated LDC increase from 2020 to 2100 would be 3,413 million!

At the very minimum, the additional population will require food, much of which will be provided by the subsistence sector from the clearing of forests and woodland for arable and pastoral agriculture. At the same time, a general increase in wealth will promote the expanded use of fossil fuels. Not only will the increased population and rising average wealth cause further clearance of forests, woodlands and grasslands, but it will also bring about significant social challenges such as mass unemployment and the movement of people to cities[1] and to developed countries. How are these problems to be tackled?

If the population peak could be limited to 9 billion by 2100 and thereafter start to fall, this would benefit the environment considerably. If it is assumed that the universal per capita daily food requirement is 2,000kcal (8.4MJ) – equivalent to 0.54kg of grain – (U.K. National Health Service 2020) and that the average per-hectare (ha) yield for (subsistence) agriculture is 2,000 kg/year[2], then a family of five would require about 1 ha to meet their basic food requirements. If the 2100 peak population was limited to 9 billion rather than the currently projected 10.875 billion, there would be 1.875 billion fewer people by that date, of which an estimated 1.695 billion would be from LDCs. This would save an estimated 167 million ha of forests being cleared for subsistence agriculture, equivalent to approximately 17 billion tonnes (t) of carbon[3] (62GtCO2) stored in the wood and the soils. This is why it is critical to tackle population increase. If it is 'business as usual', from 2020 to 2100, the world's population will increase by over 3 billion, nearly all in LDCs, (Table 1) and this could lead to a reduction of 270 million ha of forests, resulting in 27.5GtC of carbon (101GtCO2) being vented to the atmosphere[4,5]. This does not take into account forests being cleared in the cash economy for agriculture. Replacing this through tree planting would cost an estimated 105 billion US dollars ($) in planting and maintenance costs over 35 years or $3 billion per year. (Openshaw K. 2022). Such funds could be invested in family planning and infrastructure development, to the benefit of future generations and the environment.[6]

Tempering population increase with more effective family planning programs, is therefore essential for meeting the global warming target of the Paris Agreement by 2100. In addition to increasing agricultural and silvicultural productivity and reducing pests and diseases, efforts have to be made to expand rural access, promote job opportunities especially for women, promote (environmental) education for boys and in particular girls. Land rights have to be divested to rural populations and trained in sustainable land-use practices. Expand the use of renewable energy, especially biomass, and encourage energy efficiency methodologies etc. is vital.

[1] By 2100, it is estimated that 38 of the world's 100 most populous cities will be in SSA and more than 1 billion people will live in those cities. (Hoornweg D & Pope K Sept. 2016).

[2] The average yield of grain crops equivalent to 2,000 kcal/day per person at 14% moisture content is 0.54kg, giving an annual per-capita total of 197kg. 2,000kcal/per person per day is the assumed universal energy requirement.

[3] It is assumed that tropical forests have a store of 100t/ha of carbon in the wood and soils.

[4] In Africa, the annual yield of grain crops in 2000 was 1.059t/ha (Openshaw K in Pak Sum Low, 2005), With productivity increases this could rise to 1.65t/ha by 2100. Grain productivity in Asia and Latin America is greater than in Africa, and other plant and animal proteins are consumed, hence the choice of an average equivalent yield of 2.0t/ha across these three continents. Thus, each person will require the equivalent of 0.0985 ha of grain crops to achieve an energy intake of 2,000kcal/day.

[5] This is rather simplistic as the rural population will start to decline in many countries about 2050. However, it is assumed that farmers will supply food to the expanding urban population, but imported food may/will be required.

[6] Over 80 years the average population increase would be 1.0136% per year, whereas it would be reduced to 1.0023% per year to achieve a reduction of 1.205 billion to 9 billion by 2100. Spending $ 105 billion over eighty years on family planning and infrastructure development could meet this target reduction.

Thus, cooperating with all government and non-government agencies and the private sector is an essential ingredient to meet the 2015 Paris Agreement. (UNFCCC, 2016).

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Response to Keith Openshaw's comments from Roger Leakey

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Keith is quite right, if we continue along the current unsustainable and misdirected trajectory for the interactions between population growth, tropical deforestation and agriculture, climate change and community life, we are staring numerous global disasters in the face. However, the purpose of my article (especially Figures 1,2, and 4) was to indicate that if Homo sapiens wishes to live up to the name given to us by Linneaus, we need to take a much wiser and more holistic approach to our land use practices and policies. Population growth has indeed been a driver of the breakdown of natural capital as shown in the spine of Figure 1 and its encircling breakdowns of social, human and economic capitals. To reverse this, I have written extensively about how a practical, appropriate and tested approach to tropical agriculture could reverse the downward spiral of the 'cycle of land degradation and social deprivation' (e.g. Leakey 2012, 2017) based on diversifying smallholder subsistence farming with new culturally important and marketable indigenous tree crops (Leakey et al. 2022). As well as greatly increasing food production (300–600%, enough to feed a growing population) by closing Yield Gaps, these also boost the rural economy and well-being of farming communities in ways that global experience suggests would reduce family size and so slow population growth. In other words, by using trees to restore formerly degraded agroecosystems it is possible to address population growth and deforestation by default and have farming systems that are farmer-, climate- and wildlife-friendly (Leakey, 2020, Leakey et al. 2021). What is the missing ingredient? Its political will – the sixth capital needed to scale up this approach and to meet the UN Sustainable Development Goals (Leakey et al. 2022).

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Commonwealth Forestry Conference 2021 – participants' views

The results of a participants' survey carried out by the hosts, the University of British Columbia, into the Commonwealth Forestry Conference held in 2021 revealed several key points about both the content and the innovative format.

- **Wide range of subjects covered and appreciated**
  The survey revealed that participants appreciated the breadth and depth of subjects covered during the CFC and also the ability to switch easily between topics.
- **Innovative approach applauded**
  The innovative approach of moving the whole conference online due to the Covid-19 pandemic met with largely positive reactions regardin the format, cost savings and carbon reductions.
  Respondents appreciated the accessibility of the format and convenience of being able to join and leave each part of the CFC with ease. The fact that it was possible for people to meet during the pandemic was also greatly appreciated. The ability of each attendee to easily participate in discussions due to the egalitarian nature of the online software used was recognised. Participants also appreciated the efforts that the organisers had taken to spread the sessions over different time periods corresponding to the various time zones from which participants were attending. The online format also enabled participants to mix attendance at the CFC with their regular work.
- **Low cost of attendance essential for many**
  The online format enabled the hosts to vastly reduce the usual cost of conference participation – a point that was widely appreciated, particularly by those who would not have been able to attend if the conference had been held in person. However, several respondents noted that they missed the opportunities and benefits of face-to-face communication.
- **Savings in carbon emissions extremely important**
  The vast reduction in carbon emissions created by the travel of large numbers of international particpants was deemed to be of great importance by respondents and the example set by the CFC was seen by some as the way forward for similar conferences.
  conferences with large intervals, they might even take place more frequently if online (if needed).

The final comment goes to one respondent who stated "Congratulations to the organizers and to those who ran the conference seamlessly. You made history!"

The role of forests in vulture conservation – an interim report by the CFA Young Forester Award winner

Managing forest habitats to meet both conservation and production needs is a growing challenge throughout the world today, especially now that forest ecosystems are shrinking fast. Forests often provide valuable ecosystem services that boosts agricultural productivity and income, and further supports biodiversity such as birds.

That's why a better understanding of the benefits of such ecosystems for birds, specifically their relative value, is essential in developing effective management strategies, particularly within tropical regions with wanton cultivation pressure.

Unfortunately, there is a general lack of information on how long-lived vertebrates respond to silvicultural treatments due to the challenges of carrying out long-term ecological studies that can disentangle the actual effects of forestry (from other factors) influencing the abundance and distribution of large organisms.

This project examined the responses of the vulture species to different forestry practices between separate colonies where most raptor population breeds in Kenya. Distribution patterns of the target species were determined mainly by forestry and other human-related activities. Orographic variables were also applied where applicable, but forest structure largely had a lesser influence.

The study findings suggested that the two ecological factors seemed to have a greater influence in the abundance and distribution of vultures (mostly in the highland regions), whereas the other variables relating to human disturbance strongly influenced the lowland areas. Vultures in the latter part consistently preferred areas with a low incidence of forestry activity mainly for breeding purposes. This study did not delve much into investigating the variabilities in breeding success but human-caused disturbance took a toll in lowland colonies.

Although the negative effects of forestry activities might take time to diminish, it should be noted that Orography, human habitation, human disturbance, and structure of the forest significantly affects nesting preferences and breeding in forest vulture populations. On the flip side, topography and anthropogenic disturbances are the only group of factors that influences nesting in forest dwelling vulture populations.

That said, it would be best to protect suitable forest habitats from human activity especially near nests. In addition, curbing illegal logging is a strict necessity to guarantee the conservation of the endangered vulture colonies.

Given their overall evasive nature, human encroachment diminishes their breeding zones, a powerful ingredient that could tip them over the edge of extinction. Crucial habitat descriptors used in this study can be used to manipulate various forest management programs in the country and promote forest vulture conservation as well as forest habitats in general.

To minimize the occasional human disturbance within the study area, this study suggests that conservation efforts should aim at setting aside vegetated buffer areas along all roads within and outside protected areas.

Looking ahead, there is still hope to salvage the remaining populations and restore such endangered species from extinction. But we first need to understand the general perceptions about them. It is a necessary step that would help provide critical insights to human behavior and attitudinal landscape. Think of it as the missing piece of a bigger puzzle.

Gerald Osuka

Forest Scenes

Largest-ever World Forestry Congress calls for stronger cooperation

Delegates at the 15th World Forestry Congress celebrate at a closing ceremony held at Coex, Gangnam-gu, Seoul. (Yonap)

The 15th edition of the World Forestry Congress, the world's largest gathering on forests, ended with delegates signing a joint declaration calling on enhanced cooperation across the world.

The Korea Forest Service said the latest edition of the WFC, which was held at Coex in Seoul between May 3–6, both online and offline, invited a total of some 15,000 people from 164 different countries, becoming the largest in the history of the congress.

Participants of the WFC this year adopted the Seoul Forest Declaration, identifying priority agendas that not just the forestry sector, but also stakeholders and institutions in different fields, should follow to build a green, healthy and resilient environment, the KFS said.

The WFC has also drawn significant agreements and discussions, envisioning healthy forests amid mounting threats from climate crisis, it added.

With the declaration, delegates reached a consensus that forest protection can help restore the Earth's environmental balance and countries around the globe should therefore increase their cooperation on forests.

"We must now scale up political will and increase financial and technical investments. The Declaration will add to the sense of urgency to accelerate action, strengthen partnerships and enhance cross-sectoral collaboration," said Maria Helena Semedo, the deputy director-general of the Food and Agriculture Organization of the United Nations in a statement.

The declaration, in detail, says that investment in forest and landscape restoration needs to triple by 2030 to meet internationally agreed commitments and targets on restoring degraded land.

In addition, an advent of a revolutionary financial solution that can support restoration and preservation of forests is also required, the declaration reads.

The Korea Forest Service Minister Choi Byeong-am speaks during a closing ceremony of the 15th World Forestry Congress, held at Coex, Gangnam-gu, Seoul. (Yonhap)

The world, particularly the construction sector, should also use more sustainably sourced wood, to protect the environment, the declaration said.

Introducing data-based analytics to forest management is needed as well, to enable evidence-based forest and landscape decision-making, according to the declaration.

The declaration also stresses that the forestry sector, stakeholders, and government bodies should try to minimize damages

to forests, which can greatly benefit human health, amid ongoing threats from COVID-19 and potential danger from future pandemics.

The KFS said the latest edition of the WFC allowed the world to recognize the huge potential of forests to help achieve the 2030 Agenda for Sustainable Development.

The KFS also expressed hopes that the declaration and new ideas that came out during the congress could help the world to join forces to increase forest health and climate resilience.

During the congress, ministerial level officials met together and agreed that the countries should make more investment in forest management. They particularly agreed on using more sustainably sourced wood, which could help them achieve their Nationally Determined Contributions.

Throughout the event, the KFS also shared the country's history of forest management and related policies with the experts and government officials from other countries, through special events such as the Forest Fire Forum and the Peace Forestry Initiative high-level meetings.

The KFS noted that the events allowed it to solidify Korea's position as one of the world's leading nations in forestry.

The KFS also held meetings with government officials of 20 different countries to share ideas on forest management and discuss potential partnerships, according to the KFS.

The KFS expects South Korea would be able to facilitate new partnerships with foreign governments in the future, through which the country will share its forest management policies, related know-hows and technologies.

New partnerships with international organizations have been also made.

South Korea and the FAO launched the Assuring the Future of Forests with Integrated Risk Management mechanism, a global platform dedicated to strengthen countries' capacities to implement integrated fire management.

South Korea and the United Nations Environment Programme also announced that they are developing the Sustaining an Abundance of Forest Ecosystems, an initiative for restoring damaged forests and securing biodiversity around the globe.

With the United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries, South Korea agreed to look into new opportunities to promote REDD+, a platform dedicated to encourage countries to contribute to climate change mitigation efforts by reducing greenhouse gas emissions.

Businesses also joined the congress to share their recent efforts in preservation and sustainable management of forests. A total of 87 teams from companies and institutions joined a special exhibition to share their visions and products relating to the forestry sector.

During the congress, SK Group unveiled its environmental, social and governance goals. SK Forest, the forestry business arm of the business group, held an exhibition introducing the company's recent efforts in forest management and carbon reduction.

SK E&S has also signed a three-way agreement with the East Timor government and SK Forest, through which they aim to introduce forest development projects and reduce carbon emissions.

Korea Aerospace Industries, South Korea's sole aircraft manufacturer, also held an exhibition, featuring Surion-affiliated forest helicopters, along with other technologies that can be used in forest management.

Korea Forest Service Minister Choi Byeong-am said the latest WFC in Seoul has helped the country to step up its presence in the forestry sector.

Choi added that the country will expand its partnerships on forests, while continuing its efforts in forest protection.

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Lessons from Indonesia?

Last year, the area of forest lost in Indonesia fell by 25 per cent on 2020 levels, to the lowest level in 19 years of modern satellite records. What is Indonesia doing right, and can it offer any lessons for deforestation hotspots such as Brazil?

What's the trend for forest loss in Indonesia?

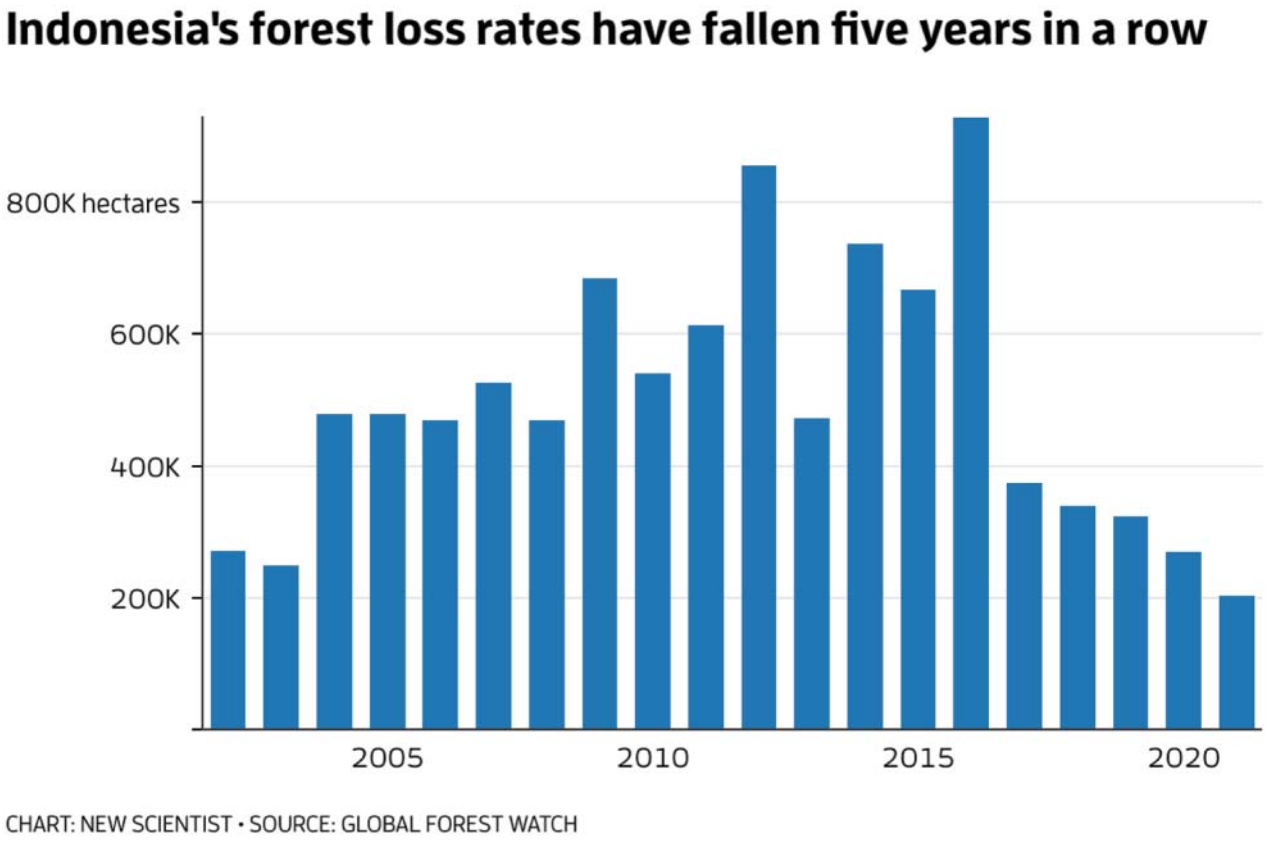
Clearances for plantations of palm oil, a commodity widely used in everything from biscuits to shampoo, really kicked off in the mid-2000s and early-2010s, says Kemen Austin at RTI International, a non-profit research group. "Of course, it's a biodiversity hotspot and there are a lot of important carbon stocks in those forests. So, this is a concern," she says. The issue has been highlighted internationally in environmental groups' campaigns about the plight of orangutans losing their habitat (such as the advert about "Rang-tan" that was banned in the UK), and it gained more prominence during the record-breaking fires in 2016 that were lit to clear land for plantations. The fires released billions of tonnes of carbon into the atmosphere and blanketed neighbouring countries in smog, sparking international condemnation. However, around that time, annual losses of long-standing forests ("primary forest") began to decline in the country. Rates of tree cover loss have now fallen for five years in a row, indicating this decline is no blip.

What might be behind these reductions?

"There are a number of things that seem to be working and building off of each other to contribute to this decline," says Liz Goldman at the World Resources Institute, a US non-profit that helped analyse the new satellite data from Global Forest Watch. She lists better fire-monitoring efforts since the record-breaking blazes and a moratorium on primary forest clearances that was first introduced in 2011 but made permanent in 2019. A government peat restoration agency has also stepped-up efforts and expanded to cover mangrove forests too.

Companies committing to buying deforestation-free palm oil, spurred in part by consumer pressure and campaigns like the one featuring Rang-tan, have also played a part, Goldman says. About 80 per cent of palm oil refining capacity in Indonesia and Malaysia is now covered by commitments for no deforestation and no peat use. A certification scheme, the Roundtable on Sustainable Palm Oil, may have helped, too.

Rates of forest loss in Indonesia have fallen for five years in a row. Photo: RDW Environmental / Alamy Stock Photo



Austin says there is some evidence emerging that the moratorium has had a small but notable impact. However, she says while corporate pledges should, in theory, be helping, "I don't think the evidence is there yet." The biggest driver for the falling forest loss rate, she thinks, is a much more prosaic macroeconomic trend. Crude palm oil prices fell over the period that forest loss declined. Following a peak in around 2011, prices fell steadily until around 2018 and 2019. "The decline in plantation-driven expansion has very closely tracked the global price for crude palm oil," she says.

How confident are we about what's driving the cuts?

Not very. Matthew Hansen at the University of Maryland says not enough rigorous work has been done to disentangle the impact of the various anti-deforestation measures. "I don't know if it's a really clean narrative. And I don't know if we should just say it's good governance," he says. One explanation for the decline in forest loss could simply be that the Indonesian island of Sumatra has been a hotspot of deforestation for many decades and the remaining forests aren't easy to access, he says.

Arie Rompas at Greenpeace, speaking from Jakarta, says that meaningful trends are unclear because there just isn't enough transparency or confidence in the Indonesian government's official land use data. Figures from Global Forest Watch suggest that 203,000 hectares were lost in 2021, 25 per cent less than in 2020. Yet the government's figures show 153,000 hectares were lost in 2021, marking a 29 per cent increase from 2020. Meanwhile, one study last year found official estimates underplayed the true area burned during Indonesia's fires in 2019 by more than half. "Government methodologies need to be reviewed by independent experts to ensure consistent and accurate data to get at the drivers of deforestation and to assess policy effectiveness," Rompas says. He also says Indonesia needs "to stop hiding behind a veil of forest land use secrecy", citing the government's failure to make plantation maps public despite a court ruling compelling it do so.

Is Indonesia doing enough?

No, says Rompas. He points out that the area lost last year was larger than Greater London. "Overall, Greenpeace does not feel Indonesia is getting its policy framework right, because deforestation is still far too rapid," he says.

What could set back Indonesia's progress?

Palm oil prices have jumped to a 40-year high and are now roughly double the average for 2010 to 2020, says Austin. There is no signal yet that the highs have driven a new wave of investment in plantations, but Goldman warns there is typically a lag of a year or two before prices show up in forest clearances on the ground. "Those programmes and policies that are designed to try to minimise deforestation will be put under quite a bit of pressure by the price of palm oil. And so we'll start to see how durable they will be in the face of these macroeconomic trends," says Austin.

Another big risk is from the drying effect of the El Niño weather pattern, which can make fires more likely and cause peatland to dry out and release significant amounts of carbon. For now, the world is still in El Niño's opposite cycle, La Niña, which is expected to last throughout this year. Another possible risk is Indonesia's new "Job Creation Law", which Goldman says is designed to spur investment and may potentially weaken some environmental regulations.

Are there lessons here for countries losing vast tracts of forest, such as Brazil?

The experts I spoke to think the issue is less about trying to replicate a country's individual anti-deforestation measures, and more about the global demand for agricultural commodities. Austin points out macroeconomic drivers such as the growth in soybean demand were the big underlying cause of deforestation in Brazil in the 2000s. In other words, the world's hunger for these commodities might have more of an impact on deforestation levels than single policies. As Rompas says: "We see the unsustainable and inequitable global agriculture system as the common major driver of deforestation."

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Zambia: Encroachment in national forests – challenges and possibilities

Over time, Zambia's national forest reserves have undergone tremendous changes as a result of encroachment coupled with the impacts of climate change. Since time immemorial, people have always illegally settled in national forest reserves and as they do so, they are referred to as illegal settlers and the illegal activity is known as forest encroachment. People encroach in national forest reserves for various reasons which include establishment of settlements, farming and charcoal production and most important, to improve livelihoods through the collection and sale of non-wood forests products. However, the main driver of all this is simply poverty. Encroachment in the national forest reserves of the country has highly contributed to deforestation while impeding on the sole purpose of protected forest areas.

National forest reserves were created to protect tree species, water sources and produce forest resources. The Forest Act No. 4 of 2015 clearly provides that 'All the land comprised in a National Forest shall be used for (a) the protection of forest resources of national importance; (b) the conservation of ecosystems and biological diversity and sustainable utilization of forest resources; (d) and the management of water catchments areas and head waters. Therefore, the purpose of national forests is twofold, in an ideal situation, national forests were created for the production and protection of trees as well as the environment, any other function exceeding the above mentioned is regarded as an offence. A realistic situation on the ground is however saddening.

All national forests across the country have been encroached to some extent. People have illegally shared the portions of land

Forest encroachment in Zambia

within forest reserves, built houses and created farms. Most of illegal settlers have been living in these protected areas for a long time and they believe its theirs as it is home. The question is how did the situation get there?

The truth of the matter is that forest encroachment is so high in the country and no one seems to bother or question it. As long as nothing is being done to stop and reverse encroachment in national forests, the situation shall reach a point of no return. It shall be very difficult for government to evict people who have encroached in national forests. These people have created families and villages and have become well connected such that the current forest law is weak to make them move out of the protected areas. Some of the illegal settlers were born there and the encroached areas have become their home they know. Now, the situation has dovetailed from being an environmental issue to a more complex and complicated social problem. Its little about trees but human lives.

By law, all the illegal settlers who have encroached the protected forests need to be displaced but inasmuch as I am concerned, government has no available alternatives to their livelihoods. Further, government has no resettlement plan for these illegal settlers. And since there is no resettlement plan, there is no way these people will tend to move out of the protected forests. Currently, the Forest Department has no capacity to move these illegal settlers from encroached areas. You might be wondering why I have said so? Here are some issues;

In the first place, Forest Department under the Ministry of Green Economy is faced with so many crosscutting challenges than any other departments in any government ministry. The Forest Department has for a very long time been faced with too many challenges to the extent where it even fails to execute its basic duties of enforcing the forest law offenders especially the illegal settlers. For example, thedepartment does not have a legal affairs office. I am talking about the department which is present in all the districts country wide and mandated to arrest and take to courts of law the offenders of forest law. It is very sad that there is no office to deal with issues of legal matters pertaining to forest law in the department. This means that the department does not have capacity to handle cases in courts of law against the offenders of the forest law. Other than this, there is no advice regarding legal matters within the department so, most of the legal issues especially encroachment issues go unresolved. There is need for serious reforms for legal matters of the department.

Secondly, the successive governments which have passed from the MMD era to the PF administration did not show any political will to uplift the operations of the Forest Department in order to safe guard national forests. I can only hope that the UPND government shall be able to see this gap and come to realization of how former governments underrated Forest Department and see it become incapacitated.

The government through the Ministry of Green Economy must identify the operational gaps of Forest Department so that it can be viable to controlling encroachment in the national forests. This is doable as problems of the department are already apparent and do not need stakeholder consultations. Thirdly, Forest Department has the mandate to enforce the forest law by preventing encroachment in the national forests. However, there is always lack of capacity to enforce the law through financial constraints.

The Department has always cited lack of funds for forest operations as being among the most disadvantaging factors leading to encroachments in the national forests. The department in all the district offices have no money for running operations. There are no operational vehicles and there is always no fuel to use in the vehicles to conduct forest patrols and inspections. So, the department cannot conduct forest patrols and inspections in the forest reserves to check for encroachment, deforestation activities and other vices which are not allowed. This is indeed a big downfall.

Fourthly, the department is very much understaffed. It lacks human resource ranging from forest guards to forest rangers to forest officers and others who are supposed to be enforcing the law when dealing with forest encroachment in national forest reserves. The department is limping because there are few officers to implement its functions and carry out the duties. Most if not all the District Forest Department stations across the country are understaffed. Government has not been massively employing forest officers since 2002 yet increasing forest graduates are out there waiting to be employed. The department has been segregated and underrated so much. While the new dawn government offered to employ teachers and health workers, it is in everybody's interest that foresters can also be considered as important in achieving sustainable economic growth.

More importantly, the Forest Department has very limited and small organization structure for the staff to work effectively and efficiently. The organization structure of the Forest Department is not wide enough. It does not allow enough number of forest officers and forest guards to be absorbed in the system yet they are the ones supposed to be on the ground to enforce the law. many stakeholders have been making submissions and recommendations to have the Forest Department undergo restructuring through parliament but to no avail. Very few positives have come out of the issue yet too many bottlenecks. Selfish interests of some individuals at high level and political interference are among the factors. The new dawn government have the opportunity to restructure Forest Department so that it can be able to execute its duties diligently in an effective and efficient way and help stop encroachment in forests reserves.

Moreover, the limited organization structure is very old and cannot work in the modern times. Some ranks in the organization structure are not well supported by law. for example, the rank of the District ForestOfficer in the organization is just an administrative convenience but not gazette. The salary scales are still complicated and are not in conformity with the organization structure.

Furthermore, the national forests lands have been transformed overtime. The challenges have changed and demands of the forests management have become different yet the department and its structure have remained the same. Also, this is posing a negative effect on funding of forest projects to Forest Department by NGOs and funders. They keep avoiding funding Forest Department for forest related projects simply because the organization structure is very limited to execute projects and mainly accounting for the funds. So, the department keep losing out on essential forestry related projects. Therefore, as long as the organization structure of the department remains unadjusted, there shall be no effective implementation of forest law and policy hence, encroachment shall not be stopped or controlled.

Lastly, there are no statistics to show the current encroachment levels in forest reserves. The word of the day is that encroachment is high in national forests but there are no inventory figures. The little data is scant and limited. So, Forest Department need to conduct inventory of all national forests to know the actual levels of encroachment country wide. This can mark the beginning of planning to reverse forest encroachment by the Minister of Green Economy. If you do not know how much portions of national forests have been encroached, you cannot even begin to talk about combating encroachment because you have no information to base your encroachment plan on.

Of course there is Integrated Land-use Assessment document supported by FAO which take stock of all the country's forests. However, in my view and that of few others, the document has some scientific challenges regarding methods and accuracy of the data. Some stakeholders feel it does not hold the true representation of the results. Nevertheless, that debate is for another day. The point I am trying to stress is that there must be a new forest inventory for all the national forest in the country so as to show the current levels of encroachment and where they are located. This will help the Forest Department and the Minister of Green Economy to know what to do with the situation and how to reverse it.

Thus, there is high need to remap national forests because some portions of the areas are already illegally established. Forest law can do little to resettle the people from the encroached areas the forest reserves. To solve the problem in an amicable way, it will only take the president to de-gazette the encroached portions and let the people live there. This being said, some forest areas will be lost and others gained hence the need to remap and redefine the boundaries of nation forest reserves. The current Forest Actgives power to the President who may, by statutory instrument, declare any area of land within theRepublic to be a National Forest and may, in like manner, declare that any National Forest shall cease tobe a National Forest or that the boundaries of any National Forest shall be altered or extended.

This is hard to digest but it's the truth. There is need to redefine the boundaries of the national forestsand remap them to get the true value of current stock of national forests and the encroachment levels.This is when the department can now plan better for combating encroachment in national forestsreserves. this can only take the will of this new dawn government to ensure that the forest department isempowered with all the resources it need to stop national forest encroachment and I believe it can be done as I dwell in so much faith in the Minister of Green Economy.

Musyani Siame
lusakatimes.com

World's leading scientific research centers on forestry and agroforestry react to new U.N. study on forests

The "2022 State of the World's Forests" (SOFO) was launched recently by the U.N. Food and Agriculture Organization (FAO) to coincide with the World Forestry Congress in Seoul happening from 2–6 May. This flagship report is updated every two years based on the latest forestry research and data, and several scientists from the Center for International Forestry Research and World Agroforestry (CIFOR-ICRAF) were among its contributing authors.

Experts from the Center for International Forestry Research and World Agroforestry weigh in on the "State of the World's Forests 2022"

The study's main takeaway is that global recovery is rooted in forests. Trees and forests can help the world recover from the COVID-19 pandemic and its related economic aftershocks, in addition to combating climate change and biodiversity loss. Estimates indicate that more than half of world's gross domestic product – $84.4 trillion in 2020 – is dependent upon ecosystem services, including those provided by forests.

"Although this latest report isn't startling with regard to research, it details a course of action long promoted by CIFOR-ICRAF by providing a financial roadmap for policymakers and the private sector to follow," said Robert Nasi, the organization's managing director.

In particular, the SOFO sets out how *halting deforestation and maintaining forests* could avoid significant greenhouse-gas emissions – about 14 percent of the reduction needed up to 2030 to keep planetary warming below 1.5 degrees Celsius. By *restoring degraded lands and expanding agroforestry*, 1.5 billion hectares of degraded land – an area twice the size of Australia – would benefit from restoration and increasing tree cover could boost agricultural productivity on another 1 billion hectares. Lastly, *sustainably using forests and building green value chains* would help meet future demand for materials – with global consumption of all natural resources expected to more than double from 92 billion tons 2017 to 190 billion tons in 2060, driven by the projected growth of the global population to 9.8 billion people by 2050.

Global Deforestation Trends

The SOFO comes just days after startling deforestation figures for 2021 were released via the Global Forest Watch. From the Brazilian Amazon to the Congo basin, the tropics lost 11.1m hectares of tree cover last year, including 3.75m ha of primary forest.

CIFOR-ICRAF, which conducts research on forestry and agroforestry in developing countries to inform policy across Asia, Africa, and Latin America, has operating offices in the DRC, Indonesia, Brazil and Peru, and is closely monitoring these trends.

"The capacity of tropical countries to address forest conservation may have been undermined by the COVID-19 pandemic," said Manuel Guariguata, a principal scientist for CIFOR-ICRAF and Lead for Peru. "During 2020, the total area deforested across the global tropics doubled with respect to pre-COVID-19 values the year before. Shutdowns and public health concerns pushed the political priorities away from forests and trees."

"The pandemic has underscored the need for creating shorter supply chains and more diverse and resilient systems," said Vincent Gitz, CIFOR-ICRAF's Director for Latin America. "To this end, we are working in the Brazilian state of Para with project partners Amazon and the Nature Conservancy, as well as local communities, in our 'Agroforestry and Restoration Accelerator Project' to establish diversified agroforestry systems on degraded land and to cultivate markets for sustainable forest-based commodities."

"The SOFO mentions halting deforestation as a key pathway. In an Amazonian context, particular attention should be given to the demonstrated role of Indigenous and local communities in this regard," said Guariguata. "Almost half of the intact or primary forest cover across the Amazon Basin falls within formally recognized, indigenous lands."

In fact, smallholder farmers, local communities and Indigenous Peoples own or manage at least 4.35 billion ha of forest and farmlands. Studies show that 91 percent of all indigenous and community lands are in good or moderate ecological condition, indicating great potential to cost-effectively reduce deforestation, according to the report. Moreover, smallholder farmers produce almost 80 percent of the world's food.

Yet less than 2 percent of global climate finance is reaching smallholders, Indigenous Peoples and local communities in developing countries. Total financing to halt deforestation, restore degraded land and build sustainable value chains must triple by 2030 and increase fourfold by 2050 to meet climate, biodiversity and land degradation neutrality targets, with the estimated required finance for forest establishment and management alone equalling $203 billion a year by 2050, the SOFO report adds.

"In general, it's not the technical solutions we are missing; but the set of incentives currently in place," said Paolo Cerutti, CIFOR-ICRAF Senior Scientist and Lead for DRC. "In countries that are extremely poor, like the DRC, the question remains: 'How do you ensure incentives, including financial ones, trickle down to the smallholder farmers so they can reduce the environmental impact from activities that they need to conduct for their basic survival, like cutting down trees for fuelwood?"

"Despite the general squeeze placed on forest-dependent Indigenous Peoples, local and low-income communities, we have no shortage of money," Nasi said. "Governments are estimated to spend $1.8 trillion a year in military expenditures and more than $5 trillion in fossil fuel subsidies, but only about $50 billion on landscape restoration. It's time for society to rethink our priorities to enable a better future."

cigar.org

How to make Africa's 'Great Green Wall' a success

Farmers at a Great Green Wall site in Niger. Researchers have found that the project is not always benefiting the most vulnerable people. Credit: Boureima Hama/AFP/Getty

One of the world's most ambitious plans to restore degraded land needs a more meaningful way to measure its achievements.

It's now 15 years since the African Union gave its blessing to Africa's Great Green Wall, one of the world's most ambitious ecological-restoration schemes. The project is intended to combat desertification across the width of Africa, and spans some 8,000 kilometres, from Senegal to Djibouti. Its ambition is staggering: it aims to restore 100 million hectares of degraded land by 2030, capturing 250 million tonnes of carbon dioxide and creating 10 million jobs in the process. But it continues to struggle.

An assessment two years ago by independent experts commissioned by the United Nations stated that somewhere between 4% and 20% of the restoration target had been achieved (go.nature.com/39zqgkr). That figure has not changed,

according to the latest edition of *Global Land Outlook* (go.nature.com/3kdjtw5) from the UN Convention to Combat Desertification (UNCCD), out last week. Equally concerning is the fact that funding for the project continues to lag. Africa's governments and international donors need to find around US$30 billion to reach the 100-million-hectare target. So far, $19 billion has been raised.

A pandemic – and now a cost-of-living crisis – has placed demands on all governments, and that means countries might be expected to reduce their green-wall commitments. But the project continues to be weighed down by other difficulties, including the complex system through which it is funded and governed, as well as how its success is measured. These problems can and must be fixed, otherwise it will struggle to achieve its goals.

Biodiversity thrives in Ethiopia's church forests

One potential solution – improved metrics – comes from an analysis published last year by Matthew Turner at the University of Wisconsin–Madison and his colleagues (M. D. Turner *et al. Land Use Policy* **111**, 105750; 2021). The researchers explored limitations in the Great Green Wall project metrics by assessing the impact of World Bank funding from 2006 to 2020. As their work indicates, definitions of success depend on which measure is used.

In Niger, for example, green-wall projects could be said to be succeeding if measured by the area of eroded soil that has been recovered or by the number of trees that have been planted. But the authors report that these gains were not necessarily benefiting the most vulnerable people. In places, women were being excluded from employment in green-wall projects, and in some cases, local administrations looked to privatize restored land that might instead have been owned by everyone in a community.

Broader problems with metrics are highlighted in the UN's latest land-degradation report. This estimates that nearly half of the land that has been pledged for restoration worldwide will be planted predominantly with fast-growing trees and plants. This will provide only a fraction of the ecosystem services produced by forests that are allowed to naturally regenerate, including significantly less carbon storage, groundwater recharge and wildlife habitat.

The Great Green Wall project also needs more predictable funding and more transparent governance. The project was conceived by Africa's leaders for the benefit of the continent's people, on the basis of warnings from scientists about the risks of desertification and land degradation. The original idea was not brought to Africa by international donors, as is often the case in international science-based development projects. But it still relies on donor financing, and lots of it – and that brings other problems, among them coordination challenges.

How to plant a trillion trees

The project is the responsibility of an organization set up by the African Union called the Pan African Agency of the Great Green Wall, based in Nouakchott, Mauritania. But some donors, such as the European Union and the World Bank, are not providing most of their Great Green Wall funding through this agency. Instead, they often deal directly with individual governments, because this gives them more control over how their money is spent. It is unfair to expect the Pan African Agency to coordinate a raft of donors doing one-on-one deals with individual countries. Bypassing the Pan African Agency also creates a problem for transparency, because it makes it harder for the African Union to determine precisely who is funding what.

In January 2021, at an international biodiversity summit hosted by France, Emmanuel Macron, the French president, announced that the Great Green Wall would receive an extra $14 billion in funding for 5 years. He also said that a new body, called the Great Green Wall Accelerator, based in Bonn, Germany, would be responsible for pulling together funding pledges and tracking progress against targets. This is well-intentioned, but the accelerator needs to coordinate its work with the Pan African Agency. It is not yet clear how this will happen.

A potentially more transformative solution was proposed two years ago by a group of UN-appointed experts. They recommended that a single trust fund be set up that all donors could contribute to and through which they could decide funding priorities together. Regrettably, this has not happened, and observers say it is not likely to happen in the current climate.

This month, the international community will come together in Abidjan, Côte d'Ivoire, for the 15th conference of the parties to the UNCCD. The green wall's funders and participating countries will all be there. If a single trust fund is off the table, they must work together to find a better way to coordinate their green-wall project activities. It is also essential that they study the findings of Turner and colleagues' review. Along with a focus on existing metrics, the Great Green Wall needs evaluation criteria that take better account of the needs of all people in participating countries, particularly the most vulnerable.

nature.com

Bringing the tūī back to town – how native birds are returning to NZ's restored urban forests

Urbanisation, and the destruction of habitat it entails, is a major threat to native bird populations. But as our new research shows, restored urban forests can return native birds to our cities and improve species richness.

We define restored urban forests as green areas within a city, dominated by native vegetation that has been planted intentionally. To evaluate restoration success, we tracked changes in native bird communities in 25 restored forests in two of New Zealand's cities, Hamilton and New Plymouth.

The forests we used in our study ranged widely in their ages, including one where initial restoration efforts began 72 years ago. We also compared these restored forests to remnant patches of native, mature forest – both within and beyond the city – that had never been clear-felled.

Our findings show older restored forests support more species of native birds, and some are close to the species richness of untouched remnants of native forest. The abundance of birds increased as the forest canopy became denser.

Contrary to our initial predictions, introduced invasive mammals had no significant effect on either species richness or abundance of native birds in urban forests.

Older restorations are better

We found the younger forests supported small-bodied insect-eating and omnivorous birds such as fantails, silvereyes and grey warblers. Older plantings were also home to nectar and fruit-feeding species such as tūī.

This increase in native species richness suggests older sites provide a greater variety of food and other resources, meeting the needs of more species over time. We also found greater overall numbers of fantails and tūī in older restored forests.

Insect-eating fantails are among the first to return to restored urban forests. Shutterstock/William Booth

To monitor these native bird communities, we counted all terrestrial birds seen and heard along 200m transects.

It appears native bird diversity in restored forests is becoming increasingly similar to what we find in urban forest remnants, but there is still a noticeable gap between the oldest restored areas and both urban and rural remnants.

This could mean it might take more than 72 years for a forest to provide the same quality of habitat as remnant forest, underscoring the importance of protecting the remaining forests, both within and beyond the city limits.

Rats and possums also like restored forests

We also needed to know how mammals affect native birds at our sites, so we used camera traps to detect cats and chew cards to track rats and possums.

Chew cards are small sheets of corrugated plastic, with the edges filled with peanut butter, which allow us to identify rodents and possums by their bite marks. To our surprise, we did not find any significant influence of rat and cat numbers on the diversity and abundance of native birds.

Native birds that survive in cities are less affected by predation. Shutterstock/JARASNAT ANUJAPAD

This was unexpected because both rats and cats prey on native birds and rats also take their eggs. However, other research has shown three of our widely detected native birds (grey warbler, fantail and silvereye) are capable of coping with a certain level of predation.

In 2006, a study proposed the idea that the bird communities we see in our cities today are those less affected by predation – the "ghosts of predation past".

We believe this to be the case in our study – birds that are highly vulnerable to predation by invasive mammals have already disappeared from New Zealand cities. The remaining birds are those that can survive despite current levels of predation.

We never detected rats and possums in the youngest restored forests. They seem to prefer a certain level of vegetation complexity, canopy cover and tree height in restoration plantings. Once these habitat requirements are met, after about nine years, rats and possums become relatively widespread.

It appears the changes in vegetation structure and complexity that occur as the restored forest ages benefit native forest birds but also provide habitat for invasive predators.

Urban forests benefit people and nature

In urban areas that have undergone extreme deforestation and habitat modification, increasing the number and quality of

native forest through restoration planting is a necessary first step towards re-establishing native forest bird communities. But this should eventually be accompanied by invasive mammal control.

Our findings highlight the considerable opportunity forest restoration presents to enhance native bird diversity. This allows us to reconcile human development with protection and improvement of native biodiversity in cities.

As people continue to move to cities, urban restoration provides a renewed link between people and native environments.

Despite the conservation challenges urban environments present, there is growing recognition of the benefits to both native species and people. Ecological restoration is a potentially powerful tool for mitigating the detrimental effects of urbanisation.

By providing habitat for birds, urban green spaces also allow city residents daily contact with charismatic species. This facilitates an emotional connection with nature which in turn promotes public support for conservation and restoration.

The United Nations has declared 2021–2030 the decade of ecosystem restoration – a rallying call for the protection and revival of ecosystems around the world, for the benefit of people and nature.

Our study shows every New Zealander can contribute to this revival of our iconic native birds by planting native trees in their own urban neighbourhoods.

By: **Elizabeth Elliot Noe** (Postdoctoral Fellow, Lincoln University, New Zealand), **Andrew D. Barnes** (Senior Lecturer in Community Ecology, University of Waikato), **Bruce Clarkson** (Professor of Restoration Ecology, University of Waikato) and **John Innes** (Senior Research – Wildlife Ecology, Manaaki Whenua – Landcare Research)
theconversation.com

How phantom forests are used for greenwashing

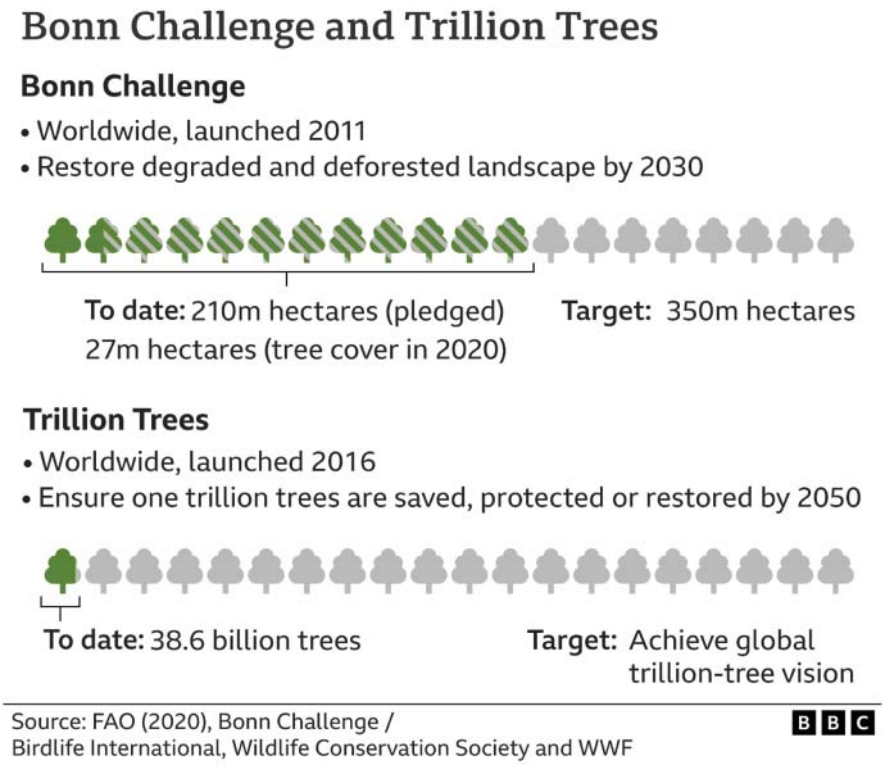
Capturing carbon by increasing forest cover has become central to the fight against climate change. But there's a problem. Sometimes these forests exist on paper only – because promises have not been kept, or because planted trees have died or even been harvested. A new effort will now be made to track success and failure.

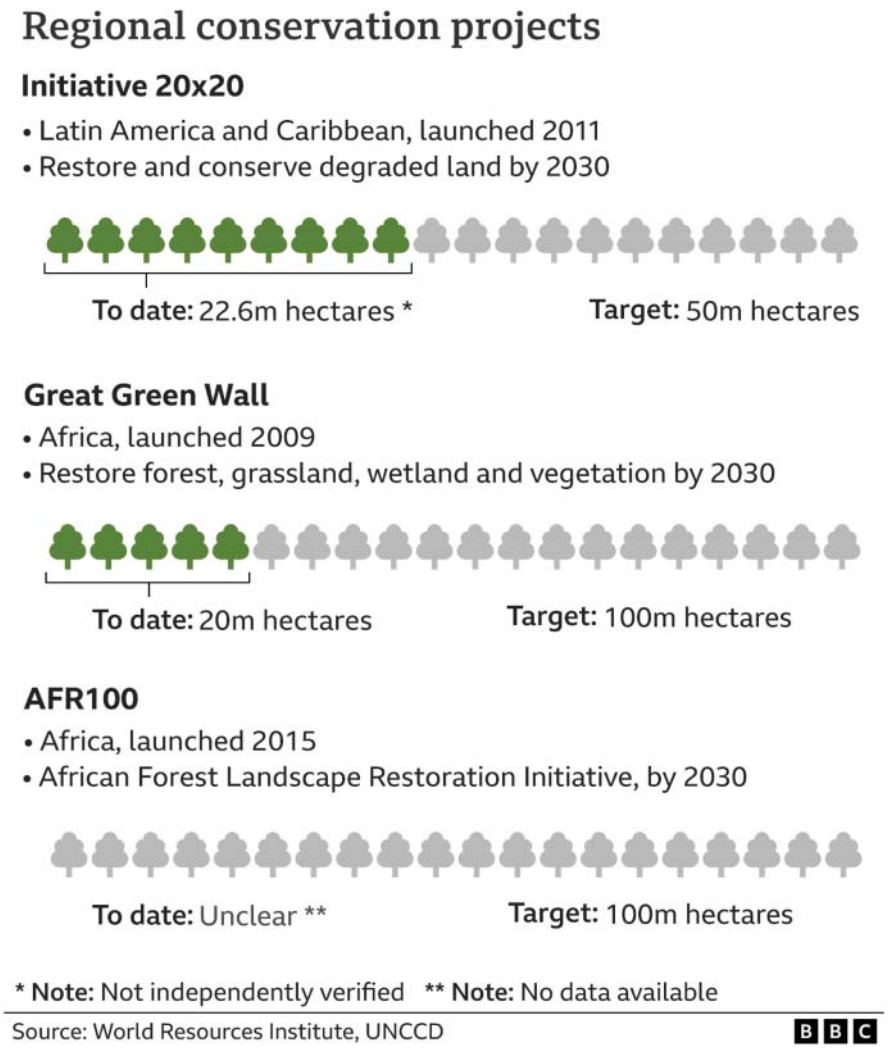
Dr Jurgenne Primavera is being paddled in a canoe along the coast of Iloilo in the Philippines. It's an idyllic scene but she is frowning. Six years ago these shallow waters were planted with mangroves as part of the country's ambitious National Greening Programme, but now there is nothing to see but blue water and blue sky.

Ninety per cent of the seedlings died, Dr Primavera says, because the type of mangrove planted was suited to muddy creeks rather than this sandy coastal area. The government preferred it, she suggests, because it is readily available and easy to plant. "Science was sacrificed for convenience in the planting."

The National Greening Programme was an attempt to grow 1.5 million hectares of forest and mangroves between 2011 and 2019 but a withering report from the country's Commission on Audit found that in the first five years 88% of it had failed.

In recent years, many ambitious forest restoration and planting programmes have been launched – some global, some regional – in an attempt to suck carbon out of the atmosphere and limit the rise in global temperatures.





The biggest of them have until 2030 to reach their targets, but they appear to have a long way to go. In some cases it's simply unknown how much progress has been made.

Tim Christophersen, until this month head of Nature for Climate with the UN Environment Programme, says that of the one billion hectares of landscape that countries have promised to restore worldwide "most" remains a promise rather than a reality.

In some cases, grandiose planting programmes have gone ahead, but have delivered limited results. The BBC has investigated a dozen examples that have flopped – as in the Philippines – usually because insufficient care was taken.

The Philippines government did not respond to requests to comment on the official Commission on Audit assessment that 88% of the National Greening Programme failed.

The local authority that planted what Dr Primavera considers to be the wrong mangrove species for coastal sites disagreed with her, saying that 50% of seedlings had survived in some locations. In the Philippines at least an audit was published; in many other countries results are unclear. The Indian State of Uttar Pradesh, for example, has planted tens of millions of saplings in the last five years, but when the BBC went to check new plantations near Banda, it found few alive. Signs still proudly announced the plantations' existence, but scrubland plants were taking over.

"These plantations are mostly photo-ops, they look great, the numbers sound stupendous," says Ashwini Chhatre, an associate professor with Indian School of Business, who has researched ecosystem restoration.

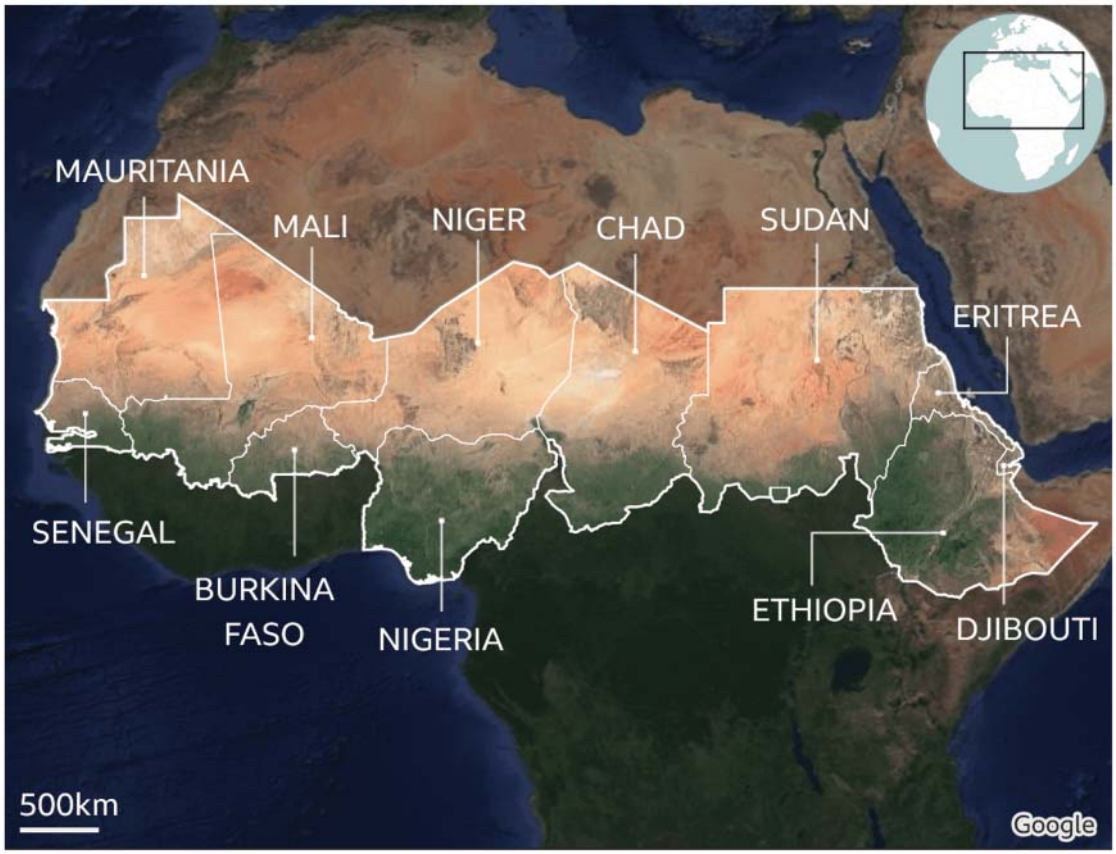
"The current model of plantation requires you to first have nurseries for which you need to procure building materials and then you need to procure sapling bags, barbed wire and other things needed for plantation and then transportation of everything. Contracts are awarded for the supply of all these materials, which can also be very leaky. And so many of these people are interested in replanting, they are not interested in the success of plantation."

Uttar Pradesh's head of forestry, Mamta Dubey, told the BBC all supplies for state nurseries were purchased through official government channels at competitive rates, and that most plantations had been judged by third parties to be successful.

Prof Ashish Aggarwal of the Indian Institute of Management in Lucknow says India has covered an area the size of Denmark with plantations since the 1990s, but national surveys show forest cover increasing only gradually. "Even at a survival rate of 50%, we should have seen more than 20 million hectares of trees and forests," he says. "But that hasn't happened – the data does not show that addition."

According to the deputy director of the UN Food and Agriculture Organization (FAO), Tina Vahanen, this problem is widespread, not confined to India. "Many of the plantations have been promotional events," she says, "with no follow-up action that is really needed to grow trees."

Countries participating in the Great Green Wall project



Source: FAO

BBC

The BBC found a different kind of problem in Mozambique, which has allowed private companies to plant large monoculture plantations as part of its contribution to the AFR100 forest landscape restoration initiative. While many plantations have grown successfully, it's alleged that in some cases mature natural forest has been felled to make space.

The BBC heard this complaint from villagers in the Lugela, Ile and Namarroi districts in the centre of the country. It is echoed by Vanessa Cabanelas of the NGO, Justica Ambiental, who says that the original landscape worked better as a carbon sink.

"The idea of plantation is sold to us as mitigation for climate change impacts, which is false," she says.

The companies behind the plantations viewed by the BBC denied that the land had previously been healthy forest. Mozambique Holdings said its rubber plantation near Lugela had been planted on a former tea-growing estate. Portucel, a Portuguese company which has a eucalyptus plantation near Namarroi, said the landscape had been degraded by human interference and that very few remnants of natural forest had remained.

The BBC also witnessed a Portucel eucalyptus plantation being harvested. Vanessa Cabanelas points out that felling trees creates emissions, as does shipping when the logs are exported, and that the dead trees are no longer sequestering carbon. A Portucel spokesman said that new trees would be planted, and the process would begin again. Portucel has received funding from the International Finance Corporation (IFC), a branch of the World Bank, which has not responded to the BBC's request for comment. The Mozambique government has also failed to respond.

It's against this background that the FAO is this week introducing a new framework for monitoring landscape restoration projects. National forest monitoring team leader Julian Fox says 20 indicators have been agreed with governments and other partner organisations. These include noting any benefits the forests brings to local communities, as it's understood that they often fail without local support.

"The idea is to build countries' capacities to measure and report their progress in a meaningful and transparent way," he says. "It's mainly about making your good monitoring data available to the international community."

The task of collecting the data still falls to the countries themselves and there is no guarantee they will do it. But fortunately, this new effort coincides with improvements in satellite monitoring systems, experts say. "There is a lot of greenwashing around and we have to actively uncover that," says Tim Christophersen, the outgoing head of UNEP's Nature for Climate branch. "There is a temptation for greenwashing, because it costs less than doing the real thing and doing it right."

By **Navin Singh Khadka**
Environment correspondent, BBC World Service
bbc.co.uk

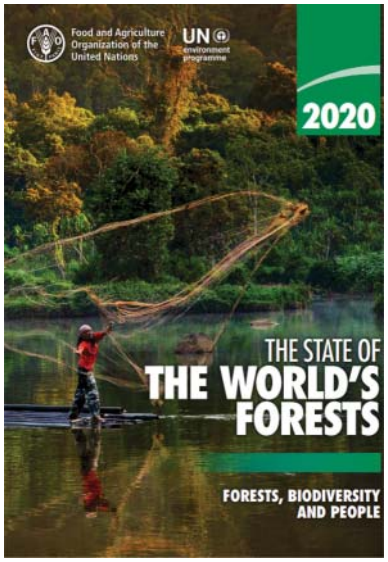
Publications

The State of the World's Forests 2022

FAO

As the United Nations Decade on Biodiversity 2011–2020 comes to a close and countries prepare to adopt a post-2020 global biodiversity framework, this edition of The State of the World's Forests (SOFO) examines the contributions of forests, and of the people who use and manage them, to the conservation and sustainable use of biodiversity.

Forests cover just over 30 percent of the global land area, yet they provide habitat for the vast majority of the terrestrial plant and animal species known to science. Unfortunately, forests and the biodiversity they contain continue to be under threat from actions to convert the land to agriculture or unsustainable levels of exploitation, much of it illegal.



The State of the World's Forests 2020 assesses progress to date in meeting global targets and goals related to forest biodiversity and examines the effectiveness of policies, actions and approaches, in terms of both conservation and sustainable development outcomes. A series of case studies provide examples of innovative practices that combine conservation and sustainable use of forest biodiversity to create balanced solutions for both people and the planet.

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Around the World

Finland: No scientific justification for increasing logging in Finnish forests, says Climate Change Panel

A report by the Finnish Climate Change Panel quashes a number of common claims about the climate benefits of increasing logging to produce wood-based energy and products.

The report concludes that increasing logging volumes from current levels will not support the effort to mitigate the climate emergency if the wood is used to produce the same products as today, be it pulp or other raw materials for the forest industry or wood-based fuels and products.

Jyri Seppälä, the professor in charge of sustainable consumption and production at the Finnish Environment Institute (Syke), on Thursday said the oft-heard claim that logging increases the carbon sink of forests over the medium, 30–80-year term is inaccurate because the removal of wood from forests undermines the carbon storage in the long term.

"Realising the climate benefits of wood use over a certain time period requires that the decline in forest carbon sinks caused by logging is smaller than the growth of carbon storage in wood products and the reduction in fossil emissions brought about by the use of wood-based fuels," he said.

Seppälä added to Helsingin Sanomat that the compensatory benefits of wood-based fuels and products should be three to four times higher than currently to justify increasing logging volumes.

"There are currently no climate-based grounds for increasing intensive wood use. On the contrary, it jeopardises both climate and diversity goals," he declared.

The Finnish Climate Change Panel is not demanding that logging volumes be decreased, he stressed, but that the timing and volume of wood harvesting be examined with caution in light of the climate goals set for the entire land-use sector.

About 75 million cubic metres of stemwood was harvested in Finland in 2021. There is considerable pressure to increase the volume due to demand arising from a new bioproduct mill that is opening in Kemi, Western Lapland, and the discontinuation of imports from Russia.

Logging has a detrimental impact on forest carbon sinks particularly because forests in the country are relatively young on average and grow at a rate that is slow relative to the intensity of logging.

"This impact is illustrated by the fact that with a lower logging volume – 63 million cubic metres a year – the average age of forests would increase by 34 years over 100 years. With the current logging volume, the average age of standing timbre would increase by 19 years over 100 years," highlights Syke.

"If forests are felled at too young an age while the trees are still growing, it undermines the carbon-sequestering sinks," Seppälä stated to Helsingin Sanomat.

Syke also challenged the perception that forest use is beneficial for the climate because wood products store carbon and replace emission-intensive fossil fuels, estimating that it would take a minimum of 150 years for existing wood fuels and products to offset the loss of carbon sinks caused by logging.

"Some wood products do replace fossil fuels and fossil coal, but they aren't enough to compensate for the carbon deficit created in forests. The effects are minuscule relative to the loss of carbon sinks," said Seppälä.

Syke pointed out that increasing the share of wood-based construction materials of forest-industry output would create benefits in the short term only if domestic logging volumes are not increased.

Only about one-fifth of stemwood consumed in the country is currently used in the production of wood products with a longer life cycle, such as construction materials.

"The climate effects of forest-industry products can be improved by increasing the material efficiency of manufacturing and using wood products, by increasing the share of long-term wood products of output and by manufacturing products that replace higher-emission products in the market," outlined Seppälä.

"The forest sector should accelerate the development of innovative climate-sustainable solutions."

helsinkitimes.fi

Global: Massive destruction of tropical and boreal forests in 2021

Tropical rainforests – which are vitally important for carbon storage and biodiversity – are disappearing at a rate of roughly 10 soccer fields a minute, a Global Forest Watch (GFW) report warned.

The GFW found that the destruction intensified from 2016 to 2018, and that in 2021 alone, deforestation resulted in carbon dioxide emissions equivalent to the annual fossil fuel emissions of India.

Though an increasingly industrial world has sped up destruction, new technologies have also given watchdogs new resources to track the issue.

"There's good news and bad news for forests," GFW senior fellow Frances Seymour said. "Over the last 10 years, satellite imagery and other remote sensing technologies have revolutionized our ability to monitor and understand the causes of forest loss."

"The bad news is that deforestation data spanning the last two decades reveals a persistent hemorrhaging of the world's most valuable terrestrial ecosystems – and we're not doing enough to stop the bleeding," she added.

Over the last two years, forest loss rates have stabilized, dipping to 4,210,000 hectares cleared in 2020, and just under 3,750,000 hectares lost the following year. However, forests continue to be targeted by organized criminal groups engaging in illegal mining, logging, illicit crop cultivation and cattle raising.

Between 2002 and 2021, Brazil saw nearly 28 million hectares of primary forest loss – equivalent to a rate of nearly 4,000 soccer fields a day – an area bigger than New Zealand.

In South America, the areas most consistently affected by tropical deforestation are located in the western Brazilian Amazon and Bolivia's Santa Cruz province. Together, the countries accounted for nearly 50% of the total tropical forest loss. Non-fire caused losses in Brazilian territory increased more than 25% from 2020 to 2021, while Bolivia saw an increase of about 30%.

According to the report, soaring deforestation in Bolivia has been at least partly caused by large-scale agriculture like soy and cattle ranching, which has accounted for much of the non-fire primary forest loss.

In Brazil, extensive clearings along existing roads next to the forests, – likely for cattle pastures – has been a major driver, the report said.

Outside of South America, GFW did have some good news to report. Indonesia, where in 2016, forest loss accounted for nearly one million hectares, lost only 200,000 in 2021, an 80% decrease.

But it's not just tropical forests that are at threat. Boreal forests – mainly those in Russia – experienced unprecedented tree cover loss last year, largely driven by fires. It was the worst fire season since record-keeping began in 2001, with more than 6.5 million hectares of tree cover loss.

Boreal "forests are increasingly under threat from climate change, with hotter, drier conditions leading to increased fires and insect damage," the report said.

It's not just acts of nature driving the decline of the world's forests, land grabbing linked to commercial agriculture and other activities causes structural destruction that only makes them more vulnerable to changes in the climate and ecosystem.

occrp.org

Global: Food, farming and forestry must be transformed to curb global warming, U.N. says

Protecting forests, changing diets, and altering farming methods could contribute around a quarter of the greenhouse gas cuts needed to avert the worst impacts of climate change, according to the United Nations' climate panel. But the changes are unlikely to happen unless governments act to spur them along, the report from the Intergovernmental Panel on Climate Change released on Monday found.

"We are in the early stages of climate and agriculture policy development, but we need to start with acknowledging the urgency of the challenge," said Ben Lilliston, director of rural strategies and climate change for the Institute for Agriculture and Trade Policy. "The IPCC warns that governments thus far have not been up to the task."

About 22% of global greenhouse gas emissions came from agriculture, forestry, and other land use sectors in 2019, the report said, around half of which were from deforestation. Much of the rest came from the combustion of fossil fuels.

Mitigation measures in those sectors – including protecting forests from clearcutting, sequestering carbon in agricultural soils, and more sustainable diets – can provide as much as 20%–30% of the emissions reductions needed to limit global warming to 1.5 or 2 degrees Celsius above pre-industrial levels.

Scientists say that is the threshhold at which climate change risks spinning out of control.

"Indigenous Peoples, private forest owners, local farmers and communities manage a significant share of global forests and agricultural land and play a central role in land-based mitigation options," the report said.

While the changes required in the agriculture, forestry and other land use sectors – dubbed AFOLU by climate specialists – would not cost much to implement, there is little momentum so far to trigger them, the report said.

A lack of institutional and financial support, uncertainty over long-term tradeoffs of how land is managed, and the dispersed nature of private land holdings have hindered implementation so far, it said.

"Land provides us with so much, for example, food, nature, and our livelihoods," said Diána Ürge-Vorsatz, vice chair of the IPCC working group that authored the report. "These competing demands have to be carefully managed."

One major obstacle is that dictating diet is divisive.

The IPCC panel's initial report summary included a recommendation that consumers shift to plant-based diets and reduce their intake of meat, according to a draft seen by Reuters.

But the final version of the summary included a recommendation instead for balanced diets that include sustainably produced animal products alongside plants like grains and legumes.

Asked about the changes, Joanna House, an expert on land use at the University of Bristol and an author of the report, said she could not comment on why the changes were made but said the issue of dietary changes is complex.

"If meat is produced sustainably, it can be low carbon and support soil carbon and nutrients," she said. "If produced unsustainably, particularly in intense systems requiring large amounts of animal feed that result in deforestation, it can cause large net emissions."

Global demand for livestock products is growing, a headwind to cutting agriculture's emissions, the report said.

wtvbam.com

Africa: Sustainable provision of goods and services from forests is challenged – African Forest Forum

The sustainable provision of goods and services from forests is challenged, and there are calls for urgent attention to rectify it.

Dr Djibril S. Dayamba, Senior Programme Officer at the African Forest Forum (AFF), says Africa is currently a deforestation hotspot.

According to him, 90 per cent of deforestation occurs in tropical areas, with Africa losing the most land to deforestation from 2010 to 2020, overtaking South America.

Agriculture expansion, shifting cultivation, charcoal production, pastures, and animals have been identified as significant contributors to forest cover loss. Firewood, mining, unsustainable logging, fire, pole production, aquaculture in mangrove forests, settlements and urban expansion are among the other issues.

Population expansion and its ramifications have also been flagged as a potentially dangerous future trend.

There are obstacles and hazards to preventing forest cover loss, but opportunities are also.

Dr Dayamba spoke at the XV World Forestry Congress in Seoul, the Republic of Korea, by Collaborative Partnership on Forest (CPF), chaired by the Food and Agriculture Organisation of the United Nations (FAO).

By 2063, the Sustainable Forest Management Framework (SFMF) for Africa envisions zero deforestation and forest degradation, with collaborative, cross-sectoral, and transformative efforts to ensure that Africa's forests are protected, sustainably managed, and restored through the prosperity, food security, and resilience of its people.

Dr Dayamba believes that providing stakeholders with proper tenure rights to encourage them to manage forest and tree resources sustainably could assist in preventing forest loss.

He believes equitable gender consideration in policy decisions, capacity building, resources for implementing sustainable forest management, and fair benefit-sharing are all important.

myjoyonline.com

India: Sunderban social forestry areas are under threat

The long stretch of Sunderban mangrove forest, one of the world's largest (140,000 acres), has been severely affected due to the mangrove deforestation in the social forestry areas by some local political figures. The island sets an example of continuous ecological processes due to a complex network of tidal rivers, mudflats, and small islands of salt-tolerant mangrove forests. Earlier, large-scale deforestation led to serious threats of erosion; however, at present, the residents of Sunderban and forest officials are keeping a strict eye on such human activities. Unfortunately, nothing has been done to ensure tight supervision in areas of social forestry where deforestation is occurring and areas are being converted for economic uses such as pisciculture.

Most of the livelihood in Sunderban is dependent on Mangrove forests as the Man and Biosphere (MAB) plays a significant role in the financial dependence of the residents. "The people of Sunderban are dependent on the forest due to the variety of fishes, crabs and so on. The people sell them and earn money, also mangrove forests attract tourists. In Sunderban, a large chunk of money comes from tourism and therefore, it is important to save the social forestry areas," Umashankar, who has been collaborating and assisting a lot of researchers in Sunderbans, told The Sunday Guardian. One can often witness numerous core zones on the eastern side as compared to the west. Asked about the reason, another researcher, who wished to remain anonymous, told this paper, "As a researcher, I have seen that there are many inaccessible areas in the eastern side as compared to the western zone. Most of the western zone undergoes deforestation and thus there has been a change in the course of the river. Also, we have seen a lot of human establishments on the eastern side."

However, when The Sunday Guardian approached the forest official, she was told that the officers were uninformed about any such ongoing activities in the eastern side of social forestry areas of Sunderban. "We keep a strict check on any degradation or deforestation of mangrove plantation in Sunderban, but we have not been informed about anything at present," Bishwajit, a forest officer, told this paper.

As Sunderban has been going through the degradation of mangroves in the social forestry areas, the Sundarban Development (SD) Board has been conducting an afforestation programme that has three components-mangrove plantations, strip plantation, and farm forestry. The Board's Social Forestry wing implements these programmes through three Range Offices in Namkhana, Canning, and Hasnabad, as well as six Beat Offices in Sagar, Roydighi, Joynagar, Canning, Nezat, and Hasnabad. Forestation of mangroves in the Char land intertidal zones, which was later expanded to mudflats. The programmes such as growing mangrove seedling nurseries and then transplanting them into silted up trenches and pits, and direct planting of mangrove seedlings grown naturally in the char lands. With a few exceptions, the SD Board has successfully established mangrove forests in large areas of char lands next to settlements. Similarly, fruit-bearing trees were prioritised under the programme of strip plantation. Seedlings of timber, fuel, and fruit plant species are cultivated for delivery to intended households and organisations for plantation under Farm forestry. In 2020, due to the Amphan cyclone, Bengal Chief Minister Mamata Banerjee stated that on World Environment Day, 5 June, 2020, around 50 million mangroves would be planted in the Sundarbans in the near future.

sundayguardianlive.com

Ivory Coast aims to raise $1.5 billion to restore forests

Ivory Coast aims to raise $1.5 billion for a five-year land restoration programme to bring back forest and increase food production, President Alassanne Ouattara said at the start of a United Nations conference on desertification.

The world's top cocoa producer lost 80% of its forests between 1900 and 2021, and risks losing them all by 2050 if the pace of decline continues, Ouattara said at the opening ceremony of the 15th Conference of the Parties (COP15) in the financial capital Abidjan.

He did not specify whom he hoped would provide the money, but called on the private sector to help fund a separate ongoing $1 billion government project to restore three million hectares of forest by 2030.

The new five-year "Abidjan Legacy Programme" will use technologies such as tree-planting drones and drought-resistant plant varieties to repair degraded land. It will also boost rural employment and increase food production in a country that has lost millions of hectares of forest and arable land to cocoa fields.

"Our people base a lot of hopes on us," Ouattara said. "Let's act together to give our lands a new life."

World leaders will be meeting at the COP15 over the next two weeks to discuss ways to reverse land degradation, deforestation and desertification fuelling poverty and conflict around the world. More than a quarter of the world's fertile land has been rendered non-productive, impacting the lives of 3.2 billion people, particularly rural communities in poorer countries, according to the United Nations.

Drought has affected 1.5 billion people and caused economic losses of at least $124 billion. West Africa is also battling against desertification, fuelling a rural exodus from the region's semi-arid north.

Desert sands are advancing at a rate of five kilometres per year, the U.N. food agency estimates, encroaching on cropland across the restive Sahel south of the Sahara.

reuters.com

Zimbabwe: Forests overlooked in industrialisation drive says scientist

Wise use of forests could contribute substantially to the country's push to end poverty and drive industrialisation – a major vehicle to grow the country into a middle-income economy by 2030, a renowned agricultural economist says.

Professor Mandivamba Rukuni, a veteran academic with extensive experience in facilitating land policy-making in Africa, told participants at the first international symposium on forestry held recently that forests must not be overlooked as allies in the fight against poverty and in the country's industrialisation drive.

"The potential of the country's forest resources is yet to be fully understood and tapped," he said. "Foresters, you are one of the most honest and straightforward people who give information as it is, but you do not tell people about the value of the wise use of forests in driving industrialisation. For example, honey has more than 20 uses and yet we use it to spread on a slice of bread. Maize has more than 15 uses and yet we use it for the stomach. Foresters should explore ways to develop, manage and sustainably add value to forestry resources in support of Zimbabwe and Africa's industrialisation."

The international symposium was held under the theme: "Forest Restoration for Climate Change Mitigation and Adaptation." It was hosted by the Forestry Commission at a time of ongoing national, regional and global efforts to restore forest landscapes and promote the utilisation of forests in combating the effects of climate change and improvement of livelihoods.

Prof Rukuni said the sustainable management of forests and their use were key to combating climate change, and to contributing to the prosperity and well-being of current and future generations.

According to an International Union of Forest Research Organisations assessment released by the UN in 2019, around 4.06 billion hectares of forests remain in the world today. In many tropical nations, forests contribute 20–25 percent of income for the poor, about the same amount as agriculture.

Forests and other trees also provide essential safety nets that help people manage climatic and economic risks. In many forest and wildlife-rich countries in Africa, for example, timber and tourism are big contributors to the national economy apart from a wide range of forest products. Among other things, Prof Rukuni highlighted the political economy theory or the premise of most African countries being stuck in the middle-income trap.

"Out of the 55 African nations, there is no single African country that has attained industrialisation," he said. "South Africa and a few others we think are industrialised, are still stuck in the middle-income trap. You cannot industrialise with single-digit growth. For African countries to industrialise, they must have double-digits growth for years. For now, most African countries are stuck in the middle income trap."

Prof Rukuni said single-digit growth rates would transform the economy and the rate of unemployment would not come down, while inequality would worsen.

"With economies stuck in the middle income trap, poverty and unemployment will persist and as gaps in income widen, the chances of attaining industrialisation that will address the needs of the majority of the population will become slim."

Prof Rukuni said getting out of this middle income trap was the single most important problem that needed to be addressed to move towards industrialisation. Zimbabwe and other African countries have committed to restore 31 million hectares of degraded and deforested land, under a new push to make 100 million hectares productive again by 2030.

Zimbabwe is one of the most mega-biodiverse countries in the world and harnessing natural resources can effectively

contribute to economic growth and industrialisation. Commercial exploitation of Zimbabwe's indigenous forests and woodlands is a significant source of income, foreign exchange, and employment at the national level.

This also extends to a diverse range of non-timber forest products, including oils, gum, waxes, edible and non-edible. However, the value of huge stocks of forestry and non-forestry products that are traded in the informal sector such as mazhanje, marula, masau, baobab, natural honey, natural herbs and oils and a whole range of other plant and animal products is not known, yet it is quite significant in terms of volumes traded on the market.

allafrica.com

U.S. forests provide 83M people with half their water

Forested lands across the U.S. provide 83 million people with at least half of their water, according to a broad new study of surface water sources for more than 5,000 public water systems.

The study also finds that 125 million people, or about 38 percent of the country's population, receive at least 10 percent of their water from forests. In the arid western U.S., 39.5 million people get more than half of their surface drinking water from forests that are increasingly under threat of wildfires.

"Healthy forests typically mean clean water, and people depend on forests for their surface drinking water supplies," said Peter Caldwell, a hydrologist at the U.S Forest Service and co-author of the new study. "Until we completed this work, we just did not know how many people obtain their water from forested lands or how much water from forests they receive."

The new study, published today in the AGU journal *Water Resources Research*, provides a critical update to the map of where surface water comes from. This information could help forest managers and water utilities identify hydrologically important forests so they can be prioritized for forest management or conservation.

The study developed a new database of inter-basin water transfers, which move surface water around from where it's plentiful to where it's not. The study focused on surface waters such as lakes, rivers, and streams because tracing the source of groundwater is very difficult at the national scale.

The researchers found 69 percent of the water transported to Los Angeles through inter-basin transfers, and 82 percent of Phoenix's imported water, originated on forested lands. Across the U.S. every year, from 2001 to 2015, 594 transfers moved 117 billion cubic meters of water per year, about five times as much water as reported in the 1980s. The increase reflects a combination of higher data quality, many fine-scale transfers, and true increases in water transfers due to the growing water demand over the past several decades.

Some urban communities obtain more than 50 percent of their surface drinking water from forested lands through inter-basin transfers, extending some of the benefits of forested lands to urban communities.

"I was surprised by the significant role inter-basin transfers play in providing water from forests to large population centers," said Ning Liu, also a U.S. Forest Service hydrologist and lead author of the new study, in a press release. "This updated inter-basin transfer dataset provided us with the opportunity to get the full picture of the contribution of forests to water supply."

Managing Forests for Water

The results of this study could inform forest management decisions in water supply watersheds, but it depends on who owns and manages the forests. While two-thirds of forests in the West are National Forests managed by the U.S. Forest Service, just 8 percent are in the east, with the remainder largely in private ownership.

In the east, 49 percent of forests are family owned and nearly 75 percent of those are less than 20 acres. This patchwork of ownership poses difficulties in managing regional water resources in the long-term, said Caldwell.

"If privately owned forests are divided into smaller and smaller pieces, it gets harder and harder for landowners to generate income from those forest lands," said Caldwell. When the costs to own forest land exceed income earned from them, landowners may be forced to sell their land, which could then be developed, decreasing water quality.

"A potential solution could be to provide forest landowners with economic returns for the water-related ecosystem services their forests provide for downstream water supplies," said Caldwell.

There are somewhat different challenges in the western U.S., where loss of privately owned forest to development is less of a threat than the increasingly prevalent wildfires. Wildfires pose risk to water supplies downstream and those cities connected through inter-basin transfers, such as Las Vegas and cities throughout California. This work could be used to help prioritize forest management activities such as thinning and fuel reduction in critical water supply watersheds.

waterworld.com