CFA Newsletter

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Don't neglect the threat of pests and diseases!

Citizen science in action. (Photo: Chris Quine, Forest Research)

Threats and Opportunities

Understandably there has been much attention in recent months to the pervasive and increasing threats of climate change and of biodiversity loss across the globe. The forestry community have been active participants in the ensuing debate – with identification of powerful opportunities for climate change mitigation and habitat restoration through reforestation, and the need to adapt sustainable forest management practices to the changing bioclimatic, social and economic circumstances.

The debate has been vigorous in the UK where there are interests in woodland expansion and government commitments to achieving net zero emissions later this century. At present the UK remains heavily reliant on imports of wood and wood products and, building on a long tradition of plant collectors and traders, remains a frequent importer of live plants. In recent years, there has been growing concern over the health of UK trees whether as individual trees in urban and rural landscapes, or in woodlands and forests. These concerns, grounded in the establishment of several unwanted pests and diseases [Box 1], serve as a salutary reminder not to neglect the threat of pests and diseases.

There is keen interest and lively discussion amongst the forestry community in the UK over the means of making our forests more resilient to these and other biotic and abiotic threats. Suggested responses include species diversification, protection and enhancement of natural regeneration, better silviculture, improved biosecurity, and greater investment in research and evidence gathering. They have also necessitated new responses by policymakers and practitioners – and this article seeks to introduce three of these.

Box 1 – Recently established threats to the health of UK trees – selected examples

Phythopthora ramorum – associated with sudden oak death in California, this Oomycete was considered a threat to several British broadleaved species and ornamental collections of Rhododendrons in gardens and arboreta; however, it surprised everyone when it jumped to larch and has since caused widespread death of larch plantations in western Britain.

Oak processionary moth (*Thaumetopoea processionea*) – was first introduced in 2005/2006 on plants for urban landscaping and has since spread through greater London; it is particularly unwelcome as it affects human health in addition to impacts on oak growth. In 2019 many new incidents were identified across England, Wales and Scotland associated with newly imported semi-mature oak trees from the Netherlands and Germany.

Ash dieback (*Hymenoscyphus fraxinea*) probably arrived in the UK both by airborne spores and imports of affect plants. The fungus originates in the Far East, where is co-exists as a harmless saprotroph, but since being introduced to naïve hosts has been responsible for widespread ash dieback and death throughout Europe since the 1990s. Costs of the outbreak in UK may be as high as £16 billion according to one recent published estimate.

Acute oak decline – the rapid decline of mature oak trees in parts of southern Britain due to a complex and not fully understood combination of drought, bacteria, and insect vectors

Identifying knowledge and evidence gaps – Action Oak

Oak and its health is considered by some as emblematic of the state of the UK environment. It contributes unique landscapes and ecosystems – supporting the highest biodiversity of any of our native tree species, and the ancient (or veteran) tree component is rare at a European scale. UK citizens are currently enjoying oaks planted several hundred years ago, and there are concerns that future generations will not benefit in the same way.

The Action Oak initiative (www.actionoak.org/) has been established to confront this threat. The initiative is an informal and innovative partnership with 11 founding organisations across private, charitable and public organisations. It also encompasses a wider network of supporters in the academic and stakeholder community. All have come together to encourage research, education, training and better management with respect to the oak population.

One of the first actions was to commission a review of what is known and not known about oak health in order to target future activities including research. The review was undertaken by a partnership inspired network of 42 scientists from 18 organisations and many different disciplines. It identified significant gaps in the understanding of the oak population, the demographic dynamics, and the complex and compound nature of the threats. It was agreed that there is now an urgent need to fill these evidence gaps so that appropriate action can be taken by tree owners, land managers, policy makers and the public; see Box 2.

Sharing knowledge between sectors – Scotland's Plant Health Centre

Casting aside the forester's lens, of course it is not just trees but many other plants which play essential roles in our lives – whether by underpinning food webs, helping to characterise our landscapes, regulating our climate and providing raw materials for many human activities. However, these contributions can be disrupted by pests and diseases – some of which can affect a wide range of plant types. A case in point is *Xylella fastidiosa* – a bacterial pathogen associated with over 500 host plant species worldwide and currently causing major economic losses to olive trees in Italy. Such pathogens threaten many land use sectors, and actions by one may unwittingly impact on many others.

To help address these interdependencies a new 'virtual' Plant Health Centre has been established, with funding from the Scottish Government. The Centre brings together key organisations to co-ordinate activities – with specific sectoral representation for forestry (led by Forest Research), agriculture, horticulture and the natural environment. Each organisation can draw upon wider expertise from pathologists, entomologists, social scientists, climate change and spatial scientists to tackle the most pressing policy questions and the plant health threats of highest risk to Scotland. In the case of *Xylella*, the Centre has

Box 2 Six grand challenges relating to knowledge of oak health

1. *Securing long-term commitment. A need to tackle the dearth of long-term records through a renewed commitment to existing monitoring, trials and exploration of new survey methods such as via remote sensing.*
2. *Understanding oak demography and its dynamics. A need to improve our understanding of the population dynamics, especially in non-woodland settings, so that our interpretation of trends in mortality takes a long view.*
3. *Uncovering the functioning of tree systems. A need to undertake more holistic studies of oak health (and that of other tree species) to understand the extent to which pests and pathogens interact with other environmental stressors, and how natural systems may control some of the unwanted organisms.*
4. *Profiling the threats. A need to characterise the many potential new threats on the horizon by improving our understanding of pests and diseases already in Britain and those yet to arrive, including the single and compound nature of these threats.*
5. *Fostering management and engagement. A need to find new ways of encouraging stewardship of oak trees and woods which will counter the lack of management of (oak) woodlands and lack of engagement of owners and publics in tree health.*
6. *Establishing the nature of interactions and complexity. A need to adopt new integrative methods of research and evidence gathering, combining many disciplines and both expert and lay knowledge, to address the immensely complex interactions.*

Source Quine *et al.* 2019

Ips outbreak in Czech Republic. (Photo: Max Blake, Forest Research)

drawn together new evidence to adapt the UK contingency plans to Scottish conditions by using broad-scale mapping to identify the economic and environmental values at risk, invertebrate sampling to establish the presence of potential vectors of the disease and adapting European disease models to refine surveillance. This co-ordinated approach across sectors will raise awareness, expand understanding of the threats and share the best ways of managing risks and impacts. More information is available at www.planthealthcentre.scot

Involving citizen scientists in early warning – TreeAlert and Observatree

Only with early detection is eradication or containment of new pests and diseases likely to be possible. As became clear during the first weeks of the ash dieback outbreak, many citizens are keen to help protect their valued trees and woods. To facilitate reporting of suspected cases of specific pests and diseases, or concerns over unhealthy trees, a web-based portal TreeAlert (https://treealert.forestresearch.gov.uk/) has been developed; the design helps the observer provide the most important details (including photographs) for Forest Research's Tree health Diagnostics and Advisory Team to assess the significance and, if necessary, commission a site visit. It has proved valuable to supplement this general reporting with the development of a dedicated citizen science network via the Observatree project. The project, led by Forest Research, involves nine partner organisations in running a volunteer network, training the citizen scientists, developing a range of educational and training resources, curating the resultant data – on both unhealthy and sentinel trees, and acting on the findings. See https://www.observatree.org.uk/ for more information.

Conclusions and applications

No doubt climate change will remain a concern of great magnitude to many foresters in the coming years – but the linked threat of pests and diseases mustn't be ignored. Linked because the changing climate can permit the establishment of organisms in locations previously unsuitable climatically or change the behaviour of endemic species so that they become a threat rather than an innocuous component of the ecosystem. The movement of plants, plant products, machines, wood packaging, and tourists rapidly around the world provide new pathways for organisms to arrive in countries where the trees are not adapted to their presence. Some of the mechanisms identified above, emphasise the need for and potential of partnership and collaboration between foresters, researchers, policy makers and publics in the face of such threats to share knowledge and create understanding that inspires actions to better protect our trees, woods and forests. Such themes are likely to gain greater prominence in the forthcoming 2020 International Year of Plant Health.

Sources

Quine, C.P., Atkinson, N., Denman, S., Desprez-Loustau, M-L., Jackson, R., Kirby, K. (eds) 2019. Action Oak Knowledge review: an assessment of the current evidence on oak health in the UK, identification of evidence gaps and prioritisation of research needs. Action Oak, Haslemere, UK. ISBN ISBN 978-1-5272-4193-0 Downloadable from www.actionoak.org.

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Queen's Commonwealth Canopy

Inside Prince Harry's efforts to preserve African parks

During his royal tour, Prince Harry unveils plaques designating Liwonde National Park and Mangochi Forest Reserve as part of the Queen's Commonwealth Canopy.

PHOTOGRAPH BY SAMIR HUSSEIN, WIREIMAGE/GETTY

In 2016, Prince Harry flew over a forest reserve in southern Malawi called Mangochi. He was shocked by what he saw. Though the reserve borders one of the country's most popular safari destinations, it looked badly deforested and neglected. People had started moving in past the park's borders. "These communities are encroaching way beyond where they should be and this whole place is on fire," he recalls thinking.

Malawi, a sliver of a country tucked into the borders of Mozambique, Zambia, and Tanzania, straddles the environment of both southern and east Africa. The electricity-poor region is reliant on charcoal for energy and reportedly has the highest rate of deforestation in the region. As conservation groups begin to tackle this crisis, a royal effort hopes to exert enough pressure to keep the indigenous forests preserved.

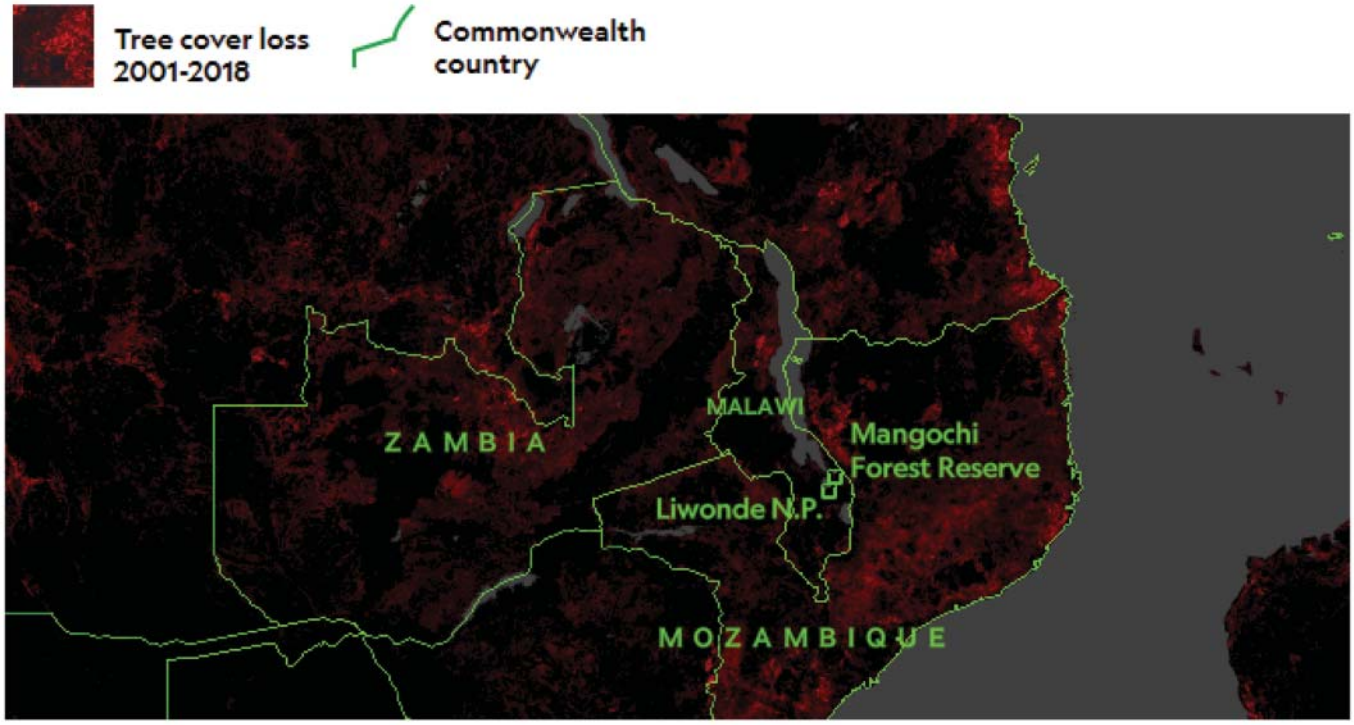
On Monday, three years after Prince Harry made that first flyover and urged Mangochi's protection, he made an announcement: Mangochi Forest Reserve and Liwonde National Park, which sit side by side, had officially joined the Queen's Commonwealth Canopy. Under the scorching sun the Duke of Sussex welcomed some 300 square miles of nature into his grandmother's initiative. The plaques indicating the new designation are mounted on the stone entrance to Liwonde, beneath a metallic tree crafted from confiscated poachers' snares.

Commonwealth conservation reaches Malawi

Malawi's Mangochi Forest Reserve and Liwonde National Park became the latest sites to be protected under the Queen's Commonwealth Canopy, a program that began in 2015 to preserve forests or replant deforested areas among former territories of the British Empire. Deforestation over the last few decades has affected broad swaths of the globe, including the 53 member states of the Commonwealth.

The Queen's Commonwealth Canopy (QCC) launched in 2015 to unite all 53 Commonwealth nations in conservation. Since then, 46 countries have pledged to protect 60 sites – either by preserving a piece of indigenous forest or replanting a deforested area. The visit to Malawi comes at the end of Prince Harry's 10-day tour of southern Africa. A few days earlier, in a remote region of Angola, he pulled off a colorful piece of fabric to reveal a QCC designation for the Luengue-Luiana National Park. In Botswana before that, he visited the area around Chobe National Park, home to Africa's largest elephant population, which is also joining the QCC. In Malawi, the rebuilding effort has just begun.

Liwonde, which sprawls out from the Shire River, is one of Malawi's popular safari spots. Just 30 minutes from the main gate, a family of elephants walks along the road, foraging for



SOURCES: HANSEN/UMD/GOOGLE/USGS/NASA; THE COMMONWEALTH FOUNDATION
NOTE: CONTENT MAY NOT REFLECT NATIONAL GEOGRAPHIC'S CURRENT MAP POLICY

African elephants graze beside the Shire River in Liwonde National Park in Malawi. Prince Harry recently announced that the park would be joining the Queen's Commonwealth Canopy, a conservation initiative.

PHOTOGRAPH BY WOLFGANG KAEHLER, LIGHTROCKET/GETTY

leaves. Buffalo stand and stare, and spry kudu sprint away from passing safari cars. The landscape is dusty and the trees are brittle, but when the rainy season begins it will turn lush. More than 600 elephants share the grasslands and floodplains with lions, leopards, and threatened black rhinoceroses.

Poaching has taken its toll on Liwonde. In 2005, ornithologist Tiwonge Gawa was doing a walking census in Liwonde when she came across a watering hole. Around it were piles of feathers and carcasses: hundreds of doves, starlings, and Lilian's lovebirds – the species she was studying. When the skies are dry, the birds travel in large flocks to find water; these had landed in a pool poisoned by poachers. This scene, she said, used to be common.

Then, in 2015, African Parks took control of Liwonde. Across the continent, the organization – Prince Harry is its president – temporarily oversees struggling parks and helps them rebound. Since then, African Parks has installed a perimeter fence around Liwonde, built a ranger training center, and overhauled security. Seven cheetah and 10 lions were reintroduced to the park while more than 500 elephants were moved out in order to halt destruction to nearby communities. Tourism has jumped, and British army units rotate in for anti-wildlife trafficking deployments.

The national parks have improved, says Gawa, the chairperson of the Wildlife and Environmental Society of Malawi, the country's oldest environmental NGO, but she sees a crisis in her homeland's forests, like Mangochi Forest Reserve. For a long time, forest guards were not armed, she says, and it was easy to enter and cut down trees. In one instance in 2015, illegal logging had so badly depleted an essential forest that the government dispatched the military to stop it. "The unique forests have disappeared," Gawa says, "and [with them] the unique species."

On a sparse landing field in Liwonde, Peter Fearnhead, the CEO of African Parks, points toward where the park intersects with the Mangochi reserve, 15 miles away. Last year, African Parks expanded their oversight to the reserve, which was being cleared of both trees and wildlife. Now, the organization must play a delicate game: protecting Liwonde and Mangochi's wildlife and resources, while keeping local communities, many of whom once farmed and hunted there, happy.

An electric boundary fence, which already encases Liwonde, has begun tracing the outline of Mangochi. The perimeter is not just for keeping people out – but keeping animals in. "These are some of the highest concentrations of hippos and elephants anywhere in Africa," Fearnhead says. "If you don't contain them they end up killing people."

David Nangoma was born just outside the park boundary, and now serves as a liaison between the park and the nearly 800,000 people who live on its outskirts. When he joined African Parks in 2015, Liwonde had 6,000 large animals and double that number of poachers' snares. Locals thought the park had been sold and demanded to know what was happening to their land. In an effort to offer livelihoods outside the park, African Parks has set up beekeeping projects, constructed schools and hospitals, and created scholarships.

In both Liwonde and Mangochi, African Parks is trying to stop further deforestation and promote natural regrowth, but the future is still uncertain. While the wildlife rebound, Prince Harry worries about how long it will take to reverse decades of environmental degradation. "I think we're going to wake up to the idea that in 10 years it's going to be far worse than it is now," he says. "Because for anything we do now to fix the problem there's going to be a massive lag time."

Those efforts are underway. The Department of Parks and Wildlife does not contribute financially to enforce the QCC designation, so the responsibility falls to African Parks to help wean local communities off of park-grown firewood by opening around 15 tree nurseries. Inside the parks' boundaries, nature is being left alone to return in its own time.

The QCC title could bring just enough attention to prove there's payoff in preservation. Currently, the designation doesn't include money, but as the first environmental initiative in Queen Elizabeth II's name – each application ends up on her desk for personal approval – it comes with the pressure of the crown and the attention of the international community. It also promises tourism. The prince envisions travelers all over the world adding the QCC areas to their bucket lists.

At the designation ceremony, rangers, government officials, and park leadership made speeches and demonstrated anti-poaching efforts. David Nangoma believes their presence – and Prince Harry's – will endear the park to local communities. As a row of local and international media set up TV cameras in front of the park's headquarters, he nodded approvingly. "The world is watching."

nationalgeographic.com

Forest Scenes

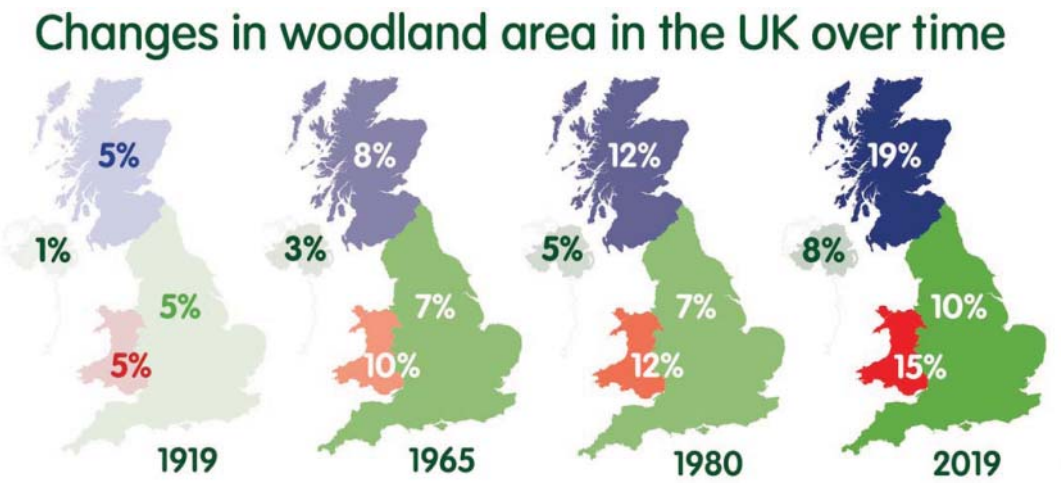
Marking 100 years of reforestation of a denuded nation

The year 2019 marked 100 years since the establishment of the British Forestry Commission, a government department established in the aftermath of the First World War.

So the centennial edition of 'Forestry Facts and Figures', an annual summary published by the commission's Forest Research agency, highlights the achievements of the past 100 years.

The war had exposed the United Kingdom's almost total dependence on imported timber, and its vulnerability to shortages during national emergencies. By 1919 only about 5% of the land was wooded after centuries of deforestation for agriculture, grazing, settlement, fuel and timber. Much of the remaining woodland was difficult to access and, in timber terms, of poor quality.

The Forestry Commission's initial remit was to re-establish a strategic national timber reserve. Successive governments facilitated this by acquiring land for the commission to reforest, as well as offering financial incentives such as tax mitigation and grants for private landowners to do the same.



Changes in woodland area in the UK over time. (Source: Forest Research)

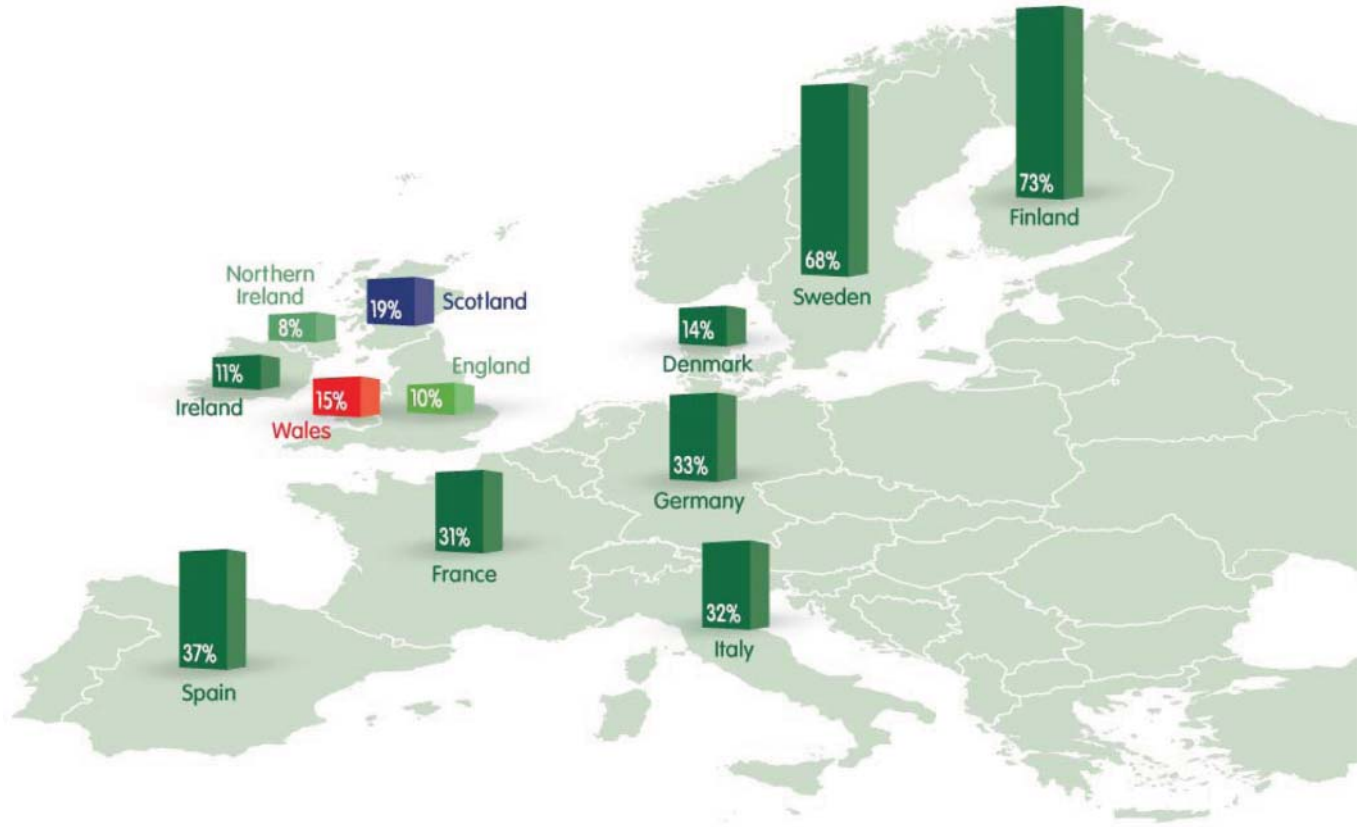
A hundred years on, the headline statistic is the increase in woodland cover to 13 per cent (3.17 million hectares). That increase is impressive, but the UK's woodland cover remains one of the lowest in the European Union, whose average is 38%.

There is considerable variation on that story within the four countries of the UK. Proportionately, Northern Ireland's is the most impressive achievement – there, woodland cover has increased from 1% to 8%. Scotland's has almost quadrupled, from 5 to 19%; and Wales's has trebled from 5 to 15%.

England has proved the most challenging country to reforest – there, the increase has been from 5 to 10%. Issues such as high land and crop values have made many landowners there hesitant to make the long-term commitment to woodland.

Reforestation – or the way it has been carried out – has had its critics. Most of the new forests comprised exotic conifer species chosen for their ability to grow fast and produce good-quality softwood timber. The main ones were North American species such as Sitka spruce (*Picea sitchensis*), Douglas fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*) and lodge-pole pine (*Pinus contorta*), and Europe's Corsican pine (*Pinus nigra*).

By the mid-20th century, environmentalists were crying foul over monocultures with little biodiversity blanketing the hill-sides. They objected to their being planted on valued habitats such as heaths, peatlands, wetlands, existing native woodland, and sites of historic and cultural heritage. Siltation of waterways



European countries' tree cover. (Source: Forest Research)

by land-preparation practices was another objection. Countryside walkers objected to the proliferation of tall deer fences to protect the new plantations.

As a result, and also driven in part by international agreements, forestry policy by the late 20th century became focused on striking a balance between economic, social and environmental outcomes. In 1988 the government also removed a taxation incentive which allowed losses in forestry to be offset against profits in other activities, which had encouraged some of the planting.

New-planting rates overall slowed in the 1990s, but a grant system was introduced which enabled the Forestry Commission to target particular types of planting, and particular types of land. The introduction of the UK Forestry Standard in 1998 helped by providing a benchmark of sustainable forest management against which applications for approval of forest management plans, felling licences and grant aid for woodland creation could be assessed.

The advent of independent certification, such as that provided by the Forest Stewardship Council against the UK Woodland Assurance Standard launched in 1999, added impetus, because many major buyers of forest products insist on buying only from certified forests.

As a result there has been an overall trend, albeit with variations between the countries and from year to year, for more native and broadleaved new planting than exotic conifers, although the latter are still widely used for timber production. There is also a trend to avoid sensitive habitats.

Sustainable forest management means that when forests are harvested and replanted, there is consideration of environmental and social objectives in addition to economic ones. Land managers seeking approval for forest design plans and grant aid must demonstrate consideration of biodiversity, the natural and historic environment, landscape and community benefits and impacts, among other factors.

Harvesting and replanting are now usually staggered over several years so that the emerging replacement forests have a diversified age structure. These practices are facilitating more-attractive forests, greater biodiversity and better wildlife habitat. Sensitive habitats are being restored, where practicable, as the exotic conifers are harvested.

Forestry policy and management of public forests has been devolved to the four countries, so it will be interesting to see how any future differences in priorities and approach will play out in the British landscape. Can the UK's woodland cover catch up to that of its continental neighbours by 2119?

- 'Forestry Facts and Figures' and its parent publication, 'Forestry Statistics', are available from www.forestresearch.gov.uk/statistics.

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Green shoots of hope

The forestry sector has faced uncertain demand conditions for several years but key shifts in the mood and make-up of the international political and economic communities suggest change is afoot.

For years it has looked like we're drifting into another global recession. US economic data was drifting lower even before president Donald Trump's trade war began, and China has been dropping consistently further from double-digit growth since around 2012.

But that conversation has now turned to the imminent arrival of said recession.

US jobs and manufacturing data have recently dipped lower again, while similar figures are more consistently coming out of China. The numbers from the world's fourth largest economy, Germany, suggest that could be where recession bites first.

My colleagues across the partition are in the mining and metals game through our sister publication *International Mining*. They reliably inform me that a quick look at the copper-gold ratio tells you all you need to know about the chances of recession.

Copper is the bellwether metal for industrial growth, used in just about everything, including the wave of electrification sweeping the globe. Gold, meanwhile, is the archetypal safe-haven asset: a store of wealth bought as insurance against economic and political crisis and, less dramatically, low bond yields. That is, copper prices are highest during times of prosperity and gold prices are highest during periods of greatest turmoil – the smaller the gulf between them, the more worrying the economic outlook.

Having spent much of late 2017 and into 2018 above the 0.00015 level, the ratio ended 2018 lower and took a sharp dip late in the first quarter of this year, which has continued. At time of writing, it was only marginally north of the level from early 2009 and the depths of the last major economic crisis.

The reasons for this trajectory have been many. For starters, the world never really got back on its feet after the 2008–2009 financial crisis. Just as that period of strength in late 2017 gathered momentum into 2018 and central banks started to toy with the idea of tightening up historically loose monetary policy, toxic trade initiatives and protectionism reshaped economic fortunes back in the direction from whence they'd come.

Much of this can be attributed to Trump's trade war with China, but to land him with sole responsibility would be wrong. Europe has handled Brexit in a manner history will no doubt regard as one of the great administrative and political blunders.

The effects on forest-related industries has been better than most would have anticipated given its primary role in construction and broader industry, and therefore link to global GDP. We should be proud of our resilience and, in the past month, it seems as if we may have an outside chance of waiting out the storm ahead of brighter days.

Trump looks certain to be impeached and even if he is not removed from office his re-election is looking increasingly unlikely, as ongoing scandals are now coupled with the results of economic mismanagement following the initial boost delivered from irresponsible tax cuts – an outcome we predicted at the time. Potential replacements are less likely to continue the hard line with China now that businesses and 'ordinary folk' are

feeling the effects of a trade war. A softer, if still stern, line will more likely be the course.

Brexit, meanwhile, looks to have finally painted itself into a corner and, with nowhere left to go, Britain looks like – again, at time of writing – holding an election that will see it either leave the EU with a deal, hold a second referendum on whether to leave with that current deal, or simply revoke article 50 (the least likely option).

Though this may cause political instability in Britain for a period it would restore some certainty to a region that badly needs to get on with mending the fortunes of Germany and Italy (eighth-largest economy) – the largest economies in most need of TLC – and then the UK (fifth) and France (seventh), to a lesser degree.

Moreover, the world has potentially seen enough of the corrosive effects of protectionist policy to ease back from the brink without having to have experienced a second major global recession in a decade.

Just think how business might react to a more stable and open relationship between the two superpower economies and a refocus of attention toward health in four of the remaining top-10 economies. Billions in investment that has been parked for up to half-a-decade could be steadily released as confidence builds in a return to political competency.

The effect on forestry is clear. Construction sector growth would benefit from not only increased demand but the reopening of international trade opportunities as contracts are signed with certainty. By-product energy revenues would be easier to realise.

This is, of course, just one possible direction for the world. The re-election of Trump or someone forced to pick up his poisonous trade policies is possible and, if politicians in Europe have shown anything in the past three years it's a talent for innovation in elongating the Brexit process beyond what any casual onlooker would dream possible.

But we at International Forest Industries are optimists. There is a light at the end of a dark tunnel in which we've been since 2009. Most are fed up and it is the motivation for something better that should propel politicians, business communities and society in general to seize on this gap in the fence and escape the drift into recession.

We saw over a 12-month period a rise in fear levels put Trump into the White House, Britain outside the European Union and the contagion of nationalistic policy that has hurt economies. There is no reason 'uncertainty fatigue' peppered with a little optimism could not see a reverse of fortunes equally as dramatic over the next 12 months.

I believe the forestry sector is one of the few that has maintained a robust, fortified and optimistic outlook for most of the past decade. It is this attitude that has underpinned our resilience and should make us one of the foremost beneficiaries of a return to economic good fortune.

Chris Cann
Editor, International Forest Industries

Esther Mwangi, researcher on gender and forest property rights, dies at 53

She studied how equity and inclusion influence livelihoods and conservation in forests

Esther Mwangi, an environmentalist, public policy expert, scholar and mentor whose research explored gender and land-rights inequities in relation to natural resources, died in October in a hospital in Nairobi. She was 53.

Her family confirmed her death on a commemorative website. A colleague said the cause was complications from cancer.

She attracted international attention for a 2006 study of the division and privatization of common lands held by the Maasai people in Kenya, a process which she said exposed how less powerful, more vulnerable groups were subjected to inequitable treatment.

"Her work on the Maasai shows how politics were important for property decisions, and how understanding politics is necessary to understand why people make choices that don't always seem to make sense to outsiders," said Anne Larson, team leader of Equal Opportunities, Gender, Justice and Tenure at the Center for International Forestry Research (CIFOR), who worked with her closely on various research projects.

forestsnews.cifor.org

New Leadership in IUFRO – John Parrotta

The International Union of Forest Research Organizations (IUFRO) has a new President. Dr. John Parrotta, National Research Program Leader for International Science Issues with the U.S. Forest Service, has assumed office for the term until the 2024 IUFRO World Congress in Stockholm, Sweden. He is joined in this leadership role with the new Vice-Presidents Prof. Daniela Kleinschmit, Freiburg University, Germany, and Prof. Shirong Liu, Chinese Academy of Forestry.

Dr. Parrotta follows Prof. Mike Wingfield, FABI Professor and Advisor to the Executive of the University of Pretoria, South Africa, who served IUFRO as President for the past five years, and under whose Presidency the organization celebrated its amazing 125th anniversary.

During his term Prof. Wingfield has strongly promoted the great responsibility of IUFRO to provide solid and reliable data that will underpin some of the most important decisions relating to forests and natural resources for a sustainable future. He has also placed special emphasis on strengthening the involvement of young forest scientists through close cooperation with the International Forestry Students' Association (IFSA), which has now also been provided with full representation on the IUFRO Board.

At the closing ceremony of the 25th IUFRO World Congress in Curitiba, Brazil, incoming President Dr. Parrotta made an enthusiastic acceptance speech, in which he particularly stressed the important role that the forest science community has to play in the world. "The world needs what IUFRO has to offer," he said. "However, the sustainable development challenges we face are multi-faceted, and extend beyond the traditional and even current scope of forest science. The good news is that we are not alone. IUFRO can multiply its impact by expanding our collaboration in research, science synthesis and communications well beyond the boundaries of our current network."

During his five year term Dr Parrotta wishes to especially focus on fostering collaboration with scientists and research networks with whom IUFRO is not sufficiently engaged. This may include, for example, fields such as agriculture, human health, spatial planning, environmental engineering, environmental education, the arts and humanities. "Diversity is IUFRO's strength," he said, "The productivity, health, and the many benefits we derive from forests are underpinned by biodiversity. Similarly, IUFRO's scientific excellence and value to society depend on engaging the diversity of disciplinary perspectives, knowledge, experience, and cultural values among our scientsts and member organizations."

Dr. Parrotta has engaged in various areas of forest science research worldwide for over 30 years, and has a particular interest in tropical forest ecology, the ecology and management of planted forests, forest restoration, and traditional forest knowledge. He has conducted research in Puerto Rico and Brazil, worked collaboratively with many colleagues from around the world on a variety of science syntheses and other projects. He is the author of over 175 scientific publications on these and other topics, and a member of the editorial board of several international forest science journals. He has been active in IUFRO since 1993 and has served as Vice-President for Task Forces, Special Programmes, Projects and IUFRO-led Initiatives for the last five years.

At SFI, collaboration is key to sustainable forestry

At the Sustainable Forestry Initiative (SFI) we believe that forests are critical to our collective future and that collaboration is central to our mission. We are a leader in sustainable forestry through our work focused on standards, conservation, education and community.

As an independent, non-profit organization, we collaborate with our diverse network to provide solutions to local and global challenges by advancing the holistic value of sustainable forests. All our partners share a commitment to future forests and understand that by working together we can have the greatest impact.

There are more than 120 million hectares of forestland in Canada and the U.S. certified to the SFI Forest Management Standard. Tens of millions more are impacted by SFI Fiber Sourcing – a proactive approach that rewards good forestry practices on non-certified lands. Products with SFI labels are sold in over 140 countries.

Three certification standards

We manage standards that are guided by science, independently audited, and implemented by a dedicated group of forestry experts, landowners, brand owners, and academics. Our standards also encourage the use of trained harvesting professionals – 94% of the fiber processed in SFI Program Participant mills is delivered by trained harvesting professionals.

The SFI Forest Management Standard is the largest single certification standard in the world. Among its requirements are measures to protect water quality, biodiversity, wildlife habitat, species at risk and forests with exceptional conservation value.

The SFI Fiber Sourcing Standard is designed for manufacturers that don't own forestland. It distinguishes SFI from all other forest certification programs in that it governs how SFI Program Participants procure fiber from non-certified forestland.

The SFI Chain-of-Custody Standard is an accounting system that tracks forest fiber content through production and manufacturing to the end product. This standard also has measures to avoid controversial sources in the supply chain.

The SFI Small-Scale Forest Management Module for Indigenous Peoples, Families and Communities is based on the requirements of the SFI 2015-2019 Forest Management Standard. But it's scaled down to reflect the forest management objectives on small forestlands and woodlots in Canada. The module can also accommodate communities or municipalities managing forests with a focus on conservation or recreation objectives.

SFI is also helping architects and builders do their part to sustain our shared environment and improve our health and well-being in the process. Sourcing forest-based construction materials that are certified to the SFI standards is easy thanks to the SFI label.

The SFI label means these certified products come from sustainably managed forests. Using certified wood also provides architects, builders and owners with the proof points they need to ensure compliance with green-rating systems like Leadership in Energy and Environmental Design (LEED) and the Building Research Establishment Environmental Assessment Method (BREEAM). Both programs recognize SFI.

Promoting conservation through daily acts of responsible forest management

SFI uses sustainably managed forests as living laboratories for research focused on climate, water, and biodiversity. Our work leverages the vast amount of land certified to SFI, diverse partnerships with world class environmental organizations, and SFI conservation grants to identify, measure and promote groundbreaking conservation outcomes.

SFI is the only forest certification program in North America that requires participants to support research to improve forest health, conservation understanding, productivity and sustainable management of forest resources. In 2018, SFI Program Participants reported 405 different conservation and research projects for a direct investment of US$59 million. Partnerships on these reported projects included more than 550 unique partner organizations. Since 1995, SFI Program Participants have directly invested nearly US$1.6 billion in forest research.

To facilitate good decision-making, and to help make the case for the value of sustainability, SFI is working to quantify the conservation benefits of its work, and the connection between sustainable supply chains and important conservation outcomes. Formally announced at the IUCN World Conservation Congress in September of 2016, the SFI Conservation Impact Project consists of numerous smaller projects, generated by partnerships within the academic, conservation and research communities, and include SFI's own Program Participants. The project has three focus areas: water, climate change, and biodiversity.

SFI is also committed to doing our part to contribute to the United Nations Sustainable Development Goals. Our work touches all 17 of the goals, but there are several in particular, such as climate change, water quality, and biodiversity, where we have the greatest impact.

SFI connects youth to forests through education

SFI, led by our Project Learning Tree (PLT) environmental education initiative, takes students outdoors to learn and connects youth to nature in urban, suburban, and rural settings. Using forests as a lens we seek to grow understanding of the environment, introduce young people to green careers, and inspire teachers and youth to become leaders and take action for sustainable forests and a sustainable planet.

More than 750,000 teachers have been trained to use Project Learning Tree curriculum, reaching more than 135 million students. PLT's GreenSchools program contributes positively to important outcomes in student learning and engagement, including students' presentation, writing, planning, problem-solving, technology, leadership, and teamwork skills. The program also helps schools and communities to reduce their ecological footprint.

SFI is committed to continuing PLT's work as a high-quality education program. Together, we are helping youth understand and appreciate the value of well-managed forests and their important environmental benefits, such as cleaning our air and water. We do this by teaching youth how to think, not what to think, about forests and other complex environmental issues through hands-on, minds-on activities that develop students' critical-thinking and problem-solving skills.

The SFI community collaborates with the diverse communities that rely on, and care for, our forests

Many diverse communities rely on forests for their economic wellbeing, while others enjoy the recreational and health benefits forests provide – 96% of the forests certified to the SFI standard are available to the public for outdoor recreation. We collaborate with local communities, Indigenous Peoples, conservation groups, landowners, educators, governments, universities, resource professionals, the forest sector and brand owners.

In 2019, 15 SFI community grants, involving 78 partner organizations, were awarded to bring together a diverse range of organizations to engage and educate youth; train and educate current and future practitioners; support and promote Indigenous values; and support underserved communities through forestry.

SFI has a memorandum of understanding with the Canadian Council for Aboriginal Business to assist in growing our relationship, engagement and outreach with Indigenous communities by encouraging SFI Program Participants to seek certification under their Progressive Aboriginal Relations program and support a dual-logo process.

Since 2008, SFI has partnered with Habitat for Humanity. The SFI community has donated countless volunteer hours and certified products to more than a dozen Habitat for Humanity builds across Canada and the U.S.

Working together to sustain our forests

As part of a global community committed to sustaining our forests, SFI is committed to ensuring that well-managed forests achieve their full potential to support the people that depend on them. Our supply chain starts in responsibly managed forests in Canada and the U.S. and stretches around the world. When you choose SFI, you are helping the SFI community stand tall for future forests and the health and well-being of us all.

Jess Kaknevicius
SFI's Vice President of Community Engagement

The use and future potential of unmanned aerial systems for forestry applications and research

Summary

Unmanned aerial systems (UAS), also known as unmanned aerial vehicles, remotely piloted aircraft systems, or colloquially as "drones", are rapidly deployable aircraft capable of enhancing environmental monitoring. These platforms are revolutionizing the science and art of Earth observation, providing cost-effective data alternatives to aircraft or satellite based imagery. UAS data have proven highly versatile for sampling or wall-to-wall mapping of various environments. The potential for foresters to fly UAS when and where they want (within regulatory frameworks) place image acquisition technology and processing in the hands of the forest manager, researcher or organization. Our recent publication in *Nature* (https://www.nature.com/articles/d41586-019-02474-y) highlighted what constraints remain before UAS usage can be fully utilized as a scientific tool. In this article, we provide background to the development of UAS, the type of data they are capable of acquiring and producing of relevance to the forest community, as well as a selection of innovative forestry applications to provide additional insight into these technologies.

How did we get here?

UAS were originally developed by the United States military, who continue their deployment for surveillance and defense operations. The miniaturization of hardware, which has seen substantial commercial investment, can largely be attributed to the integration of lighter weight frame materials such as carbon fibre and advances in silicon manufacturing technology. Miniaturization has also driven a reduction in voltage requirements, yet an increase in power availability through refinements in power source capacity. The development of smaller more powerful electronic devices serve to enhance flight ranges and altitudes, and the ability to transport a diverse array of sensors and payloads. GPS modules for example, have steadily decreased in size with some models now 5 x 5 mm and below. Improvements in GPS continue to enable efficient onboard autopilot systems for safely controlling airborne units. As off the shelf products, consumer grade UAS are typically fitted with multiple processors, a flight control module capable of pre-planned or real-time trajectory and altitude control, and a consumer grade camera.

Concurrent with the miniaturization of navigational hardware has been the rapid development of sensor systems allowing high spatial resolution data capture, and user friendly control software. Sensor settings, such as how often images should be captured can be pre-programmed and assigned unique meta-data related to the 3D orientation (roll, pitch, and yaw), and geoposition of the UAS. Depending on the sophistication of onboard hardware, both imagery and meta-data can either be internally stored or transmitted wirelessly to a nearby ground station. Small-format camera systems onboard UAS themselves have also significantly evolved and are capable of capturing and streaming high definition imagery and video. The

advent of high power processing on commonly available hand held devices has provided users the ability to easily, cost-effectively, and safely maneuver UAS, while acquiring data tailored to the operational needs.

This co-development of platform, sensor technologies, and flight control has seen UAS dominate in the civilian arena having transitioned from specialized, cumbersome, and difficult to operate machinery to consumer grade, easy to use, and robust devices. Their development has simplified data capture and expedited imaging opportunities previously unavailable to the general public and environmental managers alike. Their rapid uptake has quickly led to UAS data becoming indispensable for scientific research, with over 20,000 peer-reviewed articles having been published on their development, engineering, and application since the early 2000's, and ~2000 since 2014. Critical to their success in the forestry monitoring realm has been their ability to acquire unique data under previously challenging and/or costly scenarios. Their deployment and novel application is abundant in an environmental management context, providing new scientific insights, improving knowledge about the environment, atmosphere, and climate as they continue to change.

Images to data

Widely adopted consumer grade UAS systems are configured with a high spatial resolution, small format, 3 channel RGB camera (similar to that on a contemporary smart phone) and high quality lens. Flying below 120 m a maximum allowable ceiling without pre-approval from some jurisdictional bodies, results in a height above canopy of 10 – 80m, produces imagery as fine as 3 cm, or high definition video acquired at 60 frames per second. The lightweight nature of commercial UAS can result in significant pitch, roll and yaw of the airframe, impacting flight speed and efficiency. Orientation shifts require mounted imaging sensors to be stabilized using gimbals, and have fast shutter speeds to preserve image quality. The use of laser altimetry as well as multi- and hyperspectral sensors are also becoming more common in research domains with operational applications already been undertaken.

A rapidly advancing field with interdisciplinary potential and promise, is the use of digital aerial photogrammetric approaches on acquired images and/or video frames. Image matching software's are capable of generating 3D recreations of a target area from digital imagery acquired with a high degree (i.e. 80%) of along- and across-track overlap. 3D recreations of areas, or objects, of interest using UAS imagery are often paired with high spatial resolution ortho photography. The combination of these data types facilitate a cost-effective method of analyzing terrain, infrastructure, vegetation and various other aspects of forest structure such as tree height, and isolation of individual branches and canopies. UAS can therefore provide four separate data products from a single acquisition: still frame imagery, high-resolution video, ortho-photography, and 3D recreations.

Unlimited applications

Applications of UAS since their widespread commercial availability has risen dramatically with almost every environmental management field examining their potential role in monitoring and assessment needs. Excellent reviews exist in most relevant fields, forestry included. Herein we therefore provide a higher lever treatment.

To meet monitoring and mapping information needs, UAS can be suitable to undertake wall to wall image collection for forest inventory, operations and mill management, as well as urban, and wildlife assessments. In these cases, UAS are often presented as complementary to existing airborne campaigns, or more recently, as a replacement. This is largely driven by their ability to provide the added capacity of higher spatial resolution imagery at a cheaper price than manned aircraft sortie's. Additionally, they provide fast operationalization and increased responsivity with timely and high quality image acquisition. The deployment of UAS to provide forest inventory updates such as delineation of harvest blocks, location and volume of wood piles and road detection has already resulted in realised gains in precision silviculture, stand & individual tree inventories, and an un-invasive means to census key species such as birds, large mammals, and fish. Many of these data products, and their potential for analytical precision, were previously unattainable due to technological or cost-related restrictions.

While their potential ability to provide broad area monitoring and surveillance is tantalising, research and development has predominantly focused on using UAS as a data sampling tool, from which to develop statistical predictions of population sizes or inventory estimates. These frameworks often involve transects of UAS data to maximise the flight trajectory of most UAS platforms. When flights are conducted periodically, changes in forest attributes such as individual tree height and volume are possible, while precision sampling of key areas facilitates extrapolating to regional yield estimates of likely future supply. These benefits are highly desirable for precision forestry and agriculture as they can help to institute or improve proactive management approaches, manage risk, and realize enhanced economic and labor related efficiencies. These types of approaches capitalise on the high spatial resolution capacity of these data for detecting features of interest, and consequent incorporation into improving sampling frameworks to inform inventory knowledge over larger areas.

Where perhaps the greatest innovation brought about by UAS has occurred is the improved capacity to characterize what have been traditionally field-measured attributes. Forestry inventory and assessment is hampered by access, cost, and labour. UAS are shifting paradigms of what can be collected at field locations, and how. In forests, UAS technology can, for example, acquire data within the forest stand itself, under the canopy, a view traditionally impossible from aircraft or satellite. Characterisation up the stem, of branches, leaves, nests, and cavities are opening-up sampling opportunities. With minimal human incursion or disturbance, UAS have captured exceptionally high spatial and spectral details facilitating otherwise cost-restrictive of logistically challenging ecological monitoring. In geomorphological studies for example we see UAS being used to access stream beds, and river channels within the river itself, allowing data to be acquired in difficult to access locations.

Constraints remain

While the potential benefits of UAS technology are abundant, there still exist constraints that limit their operational implementation and widespread research use. Most prominent challenges are related to battery propulsion longevity and UAS use legislation. Current consumer grade UAS are generally limited to 15–45 minutes of flight time. Future advances in fuel cell longevity and more efficient and powerful battery technology will continue to have significant implications for UAS use. There is also often a mismatch in sensor vs UAS platform. Complex scientific sensors

such as laser altimeters, and hyperspectral instrumentation can be significantly more expensive than commercial UAS systems themselves, cautioning users when developing innovative applications.

Legislation, largely related to airspace safety, privacy, and maintaining line of sight with the UAS being used, is actively being negotiated around the world. Many countries have established line of sight constraints, which unless special permissions are granted, mean that the distance the UAS can fly from the operator is limited. This reduces potential applications, especially in areas of extensive vegetation cover and where sites are inaccessible to flight crews. Flying altitude restrictions and collision avoidance technology are also being actively pursued. Largely implemented to reduce the chances of collisions with commercial and private aircraft, many countries have altitude restrictions on UAS. In most cases flights cannot exceed specified altitudes without a pre-approved flight plan. This often results in a backlog of applications, especially those seeking flight permissions in urban and developed areas. The co-development of UAS regulations and scientific research is therefore of great importance for developing effective and efficient legislative systems.

Decision making with UAS

We conclude with a simple guide for forest managers, and researchers alike around buying or utilising a UAS for forestry applications.

1. Essential considerations –
   First and foremost, a through understanding of regulations associated with UAS flights is required. These regulations are enacted to uphold the safety of operators and the general public and should be followed at all times. Understanding of flight control capabilities, geopositioning requirements, sensor needs, and power sources is also a must.
2. Operational objectives –
   Determine the primary objectives of acquiring UAV data. Understanding mission objectives helps in consequent decision making regarding selection of a UAS airframe type and model, and the level of sophistication required for associated hardware and software.
3. Airframe models –
   Rotor designed UAS offer ease of control; smaller takeoff and landing requirements and often cheaper hardware. Fixed wing UAS offer longer flight times, potentially a more stable airframe, and more carrying capacity. The potential to use hybrid models that are able capable of vertical take off and landing like a rotary UAS, and have fixed wing flight potential is also becoming a reality.
4. Data to information –
   Know ahead of time the types of data you are looking to acquire and the flight specifications needed to achieve your operational goals.

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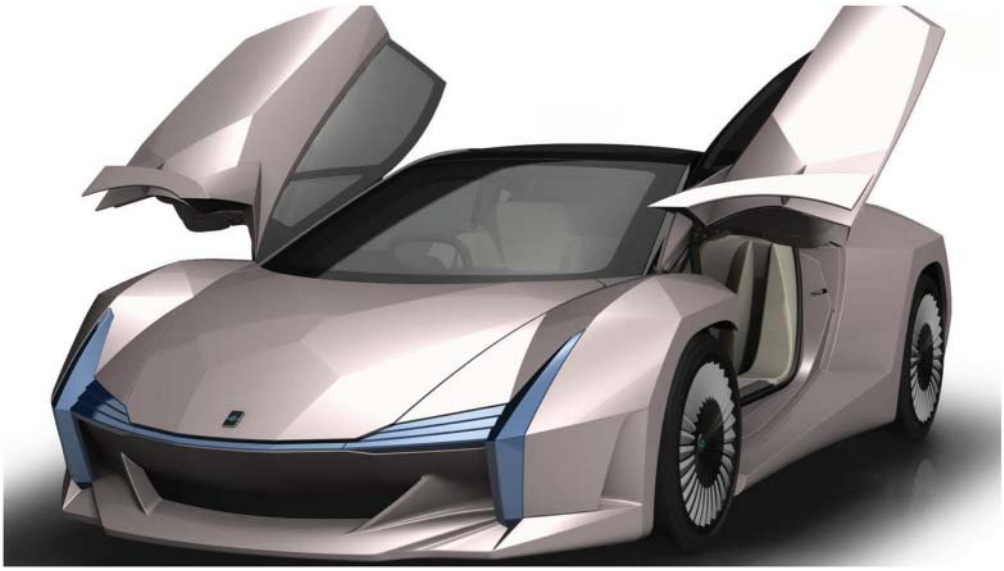
This car is made of wood



Electric vehicles have been turning the tide in the automotive industry in terms of making cars better for the environment. But Japan's Ministry of the Environment believed we could do better – and the result is an unprecedented supercar made entirely of wood.

The entire car is composed of nano cellulose fibers, or plant-derived material (including agricultural waste) that's one-fifth of the weight of – and five times as strong as – steel, the Ministry of the Environment notes. By using those fibers to compose most of the bodywork and part of the tub, the result is a car about half as light as your traditional one, with a ten percent overall reduction in mass.

That alone is a pretty awesome feat, but the production process also drastically reduces carbon emissions associated with automotive manufacturing. It's basically just recycling on a massive scale.

And I have to admit, the designers and engineers did a great job putting together a gorgeous-looking car. As much as I love the tiny and kind of adorable EV trend right now, I can also understand why it wouldn't be super appealing to traditional automotive enthusiasts who are looking to be *excited* by new cars.

The Nano Cellulose Vehicle (NCV) looks *awesome*. The sharp-cut angles of the bodywork and the butterfly doors immediately bring to mind Lamborghini, or the Acura NSX. The interior features kimono-wrapped seats and a gorgeous wooden dashboard (not just that fake wood look you get in most cars).

That said, all of the research and design has gone into the bodywork, not the stuff that makes the car run. There isn't really any information at all out there about what kind of power source will be implemented, but the rumor is that it'll be equipped with a hydrogen fuel cell and have a top speed of. . . 12 mph.

So, yes, there's some room for improvement in the powertrain. But the rest of the car? Certifiably *awesome*.

jalopnik.com

Around the World

Global: Tree stumps that should be dead can be kept alive by nearby trees

A tree stump that should have died is being kept alive by neighbouring trees that are funnelling water and nutrients to it through an interconnected root system. The finding adds to a growing understanding that trees and other organisms can work together for the benefit of a forest.

Sebastian Leuzinger at the Auckland University of Technology, New Zealand, and a colleague were hiking through a forest track west of Auckland when they noticed a single tree stump with living tissue growing from it.

Curious about how it was surviving without green foliage, they decided to put several continuous water monitors in the kauri (*Agathis australis*) stump and in two nearby adult trees of the same species.

Over the following weeks, they found a relationship between the water flow in the trees and the stump. This meant that when the neighbouring trees would evaporate water through their leaves during the day, the water movement in the stump remained low. But when the trees were dormant during the evening, the water would begin circulating through the stump.

Similarly, when it became overcast or rainy and the water flow dropped in the trees, it picked up in the stump. In healthy trees, water flow is largely driven by evaporation, but without leaves the stump's water flow was bound by the movements of its neighbours.

Along with a growing awareness of the way fungi help trees exchange carbon and other nutrients, this relationship undermines the notion of trees as individuals or distinct entities. "And that dramatically changes our view of forest ecosystems as 'superorganisms'," says Leuzinger.

The networking of water among trees may make them more resistant to water scarcity, says Leuzinger, but it may also increase the risk of diseases spreading. This is a particular worry for kauri trees, which are being affected by a deadly disease called kauri dieback.

Foresters have reported living stumps as far back as the 1800s, but this is one of the first studies of how they survive.

There are several reasons why neighbouring trees could be supporting the stump. It could be that the stump and its roots offer the living tree more stability in the ground, or that a leafless stump just becomes part of the host tree's broader root system.

Trees are "ruthlessly efficient" in maximising their resources, says Greg Moore at the University of Melbourne, Australia. "So the fact that this stump is being supported by nearby trees tells you they are getting a benefit," he says.

newscientist.com

Canada: Grooming forests could be making fires worse, researchers warn

Glyphosate sprayed on forests kills slow-burning trees, leaving more flammable species vulnerable

Researchers are growing increasingly critical of a common forest management practice, as studies show it may be causing fires to travel farther, faster. "In 2017 and 2018 here in British Columbia, in both summers, we burned over 1.2 million hectares of forest," says Lori Daniels, a forest ecologist at the University of British Columbia. "Diversifying the forest . . . is a really effective way to create resilience in our landscape and resistance to these major fires we've been witnessing."

Meanwhile, much of the Canadian forestry industry is doing the opposite, spraying thousands of hectares of public forest with glyphosate each year to promote profitable coniferous growth, and eliminate hardwood species like aspen and birch. The primary ingredient in the Monsanto-made herbicide Roundup, glyphosate has been under scrutiny in both agriculture and forestry for years. It remains widely used, because while softwood species like pine and spruce can tolerate a certain dosage of the chemical, glyphosate can be effective in eliminating the growth of hardwood trees for decades. It's an efficient way for the forestry industry to streamline cut blocks so they contain the most profitable kinds of trees. But aspen and birch burn more slowly than the glyphosate-resistant coniferous trees, and some experts say removing them is like quite literally stoking the fires that have plagued the province.

Natural fire barrier

"In aspen, birch or broadleaf forests, because of that subtle change in shade, temperature and humidity, they tend to be more resistant to fire," says Daniels. "[The fire] might burn through, but in a less intense way." It's something she has seen tangibly in the remains of the historic Williams Lake fire that ripped through B.C.'s northern forest in 2017. "As the fire spread closer into the aspen stand, it stops," she says. "And if we look in the aspen stand, the trees all have survived."

But the B.C. Council of Forest Industries says its practices meet strict criteria that make it a world leader in sustainable

forest management. “Once it has been determined that glyphosate use is appropriate, it is applied either manually or by precise aerial methods to ensure that application is limited to the target area,” the council’s manager of public affairs, Diamond Isinger, wrote in an email to CBC News. “Our forest sector is – and will continue to be – committed to responsibly managing our forests for the environment, the economy, and the communities that rely on them.”

Not a vegetable garden

More than 200 kilometres north of Williams Lake, woodworker James Steidle says he’s seen the changes the logging industry – and glyphosate use – have made to the landscape around him. “We look at forests as some kind of farm, some kind of vegetable garden where you’re trying to grow carrots, and if it’s not a carrot you get rid of it. And I think it’s a lot more complicated than that.”

He is part of the Stop the Spray B.C. movement, a group working to raise awareness about the use of herbicide spraying and its consequences for the forest. The group is aggregating research and posting videos that show what the industry is doing, under rules set by the provincial government. That’s because the province of British Columbia mandates that Crown land be nearly all coniferous on cut blocks, but that’s not how the forest tends to grow naturally. “We have a coniferous forest industry and the government saying ‘we are going to get rid of these [deciduous] trees, they are no longer part of the forest,’” says Steidle. “That makes me furious.”

“I think that some of those concepts are outdated,” she says. “When glyphosate is used to kill aspen and competitive vegetation, the word competitive is crucial. These plants compete with conifers that we want to grow to have a strong forest industry. It means that we put only one value, the financial value, before all the other values.”

The value of diverse forests extends to mitigating disease, limiting insect infestations, and sequestering carbon dioxide. “There as been great research in the last 10 to 15 years that shows that there are tremendous benefits, even to those conifer seedlings, by having other species around them,” says Daniels.

Deformed vegetation

Newer research also indicates glyphosates may have an impact on the plants that survive the sprays. “Toxicity, the immediate death of plants, these aspects have been studied extensively,” says Lisa Wood, a plant biologist at University of Northern British Columbia. “But the small nuances . . . the nuances that you do not see at first glance, these require more time for one to really understand what is happening.”

Her team has shown that glyphosate is present in the surviving plants for at least a year after it is sprayed, a finding that surprised the scientific community. The maximum amount of time the chemical may be present in plants has yet to be determined.

The B.C. Ministry of Forests declined a CBC News request for an interview, saying in writing that the use of glyphosate is declining in the province and that it is used under regulation, as it is in almost every other province. “B.C.’s reforestation practices are updated when new scientific research and information becomes available,” ministry spokesperson Dawn Makarowski wrote. “Aspen and deciduous will not disappear from our regeneration forests.”

The only province that has banned glyphosate use in forestry is Quebec.

cbc.ca

Global: Sticky fluid can be sprayed on grassy verges to prevent wildfires

A weather-resistant fluid containing fire retardants can be sprayed onto vegetation to stop wildfires from igniting. Fire retardants are often used to protect buildings from an approaching fire, but these formulations aren’t effective once the water in them evaporates.

Eric Appel at Stanford University in California and his colleagues have developed a gel-like fluid that sticks to vegetation and withstands weathering, potentially keeping the fire retardant in place for months. The idea is to spray it on vegetation in high-risk areas at the start of the fire season to prevent blazes from starting.

“Most people think fires happen willy-nilly anywhere in the forest. It turns out that’s not really true,” he says. His team worked with the California Department of Forestry and Fire Protection (Cal Fire) to analyse data from 305,000 fires in California in the past 10 years. It turned out that 84 per cent of fires had started at locations deemed high risk, such as roadsides or around utilities infrastructure.

“What that analysis allowed us to see was, if you had the tools available, you could pretreat a small amount of land and prevent an enormous proportion of fires from occurring,” says Appel. “The issue is lack of available technology.”

The new formulation was tested on plots of grass and chamise, a Californian shrub, which are types of vegetation where wildfires commonly ignite in the region. The tests showed that applying about 1 litre of fluid per square metre of land is enough to completely prevent ignitions.

The fluid is made from non-toxic chemicals commonly used in food products, cosmetics and pharmaceuticals.

At the end of the fire season, heavy rain should wash away the fluid and it should then biodegrade in the soil. Tests showed that it was benign to bacteria and would degrade anaerobically, so it won’t deplete oxygen in the soil.

Appel has started a company to commercialise the product, and is working with Cal Fire to start treating a few roadside areas this week. “The only limitation to rolling it out on big scales is getting the government agencies involved to work together collaboratively,” he says.

newscientist.com

Europe: More than half of native European trees face extinction, warns study

Ash, elm and rowan among trees threatened by pests and pollution, says biodiversity report

More than half of Europe's endemic trees are threatened with extinction as invasive diseases, pests, pollution and urban development take a growing toll on the landscape, according to a study.

Ash, elm and rowan trees are among those in decline, says the assessment of the continent's biodiversity, which could complicate efforts to tackle the climate crisis through reforestation.

"It is a threat. It is not just the naturally occurring trees and woodlands, it is also some of the big commercial conifers that are threatened by invasive species," said one of the authors of the report, David Allen of the International Union for Conservation of Nature, who produced the study.

He warned that countries such as the UK were keen to import more saplings to draw carbon out of the atmosphere, but said young trees needed to be carefully screened to avoid diseases and pests entering the country and depleting existing forests.

"We are encouraged to plant more trees, quite rightly, but we have to be very careful to ensure they don't come with pest species. We need to be very careful about biosecurity," he said.

Invasive species – spread through the trade of plants or untreated timber – are the largest threat to native trees that are found only in Europe, sometimes only in one valley or region.

The IUCN's European red list of trees found 58% of these endemic trees are threatened and 15% (66 species) were classified as critically endangered.

Many of those at greatest risk are in the *Sorbus* genus. This includes rowan, mountain ash and Ley's whitebeam, of which there are only nine plants left – all in Merthyr Tydfil, Wales. Scientists say this particular tree is a relatively recent hybrid and there was only ever a very small population in a restricted geographical area, so the knock-on effects are likely to be minuscule.

Of greater concern is the demise of more common trees. Tim Rich, another of the contributors to the study, said he was alarmed by the loss of ash trees due to an invasive fungus.

"I've been keeping an eye on it over the past five years. Last year, I began to get quite worried. This year, huge areas are experiencing a dieback and it's not just affecting saplings like it was before. Now it's whole big trees. I drove in some parts of Pembrokeshire recently, and every five or 10 metres there was an ash tree dead or dying. This is a major problem – way worse than I expected it to be."

The horse-chestnut – beloved by generations that played conkers as children – has been classified as vulnerable due to the spread of an invasive leaf-miner moth that damages its leaves. This adds to existing pressures from forest fires, tourist resort expansion and logging. Other species are negatively affected by excessive nitrogen depositions from air pollution, housing estates and pig farms.

The study of trees is part of a wider European red list that examines the status of overlooked species in order to determine priorities for conservation. It found 20-50% of terrestrial molluscs, shrubs and bryophytes, such as moss and liverworts, are threatened with extinction due to a loss of wild areas, expanded agriculture and climate change. Although these species are unglamorous and rarely attract attention, they play a vital role in food production and other natural life support systems through oxygen production, nutrient recycling and soil regeneration.

"The high extinction threats revealed by the European red list are very alarming, given that 92% of the mollusc species native to Europe are endemic to the continent. Thus, once these species are lost from Europe, they are gone for ever," Eike Neubert, an IUCN mollusc specialist, said. "In order to restore terrestrial mollusc numbers in Europe, essential changes will be needed in policies relating to land use, along with careful control of urbanisation and sustainable management of semi-natural areas."

Rich, who has studied trees for several decades, said he was increasingly worried by the broad trend.

"We are seeing our natural environment being eaten away," he said. It's such a wide scale problem, rather like climate, that it needs major policy change but what we should be doing seems impractical so it is only when things get really dire that we will take action. We should be looking after this more strategically. There really is no Planet B. When I think at how this place will be in the next 50 years, it is extremely worrying."

theguardian.com

Global: Fire blankets can protect buildings from wildfires

Existing blanket technology can protect an isolated building from a short wildfire attack, but technological advancements are needed for severe situations.

Wrapping a building in a fire-protective blanket is a viable way of protecting it against wildfires, finds the first study to scientifically assesses this method of defense.

By rigorously testing different fabric materials in the laboratory and using them to shield structures that were exposed to fires of increasing magnitude, this research, published in *Frontiers in Mechanical Engineering* (https://www.frontiersin.org/articles/10.3389/fmech.2019.00060/), confirms that existing blanket technology can protect structures from a short wildfire attack. For successful deployment against severe fires and in areas of high housing density, technological advancement of blanket materials and deployment methods, as well as multi-structure protection strategies, are needed.

"The whole-house fire blanket is a viable method of protection against fires at the wildland-urban interface," says lead study author Fumiaki Takahashi, a Professor at Case Western Reserve University, Cleveland, Ohio, USA, who teamed up with the NASA Glenn Research Center, U.S. Forest Service, New Jersey Forest Fire Service, and Cuyahoga Community College for this study.

He continues, "Current technology can protect an isolated structure against a relatively short wildfire attack and further technological developments are likely to enable this method to be applied to severe situations."

A burning need

Wildfires in urban and suburban settings can have a devastating effect on communities and pose one of the greatest fire challenges of our time.

People living and working in fire-risk areas contacted Professor Takahashi to find out if commercial products are available to help reduce the likelihood of structure ignition, which would reduce fire damage and improve public and firefighter safety. These pleas motivated the research and an initial investigation revealed that the concept of whole-structure fire blankets has been around for quite some time.

"I thought about a means to reduce wildland fire damage and found a U.S. patent 'conflagration-retardative curtain' i.e., a fire blanket, issued during World War Two. In addition, the U.S. Forest Service firefighters managed to save a historic forest cabin by wrapping it with their fire shelter materials," Takahashi reports.

An old flame-retardant

While there are anecdotal reports on the ability of fire blankets to protect buildings from fires, Takahashi's research highlighted a severe lack of scientific evidence to back up these claims. To rectify this, funded by a research grant from the U.S. Department of Homeland Security, the team conducted several experiments to test the ability of different blanket materials to shield structures against fires of increasing magnitude.

"The fire exposure tests determined how well the fire blankets protected various wooden structures, from a birdhouse in a burning room to a full-size shed in a real forest fire. We tested four types of fabric materials: aramid, fiberglass, amorphous silica, and pre-oxidized carbon, each with and without an aluminum surface. In addition, we conducted laboratory experiments under controlled heat exposure and measured the heat-insulation capabilities of these materials against direct flame contact or radiation heat."

A hot new industry

The laboratory and real-fire assessments demonstrate that fire blankets could protect structures from a short exposure to a wildfire, but also highlight the technical limitations of their existing form. Further technological advancements are needed in the areas of material composition, deployment methods and multi-structure protection strategies.

Takahashi explains, "The fiberglass or amorphous silica fabrics laminated with aluminum foil performed best, due to high reflection/emission of radiation and good thermal insulation by the fabric. New technology is needed to enhance the fire blankets' heat-blocking capability for an extended period to prevent structure-to-structure ignition. In addition, it will be more effective If dozens or hundreds of homes are protected by such advanced fire blankets at the same time, particularly in high housing-density Wildland-Urban Interface communities."

He concludes by suggesting communities potentially affected by wildfires work together to turn the concept of whole-building fire blankets into a reality.

"Fire blanket protection will be significant to those living and fighting fires at the Wildland-Urban Interface and presents entrepreneurs and investors with business opportunities. The implication of the present findings is that the technical community, the general public, and the fire service must work together to take a step-by-step approach toward the successful application of this technology."

frontiersmedia.vuelio.co.uk

The Congo Basin: palm oil's next frontier

The region accounts for 87% of global production. Borneo, who has now less than half of its rainforests remaining, hosts nearly half the world's 18 million hectares of the crop alone. Between 2000 and 2017, the loss of 14 percent of the island's old-growth rainforest has come at a well-known cost: devastating consequences for both wildlife and climate change.

But as agricultural land on Borneo becomes scarcer, regulations are becoming stricter, as Western consumers and NGOs pressure countries and companies on sustainability.

Instead, palm oil's next frontier is likely to be the rainforests of the Congo Basin, in Central Africa – where a quarter of the world's tropical forest carbon stocks are stored.

Will history repeat? Does palm oil expansion necessarily lead to rampant deforestation? A team of researchers from CIFOR set out to discover what Africa can learn from Southeast Asia's mistakes and solutions – and what is different about the Congo Basin. They found that in many ways, oil palm in Central Africa is a rather different story from Asia – with its own opportunities and challenges.

Africa's contribution to global palm oil supplies declined from 77 percent in 1961 to less than 4 percent in 2014, as the crop boomed in Malaysia and Indonesia. But many of the Congo Basin's most forested countries are dreaming big. Cameroon aims to double palm oil production by 2035, and Gabon has ambitions of becoming a leading exporter. At the same time, edible oil consumption across Africa is projected to triple by 2050 (from 2013 levels.)

"The same areas that could be used to grow oil palm are the areas that, for the moment, store carbon, and host biodiversity," says CIFOR scientist Denis Sonwa who is based in Yaounde, Cameroon. Having just contributed to an infobrief (http://www.cifor.org/publications/pdf_files/infobrief/7279-infobrief.pdf) on the subject, he says "If nothing is done, we can expect that forest

will be cleared to establish oil palm plantations. But the fact that the palm oil sector is still in the early stages of development is a unique opportunity, says the paper's (http://www.cifor.org/publications/pdf_files/infobrief/7279-infobrief.pdf) lead author Elsa Ordway, currently a postdoctoral fellow at the Harvard University Center for the Environment. "There's an opportunity now to put in place policies that could limit the kind of environmental destruction we saw from rapid oil palm expansion in Southeast Asia."

Three people working at a palm oil processing facility. This place was right next to the highway, to facilitate the passing buyer. Mokhamad Edliadi/CIFOR

SPOT THE DIFFERENCE

However, she cautions that those policies may not be the same ones that have had some degree of success in Southeast Asia – the certification schemes, industry roundtables, and deforestation – free commitments.

For her doctoral research, Ordway investigated the way palm oil is produced in the southwest of Cameroon, the country's main production area.

Importantly, she found that oil palm cultivation is expanding, and it is contributing to deforestation, though not at the rates or the scale seen in Southeast Asia. But she also found a number of key differences in the way the sector operates that have important implications for sustainability efforts. In Cameroon, smallholders cultivate palm oil on roughly twice as much land as industrial agribusinesses – though, due to low yields, they produce only a third of the country's palm oil. (Smallholders is a catch-all term that includes both subsistence farmers cultivating less than a hectare and larger-scale independent farmers.)

Unlike in Southeast Asia, the consumers of Africa's palm oil are mostly local. Oil palm is not an exotic export crop, but a native plant with a long history of traditional use: as an ingredient in stews, for frying plantains, in soaps. "It's such a culturally important crop," Ordway says. Before it was farmed commercially, people harvested the palm nuts in the wild, and it contributes to food security in the region.

Over that long history, African farmers developed various artisanal ways of extracting the oil from the palm nuts – from manual to fully mechanised systems. "That makes the supply chain incredibly complex, and very different from Asia," she says. The vast majority of palm oil mills across the Congo Basin are unregulated non-industrial facilities that vary widely in scale and quality, in Southwest Cameroon for instance, they make up for 99 percent of the milling facilities. Many mills and third-party suppliers operate entirely independent of large public and private companies.

"Palm oil is produced, processed and consumed locally – or in the region," says co-author Patrice Levang, from CIFOR and Institut de Recherche pour le Développement. "That means the usual actions by environmental NGOs to save the remaining forests in Southeast Asia won't be effective in Africa. Putting pressure on large companies with the help of European and American consumers won't be effective – boycotting and certifying won't reach their targets. Instead, environmental policies will need to target the diverse kinds of non-industrial actors involved in the sector, perhaps in different ways, says Ordway.

A PALM OIL PARADOX

One way to start is to assist farmers to intensify production – to make more oil from the land they are already cultivating. Here, there is huge potential for improvement on two fronts, Ordway says.

"So much of the production is on very small-scale farms, by farmers who are often limited in terms of their access to technology or information, so yields on these farms are very low compared to what they could be." In addition, the artisanal mills can be very inefficient, and improving those processes could greatly increase the output of oil. Giving farmers access to finance and assistance could enable them to make these improvements, says Sonwa.

However, "intensification is not inherently a sustainability path," Ordway cautions. She explains there's a risk of something called the 'Jevons paradox' – that increased profitability from intensification can ultimately incentivize further expansion.

"If production was increased, whether on-farm or at the milling stage or both, one of the positive results of that would be increased income for a farmer. However, Ordway prophesizes, that the farmer could think, 'I'm now making more money from the same amount of land, but if I cleared more land, I could make even more money."

Intensification could help Congo Basin countries to meet food security and poverty alleviation goals, she says, but to avoid that coming at the cost of forest and biodiversity loss, additional environmental policies will be required as well. That could be land-use regulations or other tactics, but will vary depending on the local and national context, says Sonwa. "Our role as scientists is to spell out the situation so that different stakeholders can know what their options are."

Patrice Levang has studied oil palm on both continents. "The oil palm expansion in Southeast Asia happened at the expense of both primary and secondary forests, and had a disastrous impact on biodiversity and animal habitat," he says.

"On the other hand, it promoted incredible economic development – and like it or not, African policy-makers and farmers are going to be more inclined to favor economic development than biodiversity conservation."

"Trying to prevent oil palm development in Africa is a lost fight. Looking for win-win – or at least lose-less – solutions are the only viable alternatives." There are some early signs that the Congo Basin's leaders are already paying attention to the potential environmental trade-offs of oil palm expansion – like the Marrakesh Declaration in which seven African governments pledge a shift towards sustainable, low-carbon palm oil production.

Preventing palm oil's history from repeating will require regional pledges like this be kept.

forestnews.cifor.org

Global: Return of GEDI's First Data Reveals the Third Dimension of Forests

NASA's Global Ecosystem Dynamics Investigation (GEDI) mission launched in December 2018. From its perch aboard the International Space Station, GEDI's powerful lasers create detailed 3D maps of Earth's forests and topography – providing innovative and unique spaceborne observations. In January 2019, GEDI's lasers were turned on for the first time and the instrument is now giving scientists a first glimpse of the insights it will provide in the coming years.

GEDI's mission provides scientists detailed information about forest structure: How tall the forest is, how dense its branches are, and the vertical and horizontal distribution of its foliage. All of this yields crucial insights into Earth's global carbon cycle by fostering a better understanding of how forests store carbon and what happens to that carbon when they are cut down or disturbed. Forests support numerous plant and animal species, and understanding their structure can help biologists better understand Earth's forest habitats and biodiversity.

When scientists process GEDI's data, the resulting measurements reveal the vertical structure of the forest. The GEDI image below is of a South Carolina woodland where darker green shows where the leaves and branches are denser, while the lighter areas show where the canopy is less dense.

"GEDI provides a vertical record, not only of how tall trees are, but how much canopy material there is at any height," said Ralph Dubayah, GEDI principal investigator and a professor of geographical sciences at the University of Maryland. "GEDI will make over 10 billion individual observations of canopy structures, which is orders of magnitude more than we have ever had."

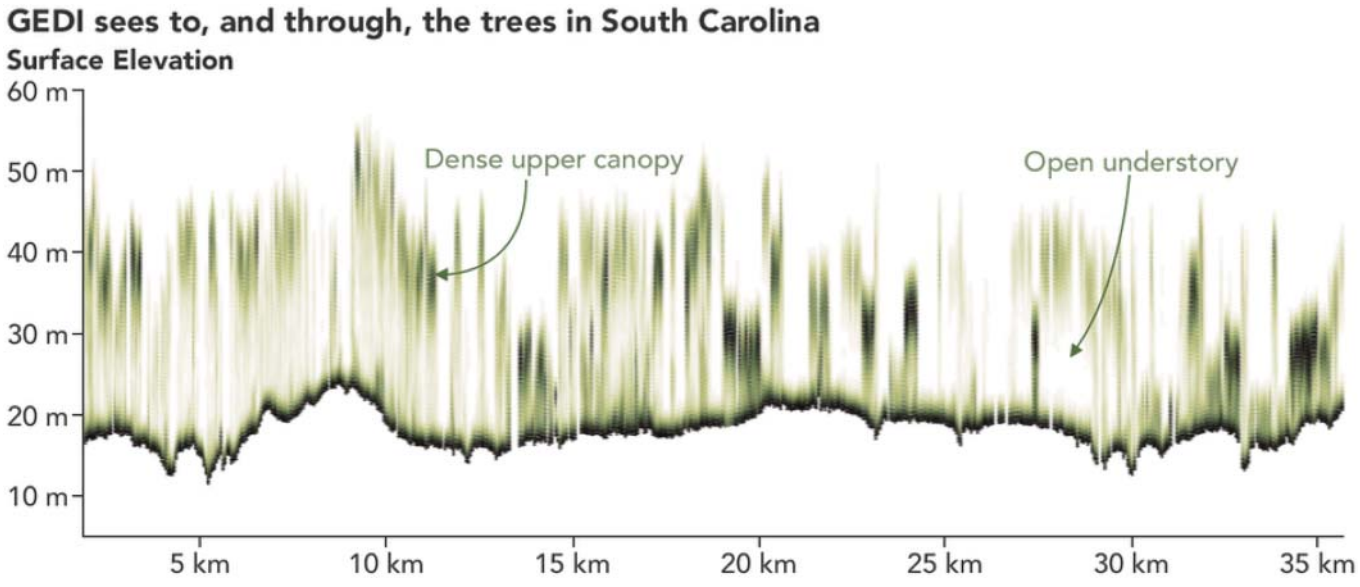
This level of detail is what sets GEDI apart and gives it the power to see the details of Earth's forests, the team explained.

"The instrument team at Goddard did an amazing job delivering this incredibly capable science instrument. GEDI brings together several challenging and state-of-the-art technologies to enable this very difficult measurement that's needed to achieve our science goals," said Bryan Blair, GEDI's deputy principal investigator and instrument scientist.

"We're very excited that GEDI is now in orbit and taking measurements," said Michelle Hofton, a research associate professor at the University of Maryland and a GEDI co-investigator. "This ability to precisely capture Earth's surface structure and its underlying topography is unique to GEDI. We're thrilled at the expansive coverage we're getting every day and looking forward to the discoveries that will be made using the data."

To learn more about GEDI, visit https://gedi.umd.edu/.

nasa.gov



Credits: Joshua Stevens / NASA Earth Observatory, Bryan Blair / NASA Goddard Space Flight Center, Michelle Hofton and Ralph Dubayah / University of Maryland

Global: Our communities are risking their lives to defend our world.' A global call to action to stop violence and killings in supply chains

Alongside the 8th UN Forum on Business and Human Rights in Geneva today, representatives from indigenous peoples, afro-descendent and peasant communities from 16 countries issued an urgent call for action – the Geneva Declaration. They are demanding governments and companies end the violence, killing and deliberate criminalisation of people defending their rights, their lands and their communities.

'We wish to live free of violence and demand the respect for our lives and our rights! The government should not impose their visions of development on us.' Indianara Ramires Machado, from Brazil's Guarani-Kaiowà indigenous peoples, said today.

Written by those who have seen first-hand what happens when destructive business activities are conducted with impunity at the expanding frontier of agricultural and extractive industries, the Declaration articulates the extreme challenges that they and their communities, families and peoples face. It offers practical recommendations for states, businesses, investors and others to ensure their rights are respected and protected.

Indigenous peoples and community leaders take extreme risks to defend their territories, communities and the environment. A recent investigation by Global Witness revealed that three defenders are killed every week, a disproportionate amount of them indigenous. They are most often attacked while resisting abuses connected to agribusiness and mining. They are also routinely criminalized or branded as terrorists.

Forest Peoples Programme's Director James Whitehead said *'Despite efforts to date, violence and killing is still inextricably linked to global supply chains – in industries such as palm oil, soy and gold. Communities are facing threats, intimidation and even death as they try to protect their lands from unscrupulous business interests. The Zero Tolerance Declaration represents a collective voice of defenders from across the world. They're saying that it's time for governments, businesses and investors to step up and adopt a zero tolerance approach to violence and killings.'*

The Declaration issues a challenge for governments, multilateral agencies, companies and investors to act in practical ways to stem the violence. The challenge now is to translate this framework into practical action. Forest Peoples Programme's new report, *Enough!* examines existing private and public sector frameworks to protect human rights and environmental defenders, and highlights gaps that need to be filled.

The UN Special Rapporteur on Human Rights Defenders, Michel Forst, spent two days speaking with and listening to the human rights defenders who finalised the Declaration. He said:

'I have worked the past 20 years on human rights defenders and so many have come on board making countless reports and recommendations. By now we know the situation, and we keep repeating recommendations. It is time to act!'

The quote in the title of this article, *"Our community leaders are putting their lives at risk to defend our world,"* is from Geovaldis González Jiménez, a community defender in Colombia.

This work has been supported by, among others, Forest Peoples Programme, International Work Group for Indigenous Affairs (IWGIA), the Asia Indigenous Peoples Pact (AIPP) and financially supported by Norway's International Climate and Forest Initiative.

www.forestpeoples.org

Global: Amazing new material combines wood fibers and spider silk

The unique material outperforms most of today's synthetic and natural materials by providing high strength and stiffness, combined with increased toughness.

Achieving strength and extensibility at the same time has so far been a great challenge in material engineering: increasing strength has meant losing extensibility and vice versa. Now Aalto University and VTT Technical Research Centre of Finland researchers have succeeded in overcoming this challenge, inspired by nature.

The researchers created a truly new bio-based material by gluing together wood cellulose fibers and the silk protein found in spider web threads. The result is a very firm and resilient material which could be used in the future as a possible replacement for plastic, as part of bio-based composites and in medical applications, surgical fibers, textile industry, and packaging.

According to Aalto University Professor Markus Linder, nature offers great ingredients for developing new materials, such as firm and easily available cellulose and tough and flexible silk used in this research. The advantage with both of these materials is that, unlike plastic, they are biodegradable and do not damage nature the same way micro-plastic do.

'Our researchers just need to be able to reproduce these natural properties', adds Linder, who was also leading the research.

'We used birch tree pulp, broke it down to cellulose nanofibrils and aligned them into a stiff scaffold. At the same time, we infiltrated the cellulosic network with a soft and energy dissipating spider silk adhesive matrix,' says Research Scientist Pezhman Mohammadi from VTT.

Silk is a natural protein which is excreted by animals like silkworms and also found in spider web threads. The spider web silk used by Aalto University researchers, however, is not actually taken from spider webs but is instead produced by the researchers using bacteria with synthetic DNA.

'Because we know the structure of the DNA, we can copy it and use this to manufacture silk protein molecules which are chemically similar to those found in spider web threads. The DNA has all this information contained in it', Linder explains.

'Our work illustrates the new and versatile possibilities of protein engineering. In the future, we could manufacture similar composites with slightly different building blocks and achieve a different set of characteristics for other applications. Currently, we are working on making new composite materials as implants, impact resistance objects and other products," says Pezhman.

scitechdaily.com

Colombia: Palm oil from Colombia is more climate and wildlife friendly

Palm oil has become an environmental villain in recent years, as people have become more aware that producing it often involves clearing rainforests – but this happens less often in Colombia than in other countries that are major producers.

If you buy products containing palm oil from plants grown in Colombia, there is a 60 to 70 per cent chance that it comes from plantations on former pastureland for cattle, rather than on former rainforest, says Juan Carlos Quezada at the Swiss Federal Institute of Technology Lausanne's Ecological Systems Laboratory.

Planting oil palm trees on pastureland in Colombia doesn't increase carbon emissions, according to a study by Quezada and his colleagues. He says it also has much less impact on wildlife. "People should try to buy palm oil from Colombia."

Globally, growing demand for palm oil is leading to a rapid expansion of oil palm plantations. In Malaysia and Indonesia, rich rainforests are being cut down and replaced with oil palms. This is not only devastating for wildlife – including the orangutan – it also releases huge amounts of carbon dioxide.

The main reason why palm oil demand is increasing is that huge quantities are now being turned into subsidised biofuels. More than half of the palm oil consumed in the European Union is burned in cars and trucks. As *New Scientist* reported in 2018, taxpayers in the EU are effectively paying for rainforests to be cut down in the name of tackling climate change.

That said, oil palm produces higher yields of oil per hectare than other vegetable oil crops, and is a more efficient use of land than livestock. "Cattle ranching produces one or two animals per hectare every few years," says Quezada. "You get three or four tonnes of palm oil per hectare every year."

"Colombian palm oil is certainly greener than Indonesian or Malaysian palm oil, but we still need to be careful," says Stephanie Searle at the International Council on Clean Transportation in Washington DC.

Suppose palm oil produced in Colombia is now sold in Peru, says Searle. If the US starts importing lots of Colombian palm oil, Peru may import it from Indonesia instead. And if overall demand keeps rising fast because of biofuel use, forests will still be cut down.

"No matter how the palm oil is grown, if it could have been used for food and you're taking it away from that sector because of additional demand in transport, there will be knock-on effects," says Laura Buffet of Transport & Environment, a group that campaigns for greener transport in Europe.

In addition, if the land were just left alone, forests could regrow, say both Searle and Buffet. This would lock away more carbon than plantations or pastures. However, Quezeda says some of the pastureland in Colombia was originally tropical savannah, rather than being land deforested long ago.

newscientist.com

Global: FAO offers novel assessment of trees and forests in the world's drylands

Geospatial data and global network of partnerships produces new insights on more than 40 percent of the earth's surface.

More than a quarter of the world's forest area is located in drylands, and trees are present on almost a third of the world's dryland regions, according to *Trees, forests and land use in drylands: The first global assessment*, launched by FAO at the High-Level Meeting on Forests at the U.N. COP25 climate summit.

The results "demonstrate that drylands are not wastelands, but productive landscapes with considerable economic potential and environmental value."

The report, which includes large amounts of data on global and regional land use and forest cover, represents FAO's delivery of a promised "collective product" on the status of drylands around the world. The assessment complements FAO's *Global Forest Resources Assessments* but differs in that its primary data are developed through visual interpretation of freely available satellite images in a global team effort using FAO's Open Foris Collect Earth tool.

"Understanding the status and changes of dryland forests, tree cover and land use is vital to evaluate the impact of climate change and human activities, the results of adaptation and mitigation measures and progress towards meeting regional targets

for land degradation neutrality," says Hiroto Mitsugi, FAO Assistant Director-General of the Forestry Department.

The new report engaged more than 200 experts and a series of regional workshops in collaboration with partner universities, research institutes, governments and non-governmental organizations worldwide, and draws on information from 213.782 sample plots, each measuring around half a hectare.

While specific instances require reality checks on the ground, the interpretation of high-resolution remote-sensing images presented in the assessment can help policymakers identify optimal investment strategies to combat land degradation and desertification, conserve biodiversity, support livelihoods and help increase the resilience of landscapes and communities, especially in the face of climate change.

What the assessment shows

Drylands, comprising hyperarid, arid, semi-arid and dry subhumid zones, cover about 6.1 billion hectares, or 41 percent of the Earth's land surface. Of these, some 1.1 billion hectares (18 percent) consist of forest, according to FAO's assessment.

Drylands are home to an estimated 2 billion people, half the world's livestock, and more than a third of global biodiversity hotspots, and provide critical migration points for birds. Their ecosystems are vulnerable to water shortage, drought, desertification, land degradation and climate change impacts.The world's drylands are expected to expand by 10 to 23 percent by the end of the 21st century, with dangerous ramifications for food security, livelihoods and human welfare.

Globally, about 18 percent of drylands are forest, just over half of which have canopy density above 70 percent, while barren land accounts for 28 percent, grassland 25 percent and cropland 14 percent. Trees are also present on drylands outside of forests, notably in Asia and Europe, and all told there are trees on some 2 billion hectares of drylands.

The report offers detailed assessments broken out by region.

FAO also released a new issue of Unasylva exploring the role of forests as nature-based solutions for water management. Its key message is that forested watersheds provide an estimated 75 percent of the world's accessible freshwater resources and thus constitute are crucial and cost-effective natural infrastructure for the production of high-quality water – including for cities – for more than half the world population. Their management for water will become increasingly important in the face of climate change.

fao.org

Canada: Long-term damage from logging hits ability of forests to regenerate

- *'Logging scars' blight up to 25% of formerly logged areas*
- *Canada partly relies on forests to capture carbon*

Canada's logging industry has a larger and more damaging impact on forest health than previously thought, a new report has found, casting doubt on the sustainability of forestry management in the country. The findings also raise questions about Canada's ability to make good on its international climate commitments, which partly rely on forests for carbon sequestration.

In a report, the Toronto-based conservation group Wildlands League found that "logging scars" – the vestigial remains of roads, landings and turnoffs meant to accommodate heavy machinery – suppress forest regeneration. Because the dirt roads are so heavily compacted, seedlings have little chance of successfully repopulating the area.

Using drones to survey the 27 sites in northern Ontario, Trevor Hesselink, a land-use planner and former forestry policy analyst, found that the scars made up anywhere from 10% to nearly 25% of the areas where forests had once been logged.

"The extent of the scarring, and getting on the ground to see the longevity of the suppression effect, surprised me the most," Hesselink told the Guardian.

Wildlands estimates that nearly 650,000 hectares of forest in Ontario – eight times the area of New York City – have been lost in last three decades due to scarring.

While the province makes up a small part of the country's overall logging industry, Hesselink and his team believe the long-term damage to forests is probably more common than many realize. The practice of "full tree harvest" – where entire trees are cut down and moved to a landing area to be processed – is also used in western provinces, where the logging industry is more widespread.

"We've been told over and over that https://www.theguardian.com/world/canada has a near-zero deforestation rate," said Janet Sumner, Wildlands League's executive director. "But it wasn't what we were seeing in the bush. So we took a closer look. And now we know."

Canada's forests have become central to the Liberal government's pledge to fight the climate crisis. As part of his re-election campaign, the prime minister, Justin Trudeau promised to plant 2bn trees in the next decade.

Hesselink's findings also call into question Canada's calculations of carbon sequestration from its forests. The lost carbon storage could be as high as 41 megatons by 2030 – or an entire year's worth of passenger vehicle emissions in Canada.

"As long as these logging scars are suppressing the natural renewal of forest, they're forgoing carbon that could removed from the atmosphere," said Hesselink.

theguardian.com