US scientist: 'Roads and corruption' are big drivers of deforestation

To be effective, forest conservation initiatives must be rooted in a local context – including the land ownership and tenure ecosystems in which they operate, says Keith Kline, from the prestigious Oak Ridge National Laboratory in the US.

EURACTIV interview Q&A with Keith L. Kline, distinguished researcher at Oak Ridge National Laboratory (ORNL), published on 4 May 2020. A shorter summary version is available here.

Q: The European Commission is preparing a biodiversity strategy for publication in the coming weeks. How is biodiversity related to forestry and climate change objectives?

A: Biodiversity, forests, and climate change objectives are inextricably and strongly linked. We've known for decades that climate change affects forests directly by influencing species composition, growth rates, and mortality and indirectly by altering the intensity and frequency of disturbances that can modify forest structure and composition.

In turn, forests affect climate change, for about half of the biomass of a tree is made up of carbon, and thus, as a tree grows, carbon is sequestered, and, when it dies or decays, carbon is released to the atmosphere.

At the same time, the distribution and abundance of species (biological diversity) are governed by environmental factors, including climate and the ecosystem in which they occur. Forest ecosystems provide distinct light, soil, moisture, and other conditions for the plants and animals that inhabit them. Hence any changes to forests or climate affect biodiversity. (For further information and other examples of how biodiversity is related to forestry and climate change, see "The interplay between climate change, forests, and disturbances" and other papers listed in the references.)

It's important to keep in mind that extraction and combustion of fossil fuels are responsible for the vast majority of observed increases in atmospheric carbon and other greenhouse gases (GHGs) and, therefore, climate change forcing.

Changes in land cover, including deforestation, contributed about 12% of total global climate forcing GHGs between 2007 and 2016 as calculated by the Global Carbon Project. The Global Carbon Project also finds that terrestrial systems are a large and important net sink for carbon, meaning that our lands sequester far more carbon via photosynthesis in a typical year than the volumes emitted from land-use change and deforestation.

Therefore, improving land management is critical to achieve "natural climate solutions." Indeed, reforestation and forest management are estimated in a recent US study to offer *more than 10 times* the climate mitigation potential of that offered by avoided deforestation.

Q: Can you mention examples around the world where forestry can support or, on the contrary, undermine biodiversity and greenhouse gas mitigation?

A: The global importance of interactions among forests, biodiversity, and climate is reflected by international scientific community research and reports such as those in the references and cited above.

Also, the UN Convention on Biological Diversity emphasises "reducing [climate forcing GHG] emissions from deforestation and forest degradation (REDD+)" initiatives as an important means to conserve biodiversity. A study by the Global Carbon Project highlights the land use-biodiversity-climate nexus focusing on forest ecosystems. Work led by the Center for International Forestry Research (CIFOR) and other studies (see references) emphasise the role of good land management to simultaneously achieve multiple conservation, climate mitigation, and development goals. Many biodiversity conservation initiatives prioritise hot spots or high conservation-value (HCV) areas where forests play key roles, not only for habitat to support threatened biodiversity but also for carbon storage and sequestration services that support climate goals.

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Another example that merits more recognition is community forest management in the Peten Department of Northern Guatemala. Within the Multiple Use Zone of the Maya Biosphere Reserve, forest management concessions for timber and non-timber products are found to be instrumental in achieving biodiversity, climate, and social development goals.

The concessions began operations in 1994 and comprise 400,000 hectares of public lands. Under the terms of the 25-year concessions, a management plan was developed and approved granting community members responsibilities to implement the plan and control deforestation and wildfires.

Multiple evaluations over the past two decades by development agencies and environmental NGOs alike find that the lands managed by communities are better conserved than the two strict conservation areas in the Maya Biosphere Reserve of similar size that are managed by the federal government: National Parks Laguna del Tigre and Sierra Lacandon. These National Parks have suffered from intensive illegal activities including logging and land invasions, as well as extensive wildfires, due to lack of institutional capacity and governance in this frontier region.

I lived and worked in Guatemala from 1987-1999, helping the government establish a national system of protected areas (SIGAP) and a new National Park Service (CONAP), as part of a broader international assistance program to strengthen governance and conserve biodiversity.

While significant improvements in the administration of parks were achieved, it was clear that community concessions could offer a more effective solution in view of persistent land-tenure conflicts and other threats to the forest ecosystem.

Q: If you were to advise the European Commission on the forestry aspects of its biodiversity strategy, what policies would you recommend?

A: ORNL scientists are prohibited from making policy recommendations, but there are many scientific papers, case studies and other resources provided in the references that can inform policy decisions.

The references support a set of eight steps required to effectively slow the loss of HCV forests, and offer insights about balancing biodiversity and conservation goals with transportation infrastructure, development and trade.

Q: In Europe and the US, environmental groups have called on policymakers to protect old-growth forests from harvesting – both for biodiversity and climate reasons. What is the value of protecting old growth forests in your view? Do you support those calls or do you believe exceptions should be made?

A: One issue with the term "old growth forest" is that definitions vary. Several sources consider any forest that has been undisturbed and contains canopy trees of 150 years or older to be 'old growth' and there is broad scientific consensus that such forests are of immeasurable value to humanity.

Therefore, I remain personally committed to protecting old growth forests; they are rare and represent HCV areas by definition. Sustainable forest management standards such as those of the Forest Stewardship Council require that management plans identify any area that has never been harvested and keep it intact to protect old growth. Thus, enforcement of sustainable forest management practices can help protect old growth stands.

Areas identified as old-growth forest are often recognised as parks and reserves but even with legal protection and good oversight, they remain under threat from factors such as changing climate and hydrology, increasing incidence of invasive pests, diseases, wildfires, and salt-water intrusion. The increasing frequency and intensity of disturbances call for management interventions in order to mitigate future losses of HCV forests and biodiversity.

Land management decisions must be made locally, so there is no "one-size fits all" solution that can be applied. As noted in the Guatemala example, one way to protect old-growth forests is to engage local communities and stakeholders who must ultimately be convinced of their value.

In many contexts, simply declaring forest areas off-limits is less effective than other options.

Q: Former UN chief Christiana Figueres has called on the EU to eliminate "embedded deforestation" from the import of agricultural goods like beef, soy and palm oil. Do you believe this is desirable or achievable?

A: Twenty-five years of field work, living in developing nations while trying to help them slow tropical deforestation, taught me that it is not the product (beef) or the land cover (pasture) that cause deforestation but rather a combination of actors (people and institutions), policies, and site-specific opportunities (access, resource extraction, land speculation, markets, etc.) that drive initial degradation and subsequent deforestation.

Those drivers must be addressed locally and early if forests are to be conserved. Thus, it is critical to involve all relevant stakeholders in a process that identifies high-conservation value areas and develops plans for their management.

Q: EU policymakers have decided to phase out palm oil imports in order to stop deforestation and biodiversity loss in places like Indonesia. And some are considering further trade restrictions in the future in the name of climate or biodiversity protection. Do you believe such policies are bound to fail?

I am not authorised by ORNL to make policy recommendations, but scientific studies – e.g., analyses that test a hypothesis based on evidence, repetition, and careful observations – can be used to inform decision making. As discussed above and in multiple studies listed in the references, roads and corruption are common enabling conditions for the loss of tropical forests and other HCV areas.

Studies that consider long-term trends find that government-facilitated colonisation and development programs have driven deforestation for centuries and involved many different types of commodities (rubber, tea, rice, palm oil) as well as extractive enterprises (timber, minerals) and large infrastructure (dams and hydropower, ports, railways).

Research led by the International Center for Forestry Research (CIFOR) finds that complex land-tenure conflicts and inadequate forest governance are among the important underlying causes of recent deforestation in Indonesia. Another study of recent changes in the region (Lim et. al., 2017) finds that major causes of deforestation are large concessions on public lands for timber extraction, corresponding infrastructure development, and civil conflicts associated with weak land tenure. These studies, which rely on many types and sources of data, are consistent with my decades of service working to protect forests and biodiversity in developing nations in Africa, Central America, and South America.

Satellite imagery and analyses are useful but can make it too easy to correlate a current land cover or crop with deforestation. Remote sensing can provide useful information about change, but it does not tell us why forests are lost.

Identifying the underlying causes is key to developing effective solutions that conserve HCV forests and requires deep understanding of local context and site-specific processes that lead to forest degradation and changes in land cover.

Therefore, based on my field work and analyses of historical data, singling out a specific commodity such as palm oil is unlikely to impact deforestation rates unless the root causes are also addressed.

Q: China will be hosting the next UN biodiversity conference in Kunming. Should the UN put limits to the commercial exploitation of the world's forests? And if so, how can policymakers make sure this is done in a fair manner for developing countries?

A: There should be incentives, rather than limits, to manage forests for increasing productivity for timber and non-timber products, and many other ecosystem services.

Much land is degraded and in need of investment and management for restoration, as noted in recent studies on natural climate solutions. In addition, knowledge gained from monitoring and rigorous scientific research should be used to inform continual improvement of forest management and should be reflected in decision-making.

Combining incentives for management, restoration, conservation, and monitoring in a single package, including sustainable harvesting of products, can be done, as shown in the forest concessions in the Peten, Guatemala. Rather than debate forest exploitation, it is more constructive to identify and invest in opportunities to improve land management and steps that can effectively conserve HCV forests (examples in references).

Q: A group of 800 scientists has warned about the greenhouse gas effects of burning wood for energy purposes, saying it exacerbates climate change by causing deforestation outside of Europe, notably in the US, which is a major exporter of wood pellets. How can those adverse effects be avoided? Can a biodiversity approach to forestry help in this regard?

A: There is disagreement within the scientific community about costs and benefits of wood-pellet based bioenergy production in the United States (US). Resolving it requires an understanding of the science, the likely alternatives, and the context influencing market decisions associated with sustainability.

Scientific studies provide evidence that wood pellets in the Southeast US are a tiny fraction of total forestry operations (less than 5% of total removals) and can be produced while maintaining or improving forest ecosystem services (see references). Ecosystem services are maintained by adherence to sustainable forest management standards and certification, and export market requirements that loggers be trained to apply science-based best practices in planning and implementing harvests.

Monitoring and evaluation are essential to verify that goals are being achieved and timely responses occur if problems arise.

Concerns about wood pellet production causing deforestation in the Southeast US may reflect a lack of understanding of land ownership and management dynamics. According to data from the US Energy Information Administration, 80% of all feedstock for densified biomass (pellets) is sourced from residues generated by sawmills and other industrial forestry activities. And nearly all commercial forest harvests in the Southeast occur on private timberlands which, if not for wood product markets, could transition to other crops or development.

The future of these forests depends on local communities and landowners, underscoring the importance of engaging local stakeholders in the process to identify and protect HCVA forests while promoting sustainable management to meet other needs.

The same criteria and guidelines to protect HCV forests and biodiversity (discussed above and in references) should apply equally to all nations and products. Thanks to investments in US wood pellet production in the Southeast, additional HCV areas are being identified and conservation initiatives are receiving increased funding to protect bottomland forests and rare longleaf pine habitat for endangered species in the Southeast US (e.g. the Forest Conservation Fund).

Thus, in this case, the opinion of 800 good-intentioned scientists runs counter to the analyses of scientists working in the Southeast US, and the available data from the US Forest Service.

Studies comparing recent data to long-term trends shows forest stocks and forest area continue to expand in tandem with wood pellet production, in part due to demand for forest products from managed forest lands. (Several examples of research examining the effects of wood pellet production in the Southeast are provided in the references.)

Q: Are there any scientifically recognised certification schemes to ensure imported wood or agricultural products don't cause deforestation? Are those schemes trustworthy enough? And should they be recognised at international level?

A: There are many responsible certification schemes that document compliance with requirements to avoid deforestation. As of April 1, 2020, the European Commission recognised 14 international certification schemes for biofuels that fulfil criteria including those to protect biodiversity and avoid forest loss.

Furthermore, sustainable forest management standards used for forest product certifications typically require that HCV forests be identified and conserved. Independent, 3rd party certification linked to clear performance standards is important to provide verification that the requirements set by a standard are being met. Thus, widespread adoption and enforcement of sustainable forest product management practices should protect old growth stands within certified, managed forests.

While certification schemes can document that requirements are met and increase consumer confidence in a product, my experience in the field suggests that certification schemes alone, as currently implemented, are unlikely to improve sustainability or deter deforestation.

Under current certification systems, some producers have the capacity and desire to fulfill documentation requirements under their existing operations. Other producers may employ more sustainable practices than those required but lack the wherewithal to document compliance. And many producers can offer uncertified products that typically enjoy a price advantage since the costs associated with certification (detailed management plans, monitoring, training, documentation and periodic reporting) are avoided.

Certification can make consumers feel better while the forests continue to decline because certification alone is unlikely to address the underlying causes of deforestation discussed above.

Granted, certification can theoretically address deforestation if 100% of natural resources harvested or extracted for any use, anywhere, are fully certified to the same high standards – an implausible proposition in the foreseeable future. Meanwhile, research such as that cited in the references identifies specific steps that can be taken now to slow the loss of HCV forests.

// ENDS

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References and suggested reading are listed below, organised by topic:

1. Biodiversity-Climate-Forests Nexus
2. Old Growth Forests
3. Engaging Stakeholders in Sustainable Management (examples)
4. Impacts of roads/infrastructure and smart development alternatives
5. Deforestation trends and drivers in SE Asia
6. Steps to slow the loss of HCV forests
7. Effects of production and export of wood pellets on Southeast US forests

Biodiversity-Climate-Forests Nexus and Natural Climate Solutions

Capitani, Claudia, Norfolk, Olivia, Platts, Philip John orcid.org/0000-0002-0153-0121 et al. (5 more authors) (2015) Exploring the future land use-biodiversity-climate nexus in East Africa: an application of participatory scenario analysis. GLP News. pp. 10-13. And also see: https://futureearth.org/networks/global-research-projects/glp-global-land-programme/

Center for International Forestry Research (CIFOR) https://www.cifor.org/ Library offers multiple relevant studies such as: https://www.cifor.org/library/7253, https://www.cifor.org/library/5121/, and related research at http://foreststreesagroforestry.org/

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Old Growth forests

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Barton AM, Keeton WS (ed). 2018. Ecology & Recovery of Eastern Old Growth. Island Press, Washington, DC.

A basic issue with “Old growth forest” is that definitions vary. For discussion of this issue, see: https://www.yaleclimateconnections.org/2019/12/what-is-an-old-growth-forest/.

Note: any forest ecosystem that has reached climax conditions and not experienced a severe disturbance for 150 years or more, would meet most criteria for old growth. A severe disturbance modifies stand composition and ecosystem functions. Old growth forest ecosystems have been likened to 'giant bank accounts' for carbon, biodiversity and potential medicinal plants and discoveries. Such forests are so rare, they are often considered HCVAs by definition.

Engaging Communities and Stakeholders in Sustainable Forest Management and Conservation

See reports from Rain Forest Alliance, CIFOR, and USAID evaluations for the Maya Biosphere Project. For example, "Forest concessions in Petén, Guatemala -- A systematic analysis of the socioeconomic performance of community enterprises in the Maya Biosphere Reserve" (Stoian et al. 2018). http://www.cifor.org/publications/pdf_files/brief/7163-brief.pdf

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Impacts of roads and large infrastructure and alternatives for smarter infrastructure development

A better Amazon road network for people and the environment. PNAS 2020. Thais Vilela, Alfonso Malky Harb, Aaron Bruner, Vera Laísa da Silva Arruda, Vivian Ribeiro, Ane Auxiliadora Costa Alencar, Annie Julissa Escobedo Grandez, Adriana Rojas, Alejandra Laina, and Rodrigo Botero. Proceedings National Academies Science USA. www.pnas.org/cgi/doi/10.1073/pnas.1910853117

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Many field-based deforestation studies underscore that international financing for large infrastructure projects (dams, bridges, ports, railways), extractive enterprises (mining, oil & gas, logging), and agricultural expansion, has often been directly linked to building roads, creating new access to forest areas, and subsequent loss of HCVA forests and biodiversity. Also see multiple papers by Philip Fearnside and the following web sites for case studies and examples: https://rainforests.mongabay.com/08-deforestation.html

Deforestation trends and drivers in SE Asia

CIFOR https://forestsnews.cifor.org/60101/palm-oils-complex-land-conflicts?fnl=en also notes that the Indonesian Sustainable Palm Oil (ISPO) certification scheme needs work to be considered credible in export markets (it is not one of the schemes approved by EU).

JRC-EU "Scientific and Technical Report on Forest Cover Change in Southeast Asia" Stibig et al., 2007, Joint Research Centre Institute for for Environment and Sustainability, Ispar, Italy.

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For current info on threats to HCVA forests in SE Asia - https://news.mongabay.com/2019/09/pan-borneo-highway-development-threatens-to-carve-up-intact-forest/ and https://www.global-roadmap.org/

Steps shown to slow the loss of HCV forests

Based on research, other case studies, and 25+ years of personal field experience working in developing nations to promote natural resource management and the conservation of forests and biodiversity, eight steps emerge as important ingredients for successful conservation of forests and biodiversity.

1) Identify the mechanisms of potential impacts on species, communities, and ecosystems of concern.
2) Engage local communities and stakeholders to define areas of high conservation value (from their perspectives) and develop and implement management plans to achieve conservation goals. Recognise that these places can be very small or large. Ensure that local stakeholders benefit from HCVA investments, for they must perceive value in conservation efforts in order to support them.
3) Stakeholders include local champions, appropriate levels of government, civil society, and private sector representatives, who need to participate in the process so that they too can support the outcomes and can take next steps to better manage and conserve HCVAs.
4) Establish clear criteria and indicators for measuring the HCV forest extents and conditions including relevant indicators of biodiversity; then document baselines and monitor (via reliable sources) changes in the selected indicators.
5) Ensure that annual targets are clear, relevant, and measurable and progress is monitored in timely manner. Prioritise and then apply all available tools to achieve the priority conservation goals and support corrective actions when monitoring identifies problems.
6) Include forest restoration opportunities and hotspots (e.g., fresh water/riparian zones, mangroves, and areas that impact downstream reefs and marine ecosystems) as recommended in the UNEP ecosystem restoration framework, focusing on integrating science, indigenous knowledge, and local stakeholders in the process required to achieve more sustainable outcomes.

7) Consider opportunities to leverage resources by developing broad-based support for smart development initiatives such as those for infrastructure options that meet people's needs while avoiding unnecessary losses of forest and biodiversity.

8) Based on steps 1 and 2, restrict projects that threaten HCV areas, paying special attention to transportation infrastructure. Case studies identify road-building and road improvements as direct and rapid contributors to losses of HCV forest. Incorporate field surveys, environmental assessment and monitoring activities to identify and protect HCV areas as prerequisite and integral components of large infrastructure projects.

Effects of production and export of wood pellets on Southeast US forests

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US Energy Information Agency - data on densified biomass, including volumes produced and feedstock sources (Table 3) for wood pellets: https://www.eia.gov/biofuels/biomass/#table_data

US Forest Inventory Analysis data, available to the public: https://www.fia.fs.fed.us/tools-data/. These data are updated annually and have been analysed by many researchers and consistently show that the landscape forest stocks are increasing at much higher rates than removals for all purposes (with wood pellets for energy representing less than 5% of total removals, as documented in Dale et al. 2017 and Parish et al. 2017.