# Ecologists outline methods for reaching global biodiversity targets

August 2 2021, by Rachel Hergett

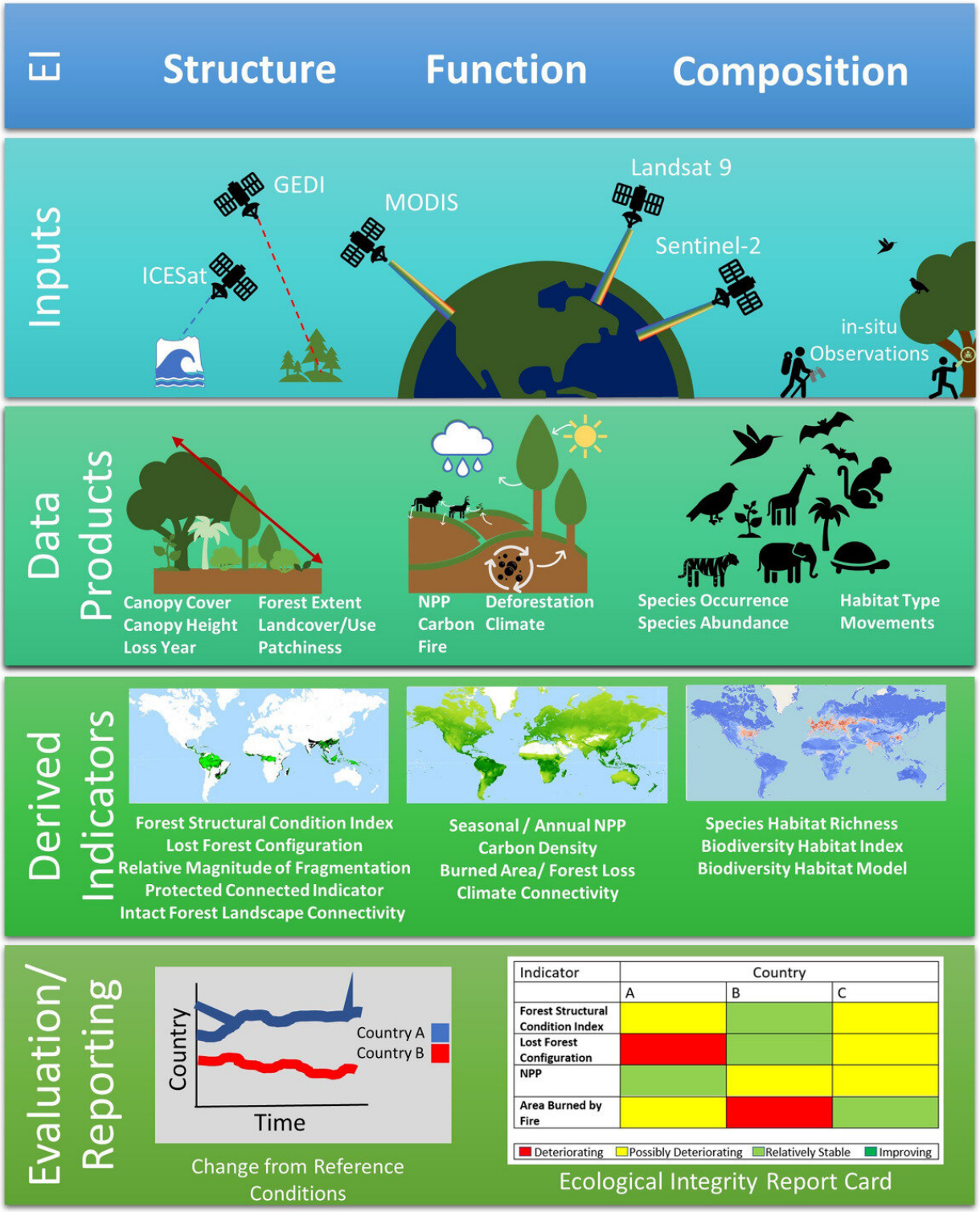


Figure 1. Flow diagram of the recommended approach for tracking indicators of ecosystem integrity. Credit: DOI: 10.1111/conl.12822

Nature is, in many ways, hard to measure, yet researchers have spent decades searching for ways to best quantify its health and create benchmarks for conservation. Now, an international team led by Montana State University ecologist Andrew Hansen hopes to help the more than 150 countries in the Convention on Biological Diversity standardize how they monitor forest ecosystems.

"Whether you are a farmer or an irrigator or someone that oversees a city water supply, managing a natural resource is all about measuring the conditions, so you know you're taking good care of it," said Hansen, a professor in the Department of Ecology in the College of Letters and Science at MSU and director of the Landscape Biodiversity Lab.

Hansen is the lead author of "Toward Monitoring Forest Ecosystem Integrity within the Post-2020 Global Biodiversity Framework," a paper published last week in the Society for Conservation Biology's journal *Conservation Letters*. The publication comes ahead of talks planned for this fall among members of the Convention on Biological Diversity to create a new Global Biodiversity Framework, essentially a plan to meet biodiversity targets in the coming decades. The paper suggests new guidelines to assess the health of forest ecosystems around the world using satellite data, a method that wasn't possible even five years ago, according to Hansen.

MSU ecology doctoral candidate Jaris Veneros, master's student Alyson East and Benjamin Noble, who earned his bachelor's degree in biological sciences this spring, are co-authors on the paper. They helped design the framework, working on the initial draft of the paper and creating figures and tables. The collaboration also included policy experts from the United Nations Development Program, remote sensing specialists and international conservation scientists.

The framework outlined in the paper draws on the idea of ecosystem

integrity, a measure of the quality of natural habitats. In forests, this is based on three things: forest structure, such as how tall the canopy layers rise above the ground and how dense the leaves are packed in that canopy; function of the ecosystem, how fast plants and animal populations grow and how well nutrients are cycling; and the composition of species in that ecosystem. Together, the structure, function and composition determine usefulness of that ecosystem.

"It is water. It is fire. It is disaster risk. It is forests that breathe. It is fruits and nuts and wood products. It is wildlife for scenery and for consumption. It is water for agriculture," Hansen said. "Ecological integrity is all of these things."

The proposed framework suggests methods to help countries monitor how ecosystems change over time and see the extent of those changes on a national and international scale. It would create a way for nations to access aerial data on land cover, productivity, fire incidence and forest extent and use that data to evaluate "essential biodiversity variables," the minimum measurements needed to determine the status of a species or ecosystem.

In 1992, the Convention on Biological Diversity was signed by over 150 international government leaders committed to conservation and sustainable development. New Global Biodiversity Frameworks to achieve the convention's goals are created roughly once a decade.

The convention's top priority in setting new targets for 2030 and beyond is "increasing the area, connectivity and integrity of natural ecosystems," explained Hansen, who studies ways to measure the health of the world's forests and manage that health across human-crafted borders. This effort will help maintain water supplies and natural resources, reduce carbon dioxide emissions, sustain fish and wildlife, and minimize fire and flooding.

"This is really critically important for global conservation for the coming decade," Hansen said.

To report on the success of meeting its targets, the Convention on Biological Diversity must now agree on a way to measure nature that member countries can accomplish consistently each year for the next decade.

"This paper was meant to offer a way to go about doing that," Hansen said.

Similar frameworks have been proposed for marine systems, but to Hansen's knowledge, no other group has created a system for measuring the integrity of forest ecosystems on a global scale. His hope is that the convention will decide the framework is solid, appoint a working group to create a standard approach for measurements and provide countries with guidance.

"All the good things MSU is doing in the state, it is doing internationally," Hansen said. "It is an incredible testament to the university that we have scientists who are making an impact across 150 plus countries."

While the United States is not a signee of the Convention on Biological Diversity and does not have a national ecological monitoring program, Hansen is hopeful the country will move toward national-scale conservation efforts.

"The methods that we're advocating internationally absolutely should be applied to the U.S.," Hansen said. "It needs to be on the table."

**More information:** Andrew J. Hansen et al, Toward monitoring forest ecosystem integrity within the post-2020 Global Biodiversity

Framework, *Conservation Letters* (2021). DOI: 10.1111/conl.12822