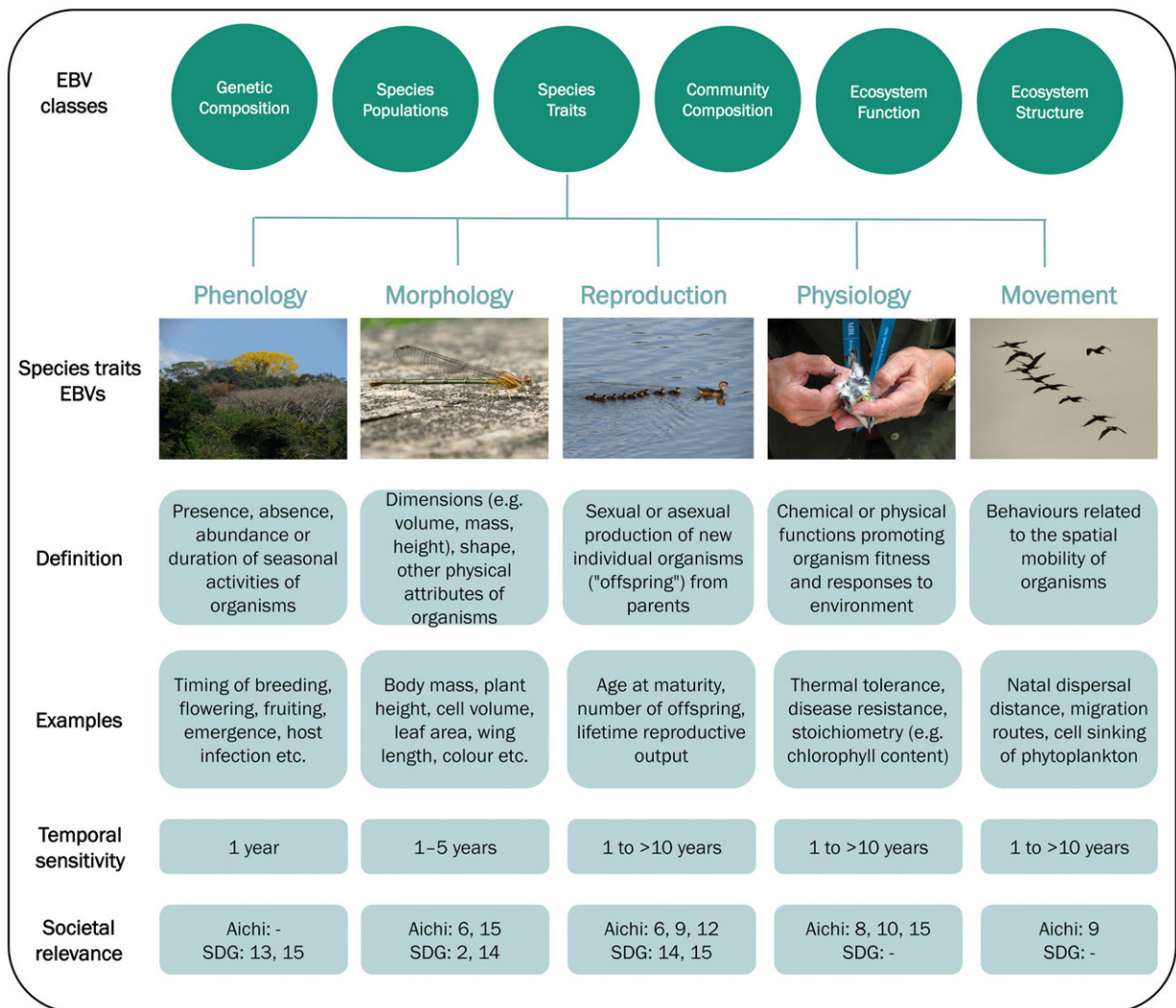


Study provides roadmap for measuring animal, plant traits to meet biodiversity goals

September 17 2018



GEO BON has identified six classes of 'essential biodiversity variables' to track and monitor, represented by the teal dots at the top of this figure. Guralnick and his colleagues refined the 'species traits' class by defining characteristics to

measure and linking these to policy goals. Credit: Figure by Kissling et al. in *Nature Ecology and Evolution*

An international team of researchers has outlined a plan for how to measure changes in key traits of animals and plants and provide these data to policymakers to improve natural resource management and keep nations on track to meet global biodiversity and sustainability goals.

Monitoring species traits—characteristics such as body size and behaviors such as migration patterns—can help researchers determine how animals and plants are responding to a rapidly transforming, human-dominated planet, highlighting species under threat from climate change, habitat loss, disease and other dangers.

Having this information in hand can empower policymakers to make strategic decisions that not only ensure species survive and flourish, but also meet staple human needs, such as food security, managing invasive species or mitigating the effects of climate change, said study senior author Rob Guralnick, associate curator of biodiversity informatics at the Florida Museum of Natural History.

"What we sometimes don't realize is that the characteristics of organisms are fundamentally linked to human needs and survival," he said. "Our ability to create biodiversity data products is valuable both because of the science it enables and because it can help us make better decisions about managing our planetary resources for the long-term."

Guralnick cited the overharvesting of large fish as one example of how species traits are directly linked to human well-being. Preferentially selecting bigger fish as food resources could lead to smaller fish populations -in terms of the number of fish available and their size as

well.

"We could see a case where the biomass of the planet is effectively getting smaller over time," he said. "That really has impacts on food security and how we're going to manage that in the face of a growing population."

Pinpointing which species traits to measure and standardizing how researchers collect and report these data marks a significant advancement in efforts by the Group on Earth Observations Biodiversity Observation Network, or GEO BON, an international collaboration between scientists seeking to sync observation programs to produce a clear picture of Earth's biodiversity. "Species traits" is one of six classes in GEO BON's framework for assessing progress toward national and international policy goals, including the United Nations' Aichi Biodiversity Targets and Sustainable Development Goals for 2030. But while other classes have been well defined, species traits and how to monitor them have remained vague.



Museum specimens can provide historical baseline data for many species traits. These birds represent three subspecies of the northern Bobwhite, *Colinus virginianus*. From left to right, they are native to Cuba, Florida and southern Mexico. Credit: Florida Museum photo by Rose Roberts

Guralnick and the study's first author Daniel Kissling, both of whom co-chair GEO BON's data task force, led a team of data ecologists and scientists to refine trait categories and produce a step-by-step workflow for how they can be measured in ways that directly link to policy goals.

They defined species traits as any physical, physiological, reproductive, behavioral, or time- or season-sensitive characteristic of an animal or plant species.

"Traits are not just things like body shape and size. They also include factors like when plants flower or when leaves appear," Guralnick said. "Some of these are really sensitive to global climate changes. Building systems that allow us to understand how traits are responding to these shifts is critical because traits really drive how ecosystems work and what services they provide to us as humans."

One major challenge of successfully building these data systems is standardizing the ways in which traits are monitored and how those data are reported.

"Instead of having everyone measuring a bunch of things in different ways and trying to draw different conclusions, we have to build a system for monitoring the planet's biodiversity in a way that coordinates efforts and creates standards for how those data get to people who make decisions," he said.

Creating a global network that takes the pulse of life on Earth might sound like an impossible feat, but Guralnick pointed to the climate science community as an example of a group that tackled similar, outsized obstacles and succeeded. He sees the global-scale collaborations that united climate scientists to collect, share and standardize data to yield highly precise models and forecasts as comparable to what GEO BON's biodiversity monitoring efforts aim to achieve.

The team outlines a workflow that combines trait data from [natural history](#) collections, observations on the ground and remote sensing from air and space—in which data resolution is nearly to the point where researchers can measure indicators of health in an individual tree.



Scientists Larry Page, left, and Andre Lopez search for catfish. On-the-ground observations and remote sensing can help fill gaps in our understanding of biodiversity and how it is changing. Credit: Florida Museum photo by Eric Zamora

"We know that forests are declining globally, and there are monitoring systems that can tell us the rate of forest loss per year or per month," he said. "What if we were able to do the same kind of thing for how body size change is happening in fish populations across the globe in response to harvesting? Those are the kinds of models we want to be able to produce."

Still, not every species can be monitored, and researchers will have to make choices about which measurements will be most relevant to

scientific and societal needs, said Guralnick, who described Earth observation as a "triage enterprise."

Understanding the human aspects of conservation decision-making is a primary reason GEO BON has incorporated UN policy goals into its biodiversity monitoring efforts, he said.

"This is a social challenge as much as a technical or scientific one," Guralnick said. "We can't address environmental sustainability challenges unless we know what problems people are trying to solve at local, regional, national and global levels. Doing this to deliver something that no one is asking for would not be a great idea."

Guralnick foresees a long road ahead—even on the data collection side—to building [global biodiversity](#) monitoring systems that coalesce and communicate data in a way that smoothly translates into policy. But he remains optimistic, in part because of the staggering advances in number, size and availability of biodiversity databases, such as iDigBio, in recent decades.

"The number of data resources that have proliferated in the last 30 years is just enormous. It's a sea change," he said.

Data collection and standardization are familiar challenges to natural history museums, which Guralnick sees as key players in the project. Museums are repositories for millions of physical specimens that provide historical baseline data for [species](#) traits and are also at the forefront of capturing some of these [data](#) in new ways through digitization and CT scanning.

"As a museum, we're going to be a part of this discussion around collections and our connections to the broader world for decades," he said. "That's awesome. That's just where we should be."

More information: W. Daniel Kissling et al, Towards global data products of Essential Biodiversity Variables on species traits, *Nature Ecology & Evolution* (2018). [DOI: 10.1038/s41559-018-0667-3](https://doi.org/10.1038/s41559-018-0667-3)

Provided by Florida Museum of Natural History

Citation: Study provides roadmap for measuring animal, plant traits to meet biodiversity goals (2018, September 17) retrieved 25 April 2024 from <https://phys.org/news/2018-09-roadmap-animal-traits-biodiversity-goals.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.