U of I Study Predicts Increase in Global List of Threatened Plant Species

December 03, 2018

MOSCOW, Idaho — Dec. 3, 2018 — More than 15,000 plant species have a high probability of being considered threatened or near-threatened under a new model used to predict conservation status. The model, which shows the predicted levels of risk to plants worldwide, was published as part of a study to help governments and resource managers evaluate where conservation resources are most needed.

Findings from the model, built by a research team from the University of Idaho, University of Maryland, Radford University and The Ohio State University, were published today in the Proceedings of the National Academy of Sciences.

The International Union for Conservation of Nature's (IUCN) Red List of Threatened Species is a powerful tool for researchers and policymakers working to limit species loss across the globe. A new approach developed at U of I and The Ohio State University uses the power of machine learning and open-access data to predict plant species that could be eligible for at-risk status on the IUCN Red List.

Adding even a single species to IUCN's Red List demands hours of expensive, rigorous and highly specialized research. As a result, many known species have not been formally assessed by the IUCN and ranked from least concern to critically endangered; only about 5 percent of all currently known plant species appear on IUCN's Red List in any capacity.

The research team created and trained a machine learning algorithm to assess more than 150,000 species of plants from all corners of the world, making their project among the largest assessments of conservation risk to date. The researchers trained the model using open-access data from the relatively small group of plant species already on the IUCN Red List, and then applied the model to the many thousands of plant species that remain unlisted by IUCN.

"Our method isn't meant to replace formal assessments using IUCN protocols. It's a tool that can help prioritize the process, by calculating the probability that a given species is at risk," said Anahí Espíndola, who worked on the project as a U of I postdoctoral researcher and now is an assistant professor at the University of Maryland. "Ultimately, we hope it will help governments and resource managers decide where to devote their limited resources for conservation. This could be especially useful in regions that are understudied."

The model predicted roughly 10 percent of the total plants assessed by the team have a high probability of qualifying as near-threatened or worse. Maps of the data indicate at-risk species tend to cluster in areas already known for their high native biodiversity, such as the Central American rainforests and southwestern Australia. The model also flagged regions such as California and the Southeastern United States, which are home to a large number of endemic species not naturally occurring anywhere else on Earth.

"Although our primary goal was to help prioritize the process for ranking species, identifying geographic areas with high concentrations of potentially at-risk species was an added bonus," said David Tank, associate professor in U of I's Department of Biological Sciences.

The model also flagged a few surprising areas not typically known for their biodiversity, such as the southern coast of the Arabian Peninsula, as having a high number of at-risk species, according to the study. Some of the most imperiled regions have not received enough attention from researchers, Espíndola said. She hopes the study method can help to fill in some of these knowledge gaps by identifying regions and species in need of further study.

"We're in an era in which large-scale public databases contain massive amounts of information," said Jack Sullivan, a professor in U of I's Department of Biological Sciences. "This paper demonstrates that machine learning approaches can yield important conclusions in biodiversity studies by detecting signals and patterns in big data."

Media note: An image associated with the study's findings is attached to the press release.

Image caption: This map shows the predicted levels of risk to more than 150,000 species of plants located worldwide. Warmer colors denote areas with larger numbers of potentially at-risk species, while cooler colors denote areas with low overall predicted risk.

Image credit: Anahí Espíndola and Tara Pelletier.

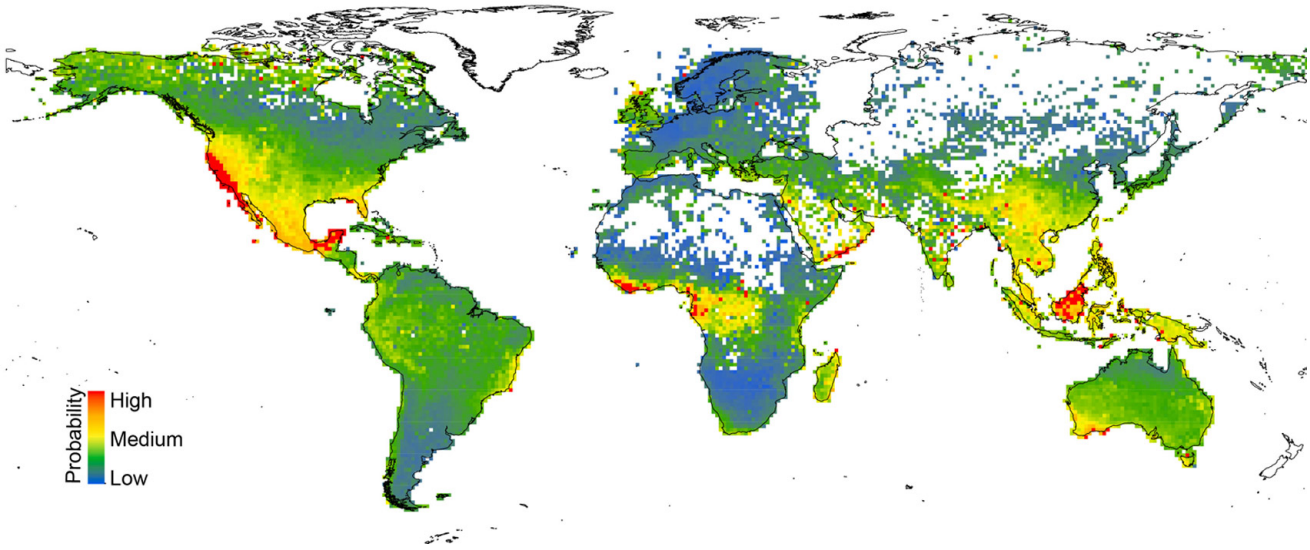
This project was funded under National Science Foundation grant No. DEB-1457726. The total amount of federal funds for the project is $622,609 of which 100 percent is the federal share.

—

Media Contacts
David Tank
Associate Professor
University of Idaho
208-885-7033
dtank@uidaho.edu

Jack Sullivan
Professor
University of Idaho
208-885-9049
jacks@uidaho.edu

Leigh Cooper
Science and Content Writer
University of Idaho
208-885-1048
leighc@uidaho.edu



This map shows the predicted levels of risk to more than 150,000 species of plants located worldwide. Warmer colors denote areas with larger numbers of potentially at-risk species, while cooler colors denote areas with low overall predicted risk.

About the University of Idaho

The University of Idaho, home of the Vandals, is Idaho's land-grant, national research university. From its residential campus in Moscow, U of I serves the state of Idaho through educational centers in Boise, Coeur d'Alene and Idaho Falls, nine research and Extension centers, plus Extension offices in 42 counties. Home to nearly 12,000 students statewide, U of I is a leader in student-centered learning and excels at interdisciplinary research, service to businesses and communities, and in advancing diversity, citizenship and global outreach. U of I competes in the Big Sky and Western Athletic conferences. Learn more at uidaho.edu