Study shows a shortfall in the assessment of plant traits across the Global South

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An international research team has revealed a knowledge gap that threatens our capacity to understand and protect tropical forests and other ecosystems from climate change.

In a paper published in the journal *New Phytologist*, researchers from the University at Buffalo, Western Sydney University (WSU), Aarhus University and UNSW show a lack of measurement of plant traits across the Global South and call for action to integrate regional and global data to fill the gap.

In the paper, they demonstrate how they more than doubled the information available globally about Australian plants by integrating the AusTraits database, an initiative supported by the Australian Research Data Commons (ARDC), with the global TRY database.

"Now we need to do the same for the Global South. We're starting by documenting the largest gaps in plant trait information across the globe and creating open-source resources that will make it easier for every nation to document their biodiversity," says Brian Maitner, a postdoctoral researcher at the University at Buffalo in New York State and first author on the paper.

"Plants are essential to almost all life on Earth, but our knowledge of plants is biased, and we certainly don't know enough about the plants and ecosystems that are found across the Global South. We have vast amounts of information about plants in the Global North, collected over many decades," says Associate Professor Rachael Gallagher of WSU's Hawkesbury Institute for the Environment, an author of the paper.

"This disparity threatens our ability to understand and mitigate the impact of climate change and land-use change on plants, and to design effective strategies for restoration. It's known as the 'Raunkiærian shortfall' in a nod to the Danish researcher who devised one of the first plant trait classifications."

Big data has transformed ecology. The international TRY database contains over 10 million observations on about 131,000 plant species,

covering height, leaf mass, seed mass, flowering time, fire response and more than 2,600 other traits. Analyzing variations in these traits provides the key tools to measure and model changes in forests, grasslands and other ecosystems.

That's allowing researchers to model and predict changes in:

- the Cerrado, a region of savannahs in Brazil
- fire-affected plant communities in Australia
- tropical dry evergreen forest of India
- agricultural systems.

By combining the global TRY database with AusTraits, a regional database focused on Australian plants, the team managed to more than double the completeness of trait data for the continent. This suggests that we can narrow the gap by bringing local and global data together.

"AusTraits has been working to make trait data more interpretable and easier to access," says Dr. Lizzy Wenk, AusTraits' project manager. "One core project has been compiling the most complete trait dictionary to date, allowing users to immediately know which data is captured in a given trait and how it links to identical trait data in other databases. AusTraits also works hard to capture all study metadata and to present the output in an easy-to-use format."

AusTraits was developed in partnership with the ARDC and 19 institutions. Rosie Hicks, CEO of the ARDC, says, "Supported by the Australian Government's National Collaborative Research Infrastructure Strategy, the ARDC invests in curated national data assets and platforms such as AusTraits to accelerate research in Australia and beyond. This paper validates the importance of the ongoing research infrastructure support that we provide for research.

"AusTraits is now an internationally recognized gold-standard database that adheres to the best practice in data standards at a national scale. It is an excellent example of why we are establishing the national-scale Planet Research Data Commons, which will provide a joined-up data infrastructure for earth and environmental research."

More information: Brian Maitner et al, A global assessment of the Raunkiæran shortfall in plants: geographic biases in our knowledge of plant traits, *New Phytologist* (2023). DOI: 10.1111/nph.18999

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