Freshwater plant functions can help predict ecosystem trends affected by climate change

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Freshwater ecosystems and their key component freshwater plants together provide a myriad of key ecosystem services to our society. Yet, global climate change is exerting unprecedented forces on freshwater

plants and their ecosystems.

In a study published in *Trends in Plant Science* on Jan. 9, a joint research team led by Prof. Pan Yingji from the Northeast Institute of Geography and Agroecology (IGA) of the Chinese Academy of Sciences highlighted the transdisciplinary knowledge benchmarks needed to improve our ability to understand and predict the impacts of future changes in freshwater ecosystems from expected concomitant changes in plant functions.

Unlike other terrestrial plants, freshwater plants have developed multiple functional adaptations to life in water. Previous studies suggested that by understanding the trait-trait and trait-environment relationships in freshwater ecosystems, we could better predict the patterns and transient disruptions in freshwater plant distributions, and thereby understand relationships between freshwater plant functions and ecosystem dynamics in inland waters.

The impacts of global change on freshwater ecosystems are various and include, for example, altered flooding/drought regimes, hydrological connections, water nutrient content, temperature and bicarbonate concentration. Different growth forms of freshwater plants present different combinations of functional trait expressions.

Moreover, the available trait data in the largest public repository between different growth forms are largely unbalanced, with an even larger data gap between freshwater plants and their terrestrial counterparts.

These findings call for extensive fieldwork and modeling exercises to reveal freshwater plant functional adaptations to potential changing regimes under global climate change.

In the face of global change, understanding the connections between

freshwater plants and ecosystem functioning will help to predict future scenarios for biodiversity, biogeography and ecosystem services of inland waters.

"We proposed an agenda towards a trait-based understanding of ecosystem functions in response to ongoing global change, and the first step is to focus on those traits that are most important for life in water," said Prof. Pan.

More information: Yingji Pan et al, Global change and plant-ecosystem functioning in freshwaters, *Trends in Plant Science* (2023). DOI: 10.1016/j.tplants.2022.12.013

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