

What can plants reveal about global climate change?

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Recently, climate change, including global warming, has been a "hot" news item as many regions of the world have experienced increasingly intense weather patterns, such as powerful hurricanes and extended floods or droughts. Often the emphasis is on how such extreme weather impacts humans, from daily heat index warnings to regulating CO₂ emissions. While the media continues to present climate change as a controversial issue, many scientists are working hard to gather data, collaborate across disciplines, and use experimental and modeling techniques to track how organisms and ecosystems are responding to the current changes in our Earth's global environment.

A group of organisms that play a wide variety of crucial roles in our global ecosystems is plants. What role do plants play in helping to regulate [climate change](#) and how will they fare in future times? A new series of articles in a Special Issue on Global Biological Change in the [*American Journal of Botany*](#) expands our view on how global changes affect and are affected by plants and offers new ideas to stimulate and advance new collaborative research.

Global change includes topics such as increasing carbon dioxide and its effect on climate, [habitat fragmentation](#) and changes in how protected and agricultural lands are used or managed, increases in alien species invasions, and increased use of resources by humans. There is increasing concern that these changes will have rapid and irreversible impacts on our climate, our resources, our ecosystems, and ultimately on life, as we know it. These concerns stimulated Stephen Weller (University of

California, Irvine), Katharine Suding (University of California, Berkeley), and Ann Sakai (University of California, Irvine) to gather together a diverse series of work from [botanists](#) spanning disciplines from taxonomy and morphology to [ecology and evolution](#), from traditional to multidisciplinary approaches, and from observations and experiments to modeling and reviews, to help synthesize our knowledge and stimulate new approaches to tackling these global [biological change](#) issues.

"We have been concerned about the rapid and irreversible changes associated with a rapidly increasing human population that is already over seven billion people," commented Weller. "Many people are familiar with the impact of rising temperatures and greater intensity of storms on humans, but have less understanding of the effects of these and other global changes on the foundation of our biological ecosystems—plants."

Focusing on a group of organisms such as plants may help provide us with insights into how such crucial organisms have responded to climate changes in the past and how they might respond to future changes. Moreover, since impacts occur from the cellular and molecular basis to the ecosystem and evolutionary scale, this Special Issue provides an excellent opportunity to synthesize the current knowledge of global change effects on a wide spectrum of aspects of plant biology, ecology, and evolution.

"Plant biologists work at different levels of organization with diverse approaches and techniques to address questions about global change," notes Suding. "What is the effect of global change on plants, and how are plants affected by global change? Can we forecast how change at the global scale may lead to biological change? Can we identify systems, processes, and organisms that are most vulnerable to global changes? Can we use this understanding to enhance resilience to global changes?"

In their [introduction](#), the Special Issue editors emphasize that in a complex world there is need to integrate information across spatial and temporal scales as well as across levels of biological organization. The need to collaborate and share information is critical if we are to understand how organisms are likely to respond to such climate changes, and how we can protect and enhance such processes in an attempt to sustain life on this planet.

"In this Special Issue," summarizes Sakai, "We bring together different botanical perspectives with the hope that the integration of these approaches will allow researchers to better answer these and other challenging questions related to global biological change."

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