UC SANTA BARBARA

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Assessing the Impacts of Climate Change

Devoted to an assessment of climate change effects on ecosystems and the consequences for people, the November issue of the Ecological Society of America's journal "Frontiers in Ecology and the Environment" contains papers from a diverse group of more than 50 ecological scientists, including UC Santa Barbara's Joshua Schimel, professor and chair of the Environmental Studies Program.

The special issue tackles five major topics of concern: biodiversity, ecosystem functionality, ecosystem services, the combined effects of climate and other pressures, preparation and management.

"These papers were designed to map out the kinds of changes we expect to see and in what regions they'll mostly likely occur," said Schimel, who is also a professor in UCSB's Department of Ecology, Evolution and Marine Biology. "Mostly, that's the West, but there are certainly areas on the Gulf Coast and in the East where sea level rise and associated problems are going to be a big deal."

The paper Schimel co-authored, "The impacts of climate change on ecosystem structure and function," looks at how climate change affects terrestrial ecosystems. Schimel's working group reviewed seven key impacts on ecosystem structure and function, including the effects of climate change on sea ice, lakes and coastal ecosystems, biome shifts and the consequences of winter warming.

"The problem is that winters don't get cold enough anymore," he explained, "so the insects don't get killed by the frost, and then their populations explode. Summers are a little bit longer so the insects get two growing cycles instead of one, and all of a sudden you have an insect outbreak that wipes out a forest.

"It's a subtle threshold effect," he added. "It's not just that on average it's a degree or two warmer. We've crossed a threshold and now things behave differently. So the goal of this special issue is to illustrate the kinds of the things we should be thinking about for the future."

The collection of reports was designed to demonstrate the interrelationships of human and ecosystem productivity, as well as the interrelationships of species, climate and landscape. The goal of the special issue is to highlight the potential for researchers to collaborate with practitioners in identifying policy-relevant questions — information that practitioners need to make science-based decisions about the management of natural resources.

By properly managing ecosystems, they say, we are also managing their potential to harm or help society. The variability of the natural world demands equal creativity and flexibility in considering a range of complementary solutions to environmental problems, the authors added.

The contributions from Schimel and his fellow authors originated from work they did for a technical input report on biodiversity, ecosystems and ecosystem services for the U.S. National Climate Assessment due to be released in 2014. The authors condensed and illustrated those submissions for the Ecological Society of America's special issue.

As changing climate conditions continue to ripple outward affecting a multitude of other interconnected factors, the authors say dealing with such unpredictable complexities will require the coordinated action of people across all sectors of society, as well as good information from the research community.

Special issue guest editor Nancy Grimm, a professor in the School of Life Sciences at Arizona State University, said: "The impacts that climate change have had and will have on people are interwoven with the impacts on ecosystems. I think that we instinctively know that. In this assessment, we try to draw that connection."

Grimm would like to see more academic researchers designing policy-relevant questions into their research programs, so that research projects may address the data needs of managers while tackling basic science questions.

"People can usually understand the questions scientists are asking even when they can't understand the answers," said Schimel, talking about explaining climate change to the layperson. "You can pose questions in English, but you can only pose answers in science."

About UC Santa Barbara

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