UC SANTA BARBARA

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# Ecologists and environmental scientists identify priorities within synthesis research to address pressing issues

In the face of dramatic and accelerating consequences of climate change, the many, often separate disciplines within ecology and environmental science need to come together to find answers and solutions to address and adapt to the increasingly complex shifts in our environment.

To meet the enormous challenge, more than 100 members of the environmental research community convened to organize and prioritize themes and issues to create a unified front in synthesis research.

“Over the next decade we will be facing huge environmental challenges and need to galvanize global efforts to address them,” said ecologist Ben Halpern(link is external), who led the large group through a virtual workshop at UC Santa Barbara’s National Center for Ecological Analysis & Synthesis(link is external). “We brought together a diverse community of ecologists and environmental scientists — about 120 people — to share ideas and key questions and help boil all that down into a set of priorities to guide the research community in the coming decade. We hope that people can use this work to support their efforts to pursue pressing research needs.”

Their results(link is external) are published in the journal Ecosphere.

The group identified several priority topics: diversity, equity, inclusion and justice; coupled human-natural systems; actionable and use-inspired science; scale; generality, complexity and resilience; and predictability — all issues that become more significant as the opportunities for synthesis science grow with the increasing scope, scale and speed of data collection.

“There was a large emphasis on diversity, equity, inclusion and justice as both a focal point for synthesis research and a change in the process of how synthesis is done,” Halpern said. By lowering the barriers to the diversity of participants, according to the researchers, synthesis scientists would be able to better define and answer research questions that would result in policies that are more relevant and impactful for broader communities.

The other priorities, Halpern noted, “include ones that have been key issues for decades and remain unresolved and high priorities, as well as new topics.” The workshop group, which consisted of members from a wide array of career stages, institutions, backgrounds and geographies, noted issues such as how human values and decisions affect environmental outcomes; how to embrace local, Indigenous and experiential knowledge; and how to approach the complexity that emerges as shifts in one system drives major changes in others.

Meanwhile, synthesis science must also incorporate understanding across spatial and temporal scales, while acquiring sufficient replication and avoiding bias in its search for general principles to explain patterns and processes. Importantly, according to the researchers, in addressing pressing environmental questions, scientists must adopt an approach in which predictions are iteratively tested and updated with continuous feedback, as opposed to reaching for “perfect” forecasts in a world with constantly changing variables.

In the process and practice of synthesis science, the group identified two common threads: expanding participation and increasing the availability of data. Efforts must be made to support representation and integration of diverse scientists and perspectives, and to engage with marginalized communities, they said, while generating, integrating and providing access to high-quality data.

While the rate of climate change is increasing with effects that may seem daunting at times to the researchers who study them, Halpern is encouraged by the willingness of the workshop participants to come forward and share ideas — a model which he hopes becomes a way forward for synthesis research.

“I have never led a paper with so many coauthors, and in a way that prioritized equal voice and participation,” he said. “This work was truly a collaborative effort at a scale I never imagined possible. It was really inspiring to engage so many people, and I learned so much from hearing the feedback and revisions and conversations that ensued during the process of writing and revising this paper.”

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