Big data is synergized by team and open science

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For some time, "big data" has loomed large as a source of challenges and opportunities for science, but as yet, guidance on how to manage the data deluge has been wanting.

Writing in *BioScience*, Kendra Spence Cheruvelil and Patricia A. Soranno, both with Michigan State University, describe a synergistic approach to data-intensive science that hinges on open and collaborative research efforts.

By harnessing the strengths of interdisciplinary collaboration and open science, say the authors, researchers will be better able to use big data to solve global environmental problems.

At the center of the challenge is the fact that ecologists are now faced with the need to answer bigger questions than they have historically, argue Cheruvelil and Soranno—questions that are "connected to the major environmental problems facing society that are fundamentally ecological in nature, that cover broad spatial and temporal scales and that cross disciplines."

The task of answering such questions, though, cannot be left to what the authors describe as the "lone genius" model of science that relies on the isolated findings of individual researchers.

Rather, approaches will be required that allow for "extrapolating findings from one location to another, scaling up knowledge and

processes from local to regional and global extents, or forecasting knowledge from past to current and future states."

This, they say, will require major collaborations among many subfields of scientific enterprise. In addition, solving societally relevant problems will require that researchers step outside of their data comfort zone.

Historically, ecologists have collected data themselves for limited purposes. The authors explain that "using other people's data or contributing their data for purposes outside of the original study design" may produce anxiety for some.

However, the authors argue that the promises of open science, team science, and big data may exceed their constituent challenges: "We believe that deliberately combining these three types of science causes synergy."

Cheruvelil and Soranno argue for an incremental approach to implementation, as they have used in their own research, which involved a 15-person interdisciplinary team working over six years to compile ecological data on 50,000 lakes.

According to the authors, a stepwise approach makes it more likely that such efforts will become standard practice and persist into long-term use, where they "will also advance the culture in ecology to value, teach, and reward these practices and perspectives."

More information: Kendra Spence Cheruvelil et al, Data-Intensive Ecological Research Is Catalyzed by Open Science and Team Science, *BioScience* (2018). DOI: 10.1093/biosci/biy097

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