Scientists identify key knowledge gaps in sustainability research

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The loss of biodiversity continues at an alarming rate despite decades of research and international policies setting out clear goals in the area. In an article published this week in *Nature Sustainability*, an international team of scientists including researchers from McGill identified seven key areas for future research in order to tackle, effectively, the root causes of the problem. They reached their conclusions by looking at all

major regional and thematic reports from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (or IPBES). IPBES is a leading international organization and scientific body whose goal is to improve the interface between science and policy on issues of biodiversity and ecosystem service.

In order pinpoint the knowledge gaps that needed to be addressed, the researchers looked at the frequency with which gaps in our knowledge were reported in the IPBES publications from around the globe between 2012-2019. They compared these findings with research gaps identified in the 2005 Millennium Ecosystem Assessment. Their goal was to investigate whether the research gaps would get in the way of meeting key international sustainability goals set out by the United Nations.

"We've made great strides forward in global assessments. But the most urgent research gap hasn't changed since 2005: we need effective strategies to meet our sustainability goals," says Elena Bennett, Associate Professor at the McGill School of Environment and one of the co-authors of the study. "Additionally, in this latest assessment, the role of indigenous and local knowledge to sustain nature's benefits to people has emerged as a key knowledge gap. Now we need to get those with deep expertise in social change and governance to the table, including local actors and decision makers."

Seven key areas for further research

The seven areas in which the study found that there was a need for further research were:

- How can the knowledge of indigenous and local communities be better integrated into research in order to develop innovative strategies for adapting and mitigating environmental change?
- How do consumption patterns create pressures on nature? A

better understanding of the feedbacks between social and ecological systems is needed in order to design and implement effective plans for sustainable production and consumption;
- What indicators can be used to measure how effective alternate governance systems are in promoting the desired socio-ecological changes through decisions and policies that set in place, for example, incentives to enhance biodiversity?
- How do interests and influence of diverse stakeholders affect the distribution of the benefits of nature amongst members of society? The identification of governance systems and institutional arrangements that foster equity in the distribution of nature's benefits to people was considered a key area of research to promote human health;
- What are the synergies and/or trade-offs between biodiversity and the benefits that humans gain from nature? For example, food production is clearly important for human survival, yet it often has important costs or trade-offs with other benefits that people derive from more natural landscapes, like recreation or carbon storage;
- How can national accounting and development planning systems take into account the multiple benefits that nature confers on humans, beyond simply the economic benefits?
- How can we better monitor long-term trends in key ecological and social processes to prevent the biodiversity loss and halt the land degradation associated with climate change?

A need to identify effective management and policy strategies

"We found that global sustainability goals cannot be achieved without improved knowledge on feedbacks between social and ecological systems, and on effective governance systems and institutions that can

equitably deliver ecosystem services and protect vulnerable people," says Matias Mastrangelo, researcher at the National University of Mar del Plata in Argentina, who led the study. "We need to identify management and policy strategies for ecosystems and biodiversity that are effective, just, inclusive, and promote good quality of life."

Along these lines, the IPBES assessments reflect a growing consensus for the need for new ways to value both human well-being and biodiversity protection. Coauthor Kimberly Nicholas, Associate Professor of Sustainability Science at Lund University in Sweden, notes the new assessments mark an emerging paradigm shift: "The emphasis we found on the importance of human values and institutions puts people at the heart of nature protection. To support decisions that ensure both people and nature can thrive, we need new ways to value human and natural well-being, beyond defining a good life based just on gross domestic product."

More information: Key knowledge gaps to achieve global sustainability goals, *Nature Sustainability* (2019). DOI: 10.1038/s41893-019-0412-1 , nature.com/articles/s41893-019-0412-1

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