Citizen science empowers people to address global challenges

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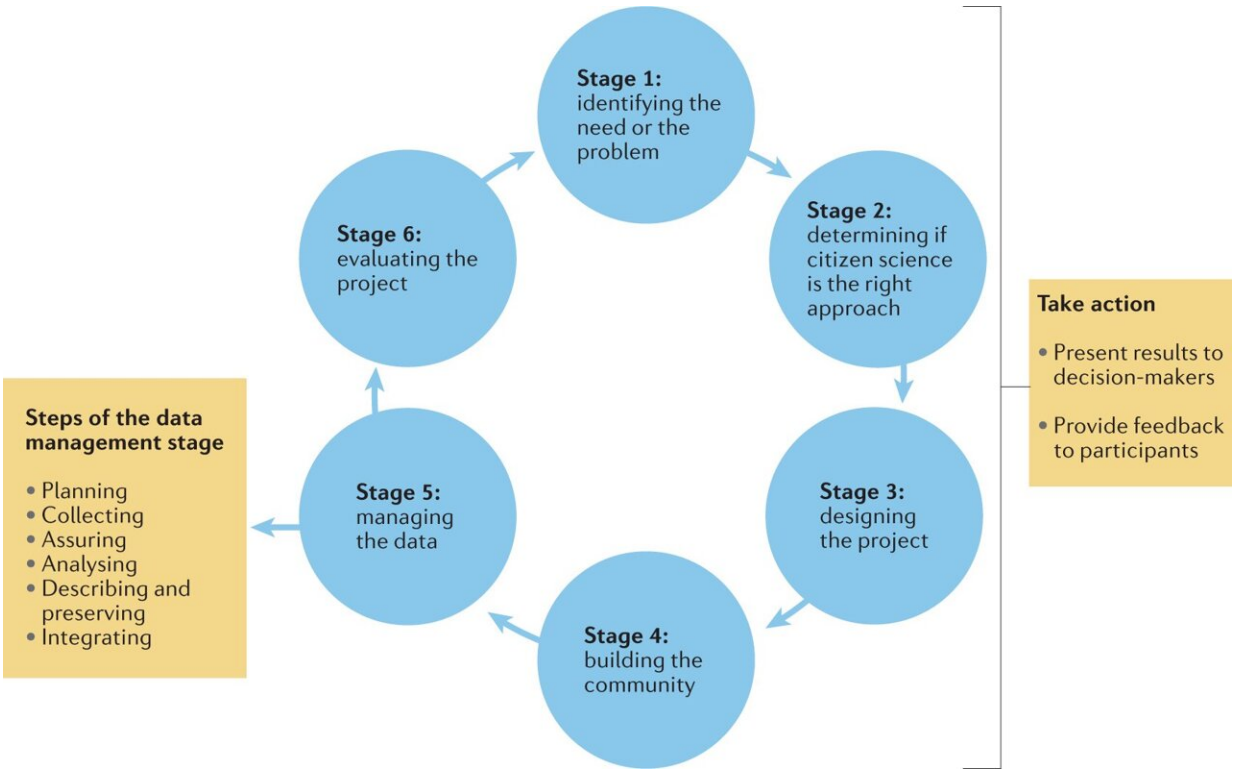

Stages of designing and implementing a citizen science project in ecology and environmental sciences. Six iterative stages of designing and implementing a citizen science project from identifying the need or the problem to evaluating the project, focusing on the fields of environmental sciences and ecology. Project teams should be action-oriented while designing and implementing citizen science initiatives. Credit: *Nature Reviews Methods Primers* (2022). DOI: 10.1038/s43586-022-00144-4

Citizen science is increasingly recognized as an important vehicle for democratizing science and promoting the goal of universal and equitable access to scientific data and information. IIASA researchers actively contribute to the development of this scientific approach and have recently published a primer aimed at both established and aspiring practitioners of citizen science to highlight key issues and how to address them.

Citizen science has a long history and interested volunteers have participated in scientific inquiry for centuries, leading to some of the most extensive datasets and sources of information on among others, public health, pollution monitoring, and ecology and biodiversity tracking. Today, it offers unique opportunities to join science and research across the globe, empowering people to participate in the scientific process, to gather and share data and information, and to be equipped to contribute to collective action to address important challenges that we face locally and globally today.

IIASA is well known for developing innovative research methods to address global problems and citizen science is no exception. A new IIASA-led article just published in *Nature Methods Reviews Primers*, highlights how citizens can contribute meaningfully to scientific research , thereby becoming an integral part of integrated and evidence-based knowledge creation needed to address some of today's most pressing challenges, including environmental pollution, food security, biodiversity loss, or the climate crisis. The authors also call attention to the impacts and great potential of citizen science for monitoring progress on ambitious global efforts like the UN Sustainable Development Goals (SDGs), large-scale data collection, and as a viable means to close data gaps and support inclusive decision-making.

"*Nature Methods Reviews Primers* articles are high-quality, introductory review articles describing the current state-of-the-art for applying a

specific scientific method. Being invited to write a primer on citizen science is important in two main ways. First, it underlines that the field is earning recognition within the scientific establishment as a valid and valuable approach. Second, it offers the opportunity to showcase the breadth and depth of citizen science possibilities to a wide range of scientists and researchers who are not yet familiar with it," explains co-lead author Gerid Hager, a researcher in the Novel Data Ecosystems for Sustainability Research Group of the IIASA Advancing Systems Analysis Program.

One of the big advantages of citizen science is the fact that it promotes open data practices. In this way, the approach contributes to science innovation by opening science up to society and advancing collaborations between various actors, including citizens, which helps to make science more participatory and inclusive.

"When designed optimally, beyond addressing the data gaps to create effective policies and achieve sustainable development, citizen science can help establish more inclusive data ecosystems that empower individuals and communities, especially those that are hard-to-reach and marginalized," notes co-lead author Dilek Fraisl, a researcher in the same group at IIASA.

In conclusion, the authors point out that the fields of application for citizen science methods and approaches continue to broaden in terms of subject matter and deepen in terms of the advancement of methodologies as more examples of citizen science research enter the mainstream scientific literature. The principles described in their primer have been successfully applied to a wide range of research domains, particularly in biodiversity research, earth observation and geography, climate change research, or environmental monitoring, which in turn contribute further to the development of both best practice and novel approaches within the ecological and environmental sciences.

More information: Dilek Fraisl et al, Citizen science in environmental and ecological sciences, *Nature Reviews Methods Primers* (2022). DOI: 10.1038/s43586-022-00144-4

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