Climate change science aided by huge but 'invisible' efforts of amateurs

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Hundreds of thousands of volunteer data collectors are due for some thanks from scientists, according to a new paper that reveals the role of citizen science in studies of birds and climate change. Data collected by amateurs underpins up to 77 percent of the studies in this field, but that fact is largely invisible by the time the research appears in journals, according to a study published today in the open-access journal *PLOS ONE*.

"Our paper is a chance to say thank you to the many people who are citizen scientists," said lead author Caren Cooper, a research associate at the Cornell Lab of Ornithology. "These people are part of the process of creating new knowledge—and whether it's counting birds or butterflies, gazelles or galaxies, they should know that their observations really make a difference in professional science."

Birds make excellent subjects for citizen-science projects—the term for studies that depend on members of the public for data gathering. That's in part because the great popularity of bird watching offers a ready pool of skilled observers. Some well-known North American projects are the Christmas Bird Count, eBird, and the Great Backyard Bird Count, as well as activities such as bird-banding stations and breeding bird atlases. But citizen science is not limited to birds—hundreds of other projects cover bugs, trees, flowers, mammals, and microbes, as well as topics like water quality, air pollution, and astronomy.

Citizen science provides scientists with continent- or globe-spanning

observations, often over periods so long that they outlast the careers of individual researchers. (The Christmas Bird Count has been running continuously since 1900.) For many types of data, there's simply no other way to collect it at such a scale than with volunteers.

So how well does that dependence on volunteers come through in scientific papers? As a springboard for their study, Cooper and her colleagues analyzed the bibliography of a recent review on the effects of climate change on migratory birds. For each of the 173 primary studies cited in the review, Cooper and her colleagues tracked down the sources of data used.

Neither the review itself nor any of the cited papers used the term "citizen science"—a term coined in 1995—and only 37 papers used the word "volunteer." Yet between 24 percent and 77 percent of the papers supporting each claim drew primarily on volunteer data. Citizen science proved especially important for documenting the patterns and consequences of climate change, such as population declines and changes in migration timing.

Cooper says that it's not as if scientists are downplaying the role of citizen science—in some cases, scientists use large data repositories and may be unaware that citizen science was involved. In the majority of cases, scientists simply don't use a standardized term to refer to citizen science. The result is that the product of all that volunteer effort is invisible in the literature, despite having played an integral part in analyses.

"I'd like to see this information coming full circle. In the world today we tend to have notions about expertise, and that only professionals have it," Cooper said, noting that this idea can keep people from feeling they have anything to contribute to the scientific process. "But people who have been doing a hobby for years have tons of expertise, and they can make a

very real contribution."

"It would be so cool for people to start to identify with the term citizen science, instead of thinking 'I'm a bird watcher,' or 'I measure water quality,'" Cooper said. "People might realize they have a lot of kindred spirits out there."

More information: *PLOS ONE*, www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0106508

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