The problem with delineating narrow criteria for citizen science

Jeremy Auerbach[a,1], Erika L. Barthelmess[b], Darlene Cavalier[c], Caren B. Cooper[d], Heather Fenyk[e], Mordechai Haklay[f], Joseph M. Hulbert[g], Christopher C. M. Kyba[h,i], Lincoln R. Larson[j], Eva Lewandowski[k], and Lea Shanley[l]

Heigl et al. (1) propose an international definition of citizen science based on quality criteria for projects. As an international group of scholars with extensive background in the theory and practice of citizen science, we find the Opinion by Heigl et al. (1) antithetical to the creativity, innovation, and bottom-up pathways to knowledge generation that are embodied by citizen science. The minimum quality standards Heigl et al. (1) propose do not represent the interdisciplinary consensus of the international citizen science community*, and we fear that such a definition would confine rather than define the field.

Many citizen science professionals, including some of the authors of this letter, have attempted to define citizen science in the past, only to discover later that their definition does not fully encompass the field (2). We also strongly believe that it is both unproductive and fraught to narrowly define citizen science based on a set of quality criteria for individual projects. In addition, we note that, practically speaking, a classification system for citizen science projects based on quality criteria is not equivalent to a definition.

Such an approach also excludes several types of citizen science. For example, Heigl et al. (1) restrict their concept of citizen science to include only projects in which groups of citizens gather data for a predefined scientific purpose, generally reflecting contributory-style projects that represent only one component of the larger citizen science landscape. As a result, many long-standing examples of citizen science are not included in their definition, such as amateur astronomers who independently make systematic observations of our universe (3).

Heigl et al. (1) propose criteria that they claim will "help the field flourish, and . . . encourage policymakers to take [citizen science] project data and results seriously." While defining criteria for inclusion is entirely reasonable for many purposes (e.g., project funding), those criteria will depend strongly on the situation. For example, some existing agencies have already developed definitions that meet their needs (4), and as with other scientific data citizen science data, should of course be evaluated as to its fitness for purpose. It is important to recognize, however, that citizen science also extends well beyond development and testing of research hypotheses, including activities such as environmental monitoring, producing training data for supervised machine learning, data visualization and interpretation, and complex problem solving.

We argue that Heigl et al.'s (1) specified minimum quality criteria should not be used as "the basis for an international declaration" because any exclusionary approach will necessarily fail to address the "challenge of accommodating considerable heterogeneity" within the field of citizen science. Instead of focusing on specific criteria, we advocate for collaboration among all engaged actors to emphasize informed consent about project design features and transparency in data collection and handling practices (to indicate data quality and fitness for purpose). We encourage the citizen science community and associated collaborators (such as funding agencies) to determine the best design specifications for their own unique contexts, enabling citizen science to achieve its full potential.

[a]Department of Environmental and Radiological Health Sciences, Colorado State University, Fort Collins, CO 80523; [b]Biology Department, St. Lawrence University, Canton, NY 13617; [c]School for the Future of Innovation, Arizona State University, Tempe, AZ 85287; [d]Department of Forestry and Environmental Resources, North Carolina State University, Raleigh, NC 27695; [e]Lower Raritan Watershed Partnership, New Brunswick, NJ 08901; [f]Department of Civil, Environmental and Geomatic Engineering, University College London, London WC1E 6BT, United Kingdom; [g]Forestry and Agricultural Biotechnology Institute, University of Pretoria, Pretoria 0002, South Africa; [h]Remote Sensing and Geoinformatics, Deutsches GeoForschungsZentrum Potsdam, 14473 Potsdam, Germany; [i]Ecohydrology Department, Leibniz-Institute of Freshwater Ecology and Inland Fisheries, 12587 Berlin, Germany; [j]Department of Parks, Recreation and Tourism Management, North Carolina State University, Raleigh, NC 27695; [k]Wisconsin Department of Natural Resources, Madison, WI 53707; and [l]Nelson Institute for Environmental Studies, University of Wisconsin–Madison, Madison, WI 53706

Author contributions: J.A., E.L.B., D.C., C.B.C., H.F., M.H., J.M.H., C.C.M.K., L.R.L., E.L., and L.S. wrote the paper.

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[1]To whom correspondence may be addressed. Email: jeremy.auerbach@colostate.edu.

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