

Why we need new data sources for the SDGs: Building a case for citizen science data



Jillian Campbell
Chief Statistician
UNEP



The fundamental challenge of our time

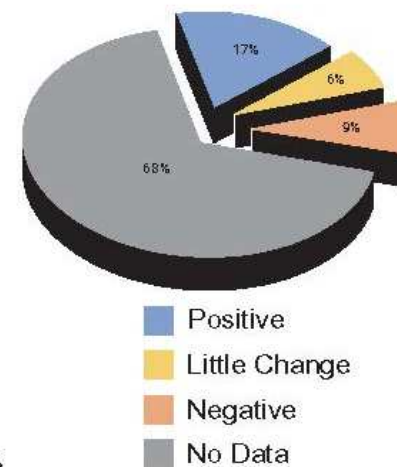
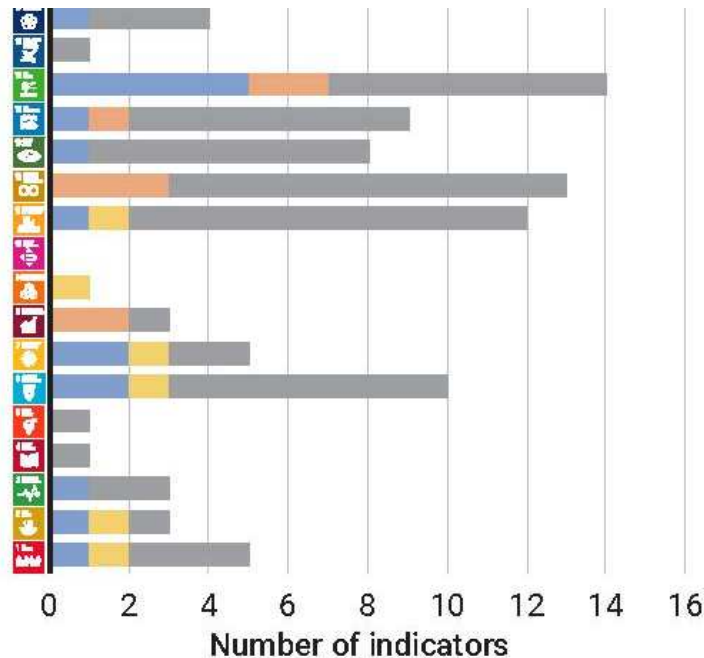


How can we provide food, water, energy for 9,4 billion people while at the same time protecting our planet's biodiversity and ecosystems?

© Yann Arthus-Bertrand

Data underpin good decisions

Measuring Progress Towards achieving the environmental dimension of the SDGs' found that 68% of environment-related SDG indicators do not have enough data to assess progress.



Environment-related indicators in the SDGs

CITIZEN SCIENCE

ENGAGEMENT OF VOLUNTEERS IN SCIENCE AND RESEARCH

BENEFITS

- Collection of data at lower cost.
- Increased scientific literacy
- Citizen engagement
- Cost-effective measure
- Improved environmental monitoring
- Exposure to scientific expertise and indigenous knowledge

CITIZEN SCIENCE INITIATIVES

- Collaborative knowledge (e.g. Wikipedia, OpenStreetMap)
- Volunteer computing (e.g. Citizen Grid, climateprediction.net)
- Pattern classification (e.g. Galaxy Zoo, eyewire)
- Community collection of observations (e.g. bird counting, air sensor toolbox)

FIELD DATA AND REPORT GENERATION

- Top-down - Scientists train volunteers
- Bottom-up - Community-driven research

TARGETED RESPONSE

- Technology revolution has introduced multiple ways of **collecting, archiving, analyzing, transmitting, and processing huge volumes of data.**
- Citizen science can be used to **sensitize and engage the community** on issues related to their natural environment



Citizen Science and SDGs

Dilek Fraisl, Research Scholar

Email: fraisl@iiasa.ac.at

Twitter: [@dilekfraisl1](https://twitter.com/dilekfraisl1)

Web: weobserve.eu/cops



International Institute for
Applied Systems Analysis





Citizen Science

Public Participation

- *Five models on degree of participation* (Shirk et al. 2012): From projects, where citizens primarily contribute data to initiatives citizens design the research with scientists.

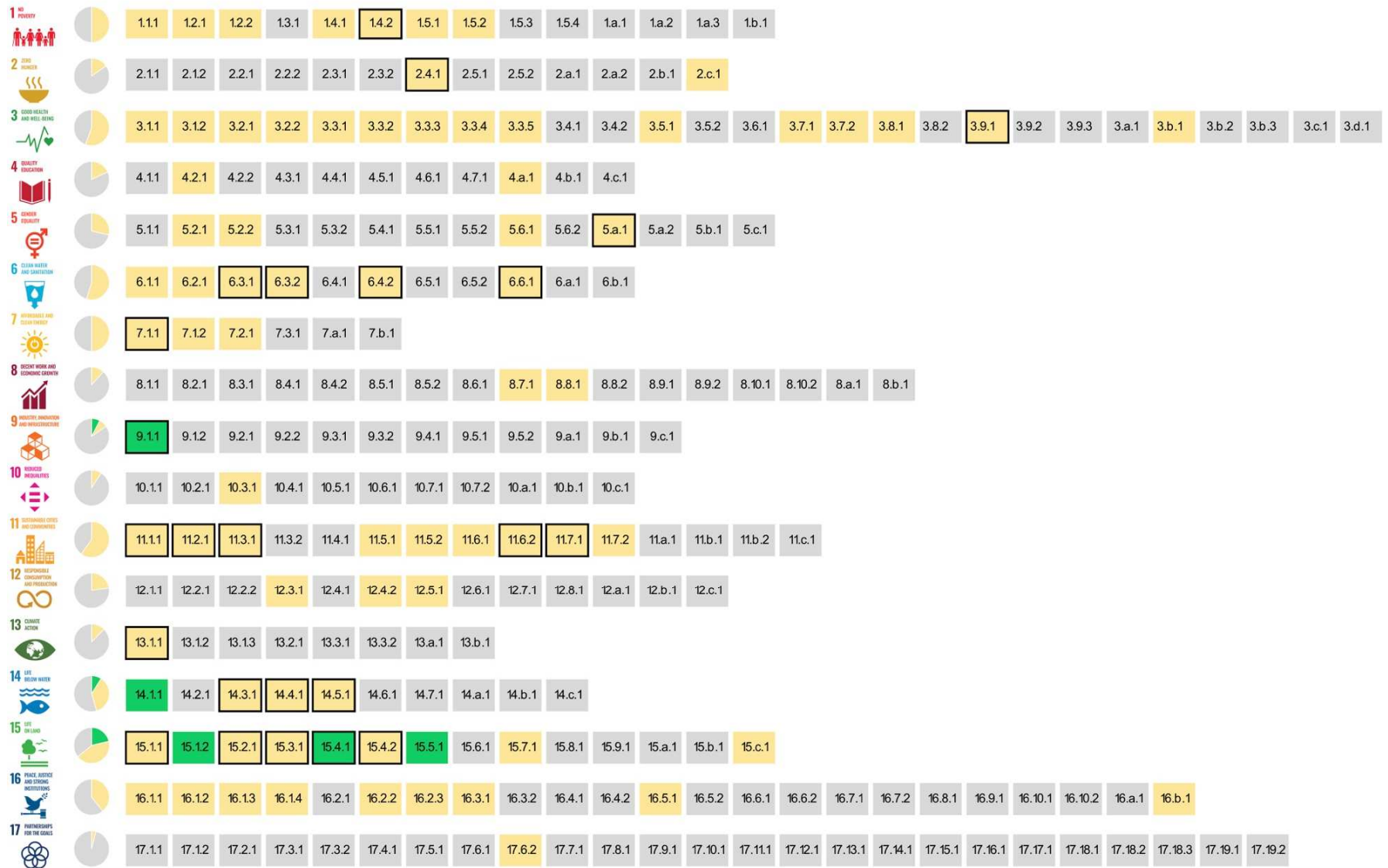
Voluntary contribution

- Contributions on voluntary basis; no professional background or disposable income. Active contribution with the purpose of involvement in a citizen science activity.

Knowledge production

- Production of scientific knowledge and clear research outcomes that include monitoring & observation.

Results



The SDG indicators where citizen science projects are ‘already contributing’ (in green), ‘could contribute’ (in yellow) or where there is ‘no alignment’ (in grey). The overall citizen science contributions to each SDG are summarized as pie charts. Black borders around indicators show the overlap between citizen science and EO, as identified by GEO (2017)

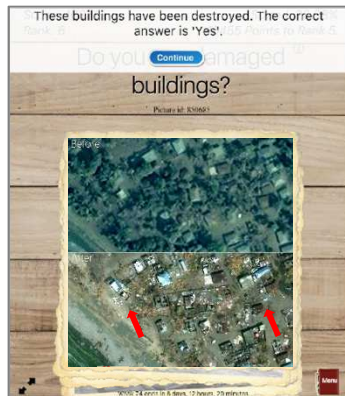
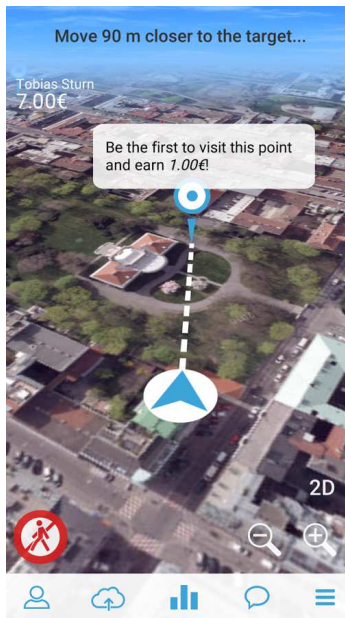
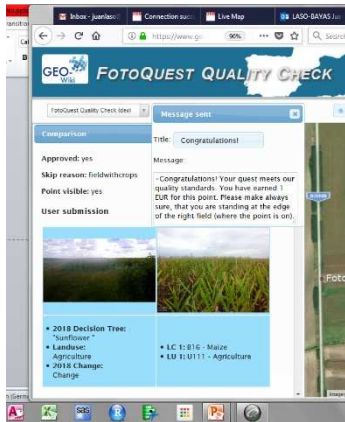
Mapping Info Sheet ☆

File Edit View Insert Format Data Tools Add-ons Help All changes saved in Drive

100% \$ % .00 .123 Times New... 11 B I S A

Global Forest Watch, LACO-Wiki; Picture Pile: Deforestation, FotoQuestGo

H	J	K	L	M	N
s, combat desertification, and halt and reverse land degradation and halt biodiversity loss					
Tier I		Global Forest Watch, LACO-Wiki; Picture Pile: Deforestation, FotoQuestGo		https://www.globalforestwatch.org/ https://laco-wiki.net/en/Welcome https://geo-wiki.org/games/picturepile/ http://fotoquest-go.org/en/	High quality remote sensing imagery of areas with forest cover is widely available, and citizen science approaches, such as participatory crowdsourcing, volunteered geographic information and more are used for identifying and categorising the nature of forest cover, and forest cover data are a large number of existing citizen science initiatives that focus on this topic.
Tier I	eBird, Bird Track, Seabirds, PanEuropean Common Bird Monitoring Scheme, International Water Bird Census, IBA Canada Regional Caretaker Networks, Maritime Breeding Bird Atlas, North American Breeding Bird Survey, INaturalist, Natura Alert, and many more bird monitoring & biodiversity projects...			Call recording with Stuart Butchart - Birdlife International https://www.cepf.net/sites/default/files/iba-statusreport2015.pdf https://ebird.org/news/birdlife-americas https://www.birdlife.org/sites/default/files/attachments/iba-monitoring-factsheet-birdlife-international.pdf https://www.birdlife.org/sites/default/files/attachments/iba-monitoring-factsheet-birdlife-international.pdf	Citizen science is already informing this indicator on protected areas, Important Bird and Biodiversity Areas (IBAs) and Key Biodiversity Areas (KBAs) schemes (Fritz et al, 2019; SDSN TReNDS, 2019). 44% of each of the terrestrial KBA is covered by existing protected area boundaries (Fritz et al, 2019). The largest subset of KBAs is identified using data on bird monitoring. Hence, all the projects mentioned here (eBird, Bird Track, PanEuropean Bird Monitoring Scheme, International Waterbird Census, etc.), at the fields of bird monitoring and biodiversity, are already contributing to the monitoring of this indicator.
Tier I		Relasphone, Amazon Aerobotany, Moabi DRC, Logging Roads, FotoQuest Go, Forest Eyes, Forest Watchers, Picture Pile		https://www.mdpi.com/2072-4292/8/10/869 http://info.perunature.com/aerobotany http://rdc.moabi.org/en/ https://blog.globalforestwatch.org/people/tracing-the-paths-to-forest-destruction-new-crowdsourcing-initiative-tackles-logging-roads-in-the-congo-basin http://fotoquest-go.org/en/ https://blog.iiasa.ac.at/2016/05/17/picture-pile-gaming-for-science/ https://geo-wiki.org/games/picturepile/	The citizen science initiatives mentioned in the column to the left are direct inputs to some of this multi-part indicator. One of the sub-indicators is on both the direction of change (whether there is a loss or gain in forest area) and how this rate is changing over time; the latter is important in order to track progress among countries that are losing forest area, but have managed to maintain their rate of annual forest area loss.



Examples Tools

1.5.2 Direct economic loss attributed to disasters in relation to global gross domestic product (Picture Pile)

15.1.1 Forest area as a proportion of total land area (Global Forest Watch, Picture Pile, FotoQuest Go, etc.)

6.3.2 Proportion of bodies of water with good ambient water quality (Fresh Water Watch)

15.1.2 Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type

Way Forward

Building awareness and sharing experiences on the use of citizen science for the SDGs;

Developing case studies or success stories where citizen science data have been used in innovative ways by NSOs;


Identifying criteria for ensuring data quality or data quality assurance procedures;

Integrating citizen science into the methodologies of SDG indicators;

Promoting consistent data collection across citizen science initiatives through aligning definitions with global definitions; and

Supporting open citizen science data that are formatted using standards.

Citizen science and the United Nations Sustainable Development Goals

Steffen Fritz , Linda See, Tyler Carlson, Mordechai (Muki) Haklay, Jessie L. Oliver, Dilek Fraisl, Rosy Mondardini, Martin Brocklehurst, Lea A. Shanley, Sven Schade, Uta Wehn, Tommaso Abrate, Janet Anstee, Stephan Arnold, Matthew Billot, Jillian Campbell, Jessica Espey, Margaret Gold, Gerid Hager, Shan He, Libby Hepburn, Angel Hsu, Deborah Long, Joan Masó, Ian McCallum, Maina Muniafu, Inian Moorthy, Michael Obersteiner, Alison J. Parker, Maike Weissplug & Sarah West - Show fewer authors

Nature Sustainability **2**, 922–930 (2019) | [Download Citation](#) ↓

3542 Accesses | **1** Citations | **261** Altmetric | [Metrics](#) >>

Abstract

Traditional data sources are not sufficient for measuring the United Nations Sustainable Development Goals. New and non-traditional sources of data are required. Citizen science is an emerging example of a non-traditional data source that is already making a contribution. In this Perspective, we present a roadmap that outlines how citizen science can be integrated into the formal Sustainable Development Goals reporting mechanisms. Success will require leadership from the United Nations, innovation from National Statistical Offices and focus from the citizen-science community to identify the indicators for which citizen science can make a real contribution.



Thank you!

Jillian Campbell, UN Environment

Email: campbell7@un.org

Twitter: [@JillStats](https://twitter.com/JillStats)

Web: www.unenvironment.org

Dilek Fraisl, International Institute for Applied Systems Analysis (IIASA)

Email: fraisl@iiasa.ac.at

Twitter: [@dilekfraisl1](https://twitter.com/dilekfraisl1)

Web: www.iiasa.ac.at

Authors: Dilek Fraisl, Jillian Campbell, Linda See, Uta Wehn, Jessica Wardlaw, Margaret Gold, Inian Moorthy, Rosa Arias, Jaume Piera, Jessie L. Oliver, Joan Masó, Marianne Penker, Steffen Fritz