The Potential Role of Citizen Science for Addressing Global Challenges and Achieving the UN Sustainable Development Goals
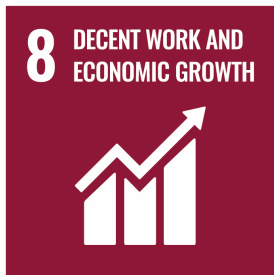
Dilek Fraisl, Jillian Campbell, Linda See, Uta Wehn, Jessica Wardlaw, Margaret Gold, Inian Moorthy, Rosa Arias, Jaume Piera, Jessica L. Oliver, Joan Maso, Marianne Penker, and Steffen Fritz

fraisl@iiasa.ac.at
@dilekfraisl1
https://www.geo-wiki.org/

https://sustainabledevelopment.un.org/sdgs

Main Issues around Data

Traditional sources of data have some issues such as the high costs, infrequent data collection cycles, lack of spatial variations across a country, openness, accuracy, etc.

68% of the 93 environmental SDG indicators lack data

We need data not only to measure progress to date, but also to make timely decisions to improve people's wellbeing today and tomorrow

LITTER SURVEY #01 • 25 October 2018 • Waikanae Beach, Gisborne, New Zealand • www.sustainablecoastlines.org/litterproject

As a new data source, citizen science has a role to play!
WeObserve SDGs and Citizen Science Community of Practice (SDGs CoP)!
Register the SDGs CoP here: https://www.weobserve.eu/weobserve-cop4-sdgs/

SDGs CoP Objectives

- Understand the opportunities and challenges for the use of data from citizen science/citizen observatories for SDG monitoring; and

- Advance our knowledge of how citizen science and citizen observatories can help behaviour change towards achieving the SDGs.

Mapping citizen science contributions to the UN Sustainable Development Goals

Sustainability Science (in review)

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.
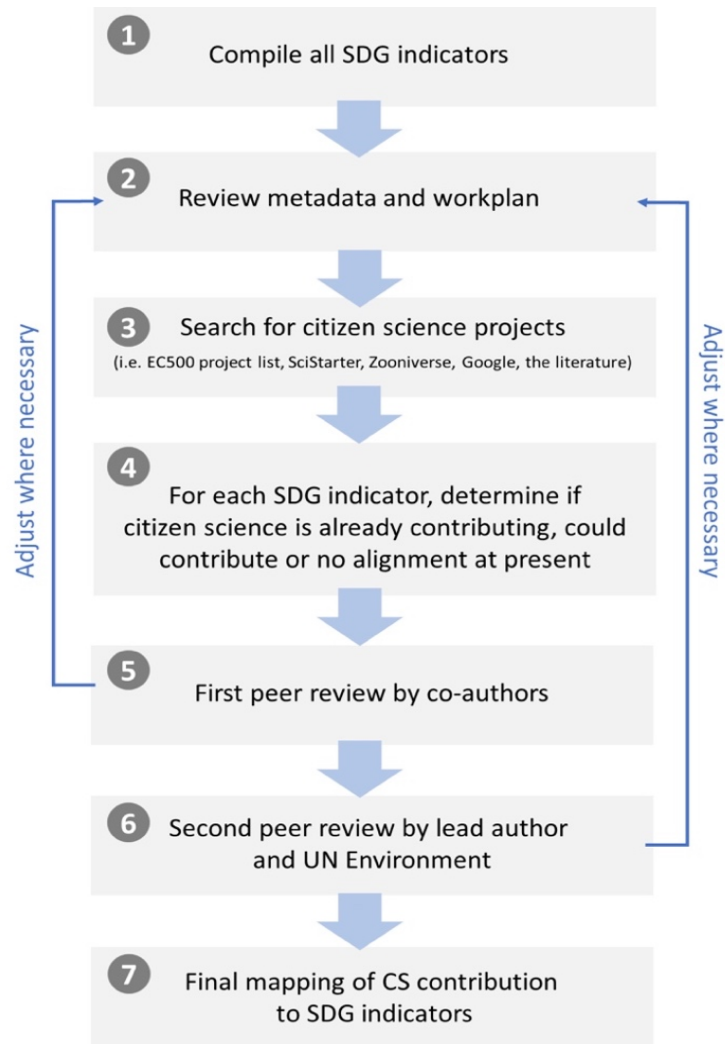
Voluntary contribution

- 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.

Methodology (in review)

1. Compile all SDG indicators
2. Review metadata and workplan
3. Search for citizen science projects (i.e. EC500 project list, SciStarter, Zooniverse, Google, the literature)
4. For each SDG indicator, determine if citizen science is already contributing, could contribute or no alignment at present
5. First peer review by co-authors
6. Second peer review by lead author and UN Environment
7. Final mapping of CS contribution to SDG indicators

Adjust where necessary

Adjust where necessary

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

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

s, combat desertification, and halt and reverse land degradation and halt biodiversity loss

H	J	K	L	M	N
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 participa crowdsourcing, volunteerd geographic information and more are v identifing and categorising the nature of forest cover, and forest co are a large number of existing citizen science initiatives that focus 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-statusreport201 5.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 are Important Bird and Biodiversity Areas (IBAs) and Key Biodiversi schemes (Fritz et al, 2019; SDSN TReNDS, 2019). 44% of each fi of each terrestrial KBA is covered by existing protected area boun 2019). The largest subset of KBAs is identified using data on birds Hence, all the projects mentioned here (eBird, Bird Track, PanEur Bird Monitoring Scheme, International Waterbird Census, etc.), ar the fields of bird monitoring and biodiversity, are already contribu 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 direct inputs to some of this multi-part indicator. One of the sub-in on both the direction of change (whether there is a loss or gain in how this rate is changing over time; the latter is important in order progress among countries that are losing forest area, but have man their rate of annual forest area loss.
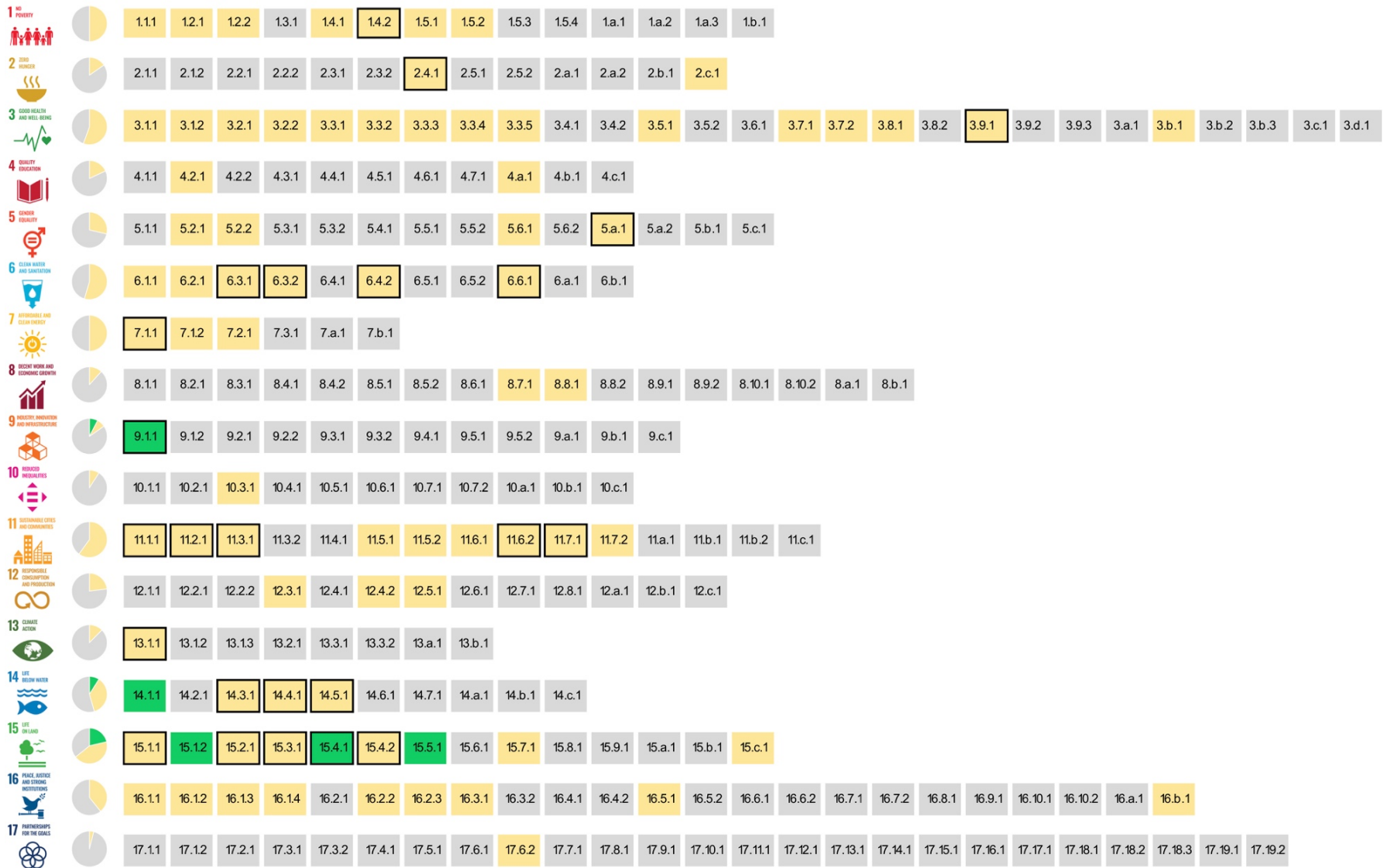
The SDG indicators where citizen science projects are 'already contributing' (in green), 'could contribute' (in yellow) or where there is 'no alignment' (in grey). The overall citizen science contributions to each SDG are summarized as pie charts. Black borders around indicators show the overlap between citizen science and EO, as identified by GEO (2017)

Examples of Citizen Science Projects that are "already contributing" to SDG Monitoring
(in review)

———————————

14.1.1 Index of coastal eutrophication and floating plastic debris density

- UN Environment, the custodian agency for this indicator, has recently developed a methodology that uses citizen science data as a primary source of information for measuring marine plastics on beaches and shorelines:

- https://unstats.un.org/sdgs/metadata/files/Metadata-14-01-01.pdf

- Litter Intelligence is a large-scale citizen science program led by Sustainable Coastlines. The initiative collaborating with the Ministry for the Environment, Stats New Zealand and the Department of Conservation since the design phase of the program in 2016. The results are included in the official environmental report 'Marine 2019' produced by the Ministry for the Environment and Stats New Zealand (Counting on the World to Act, SDSN TReNDS).

9.1.1 Proportion of the rural population who live within 2 km of an all-season road

- [This indicator](#) is about the Rural Access Index (RAI) and it measures the share of a country's rural population that lives within 2 km of an all-season road (defined as a road that is motorable in all weather conditions).

- [OpenStreetMap](#) is an online crowdsourced community-driven project to create an open, editable, and free map of the world.

- Metadata for indicator 9.1.1 refers to OpenStreetMap as an alternative source of data for countries that do not have sufficient road location information available or it is completely missing.

- In addition, measuring the RAI using OpenStreetMap in 120+ countries is a work in progress at the World Bank. Hence, citizen science is already contributing to this indicator.
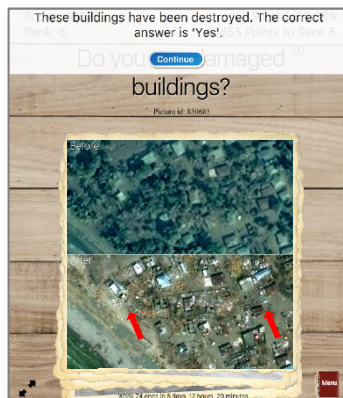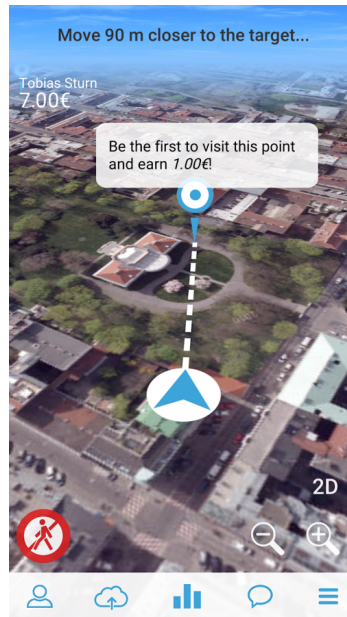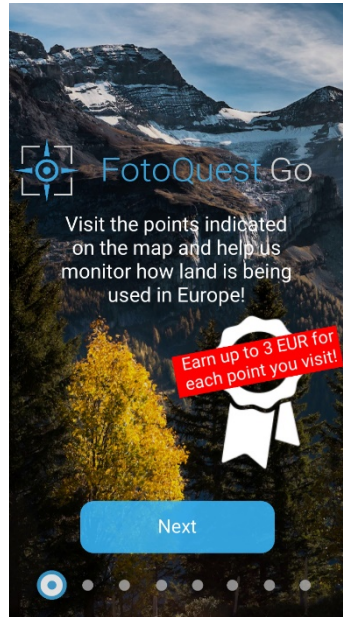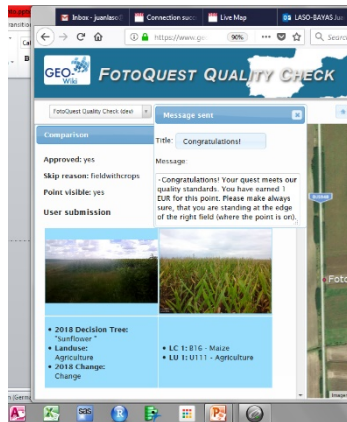
Other Examples & Tools

1.5.2 Direct economic loss attributed to disasters in relation to global gross domestic product → **15.1.1 Forest area as a proportion of total land area**

6.3.2 Proportion of bodies of water with good ambient water quality → **3.3.3 Malaria incidence per 1000 population**

Some indicators could be more amenable to citizen science than others. This include:

- Environmental SDG indicators (https://wedocs.unep.org/bitstream/handle/20.500.11822/27627/MeaProg2019.pdf?sequence=1&isAllowed=y);

- Indicators that could benefit from observations such as bird and biodiversity monitoring (15.1.2, 15.4.1) or monitoring of land use and land cover changes (15.1.1, 15.2.1);

- Indicators that could be supported by spatial data, e.g., monitoring of water quality (6.3.2) or air quality (3.9.1), disease threats (3.3.3), post disaster damage assessment (1.5.2) or open spaces in cities (11.7.1);

- Indicators that could be supplemented through self-reporting such as sexual violence (16.1.3) or perception of safety (16.1.4);

- More generically, indicators measuring issues that raise a concern among citizens and communities are more amenable to citizen science. The reason for this may be these issues affect or could affect their health, environment and quality of life.

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

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.

https://www.**nature**.com/articles/s41893-019-0390-3

Thank you!

- **Dilek Fraisl**, Jillian Campbell, Linda See, Uta Wehn, Jessica Wardlaw, Margaret Gold, Inian Moorthy, Rosa Arias, Jaume Piera, Jessica L. Oliver, Joan Maso, Marianne Penker, and Steffen Fritz

Dilek Fraisl
International Institute for Applied Systems Analysis (IIASA)
on behalf of the **WeObserve SDGs CoP**

Email: fraisl@iiasa.ac.at
Twitter: @dilekfraisl1
Web: www.iiasa.ac.at