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TAKING THE PULSE OF OUR PLANET FROM SPACE

COMPLEMENTARY USE OF CITIZEN SCIENCE AND EO DATA FOR ADDRESSING SDG DATA GAPS

Linda See, Dilek Fraisl and many others

25 May 2022

Starting point

nature sustainability

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Perspective | Published: 09 October 2019

Citizen science and the United Nations Sustainable Development Goals

Steffen Fritz, Linda See, ... Sarah West + Show authors

Nature Sustainability **2**, 922–930 (2019) | Cite this article

23k Accesses | **152** Citations | **334** Altmetric | Metrics

An Author Correction to this article was published on 18 October 2019

This article has been updated

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

Springer Link

Original Article | Open Access | Published: 02 July 2020

Mapping citizen science contributions to 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 Masó, Marianne Penker & Steffen Fritz

Sustainability Science **15**, 1735–1751 (2020) | Cite this article

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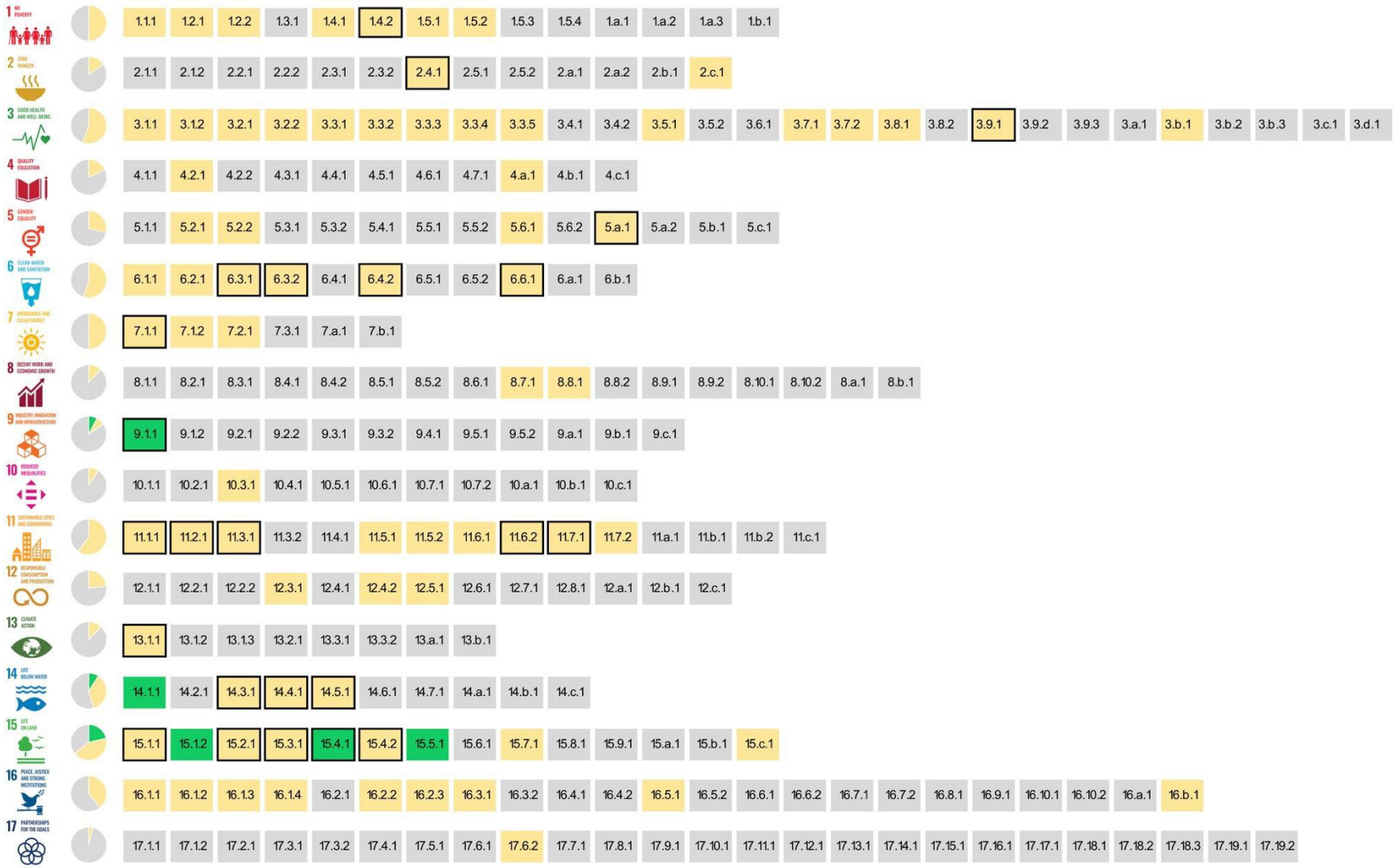
Abstract

The UN Sustainable Development Goals (SDGs) are a vision for achieving a sustainable future. Reliable, timely, comprehensive, and consistent data are critical for measuring progress towards, and ultimately achieving, the SDGs. Data from citizen science represent one new source of data that could be used for SDG reporting and monitoring. However, information is still lacking regarding the current and potential contributions of citizen science to the SDG indicator framework. Through a systematic review of the metadata and work plans of the 244 SDG indicators, as well as the identification of past and ongoing citizen science initiatives that could directly or indirectly provide data for these indicators, this paper presents an overview of where citizen science is already contributing and could contribute data to the SDG indicator framework. The results demonstrate that citizen science is “already contributing” to the monitoring of 5 SDG indicators, and that citizen science “could contribute” to 76 indicators,

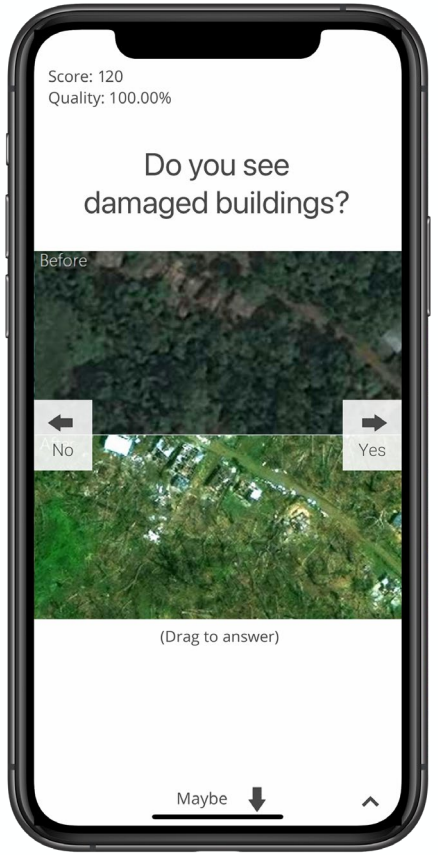
Synergies between Citizen Science and EO for the SDGs

- Green = where citizen science is already contributing
- Yellow = where citizen science has the potential to contribute
- Black boxes indicate both citizen science and EO can contribute together

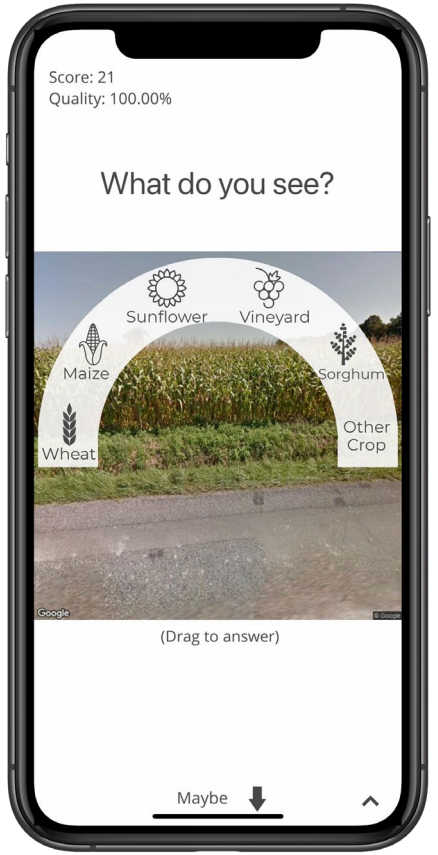


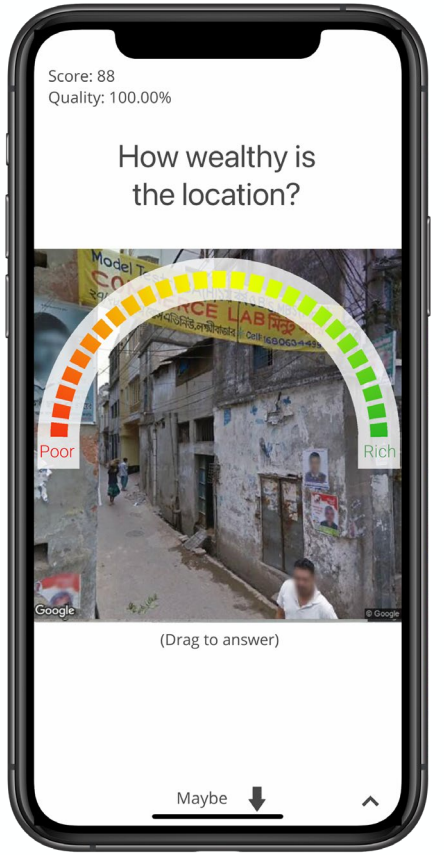
Picture Pile as a tool for SDG monitoring

- Rapid image classification
- Single or pairs of images (for change detection)
- Wilderness, deforestation, building damage assessment
- Yes/no/maybe mechanic



- Yes/No/Maybe mechanic modified for categorical and continuous variable data collection





Picture Pile Campaigns

Campaign	Location	# of participants	# of validations	# of images	Campaign start date	Campaign available for
Wild landscapes	Global	32	11,937	86,176	2014-12-15	6 months
Deforestation	Tanzania, Indonesia	1360	5,127,697	362,544	2015-07-25	Left open until 2018-09-04
Hurricane Matthew campaign 1	Haiti	344	224,214	37,582	2017-04-28	6 days
Hurricane Matthew campaign 2	Haiti	421	298,323	37,582	2017-05-03	12 days
Cloud detection	Global	149	276,068	27,021	2019-02-28	2 months
Nighttime lights	Global	217	160,338	13,966	2019-03-04	6 months
Urundata land cover campaigns	Indonesia	395	1,373,840	14,221	2019-04-01	4 months
Oil palm plantations	Global	78	56,212	1,649	2019-07-31	1 month
Oil palm plantations Asia	Asia	78	99,618	13,653	2019-08-20	2 months
Poverty (degree of wealth)	Dhaka, Bangladesh	176	60,382	11,300	2019-08-26	6 months
Slums	Dhaka, Bangladesh	74	13,636	30,028	2019-08-27	6 months
Urundata Change Campaigns	Indonesia	195	3,553,315	153,115	2019-08-27	3 months
Marine litter	One beach	105	14,374	1,215	2019-12-13	3 months
Poverty (degree of wealth)	Africa	63	7,888	1,398	2019-12-18	6 months
Poverty (building height)	Dhaka, Bangladesh	181	36,430	12,300	2020-02-06	6 months
Earth Challenge Food Insecurity (crop types) from present	France, Latvia, USA	1292	289,553	45377 out of 70,520	2020-07-28	Ongoing

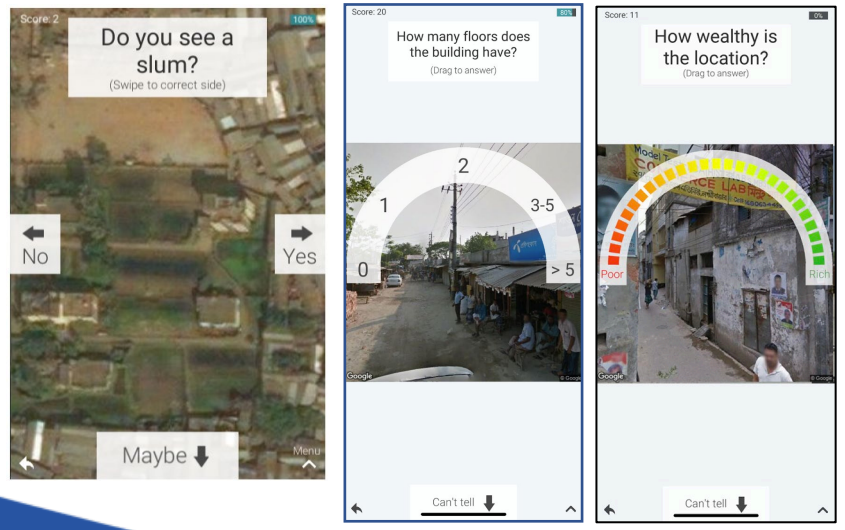
Picture Pile and the SDGs

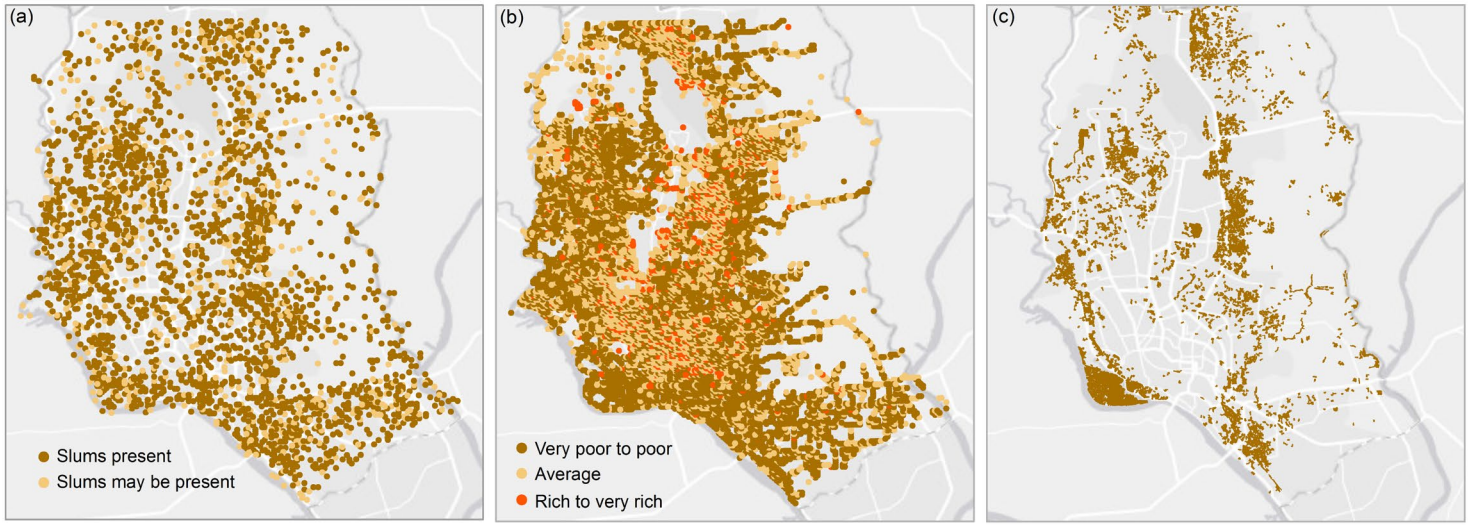
- Found that Picture Pile could contribute to the monitoring of 15 SDG indicators (SDGs 1, 2, 11, 13, 14, 15)
- Direct = data from Picture Pile could contribute to the calculation of the SDG indicators
- Supplementary = data that are useful to contextualize an SDG indicator or target

	SDG contribution by indicator	
Campaign	**Direct**	**Supplementary**
Wild landscapes	-	-
Deforestation	15.2.1	-
Hurricane Matthew campaign 1	1.5.2, 11.5.2	1.5.1, 11.5.1, 13.1.1
Hurricane Matthew campaign 2	1.5.2, 11.5.2	1.5.1, 11.5.1, 13.1.1
Cloud detection	-	-
Nighttime lights	11.3.1	1.1.1, 1.2.1, 1.2.2
Urundata land cover campaigns	15.1.1, 15.2.1, 15.4.2	-
Oil palm plantations	15.1.1, 15.2.1, 15.4.2	-
Oil palm plantations Asia	15.1.1, 15.2.1, 15.4.2	-
Poverty (degree of wealth)	11.1.1	1.1.1, 1.2.1, 1.2.2
Slums	11.1.1	-
Urundata Change Campaigns	15.1.1, 15.2.1, 15.4.2	-
Marine litter		14.1.1b
Poverty (degree of wealth)	11.1.1	1.1.1, 1.2.1, 1.2.2
Poverty (building height)	11.1.1	1.1.1, 1.2.1, 1.2.2
Earth Challenge Food Insecurity (crop types) from 31 Mar 2021	2.4.1	-

An example of Picture Pile + EO for SDG 11

- SDG 11, indicators 11.1.1: Proportion of urban population living in slums, informal settlements or inadequate housing
- Slums have multiple dimensions, but one is about housing durability
- Picture Pile was used to classify images in Dhaka for presence/absence of slums, number of floors in buildings and degree of wealth (although clearly subjective)
- Inputs were used (along with many other features including those from remote sensing) to produce a wall-to-wall map for the city with slum locations



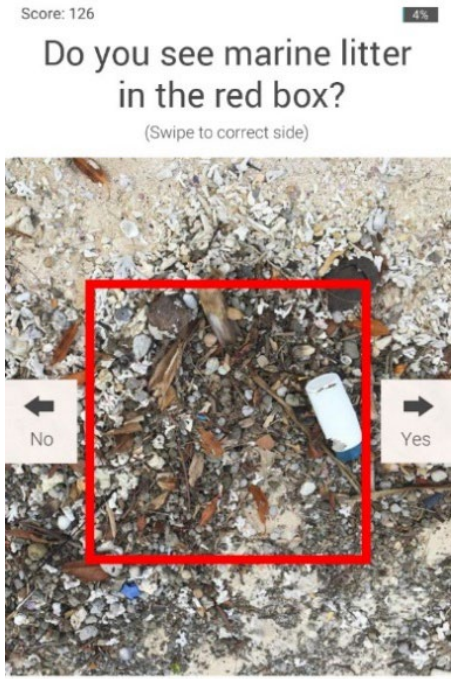


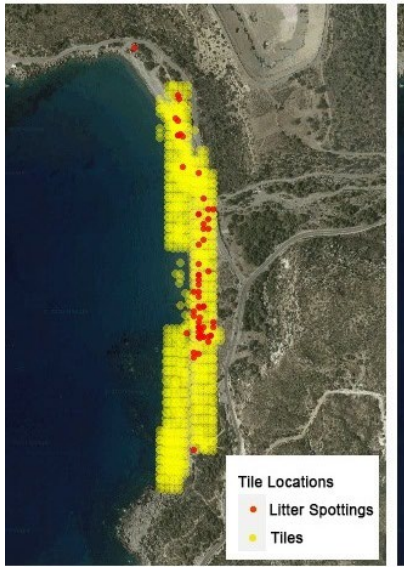
Data from Picture Pile

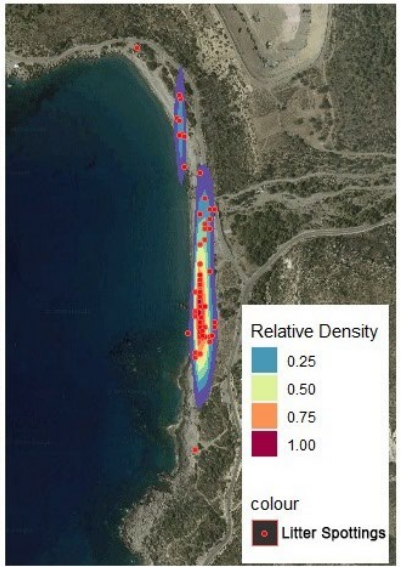
Slum locations from Gruebner et al. (2014)

An example from SDG 14.1.1b

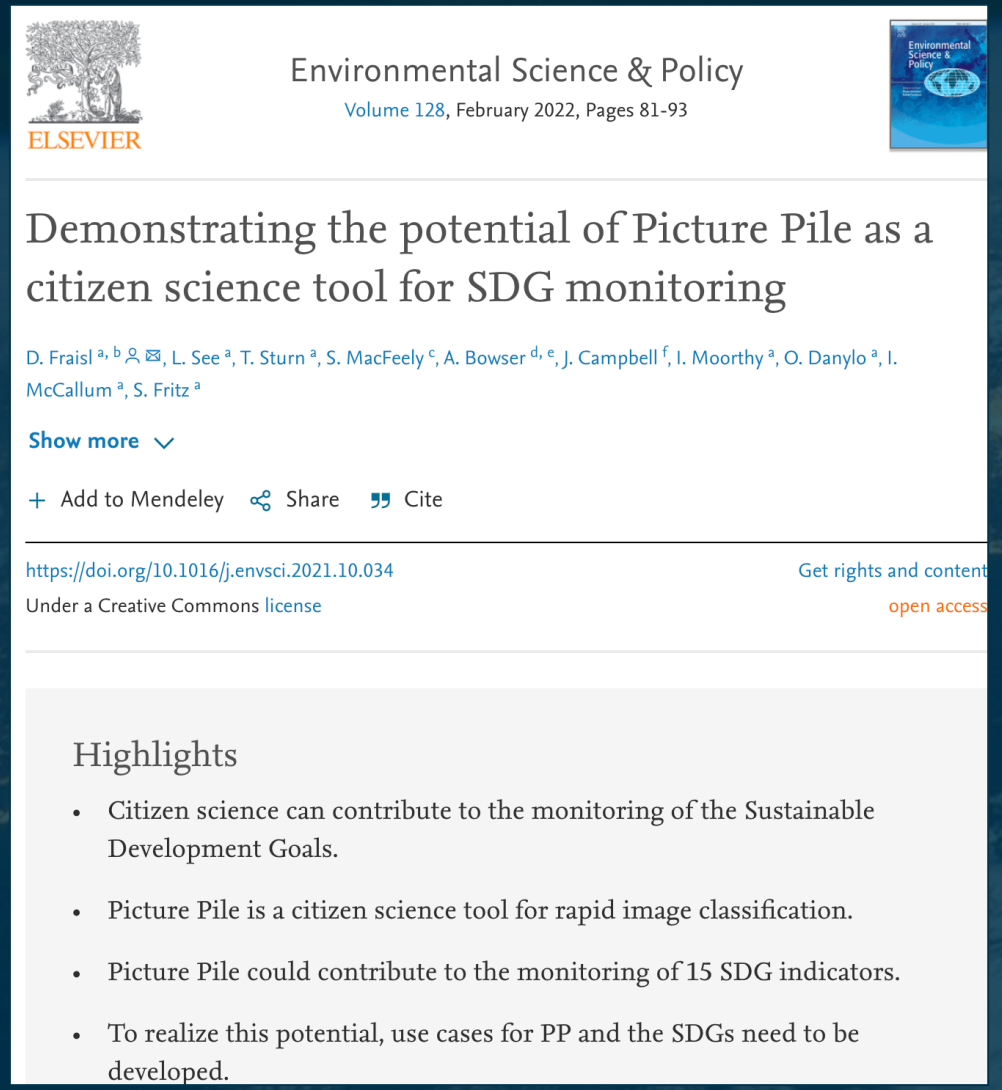
- Index of plastic debris density
- Citizen science already part of the methodology for this indicator (GESAMP, 2019; UNEP, 2021)
- Many citizen science initiatives established in cleaning up beaches (counting, identifying and weighing items)
- Picture Pile was used in a campaign to gather observations of marine litter from imagery
- Could be used to complement field-based approaches
- Was used to train an AI algorithm to automatically recognize marine plastics using remote sensing to produce a density map as a demonstrator (in collaboration with U of the Aegean)







Picture Pile as a tool for SDG monitoring



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Demonstrating the potential of Picture Pile as a citizen science tool for SDG monitoring

D. Fraisl [a, b], L. See [a], T. Sturn [a], S. MacFeely [c], A. Bowser [d, e], J. Campbell [f], I. Moorthy [a], O. Danylo [a], I. McCallum [a], S. Fritz [a]

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https://doi.org/10.1016/j.envsci.2021.10.034

Highlights

- Citizen science can contribute to the monitoring of the Sustainable Development Goals.
- Picture Pile is a citizen science tool for rapid image classification.
- Picture Pile could contribute to the monitoring of 15 SDG indicators.
- To realize this potential, use cases for PP and the SDGs need to be developed.

More examples can be found in the paper

Picture Pile Platform

- Picture Pile Platform, new project funded by ERC PoC
- Commercially self-sustaining platform
- Anyone can setup a pile and run their own campaigns via the Picture Pile Campaigner for free

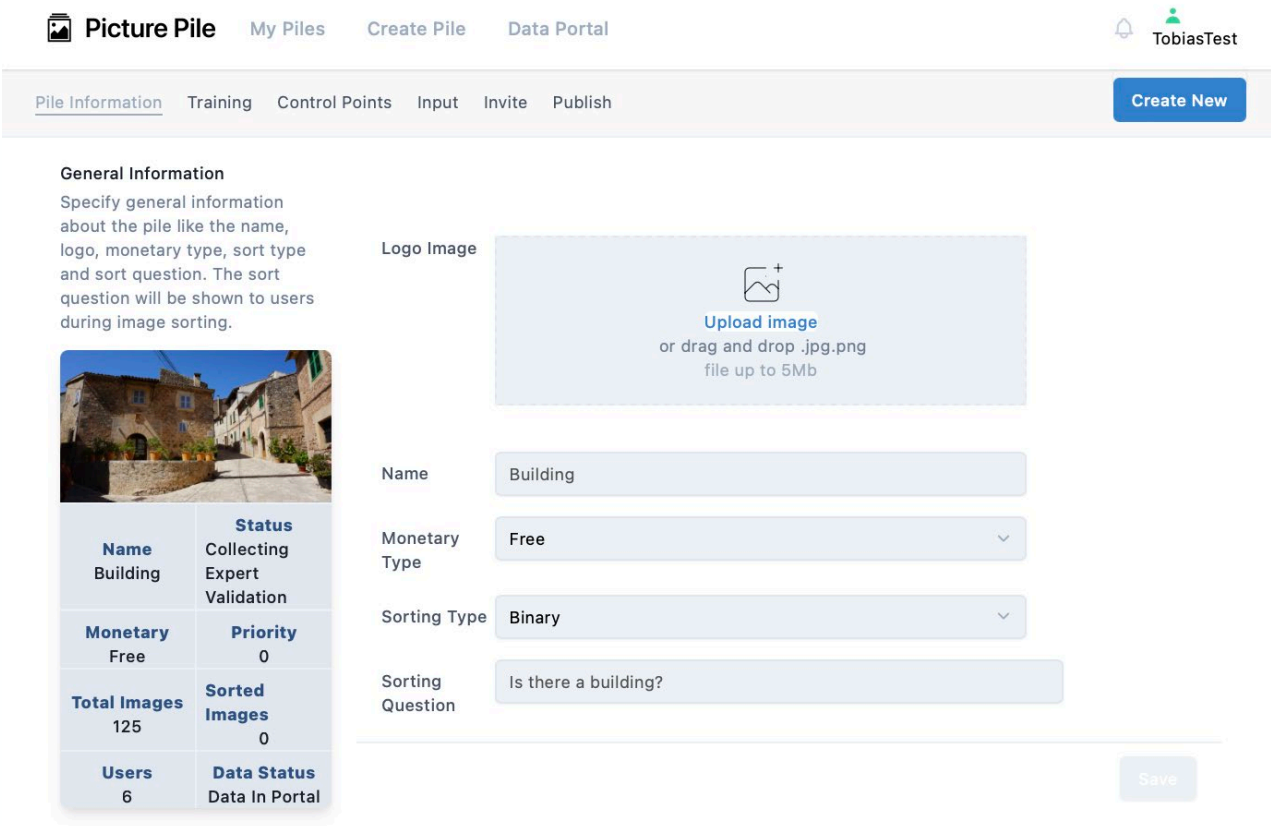
Campaigner
Setup your own pile of images to get classifications

Picture Pile App
Crowd classifies the images using the picture pile mobile app in an intuitive, efficient and engaging way

Data Portal
The image classifications are made publicly available on Data portal

Quality Assurance
Many quality control mechanism guarantee the quality of data collected.

Free To Use
Its is completely free to setup you own pictures. You can pay the crowd if you don't want to make the collected data public on Data Portal or provide additional incentives for the crowd to do classifications.

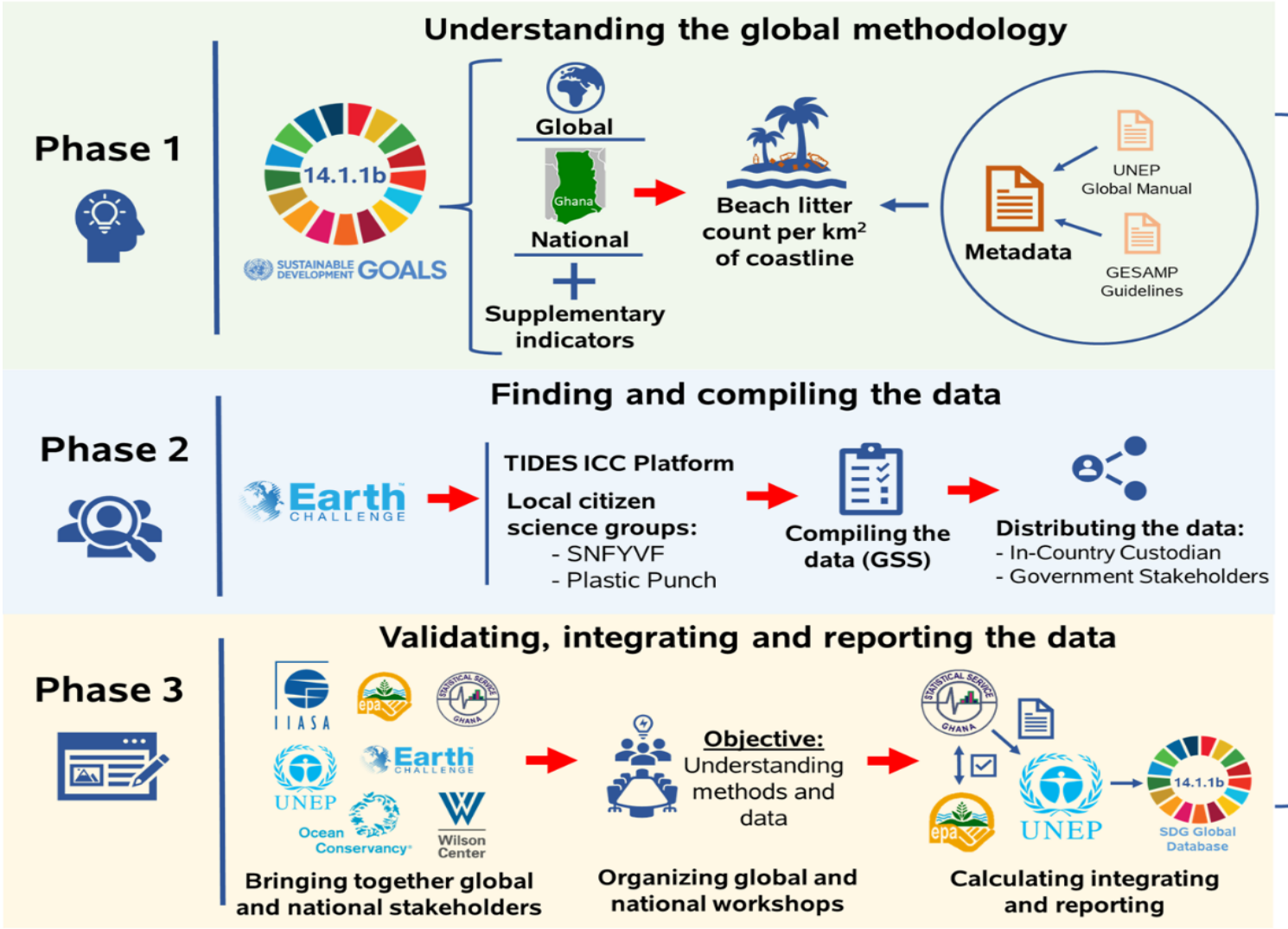


- Users can earn money
- Data freely available on the Picture Pile Data Portal
- Launch at end of 2022
- Looking for people interested in creating first piles

Monitoring SDG 14.4.1b with Citizen Science

Citizen Science for the SDGs StoryMap: https://dataforchange.net/strengthening-measurement-of-marine-litter-in-Ghana

Integrating citizen science data on marine litter for SDG indicator 14.1.1b reporting in Ghana



Align the ICC **methodology** with the global 14.1.1b indicator methodology

Facilitate support to the local citizen science groups for future data collection activities

Ensure policy uptake and impact

Citizen Science data….

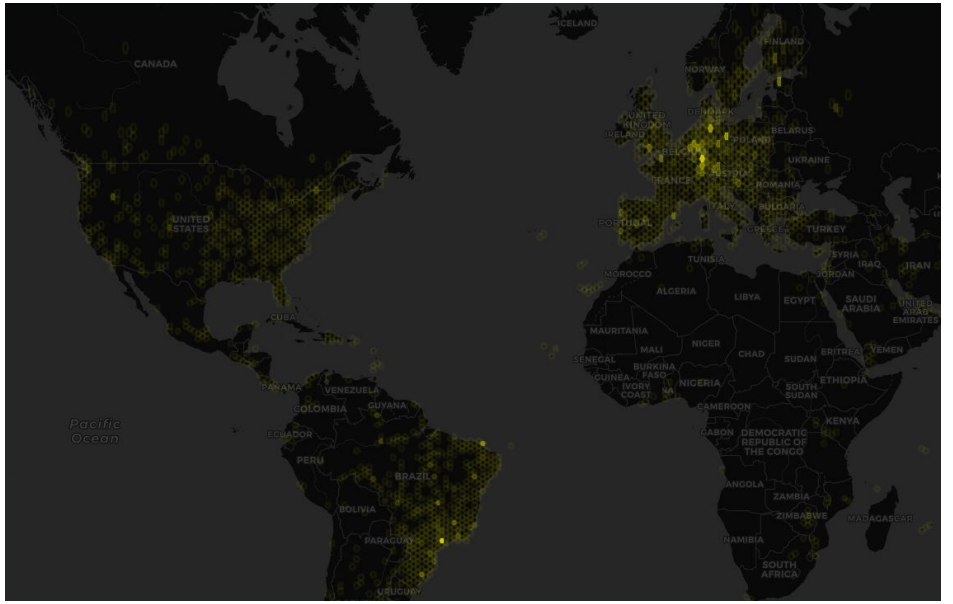
- that were used for monitoring beach litter have been integrated into the official SDG monitoring and reporting mechanisms of Ghana
  - Ghana is the first country to report on SDG indicator 14.1.1b and the first country to use citizen science data for that purpose
- will serve as inputs to Ghana's Ocean Plan and other relevant policies to address the marine litter problem
- have helped to bridge local data collection efforts with global monitoring processes by leveraging the SDG framework
- will be integrated with EO in the next phase of the project using Picture Pile to classify drone imagery/classification of RS imagery

Lessons Learned

- Rather than the time- and resource-intensive process of designing a digital mobile app from scratch, used off-the-shelf solutions such as CleanSwell, requiring fewer resources to implement and enabling the reuse of historical data
- By tapping into **Smart Nature Freaks Youth Volunteers** and **Plastic Punch**, who are already established and sustainable networks, data could be efficiently compiled as a by-product of existing activities
- Importance of creating time and space for the government, international organizations and NGOs to meet, in order to **build trust**, common goals and **ownership** over the results

Plug for our latest project: CAMALIOT

- Collection of raw GNSS data from mobile phones to improve weather forecasting
- > 11K participants; > 58 billion measurements
- https://www.camaliot.org
- Poster at the session on Friday



Thank you!
Any questions?

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