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Citizen Science: From Local Action to Policy Across Governance Levels and Topics

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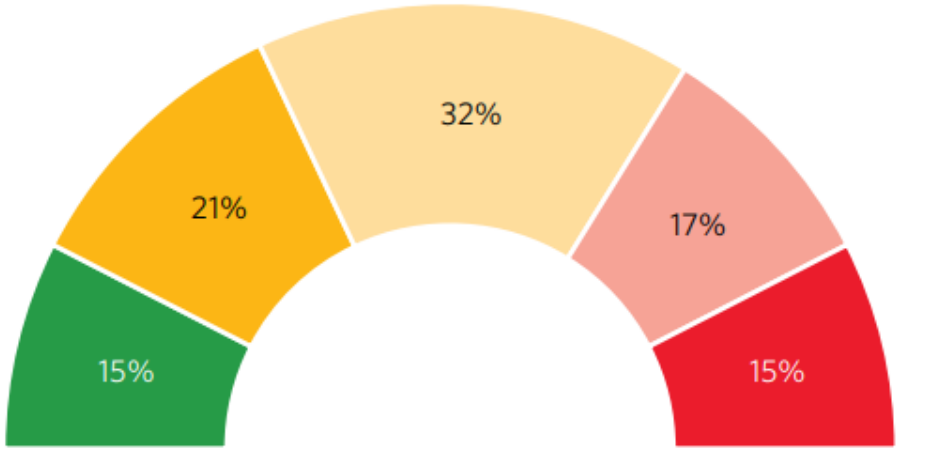
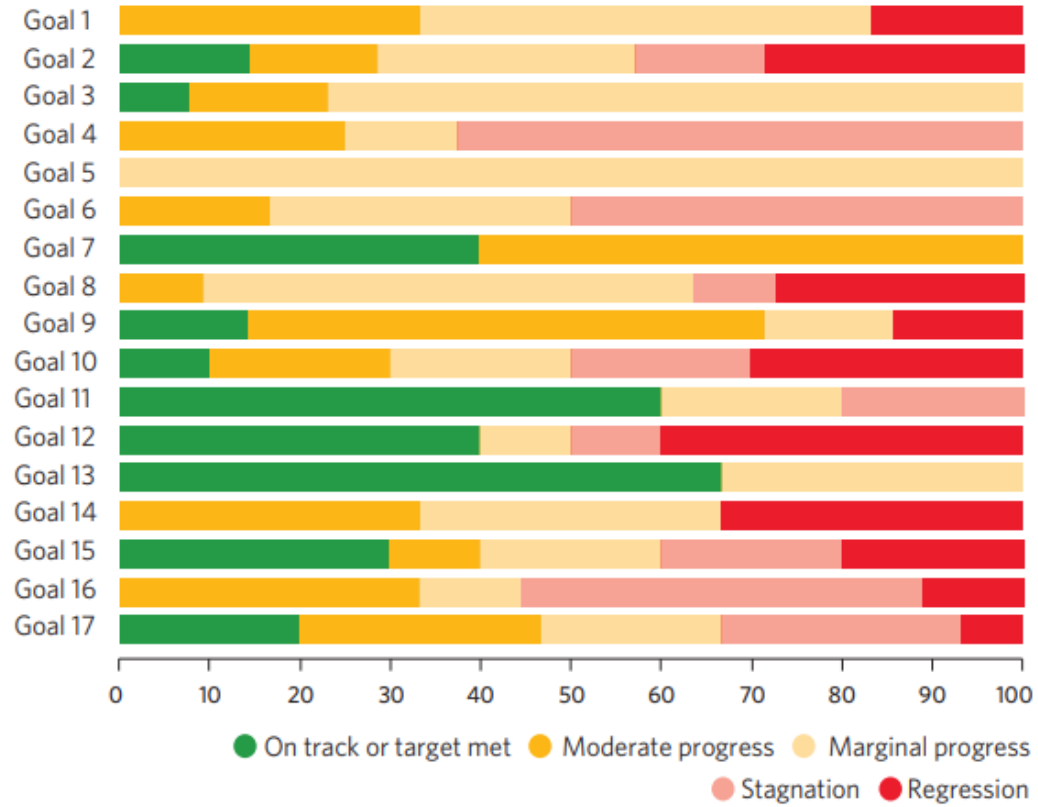
1 NO POVERTY
2 NO HUNGER
3 GOOD HEALTH
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 RENEWABLE ENERGY
8 GOOD JOBS AND ECONOMIC GROWTH
9 INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE AND JUSTICE
17 PARTNERSHIPS FOR THE GOALS
THE GLOBAL GOALS
For Sustainable Development

Overall progress assessment across 139 targets with trend data, 2025 or the latest data



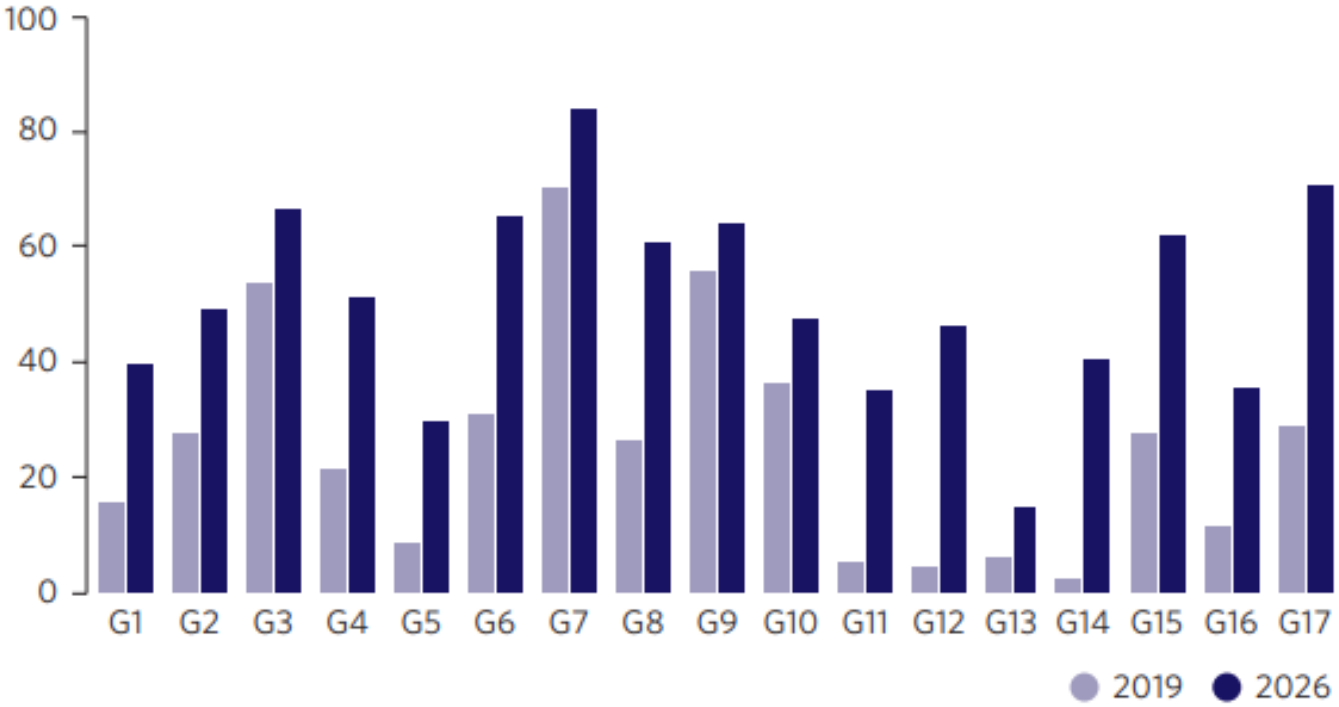
Progress assessment for the 17 Goals based on assessed targets, by Goal (percentage)



UN SDG Report, 2026

Data gaps

Proportion of countries or areas with trend data (at least two data points since 2015), comparing 2019 and 2026 databases, by Goal (percentage)



UN SDG Report, 2026

We cannot improve what we cannot measure.

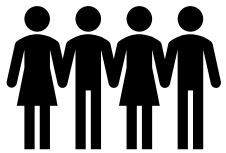
- Traditionally, progress toward the SDGs has been measured using conventional data sources such as household surveys, censuses, and administrative records.
- These sources have limitations: timeliness, disaggregation, data availability, and quality.

Where are we today? SDGs, Data and Policy Shifts

- Data availability has become even more major issue recently due to geopolitical issues.
- For example, core funding for the Demographic and Health Surveys Program ended in early 2025, disrupting a major global source of population, health and nutrition data in 90+ countries since 1984.
  - One-third of SDG indicators rely on household survey data.
  - DHS alone contributes to over 30 SDG indicators

    The program has since been revived under new funding arrangements, but its long-term financing is unknown.
- **Environmental Monitoring Cuts (US):** 2027 proposal: 52% cut to EPA budget, undermining climate, pollution, and environmental justice programs.
- **Policy Stance:** In 2025, the U.S. formally stated that it rejected the 2030 Agenda and SDGs and would no longer routinely affirm them. In January 2026, the administration has withdrawn from **66 international organizations and UN entities**, including UN-Habitat, UN Women and the UNFCCC.

Citizen science

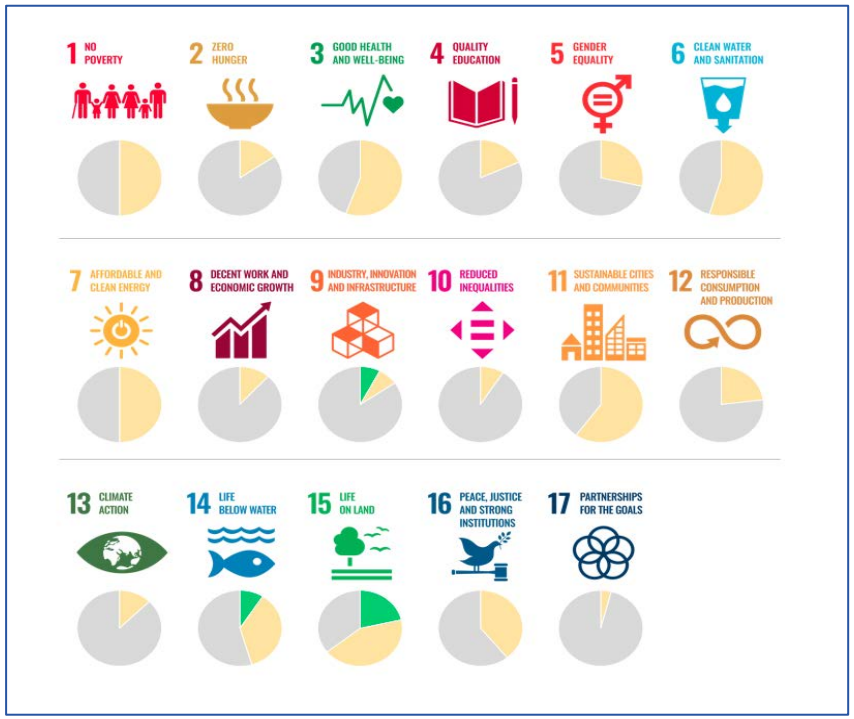


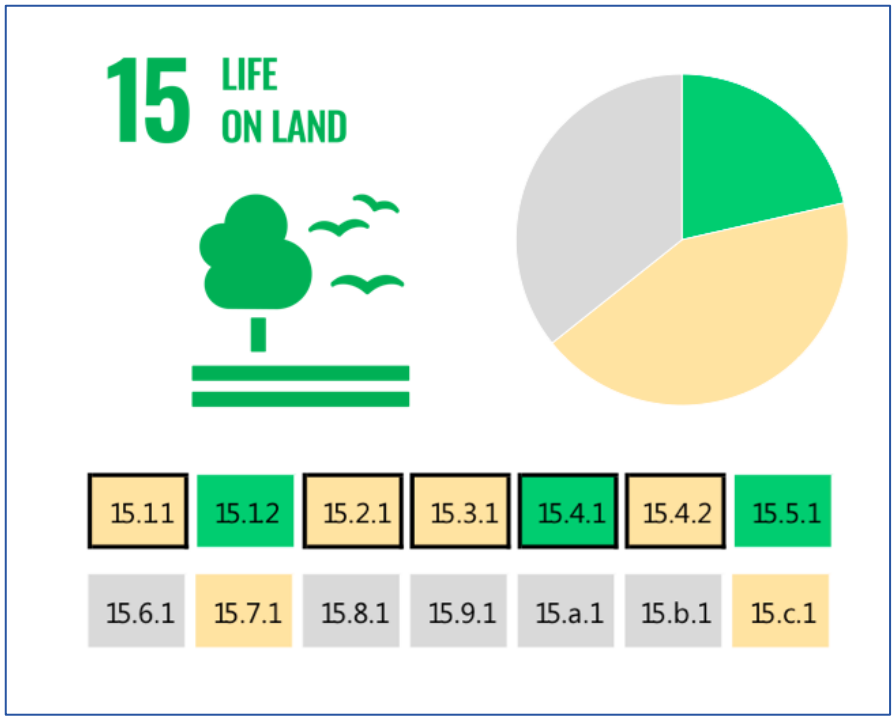
Public Participation

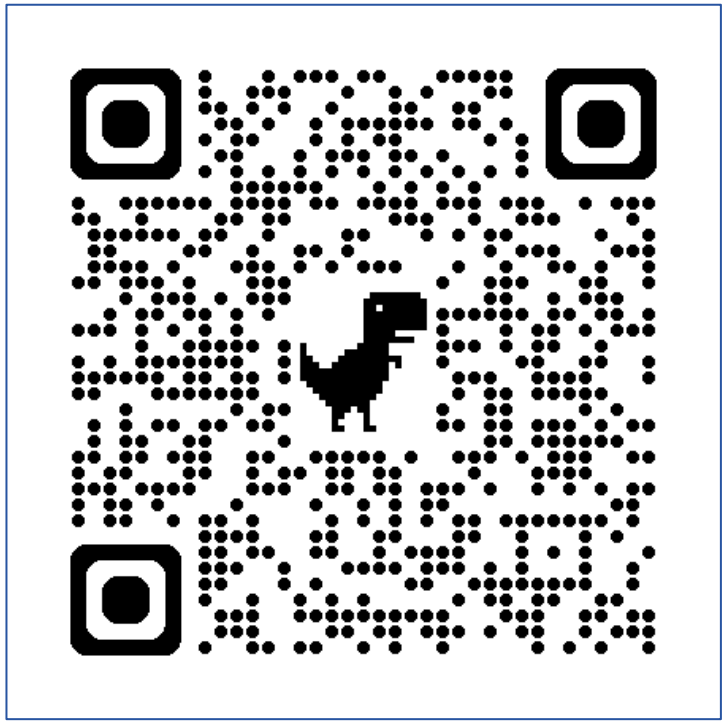
Knowledge production

Voluntary contributions

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.







Fraisl, D., Campbell, J., See, L. *et al.* Mapping citizen science contributions to the UN sustainable development goals. *Sustain Sci* **15**, 1735–1751 (2020). https://doi.org/10.1007/s11625-020-00833-7

eBird

- One of the world's largest biodiversity-related science projects, with more than 100 million bird sightings contributed annually around the world
- An average participation growth rate of 20% year over year
- Documents bird distribution, abundance, habitat use, and trends through checklist data collected within a simple, scientific framework. Birders enter when, where, and how they went birding, and then fill out a checklist of all the birds seen and heard

    - SDG indicators 15.1.2 Proportion of important sites *for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type* and 15.4.1 *Coverage by protected areas of important sites for mountain biodiversity*
    - *GBF Headline indicator Red List Index, Red List of Ecosystems and others…*

Source: Earthwatch Institute

SDG 6.3.2 Proportion of bodies of water with good ambient water quality

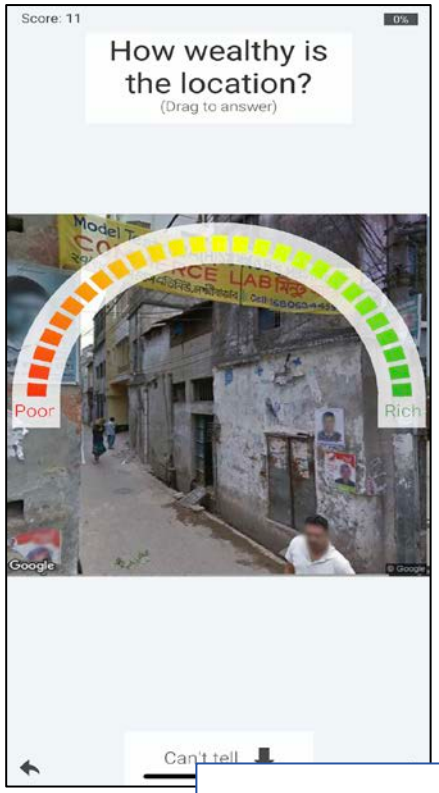
GBF Target 11 Complementary indicator

FreshWaterWatch

Thousands of volunteers from around the world .

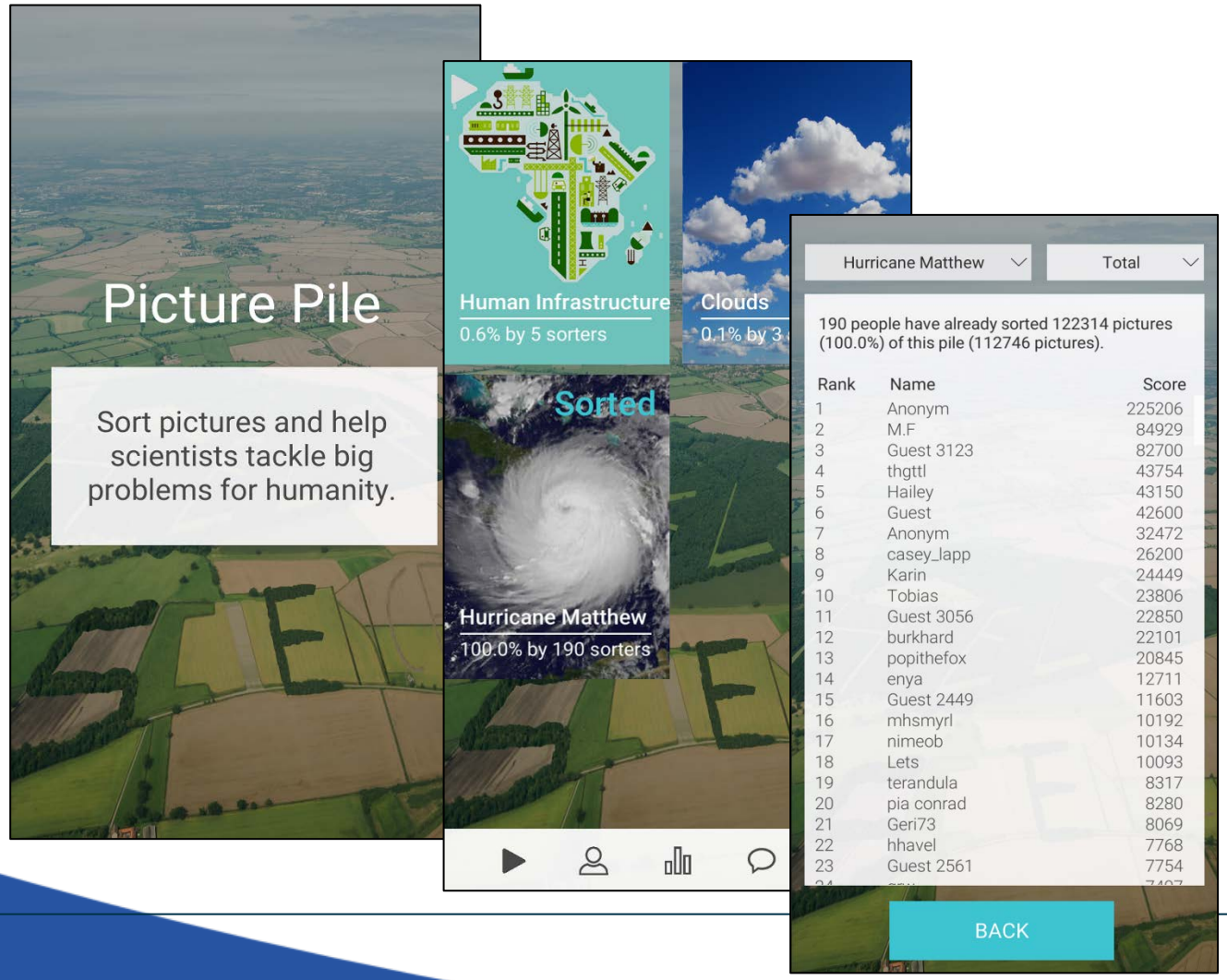
Picture Pile

- Pairs of images for change detection
- Deforestation, building damage assessment, plastics monitoring
- Yes/No/Maybe mechanic
- Yes/No/Maybe mechanic modified for categorical and continuous variable data collection
- Could contribute to the monitoring of 15 SDG indicators (SDGs 1, 2, 11, 13, 14, 15)



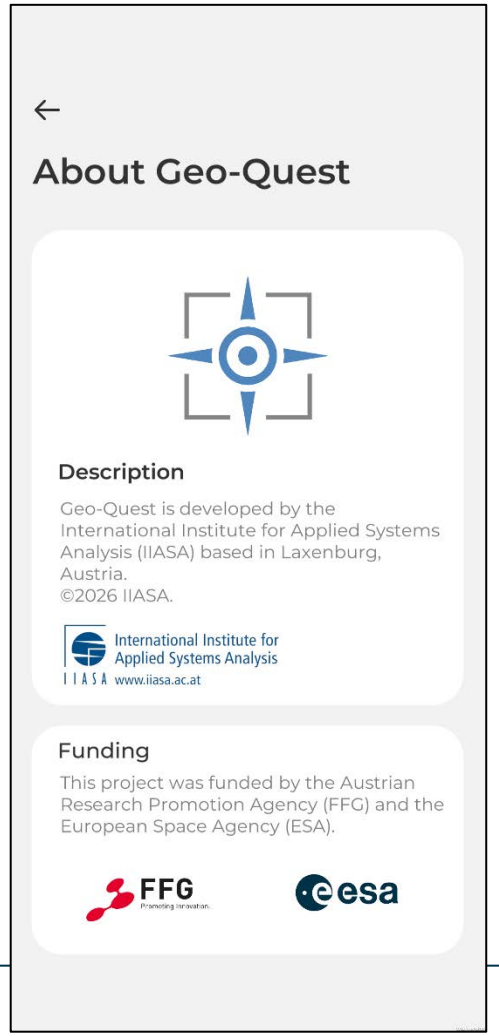
Citizen science & Earth Observation: Top-down & bottom-up citizen science

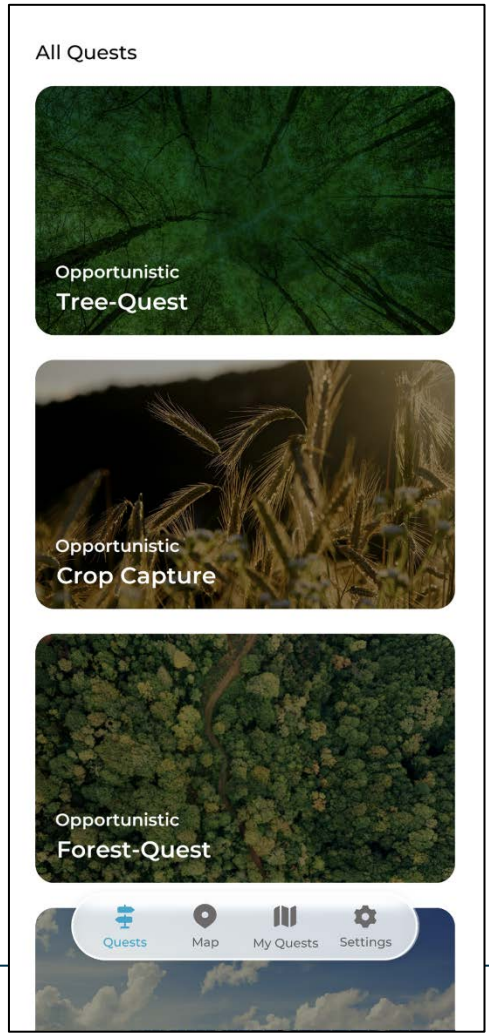
- **Top-down: Picture Pile**



Complemented by bottom-up citizen science:

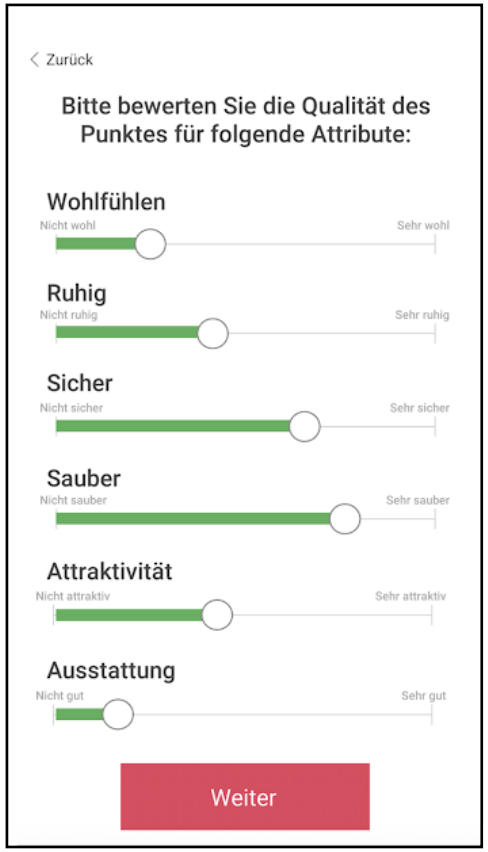
Geo-Quest

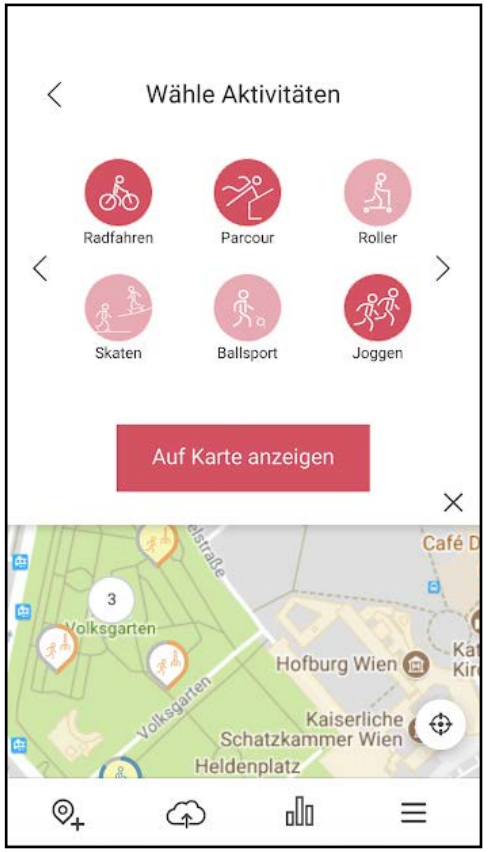




SDG 11.7.1 Built-up area of cities that is open space for public use

City Oases





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The contributions of citizen science to SDG monitoring and reporting on marine plastics

Original Article | Open access | Published: 19 September 2023

Volume 18, pages 2629–2647, (2023) Cite this article

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Dilek Fraisl, Linda See, Rachel Bowers, Omar Seidu, Kwame Boakye Fredua, Anne Bowser, Metis Meloche, Sarah Weller, Tyler Amaglo-Kobla, Dany Ghafari, Juan Carlos Laso Bayas, Jillian Campbell, Grant Cameron, Steffen Fritz & Ian McCallum

Best Paper Award 2024, Springer Nature, Sustainability Science

GLOBAL RECOGNITION AND IMPACT

@Smart Nature Freaks Youth Volunteers Foundation

- Ghana has become the first country to integrate existing citizen science data on marine plastic litter into their official statistics, SDG monitoring and reporting.
- Results used in Ghana's Voluntary National Review of the SDGs, and reported on the UN SDG Global Database
- Informing the integrated coastal and marine management policy in Ghana.
- Bridging local data collection efforts with global monitoring processes and policy agendas by leveraging the SDG framework.
- Partnerships with citizen science networks have been built to ensure sustainability of data and the approach, led by the government.
- Other countries, such as Siera Leone and Colombia, are also adopting the approach and have engaged in knowledge exchange workshops with Ghana aimed at replicating the model and process.

GLOBAL RECOGNITION AND IMPACT

- Recognized in the UN SDG Reports published by the UN Statistics Division (UNSD) (both in 2023 & 2024 editions)
- Showcased on the UNSD website as a best practice model
- Highlighted in the UN Statistical Commission - Secretary General's Report (Statistical Commission Fifty-sixth session, 2025)
- Influenced other UN agencies (UNDP's work on SDG 16 citizen satisfaction indicator, UN-HABITAT Quality of Life Indicator Framework)
- Won the Group on Earth Observations (GEO) SDG Award, including its second phase (drones, citizen science and AI integration to produce litter density maps)
- Featured by the UNSD Citizen Data Collaborative across sessions, publications, and best practice platforms
- Featured in a Nature Sustainability perspective piece, which was then highlighted in a Nature editorial
- Presented at the UN World Data Forum, UN Statistical Commission, UN Environment Assembly, UN Big Data and Data Science for Official Statistics Conference, and other major UN events, and scientific conferences; published on the World Bank blog

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The process of integrating citizen science data on marine litter for SDG indicator 14.1.1b reporting in Ghana

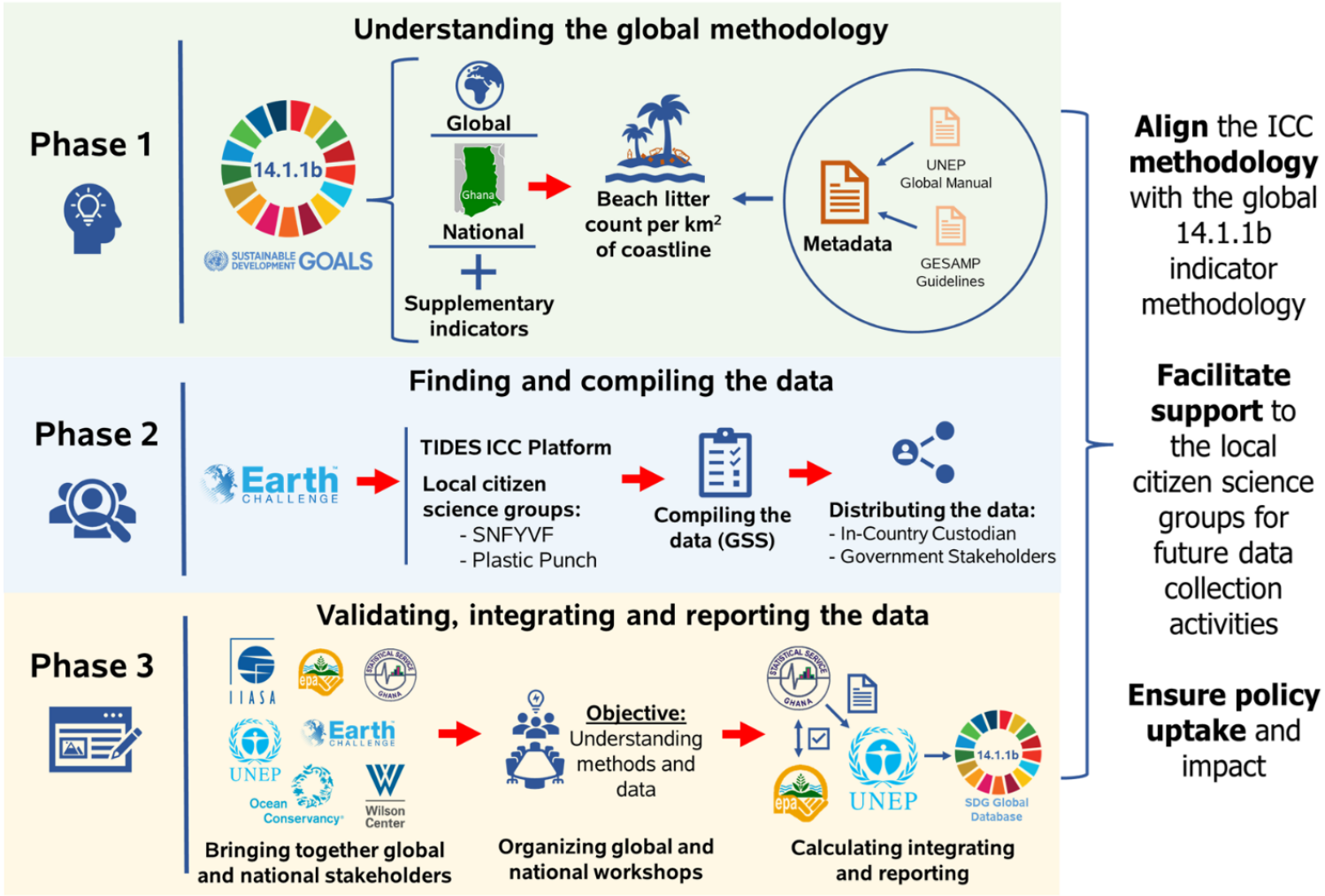

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Table S2: Checklist for the process of leveraging existing citizen science data for 14.1.1b reporting

Phase 1: Understanding the global methodology for indicator 14.1.1b on *plastic debris density*
☐ Examine the global methodology for SDG indicator 14.1.1b with a focus on beach litter - average count of plastic items per km^2; ☐ Review the SDG Indicator 14.1.1b Metadata (UN 2021); ☐ Review the Global Manual on Measuring SDG 14.1.1, SDG 14.2.1 and SDG 14.5.1. (UNEP 2021); ☐ Review the GESAMP Guidelines for the Monitoring and Assessment of Plastic Litter in the Ocean (GESAMP 2019); ☐ Identify additional aims beyond SDG monitoring, if applicable. Examples include: ☐ Policy formulation; ☐ Education and awareness raising; ☐ Supporting citizen science initiatives for future data collection activities.
Phase 2: Finding and compiling the data
☐ Create a list of key stakeholders for in-country, as well as global engagement, e.g., NSO, line ministries, CSOs, academia, UNEP, ICC, etc.; ☐ Explore if there are existing citizen science projects, local citizen scientist networks or citizen science data available in the country. Examples of data platforms include: ☐ Global Earth Challenge Marine Litter Data Integration Platform (Earth Day Network 2021); ☐ ICC TIDES database (Ocean Conservancy 2022). ☐ If data are available, investigate issues, such as: ☐ The number of beach litter collections per year; ☐ The dispersion of the locations of the data collection activities; ☐ The classification of litter into plastics and non-plastics as per the global methodology; ☐ Completeness of the data; whether area covered is captured or needs to be approximated; ☐ Any outlier values available in the data set.
Phase 3: Validating, integrating, and reporting the data
☐ Bring key stakeholders together and ensure their engagement by providing a platform to communicate needs, motivations, and concerns; ☐ Ensure both national and global level coordination and collaboration that goes beyond the data validation activity; ☐ Organize several workshops with clear goals, such as: ☐ Understanding the methodologies developed by the citizen science projects; ☐ Determining how these methodologies were implemented by local citizen scientist networks and CSOs; ☐ Understanding the eligibility of coastal sites: ☐ Identifying any geographic areas of policy interest and any existing litter prevention interventions; ☐ Discerning between sites with land- or ocean-sourced litter flows. ☐ Clarifying any open issues with the data set; ☐ Identifying areas of future improvements of the methodologies or their implementation; ☐ Understanding the limitations and challenges of citizen science data and how to overcome them or minimize their effect; ☐ Ensuring that the data produced are of sufficient quality for informing the SDG indicator 14.1.1b, as well as policy action; ☐ Ensuring that the ethical principles are followed while developing and using the methodology, e.g., data privacy, etc. ☐ Determining whether citizen science methodologies could be integrated into future policy monitoring. ☐ Gather a small team of statisticians and thematic experts for data validation; ☐ Identify any shortcomings related to the data set. Some of the questions that can be asked here include: ☐ Does the citizen science methodology align with the global 14.1.1b methodology? ☐ Was the area covered captured during data collection? ☐ Were the data collection sites selected using a sampling method or opportunistically (with no sampling design)? ☐ If opportunistically, could the data be representative of the overall country? ☐ Calculate the indicator, with support from UNEP and other partners if needed; ☐ Follow the in-country structures and regulations to communicate the results, e.g., official communique between government agencies; ☐ Consider reporting the results to the UN SDG Global Database and in the Voluntary National Review, once approved; ☐ Use the results for policy development or improvement.

Ensure inclusiveness through meaningful engagement of all stakeholders

Create time and space for these stakeholders to meet and connect

Listen and understand the motivations, interests and concerns

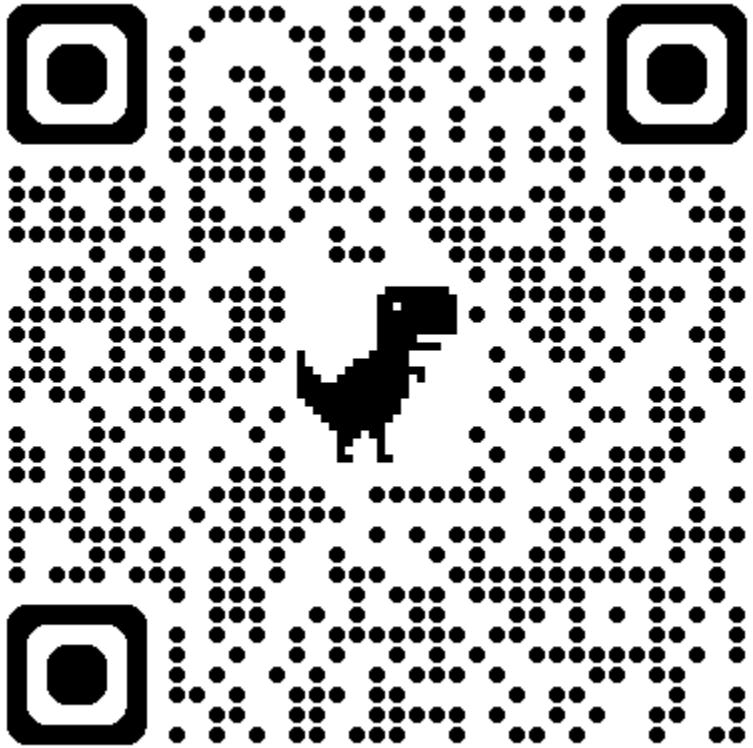
Be transparent about citizen science results and methodologies, especially how these methodologies were implemented

Citizens and communities are no free labor to close government data gaps; they should receive a share of the benefit from participating

@Smart Nature Freaks Youth Volunteers Foundation

Bridging local data collection efforts with global monitoring processes by leveraging the SDG framework

Leveraging Citizen Data to Improve Public Services and Measure Progress Toward SDG 16



Objectives:

- To improve the production, timeliness, and use of statistics on citizen satisfaction with public services at subnational and national levels by engaging with individuals and communities, particularly those harder to reach, and not represented in official statistics because of that
- To improve public service delivery and implement targeted interventions and policy adjustments based on data insights to enhance overall satisfaction and public service effectiveness

If the aim is SDG monitoring and reporting as official statistics, aligning with the global methodology is necessary:

- *Education*
- *Health*
- *Public services*

Representative population surveys conducted by NSOs, which capture specific aspects (*access, affordability, quality facilities, equal treatment for everyone, courtesy and treatment*) citizen satisfaction with public services based on experiences rather than general perceptions.

Technology & Implementation

- The pilot and mobile application design prioritized inclusivity from the start to ensure that everyone interested could actively participate, including persons with disabilities:
    - Co-design process both for the project and app development,
    - Unstructured Supplementary Service Data (USSD) option, a basic phone feature that works like text messages, for those without smartphones or internet access
    - Local languages, the app offered English, Twi, and Ga as options for participants reflecting the primary languages spoken in the pilot districts
    - The app included features such as a text reader, a sign language interpreter, and dark and light mode options. For potential literacy barriers, it incorporated a voice recording option for answering the survey in Twi, Ga, and English
    - Respecting data privacy: data collected via the app were kept confidential and then aggregated for reporting purposes.

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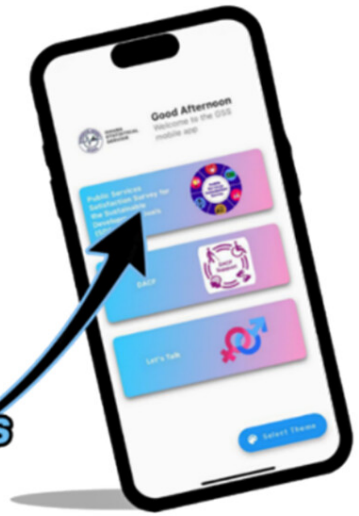
TO INSTALL APP:

1. SELECT ICON

2. ACCESS PSSS APP



DIAL THE USSD SHORT CODE

PUBLIC SERVICES SATISFACTION SURVEY APP

Feedback for better public services

HAVE YOU RECEIVED ANY PUBLIC SERVICES IN THE AREAS OF HEALTH, EDUCATION, GOVERNMENT ISSUED- IDENTIFICATION SERVICES?

HEALTH

EDUCATION

GOVERNMENT-ISSUED IDENTIFICATION DOCUMENT

Then, this is your opportunity to provide direct but anonymous feedback on services received to help improve public services delivery in your district, and further help Ghana to measure the Sustainable Development Goal (SDG) 16, "Peace, Justice and Strong Institutions".

Frequently Asked Questions

What!

The Public Services Satisfaction Survey (PSSS) App is an application for iPhone, android phone and non-smart phone that allows you to provide direct but anonymous feedback on public services such as health, education, and government-issued identification services.

Why?

By reporting on the PSSS App, your feedback goes to the right people to address challenges experienced in the delivery of public services in your district.

Furthermore, by sharing your experiences, you help Ghana to measure how well SDG 16, "Peace, Justice and Strong Institutions", is being achieved.

How

Download the PSSS App on Google Play Store and App Store or dial the USSD shortcode *920*158# to give anonymous feedback on your experiences in using public services in the past 12 months.

GET IT ON Google Play

Download on the App Store

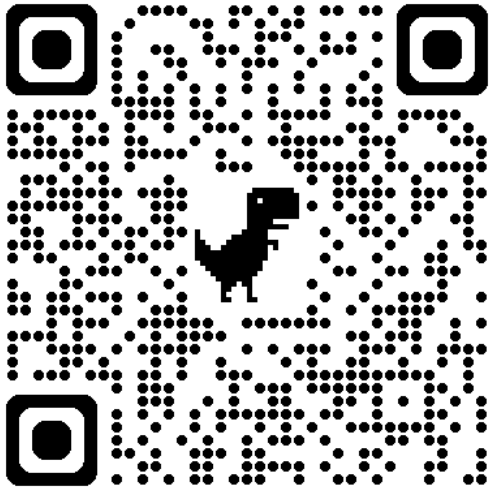
PUBLIC SERVICES SATISFACTION SURVEY APP

*920*158#

provide
PUBLIC SERVICES SATISFACTION SURVEY (PSSS) APP
'Feedback For Better Public Services'
Use your phone to provide anonymous feedback for better public services for:
Health
Education
Government-Issued Identification Services
DOWNLOAD PSSS APP
Google Play
App Store
DIAL THE USSD SHORT CODE

Example on the results on government services

- **70%** attempted to obtain an ID or passport in the previous 12 months.
- **Over 80%** cited **high cost** as a major barrier, while many reported **long waiting times and unfair treatment**.
- Participants in **rural Suhum** faced greater challenges with **travel distance and inefficiency**, whereas those in **urban Ga East** pointed to **communication gaps**.
- A shared demand emerged for **faster, more affordable, and regionally available services**.



In addition to official statistics and SDG reporting impact, POLICY IMPACT achieved:

*Ghana's **most comprehensive passport reform package** to date was launched!*

- Establishment of **passport application centers in all 16 regions by December 2025.**
- Deployment of **e-tracking systems, 24-hour operations at the Passport Head Office, and courier delivery** through Ghana Post and Troskit**.**
- **Reduced processing time** to 15 working days (standard) and 5 days (expedited).
- **Passport fees reduced** from GH₵500 to GH₵ 350 (effective November 2025).
- Integration of **mobile and online payment systems**.

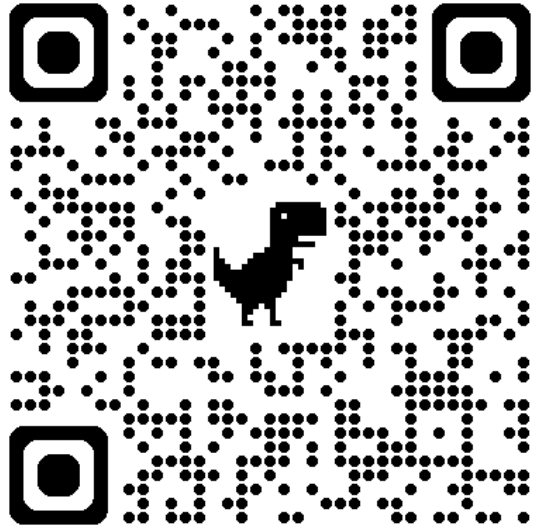
Institutionalization

- ***Ghana Statistical Service,*** *as coordinator of the* ***National Statistical System, is institutionalizing citizen data projects and initiatives*** *under the National Strategy for the Development of Statistics Round 3 (NSDS III, 2026–2030)* ***to strengthen performance monitoring and ensure continued feedback between citizens and government.***

Why uptake is difficult?

- We need a fundamental shift in how we view citizen science. Official statistics and policy communities have long seen it as a secondary data source, with concerns over **data quality** and **limited awareness** of its potential.
- Uptake is **happening but slow**...

  ***Collaborative on Citizen Data** – UN Statistics Division, UN Women, World Bank…*



Standards & Quality Assurance

Align rigorous methods with the participatory and adaptive nature of citizen science

Government & Institutional Endorsement

Build trusted partnerships to co-develop methods that meet official standards and leverage public input

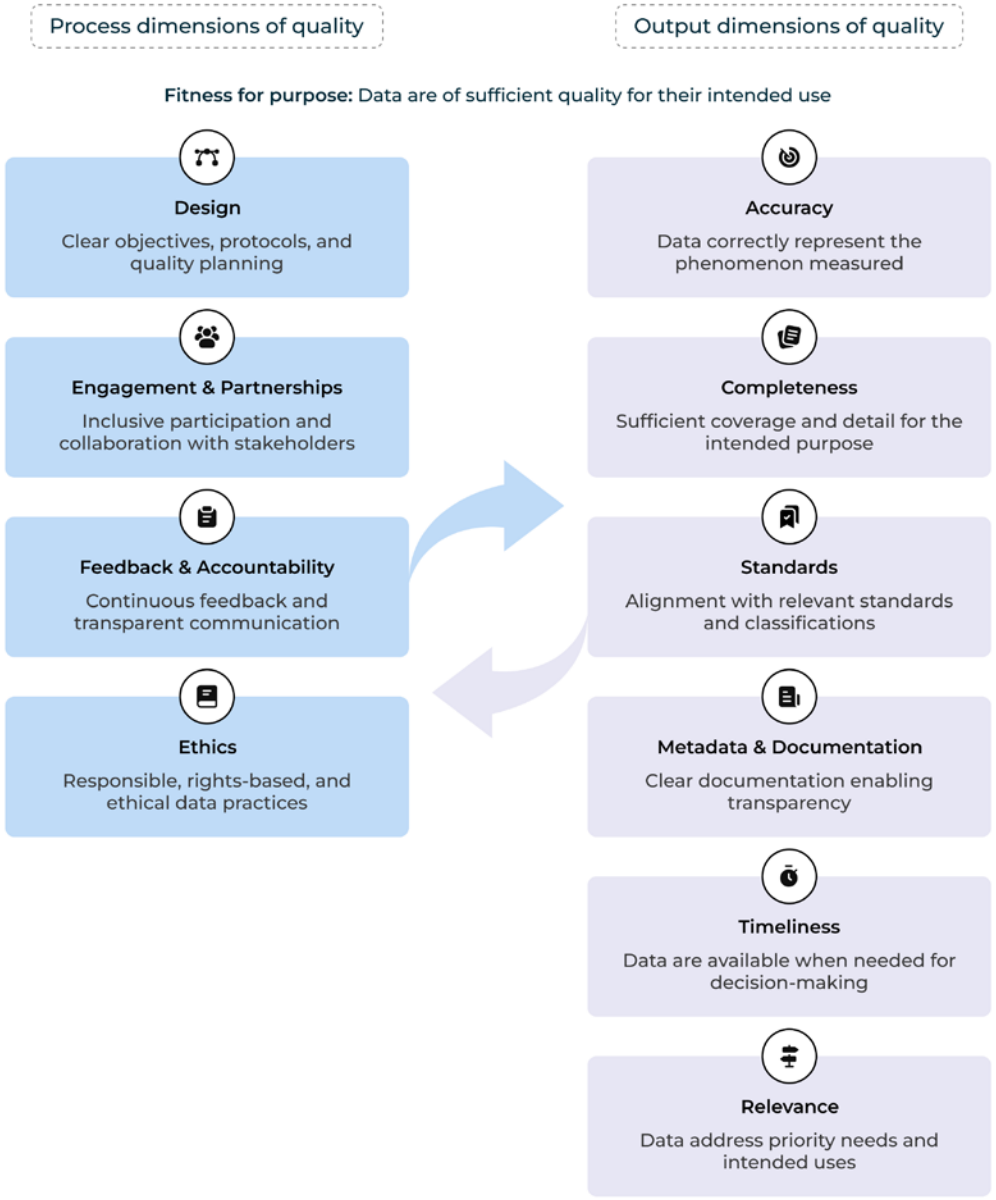
Global Data Governance

Engage citizen science communities in global data discussions via networks like the Citizen Science Global Partnership

Sustainable Financing

Incentivize National Statistical Offices and participants, especially in underserved communities, through context specific support

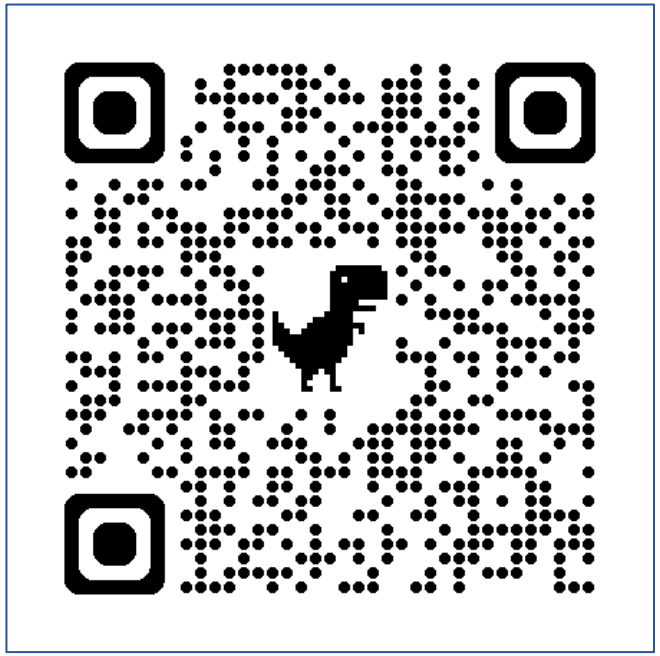
The 10 Dimensions of Citizen Data Quality



Politics of measuring sustainability

- Indicators are not neutral: what we choose to measure, and whose knowledge counts, shapes what gets prioritized, funded and acted upon.
- Global sustainability indicators are still largely developed by governments, nominated experts and international organizations, with limited influence from local communities and citizen science.
- Citizen science can do more than fill data gaps: it can bring local and lived realities into monitoring, improve representation in under-monitored areas, and reveal discrepancies between official statistics and conditions on the ground.
- Key shift needed: involve citizen science and other participatory approaches in deciding what is measured and how, not only in supplying data for predetermined indicators.

Who participates in defining indicators determines what becomes visible, and therefore what counts as sustainability progress.



CITIZEN SCIENCE GLOBAL PARTNERSHIP

CSGP is a network-of-networks that aims to advance citizen science for better monitoring and achieving sustainable development.

- ***Coordinating Global Collaboration:*** Offering a structured, coordinated point of entry for government, NGO, and business partners looking to collaborate with the broader global citizen science community.

- ***Supporting and Forming Networks:*** Promoting existing networks that advance citizen science—such as the established associations in the United States, Europe, and Australia—while providing strategic guidance to help establish emerging networks in regions like Asia and Africa.

- ***Fostering Research Consortia:*** Supporting global consortia of localized citizen science projects working on identical global topics.

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Thank you!

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