



How can Inclusive Citizen Science Transform the Sustainable Development Agenda? Recommendations for a Wider and More Meaningful Inclusion in the Design of Citizen Science Initiatives

CITIZEN SCIENCE:
THEORY AND PRACTICE

COLLECTION:
CONTRIBUTIONS OF
CITIZEN SCIENCE TO
THE UN SDGS

ESSAY

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ABSTRACT

Although there has been a sharp increase in citizen science (CS) initiatives in past years, barriers to participation are often too high for many social groups, including vulnerable social groups, making CS subject to the same exclusionary processes that are reflected on a wider societal level. This essay aims to start a conversation on achieving more inclusive practices in CS initiatives and integrating them into the 2030 Agenda for wider data representation. First, we present prior research findings on the importance and benefits of social inclusion to science, citizens, and society, and considerations when designing for inclusive participatory practices. Next, we highlight ongoing European research projects that are making substantial efforts towards CS inclusion (e.g., [SOCIO-BEE](#)). Then, we discuss how inclusive CS can advance the Sustainable Development Agenda in general and in several Sustainable Development Goals (SDGs) in particular. Finally, we put forward a set of 12 recommendations to design for inclusion in CS initiatives, ranging from more abstract ideas (e.g., centering the strategy around the margins, being open to making mistakes) to practical actions (e.g., involving intermediary organizations, using inclusive language, publishing participant demographics).

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INTRODUCTION

As more funding is made available for participatory research, we are observing a steep increase in research projects adopting a citizen science (CS) methodology. As a consequence, a growing number of people now have the opportunity to participate in research projects, and thus gain a better understanding of how scientific methods work. Unfortunately, this participation is often not open to those who are the most affected by the challenge the project intends to solve, but to those who have more access and are easier to reach. Efforts to engage those who are most vulnerable and/or harder to reach remains mostly a checklist instead of a real strategy.

The Oxford dictionary defines vulnerability as a position of relative disadvantage, which requires a person to trust and depend upon others. This definition implies that vulnerability is not a strict concept but one that varies both across context and time. In citizen science projects, a common trait of groups or communities who are considered vulnerable is that they fall under the label of being hard to reach or engage. However, who belongs or not to a vulnerable community might depend on the focus of each project or initiative (for an example on defining vulnerability see the PANELFIT project on information and communication technology [ICT] and vulnerable groups). For instance, projects aiming to tackle accessibility constraints caused by bad urban planning should consider vulnerable all those affected and often not heard by this issue, such as those living in more remote neighborhoods badly connected by public transport, parents who find it hard to move with a stroller, and people requiring wheelchairs. Now, if the focus of the project is on air quality, then those we consider vulnerable might change, and here we should include those living in areas with heavy traffic, those with breathing problems, and those who lack access to information on the topic, among others. Therefore, it is imperative that we are able to understand society's point of view as a whole across the entire vulnerability spectrum, and advance the dialogue on inclusive citizen science.

Building on this (definition) challenge, this article aims to contribute to the discussion on how to make CS practices more inclusive in several ways. First, by drawing on the concept of social sustainability and prior knowledge on CS and volunteering, we highlight the benefits of inclusive participatory processes and some important design considerations. Second, we showcase examples of European research initiatives with substantial efforts towards achieving more inclusive CS. Third, we stress the potential of inclusive CS to contribute to the United Nations (UN) Sustainable Development Goals (SDGs) in general and to several SDGs in particular. Finally, we provide a set of

holistic recommendations on how to design for inclusion in CS to advance the 2030 Agenda.

THE NEED FOR SOCIAL SUSTAINABILITY AND SOCIAL INCLUSION

Next to economic and environmental sustainability, many cities strive for social sustainability involving their local communities with the goal of creating a more inclusive city. While definitions of social sustainability are diverse, it is based on two core elements: social inclusion and a sense of belonging (Carnemolla et al. 2021). The fundamental premise of social sustainability is that less inequality and greater justice create a closer connection between people and their living surroundings, and thus, heighten their agency with environmental issues (Eizenberg and Jabareen 2017). Social sustainability is also embedded in the UN sustainability goals; the 2030 Agenda recognizes the links between sustainable development and other relevant ongoing processes in the economic, social, and environmental fields (Bouzguenda et al. 2019).

The concept of social sustainability gained increasing importance in recent years as it became apparent that environmental and economic externalities are differentially and disproportionately distributed, both geographically and among different social groups (Puentes et al. 2021). Within all countries, there are individuals and communities that lack sufficient resources to adapt to development challenges, making them particularly vulnerable groups in society. The degree of vulnerability is influenced by several factors: the most important are income, education and language skills, gender, age, physical and mental capacity, access to resources and political power, and social capital (Eizenberg and Jabareen 2017). Furthermore, the communities most vulnerable to planetary health typically live in the most high-risk locations and may lack required skills and adequate infrastructure and services, and thus bear the highest costs. The barriers faced by these communities are not inherent to them but are the result of societal progress. Thus, these communities possess a unique point of view that can greatly contribute to change. Prior literature reports that effective community engagement practices have a positive impact on social sustainability, not only on vulnerable groups, but on the population in general (Bouzguenda et al. 2019), reinforcing how greater inclusion benefits society as a whole. Despite these findings, the social dimension of sustainability has been addressed considerably less by academics and practitioners than the economic and environmental dimensions. Tackling global challenges can be achieved only when all relevant players openly exchange ideas and expertise with each other,

thus it is paramount that we bridge this gap (Nodira and Jushkunbek 2022). On the basis of prior academic and applied research as well as practical evidence, we shed light on how inclusive citizen science can be a means to advance the SDG Agenda and reporting, and thus strive for social sustainability. The most important aspects will be elaborated in our set of 12 recommendations.

INCLUSION IN CITIZEN SCIENCE: BENEFITS AND CONSIDERATIONS

Although a limited amount of data is available on the demographics of CS participants, prior results seem to confirm that most participants belong to the highly educated, academically skilled, adult male proportion of the population (Vasiliades et al. 2021; Cooper et al. 2021). While CS is promoted as a way of contributing to the democratization of science and governance with the participation of the public, governments, academia, and industry (the quadruple helix), it appears that it is subjected to the same exclusionary processes that are reflected by the wider society. Inclusion is often mentioned in the literature in relation to CS, but the number of articles that specifically focus on making citizen science more inclusive and open to vulnerable social groups is still extremely limited.

Drawing on multiple literature streams such as volunteering, participatory governance, and CS, here we discuss the findings of a handful of articles that were deemed to have an important contribution to advance research on social inclusion. Prior literature recognizes myriad benefits of volunteering and of CS activities, which can be amplified by more inclusive practices (Prieto 2022). Benefits to science include increased efficiency compared with traditional data collection methods, the promotion of social good through collection and generation of data, and growth of science capital. Benefits to citizens include psychological and cognitive skill development through hands-on engaging activities, social skill development through collaborative engaging activities, improved physical and mental health, higher well-being and life satisfaction, and increased tolerance and understanding towards other individuals. Benefits to society include higher levels of scientific and environmental education, improved management of local and context-specific issues, more effective participation of the public in local decision-making processes, increased public support of organizations, enhanced democracy, civic engagement and environmental stewardship, and a stronger sense of belonging to a community (e.g., Tang et al. 2009; Makuch and Aczel 2020).

Although inclusion in CS is highly context specific, Cooper et al. (2021) suggest centering around the margins as a general strategy, which means that if a project is accessible to vulnerable groups, it will be accessible to all. In some cases, it might mean emphasizing diversity and inclusion from a cultural perspective, and in others the focus might be on reducing economic inequality. Another contribution is that of Fiske et al. (2019) with a list of 30 questions addressing ethical concerns (e.g., diversity, inclusion, representation) in CS in healthcare (intended for project managers to use for self-assessment). Institutional facilitation has also been reported as an important factor to make volunteering (and CS) projects more inclusive. Tang et al. (2009) identified role flexibility as the most important element for older adults to participate in volunteering activities. Being able to set their own schedules and to choose from multiple activities might motivate volunteers with mobility or transportation challenges to participate. Accommodating specific needs, for example, by providing support and education through various channels or offering home-based participation opportunities, has also been reported as a valuable element of volunteering projects. Another way of providing institutional support is by offering small monetary compensation or stipends, which may be important to low-income participants to cover the cost of volunteering (e.g., transportation costs). Finally, public recognition of participants' contribution may be more meaningful for vulnerable social groups than for average participants because their contributions to society are often underrecognized. These considerations can all easily be implemented through the combination of inclusive engagement methods and co-creative practices.

INCLUSION IN EUROPEAN UNION RESEARCH INITIATIVES—KEY SELECTED PROJECTS

Following the overarching goal of this paper, we describe three different CS projects we believe have the potential to greatly contribute to further achieving the SDG agenda: (1) SOCIO-BEE is creating an actionable and inclusive CS toolkit that is being tested in different pilot cities, which will be an important asset in facilitating the collection and use of CS-collected data by relevant decision makers and stakeholders; (2) YouCount developed a lot of the groundwork to establish meaningful connections with young communities and empower them to actively participate in solving global challenges; and (3) CitSci4All, much like YouCount, focusses on a particular community, namely deaf and hard of hearing, in developing methodologies of social inclusion. All three projects focus on different global challenges, and all

highlight the importance of social inclusion. Furthermore, these projects provided us with practical evidence through discussions with CS professionals, document revisions, and ongoing collaborations with project partners to formulate our recommendations.

SOCIO-BEE

SOCIO-BEE (2021–2024) is about working together with local communities to build citizen science hubs (referred to as hives) where inclusive engagement practices will be put in place to build active groups of participants working towards clean air. The overarching aim is to empower people to take action whilst fostering a long-lasting wish in everyone to adopt more environmentally friendly behaviors in their day to day lives.

A crucial component of the SOCIO-BEE engagement strategy is the inclusion toolkit. This element is important not only for SOCIO-BEE but for any project engaging citizens. The purpose of the inclusion toolkit is to invite CS practitioners to reflect on the design of their projects, and it will be freely available for anyone to use. SOCIO-BEE, and thus the inclusion toolkit, is currently in the design phase, which is why we cannot yet discuss the results of its application.

The inclusion toolkit can serve as a self-managed checklist to investigate whether a CS project meets the criteria for inclusive participation. It highlights the need to reflect on the ways of guaranteeing inclusivity throughout the entire research cycle. The five phases of CS development identified by Tweddle et al. (2012) provided the baseline for the procedural analysis (i.e., preliminary phase, definition phase, development phase, live phase, analysis and reporting phase). SOCIO-BEE researchers identified three main building blocks of inclusion across the five phases:

1. Representativeness of the sample and inclusion of vulnerable groups

Vulnerable groups can be identified along different dimensions such as:

- Age (children, adolescents, young adults or older adults)
- Health (disabilities, temporary illnesses to long-term conditions)
- Socio-economic status (low income and poverty, unemployment, limited education, homelessness, or other)
- Sexuality (LGTBIQ+)
- Ethnicity (minority groups).

It is important to note that some of this data is sensitive and requires additional protection in cases

where intersectional discrimination and/or multiple discrimination may be involved (e.g., women + ethnic minority + disability).

2. Data accessibility and inclusiveness (i.e., data gathering, data analysis, data reporting)

Products, services, environments, and programs should be designed in a way that everyone can use them to the greatest extent possible, without the need for further adaptation. The following universal design principles can be considered (Ginnerup 2010):

- Equitable use: marketable and useful for people with a range of disabilities
- Flexibility of use: adaptable to a wide range of individual preferences and abilities
- Simple and intuitive to use: easy to understand regardless of the user's experience or knowledge, language proficiency, or level of concentration at the time
- Perceptible information: conveys the necessary information to the user effectively, regardless of environmental conditions or the user's sensory capabilities
- Tolerance of error: minimizes the risk and adverse consequences of accidental or unintended actions
- Limited physical effort: can be used effectively and comfortably and with a minimum degree of fatigue
- Size and space: appropriate for approach and access, handling and use, regardless of the user's body proportions, posture or level of mobility.

3. Secure spaces (on site and online)

Diversity and inclusion principles include:

- Creating welcoming, respectful, and safe environments, both physical and virtual
- Promoting good treatment among all people
- Attending to, protecting, and caring for any person in a situation of vulnerability.

The three building blocks provided the baseline for the development of a self-assessment checklist. The checklist has three levels of inclusive participation with 47 indicators in total. These indicators outline the level of inclusiveness of any CS project:

- LEVEL 1 (23 indicators): The project encourages reflection on inclusion, but still requires further development of inclusive strategies in some phases of the research process.

- LEVEL 2 (14 indicators), Inclusive Citizen Science: the project commits to achieving the inclusion criteria in almost all phases of the research.
- LEVEL 3 (10 indicators), Inclusive Communities Citizen Science Experience: the project guarantees that all inclusion criteria are taken into account throughout all phases.

In 2023 and 2024, the SOCIO-BEE toolkit will be tested in the pilot cities of the project to correct possible deviations and define actionable items. Ultimately, the toolkit will be used to promote inclusion in all citizen science projects.

YOUCOUNT

YouCount (2021–2024) is an ongoing Horizon 2020 project that focuses on social inclusion, referred to as equal opportunities for youth participation in society. The project elucidates three main domains of social inclusion: 1) social participation (e.g., work, education, and social life); 2) connectedness and social belonging; and 3) citizenship and rights. YouCount approaches inclusion from a design perspective, both as a process and as a goal. In the recently published Policy brief of *Youth Citizen Social Science for Social Inclusion* (Butkevičienė et al. 2022), the use of citizen science to foster youth social inclusion is discussed. In this document, recommendations to increase social inclusion include the following: 1) Acknowledge youth as key citizens in Europe, 2) foster citizen social science (CSS) in countries where it is lagging, setting it up to be more inclusive, 3) address responsible research and innovation (RRI) practices while engaging youth (or anyone) in science, 4) motivate youth to engage in CSS, 5) address risks of exploitation, and 6) assure ethics in CSS.

CITSCI4ALL

CitSci4All (2022–2024) project is co-financed by the ERASMUS+ programme of the European Union. The project focuses on the inclusion and active participation of the deaf and hard of hearing community in matters of climate change. In CitSci4All, CS is envisioned as a means for achieving social and environmental justice. Similar to YouCount, the project revolves around social inclusion and what that means to a certain segment of the population. The project provides a Guide on Deaf and Hard of Hearing Adults' Engagement on Citizen Science Projects for Climate Change. This document outlines how participating in CS projects can be mutually beneficial to this community and to the general population, by overcoming communication barriers, and enhancing active citizenship and capacity building, which in turn leads to increased overall mental and physical health and an increased acceptance of diversity.

INCLUSIVE CITIZEN SCIENCE AND THE SUSTAINABLE DEVELOPMENT GOALS

There are currently 17 SDGs, which provide a framework for projects to develop methodologies that bring us closer to planetary health. For monitoring and reporting purposes, the goals are translated to 169 targets, which are reviewed using a set of 231 global unique indicators as an attempt to make the work towards achieving each goal both tangible and comparable across initiatives.

Within the framework of the SDGs, each country is asked to monitor their national progress towards the goals posing significant challenges and costs to countries; progress may, for example, be measured in spatial and temporal dimensions of data collection. Therefore, CS, a collaborative participatory practice in which the public and professional scientists work together, offers a powerful contribution to achieving the SDGs. Through citizen science, it is not only possible to gather data with stronger temporal frequency and larger spatial representation, but it is a practice open to the public, and thus there is the opportunity to invite all sectors of society into the conversation. CS represents a great opportunity to engage diverse social groups, including vulnerable social groups, in monitoring the SDGs and thus achieving sustainable development (Montanari et al. 2021).

Although there are many ways of doing CS, we propose some useful guidelines and best practices to follow, in line with the SDGs. For example, ECSA's 10 Principles of Citizen Science provide a code of conduct that helps project organizers to successfully develop participatory initiatives while remaining reliable, accountable, and inclusive. Another example for bridging CS and the SDGs is the *WeObserve* SDGs CoP (Citizen Science Community of Practice). By taking advantage of community-led working spaces, the key focus is to advance the existing knowledge of how citizen science/citizen observatories can trigger behavior change to achieve the SDGs.

CITIZEN SCIENCE AND THE CONCEPT OF “LEAVE NO ONE BEHIND”

The 2030 Agenda pledges to “Leave no one behind,” recognizing that for the SDGs to be achieved, involvement should be accessible to all. Countries that ratified the 2030 Agenda made a commitment to prioritize reducing inequalities, discrimination, and exclusion, and to foster human development of those who are furthest behind. The United Nations Development Program (UNDP, p. 3) defines the concept of leaving no one behind as follows: “All persons living in extreme poverty can thus be considered ‘left behind’, as can those who endure disadvantages or deprivations that limit their choices and opportunities

relative to others in society.” Across countries, women and girls, people in rural areas, indigenous peoples, ethnic and linguistic minorities, people with disabilities, migrants, gender and sexual minorities, youth and older persons are disproportionately among the left behind. The UNDP created a framework to help countries determine who is left behind and why, on the basis of the following intersecting factors: discrimination, geography, socioeconomic status, governance, shock, and fragility. In the context of this article, it is safe to say that these communities fall well under the term vulnerable.

Although efforts have been made to use CS-collected data in initiatives related to tackling the different SDGs, past research mostly focused on better CS data uptake in these processes (Ballerini and Berg 2021). Considerably less work has been done on increasing the representability of CS data. We argue that achieving any of the SDGs can be done only with an inclusive mindset and with constant efforts to involve a fair representation of society. In the section below, we expand on the reasoning behind this need for three particular SDGs.

SDG1: NO POVERTY, SDG2: ZERO HUNGER, SDG3: GOOD HEALTH AND WELL-BEING

How can zero poverty, zero hunger, and good health and well-being be reached without a representative overview of everyone’s challenges and needs? These three SDGs are heavily intertwined as one often leads to or is the cause of the other. What is the cause of poverty, hunger, or bad health? Is it always a lack of resources or could factors such as education, local environment, and bad urban planning also play a fundamental role? Poor households disproportionately lack access to services such as education, healthcare, water and sanitation, transport, and electricity, yet this is often not considered in poverty measures and solutions (Lanau et al. 2020). We can tackle the issue only when we understand it in all its facets. Thus, everyone needs to have a seat at the table. Within the same geographical area, different factors could play a role to different members of a community. For example, sometimes the lack of accessibility to healthy food might cause food insecurity, and other times it could be that the lack of education is what prevents people from getting the right food for their needs. To build a systematic map of all the challenges, we have to invite those familiar with them to the conversation (Fritz et al. 2019).

SDG13: CLIMATE ACTION, SDG14: LIFE BELOW WATER, SDG15: LIFE ON LAND

This principle is also true for climate action, life below water, and life on land. It is easy to assume that scientists

are the key players to move these SDGs forward. On one hand, scientists have high-quality data and are able to develop precise models of what problems exist and what solutions could work. On the other hand, without the support of all stakeholders that can affect or are affected by these issues, whatever solution is developed will not be complete. When tackling life below water, for instance, these stakeholders should include fishing communities, as well as those in the boating and oil industries, among others.

SDG11: SUSTAINABLE CITIES AND COMMUNITIES, SDG10: REDUCED INEQUALITIES

Cities are not often built with an inclusive mindset. Problems include high pavements, silent traffic lights, lack of parking spots that do not allow space for wheelchairs, and even more dramatic situations such as neighborhoods without easy access to primary services and with detrimental levels of noise and air pollution. There is an urgent need to create actions that enable urban planners to solve these issues swiftly and robustly (see the [DUET](#) project for an example on using digital twins in co-creative urban decision making). CS projects present a perfect opportunity to let key stakeholders such as policy-makers start a discussion with individuals and communities who are the most affected by urban inequalities.

This particular SDG coupled with CS is at the core of improving planetary health not only by directly improving the quality of life of those living in urban areas but also by showcasing to a large number of different communities the power of co-creation and how much they can achieve.

RECOMMENDATIONS ON DESIGNING INCLUSIVE CITIZEN SCIENCE INITIATIVES

Given the sustainability challenges we face and the tools we have at hand, we must work towards making CS practices more inclusive by gathering truly representative data, increasing CS data usage by local authorities, and integrating such data in SDG reporting (Fritz et al. 2019). Citizen science is a powerful tool that has true potential to achieve these objectives and to contribute to stronger social inclusion and social sustainability. Fritz et al. (2019) provides a well-structured roadmap for integrating CS data into SDG reporting; here, we highlight key recommendations we believe to be crucial in moving the data representation aspect forward. [Figure 1](#) provides a visual representation of our 12 recommendations.



Figure 1 Recommendations for inclusive citizen science design.

- 1. Invite actors of the quadruple helix to the conversation.** Establishing a dialogue and co-creative practices early on between the public, (local) governments, academia, and industry has the potential to enhance active, inclusive, and wide participation in citizen science projects (see Senabre Hidalgo et al. [2021] for co-creation methods and tools).
- 2. Have clear definitions, objectives, and KPIs for inclusion already at proposal level.** We recommend clearly defining the social groups the project intends to reach, establishing clear goals, and developing measurable indicators for each goal already at the time of writing the project proposal. All partners should have a common, shared understanding from the beginning. The project objectives should be realistic, taking into account the potential tradeoffs between wider public participation and data usability.
- 3. Include partners and stakeholders with expertise in engaging those you want to engage.** Next to a general call for participation through offline and online channels, we propose following a specific engagement approach by involving (intermediary) organizations that already have contact and expertise with vulnerable groups (see Skarlatidou et al. [2019] on how proper stakeholder mapping can enhance inclusive co-creation).
- 4. Understand the barriers to participation.** One of the main reasons CS projects don't go beyond engaging the "usual suspect" is that the barriers of participation are too high for individuals with different backgrounds. Such barriers are often invisible to project organizers. For example, interest in science and technology is considered one of the most important motivations for participation, yet not everyone has prior knowledge or training to carry out the tasks determined in the project. Thus, project organizers should dedicate time to discover the different barriers to participation among their target groups and design the tasks accordingly (see the SOCIO-BEE inclusion toolkit for self-assessment).
- 5. Center your strategy around the margins.** As a general rule, we recommend designing the project in a way that it is open to vulnerable groups (the specific target audience depends on the scope of the project). If this mindset is shared among all stakeholders from the beginning, every step can be designed inclusively or corrected along the way.
- 6. Publish participant demographics.** We encourage project organizers to collect demographic data on participants in every project and make them publicly available, so we have a better understanding of the different participant profiles. This should always be conducted with guidance from experienced data protection officers.

7. *Make inclusion context-specific, taking into account local social realities.* While it is not possible to make every CS project accessible to everybody, project organizers should aim for an inclusive design by taking into account the local context of the challenge they are trying to solve. In some cases, this might mean focusing on people living in the poorest neighborhoods of a city, while in others, the focus might be on a specific age group such as older adults or children.
8. *Use inclusive language according to the target audience.* Since over 90% of CS is communication (Veeckman et al. 2019), it is important to set the right tone with participants at every stage, and to consider their background, motivations, interests, and preferences.
9. *Make interaction with the project flexible.* Being able to choose from different activities and complete them in their own time can better motivate participants with different barriers to interact with the project. Within the local context, vulnerable groups or their representative organizations should be involved in designing tasks according to their needs and resources.
10. *Accommodate special needs.* An inclusive CS design also entails that participants' specific needs need to be considered in every phase of the project. For example, training materials, communication channels, feedback, and support might need to be adapted to the target audience.
11. *Be open to making mistakes and fixing them.* Striving for inclusion is a non-ending learning journey through which mistakes inevitably happen. It is not about having all answers ready but about how we adapt when we are confronted with the fact that someone feels excluded. It is also important to share these learning experiences (i.e., good and bad practices) with stakeholders outside the project to advance the overall knowledge on inclusive CS.
12. *Protect your participants.* As the 10th principle of the ECSAs 10 principles of citizen science states, responsibility for complying with ethical requirements falls entirely on those developing the project (see Fiske et al. [2019] for self-assessment). Participants should always feel safe that their rights are being protected. Thus, project organizers should always consult and/or collaborate with experts in ethics and law. This is particularly important when working with vulnerable social groups to make sure that no unintended harm is caused by involving them in the project, (e.g., causing emotional distress to participants by making them aware of a socio-environmental challenge or through inadequate engagement and communication practices).

CONCLUSION

We aim to start a discussion on how to design for inclusive citizen science and its potential contribution to the SDGs for increasing data representability and social inclusion. Our (non-exhaustive) set of recommendations is rooted in evidence from prior research findings and best practices from several European research projects (including our own) and may serve as guidelines when setting up future CS initiatives. This list is intended to be a holistic attempt to help the CS community to make future CS activities more participatory and representative at a wider societal level. We encourage project organizers, researchers, and other stakeholders to collect more empirical evidence on CS inclusion and to share their experiences to revise and complement these initial recommendations. Future research may be able to create a detailed roadmap on designing and implementing inclusive CS initiatives. In this way, CS is presented as a participatory and inclusive scientific research methodology that, from a critical and transformative perspective, can make a substantial contribution to the creation of public policies aimed at ensuring social inclusion and the prosperity of the planet, as set out in the SDGs.

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The authors have no competing interests to declare.

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