Diversifying Participation in CS Programs: Insights from Across the Field

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Engaging a diverse audience in a community science (CS) program can be rewarding for those who participate and for the project overall, but diversifying participation can be challenging to accomplish. Results of a recent survey of CS programs suggested that, while 60% of programs (n = 50) felt their program would benefit to a great extent by engaging a broader diversity of participants, 80% of those programs (and 68% of all of responding programs) faced challenges to doing so. With support from the National Sea Grant Network, a survey was conducted in fall 2022 to gain insight into efforts of water-focused CS programs to enhance diversity of participants, challenges faced, successes achieved, and lessons learned. This survey was conducted among programs supported by Sea Grant, U.S. Environmental Protection Agency (EPA), U.S. Geological Survey (USGS), and the Offices of Fisheries and Education within the National Oceanic and Atmospheric Association (NOAA).

For purposes of our study, water-focused programs included in the survey included those in which members of the public monitored water quality or quantity in freshwater or saltwater ecosystems including lakes, streams, beaches, tides, marshes, wetlands, canals, and permafrost. These projects also included those in which the public assessed resources, habitats, or situations related to water. These included beach erosion, fish, turtles and other aquatic life, cyanobacteria and other types of harmful algal blooms, microplastics, stormwater, and sewage.

Many terms are used when referring to public participation in the scientific process including citizen science, volunteer monitoring, participatory science, crowdsourcing, collaborative research, and co-production of knowledge, among others. Certain terms, like citizen science are widely recognized, but can be exclusionary. As such, within this fact sheet, we use the term "community science" or simply "CS" to reference such programs. "Community science" was first introduced through the Environmental Justice movement in the 1980s.[1] It has recently been adopted by other organizations that collaborate with members of the public to engage in the scientific process. Projects and programs referenced in this fact sheet may follow either a bottom-up (citizen-led) or a top-down (scientist-led) approach to develop and implement monitoring and assessment of the aquatic environment and related habitats.

DEFINING DIVERSITY

Diversity of participation in CS programs and projects relates not only to participants' race and ethnicity, but to other aspects of diversity as well. Here we define diverse participation as that which is demonstrated by race, color, gender, gender identity and expression, sexual orientation, national and ethnic origin, socioeconomic status, cultural and geographic background, Veteran's status, religious belief, age, disability, and other characteristics.

Of 33 CS programs that targeted outreach to a specific audience to increase their diversity of participation, 48% did so by race/color and 42% by cultural and geographic background † (Figure 1). Among these, Native American and First Nation groups were identified most often (by 12 CS programs). Three CS programs indicated working with people of color, or black, indigenous and people of color (with no further details about those people), while African American, Native Hawaiians, Vietnamese, and Latinx groups were mentioned once each. Nine CS programs (27%) targeted outreach by age. Kindergarten-12th grade youth and college students were most commonly identified as a target audience, while fishers over age 50 were also mentioned. Two programs each (6%) targeted outreach by either socioeconomic status or by disability, while 3% targeted by ethnic origin (i.e., Hispanic). No CS programs targeted outreach by gender, sexual orientation, Veteran's status, or religious belief.

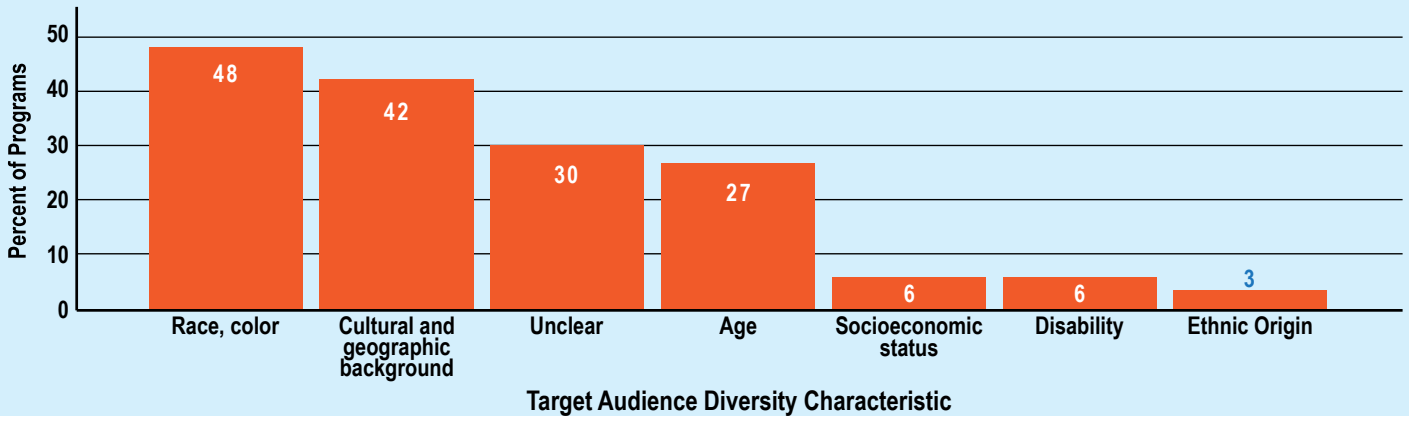

Figure 1. Characteristics of groups targeted by CS programs to diversify participation.

† Native American and First Nations were counted a targeting race, color *and* cultural and geographic background. When "people of color" were targeted with no further specifications this was not counted as targeting by cultural and geographic background as culture and geographic background were unknown. However, when a CS program reported targeting "BIPOC" individuals, this was counted as targeting by cultural and geographic background as indigenous is inherent in the acronym, black, indigenous and people of color.

CHALLENGES TO DIVERSIFYING CS PARTICIPATION

CS programs identified a variety of challenges related to supporting diverse participation. These can be divided into challenges pertaining to participants and those related to the CS programs, as described below.

Participant-related challenges

- Lack of access to technology (e.g., internet access)
- Lack of transportation to sites/training
- Too much time required to participate
- Lack of trust in sponsoring organization
- Timing of training/monitoring did not align with potential participants' schedules
- Lack of resources needed to participate (e.g., money, boat)
- Lack of physical ability to access sites/conduct methods
- Other obligations in life took precedence
- Did not meet prerequisites for participation

Participant Requirements Difficult to Meet

One program's methods required a full day for training, a one-year participation commitment, a flexible schedule to collect data, personal transportation to access sites, and ability to move across uneven ground while carrying supplies.

Program-related challenges

- Program locations were not accessible to diverse communities
- Diversity of potential participants was limited in project location
- Use of communications pathways failed to reach diverse audiences
- Benefit to participating was not obvious/not present for diverse audiences
- Lack of staff time/expertise to recruit and nurture diverse participation
- Diverse audience engagement not prioritized over other tasks
- Lack of program funds to support engaging diverse participants
- Lack of knowledge of how to engage diverse participants
- Long-term partnerships required but funding is often short-term
- Lack of capacity to develop CS programs that are valued by diverse audiences (e.g., due to lack of knowledge of issues of importance to diverse audiences)

Inability to Reach Diverse Groups

Several programs observed that the mechanisms they used to recruit participants (e.g., social media, news media) may not be used by the audiences they hope to engage to diversify participation.

Lack of Connection with Participant Community

When one program recruited individuals from diverse populations "with stong connections to land and rivers." they found those individuals were "not particularly interested in engaging in scientific research." Other programs found their staff lacked knowledge of specific audience needs, while others lacked resources and priority to research such needs of potential target audiences.

PROGRAMMATIC NEEDS

When provided a list of possible needs CS programs may have to be able to diversify participation, additional staff capacity to allow focus on diversifying participation was identified most often (Figure 2). Other types of needs were identified by 16% of programs (7 programs). These included funding to support staff and participants (5 programs) and how to collect demographic information to assess progress (1 program). One program noted proximity to monitoring sites being a challenge for diverse participants, potentially indicating a need for expanded geographic distribution of stations.

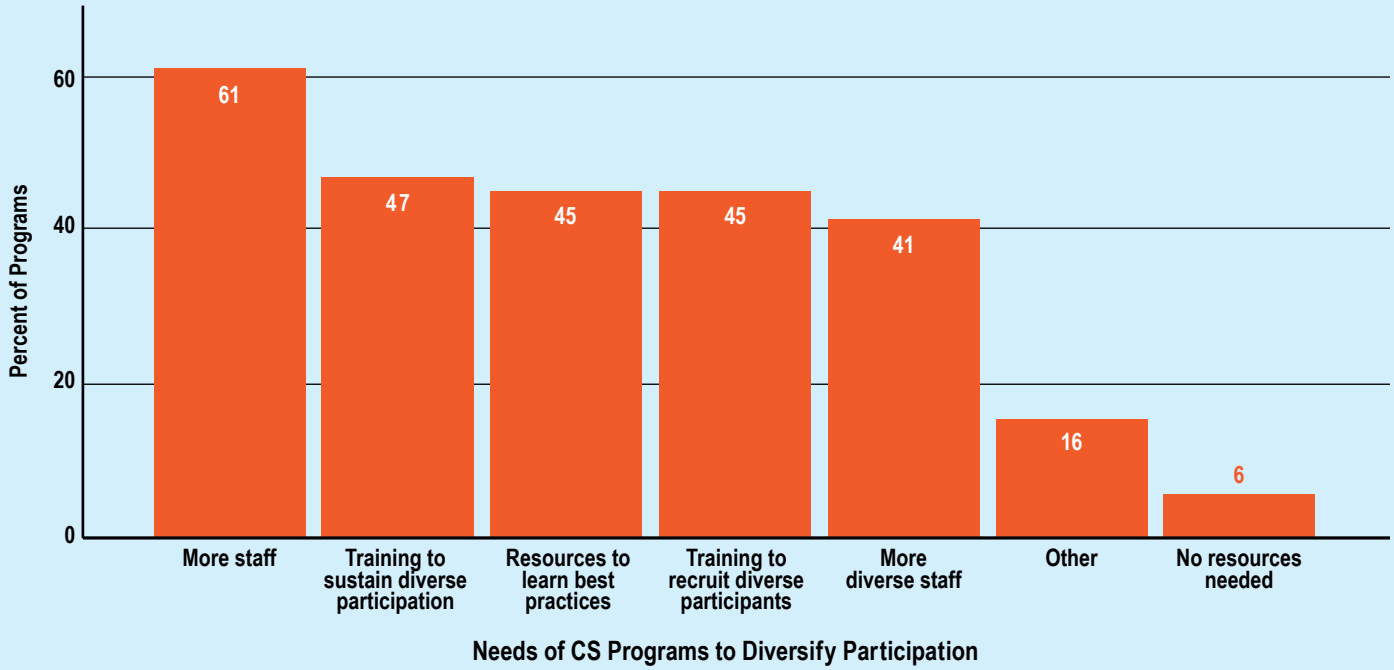

Figure 2. Needs of CS programs (n=50) to support greater participation among diverse groups.

SUCCESSES

Programs reported a variety of successes in reaching more diverse audiences. These included increasing diversity of participation by race, color, culture, socioeconomic status, a disability, and realizing a variety of benefits by enhanced diverse participation, as listed below.

- Monitored primarily areas with environmental justice concerns
- Adapted/developed CS program
- Increased program sustainability
- Built new partnerships
- Learned Traditional Local Knowledge (TLK)
- Collected data collected across a broader geographic area
- Developed new methods that allowed for more diverse participation

LESSONS LEARNED

A variety of lessons were learned as programs worked to recruit and sustain participation of diverse audiences. We separated these into lessons applicable during the recruitment, program development, and implementation phases.

RECRUITMENT

- Traditionally used recruitment methods can be exclusionary to diverse audiences.
- Networking with existing groups/ trusted individuals within diverse communities is essential.
- Having dispersed staff across a geographic area is helpful (e.g., to reach cultural communities where they live).

IMPLEMENTATION

- Flexibility in timing of program events is required.
- Participants will come with varied levels of knowledge about the subject.
- Diverse participants may need added encouragement to participate (e.g., that missing a sampling event is ok [if that's true] and their effort is valuable regardless).
- Continuous and clear communications in two directions throughout a project are important (and these take time and money).

PROGRAM DEVELOPMENT

- Diverse audiences are unique, and partnering with any particular audience requires a unique approach.
- Significant effort is required to align diverse community goals with agency missions/academic research.
- Need to be open to hearing constructive feedback and trying new approaches.
- The CS program should consider and address accessibility challenges of participants.
- Access privileges to collected data may need to be restricted (e.g., if data are sensitive and put individuals, a sacred site, a wildlife population, or something else of importance/value at risk if shared).

LEARNING FROM LITERATURE

We also reviewed peer-reviewed literature to identify best practices in reaching diverse audiences. Multiple routes were used to find literature pertaining to diversity, equity, inclusion, justice, and accessibility best practices within community science. These routes included searches using pertinent keywords** in Google Scholar and Science Direct databases, using listed citations both within found literature and those citing found literature, and asking colleagues for papers. This multipronged approach helped to fill potential gaps due to the abundance of terms now used in this field.

ORGANIZATIONAL LEVEL FOCUS

Recommendations that research teams or organizations may adopt to address diversity, equity, inclusion, accessibility, and justice:

- Relationship and trust building [2,3]
  - Start engagement early, even before setting the research question
- Participant inclusion in multiple aspects of the project, not exclusively data collection [2,3]
  - Co-development of ideas and questions, analysis of data, and sharing outcomes
- Align research goals with community priorities [3]
- Be open with the purpose and intent of the research [4,5]
  - Open communication helps build trust and retain participants
- Interdisciplinary teams [3]
- Inclusion of other ways of knowing [6]
- Partner with existing organizations [3]

INDIVIDUAL PARTICIPANT FOCUS

Recommendations that are focused on recruiting and retaining diverse participants:

- Targeted and personal recruitment [4]
  - Less broad sweeping advertisements and more that are direct and purposeful letters, 1-on-1 conversations, attending community events and meetings, etc.
- Identify any distrust or hesitancy toward the scientific community [3]
  - Break down perceptions to build trust and get at the root as to why distrust may exist
- Eliminate jargon/divisional language [2]
  - E.g., use plain language, translate documents
- Incentives for participation [5]
  - Childcare, volunteer hours, meals, etc.

** Keywords: community science, citizen science, participatory science, diversity, equity, inclusion, diverse participation, best practices, recruitment.

GETTING STARTED TO DIVERSIFY PARTICIPATION IN A CS PROGRAM

To diversify participation in CS programs, here are a few steps to consider that incorporate findings from the survey and our review of peer-reviewed literature:

- **Recognize and accept that diversifying participation will require time, funding, and flexibility.** Making a commitment to diversify your CS program's participation will likely require changing some things about the program. Reaching a new audience may require programmatic changes, such as when or how training is offered, how data are reported or displayed, what locations will be monitored, or the language in which you offer trainings, methods, or reports.

- **Seek or allocate funding to support your effort.** Consider raising funds or reallocating budgets to support new staff or consultants who represent that target audience, and that support your target community's engagement in the planning process. To help you get started, we developed a list of funding opportunities to which CS programs can apply to help with making such a commitment. This is accessible at: *www.bit.ly/CSfunding*

- **Get to know potential target audiences.** Get to know people and visit places you might not commonly go and reflect upon possible communities that may have been overlooked and/or that may benefit from becoming involved in your CS program. Aim to become informed of potential target audiences through conversations and relationship building with individuals who may be outside of your usual network.

- **Partner with a liaison organization(s).** Consider partnering with existing organizations that work with or represent a potential target audience. They will understand community needs, interests, communications pathways, and goals that align with your CS program.

- **Identify a target audience.** From your research and relationship building, determine a narrow target audience with which you wish to partner and that wishes to partner with you. Having a CS program that is "open to all," or that aims to reach, for example, "all youth who receive reduced or free lunch in schools," "all indigenous people," or "all disabled people in the state" is not likely to result in increased diversity of participants in your CS program. Such a wide goal doesn't define a pathway to reach or meet the needs of anyone outside of those currently engaged, except by chance.

- **Be considerate of the time required of your partner.** Your interests to diversify participation in your program may pose a burden to the partnering community. Time will be required throughout the planning and implementation phase, and while you may be being paid to do this work, the target audience may not be. You should identify a planning pathway to support diversified participation in your program that equitably includes individuals who represent the interested target audience (see seek funding section above).

- **Take time to listen.** To effectively recruit and sustain participation of your target audience it is crucial to understand that audience from their own perspectives, knowledge, and experiences.

- **Explore new communications pathways.** Recognize that communications pathways you normally use may not be the best to reach potential new target audiences. Learn from your target audience how they get information and communicate. Tailor your program outreach and recruiting to use those pathways.

- **Evaluate and adapt your program.** Modifying communications pathways is only one of a series of changes that may be required for your CS program to meet needs of a new diverse audience. Evaluate all aspects of your program in concert with the group with which you have partnered. Everything from recruitment, to training, to monitoring locations, to methods and reporting may need to be modified to align with your new audience.

- **Follow established program planning steps.** Program planning should follow established guidelines, such as through development of a quality assurance project plan that defines project goals, data quality objectives and requirements, and associated aspects of program design. The EPA has developed a handbook for Citizen Science Quality Assurance and Documentation (EPA 2019) that includes examples, templates, and videos to help you through the process.

To diversify your CS program's participation there is an infinite number of narrowly focused target audiences with which you might partner. The potential audiences will be specific to your geographic area and topic of focus of your CS program. Look back to the definition of diversity we offered earlier and think about populations in your area of operation. Consider indigenous and immigrant communities, people with physical or mental disabilities, and Veterans. Think across neighborhoods, churches, schools, grocery stores, and community programs. Take account of where people with different cultural, language, ability, and socioeconomic status live, work, and play.

REFERENCES

[1]Wandersman, A. (2003). Community science: Bridging the gap between science and practice with community-centered models. American Journal of Community Psychology, 31, 227–242

[2]Paleco, C., García Peter, S., Salas Seoane, N., Kaufmann, J., & Argyri, P. (2021). Inclusiveness and diversity in citizen science. The science of citizen science, 261.

[3]Pandya, R. E. (2012). A framework for engaging diverse communities in citizen science in the US. Frontiers in Ecology and the Environment, 10(6), 314-317.

[4]Brouwer, S., & Hessels, L. K. (2019). Increasing research impact with citizen science: The influence of recruitment strategies on sample diversity. Public Understanding of Science, 28(5), 606-621.

[5]Pateman, R. M., Dyke, A., & West, S. E. (2021). The diversity of participants in environmental citizen science. Citizen Science: Theory and Practice.

[6]Dibner, K. A., Pandya, R., & National Academies of Sciences, Engineering, and Medicine. (2018). Overview of Citizen Science as a Context for Learning. In Learning Through Citizen Science: Enhancing Opportunities by Design. National Academies Press (US).

[7]EPA. (2019). Handbook for citizen science quality assurance and documentation. Retrieved from: *www.epa.gov/participatory-science/quality-assurance-handbook-and-toolkit-participatory-science-projects*

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