Lessons for engaging the public in conservation: Synthesis across coastal and marine citizen science projects

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Based on a foundation of research excellence, the Center helps scientists, communities, and citizens collaborate on science to address environmental problems as a part of civic life.

Public participation in scientific research

Community-based participatory research

Citizen Science

Participatory action research

community science

volunteer monitoring

“Scientific research that involves members of the public in one or more stages of the scientific process”
## Models of Citizen Science

*From Bonney et al. 2009, Shirk et al. 2012*

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<th>Contributory</th>
<th>Collaborative</th>
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<td>Gather information</td>
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<td>Develop explanations</td>
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<td>Design data collection methods</td>
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<td>Collect samples</td>
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<td>Analyze samples</td>
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<td>Disseminate conclusions</td>
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<td>Discuss results/inquire further</td>
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Case Studies

1. Tracking change in seabird populations – Northwestern USA
2. Climate change, mangroves and coastal systems – Kenya
3. Invasive non-native species reporting – UK
4. Impacts of vessel traffic and whale watching – CA, USA
5. Marine litter – International and Chile
6. Citizen science informing marine protected areas – CA, USA
7. Eelgrass monitoring and restoration – Maine, USA
8. Community based coral reef monitoring – Micronesia
9. Intertidal monitoring by teachers and youth – CA, USA
10. Snorklers and divers monitor Queen Conch - Belize
Example of a Collaborative Project: Assessing Queen Conch Populations in Belize
By collaborating with citizens, natural resource management agencies and environmental organizations, COASST works to translate long-term monitoring into effective marine conservation solutions.
Reef Environmental Education Foundation is a grass-roots organization that seeks to conserve marine ecosystems by educating, enlisting and enabling divers and other marine enthusiasts to become active ocean stewards and citizen scientists.
Synthesis Areas for Citizen Science Projects

- Conservation issue and context in which the case is situated
- Project objectives, methods, quality control/quality assurance procedures
- Explanation of how participants are involved in scientific monitoring or research
- Evidence of whether and how the project met its conservation goals
- Benefits, limitations and challenges of citizen science for conservation and for participants
Key Conservation Issues and Questions

• …When data is needed over wide spatial and/or temporal scales, and/or hard to reach areas

• …When data is needed to provide a baseline to which future anthropomorphic or other perturbations in the system can be compared, providing early warning systems for managers.

• …When citizen science projects can explicitly link science to on-the-ground stewardship and decision-making (ecological restoration, natural resource management, and policy).
Circumstances under which citizen science is effective for marine and coastal conservation

Key Audiences and Stakeholders

- **Recreationists** – people with an interest, and/or stake in the health of coast and marine systems who may not depend on the ocean for livelihoods.
  - People who live near or frequently visit the beach
  - Snorklers and divers
  - Ecotourists

- **Fishers** and other **Coastal Resource Users**

- **Youth** – teachers, schools, out-of-school programs, families
Ensuring Data Quality

• Intensive **in-person training** of participants before they can submit data to the project – this is in contrast to many citizen science projects that simply provide resources online

• **Train-the-trainer** model

• Online guides with **video instructions**

• **Supervision** by professional scientists

• **Data verification** procedures using geo-located, time-stamped photos

• Provide **feedback** to participants to improve accuracy
Recruiting, retaining, and engaging participants

- Address participants’ motivations, interests, and needs
- Reach out to the specific audiences or communities who’ve shown interest in the topic of the project
- Develop deliberate and equitable partnerships between scientists and community-based organizations for long-term commitment to the project
- Communicate HOW participants’ data is being used and making a contribution to conservation goals they care about
Key considerations for designing marine and coastal citizen science programs: Effective strategies and approaches

Logistics and Safety of Participants

- Assess and **design around the volunteers** – don’t have them do something they aren’t ready for
- Consider accessibility for volunteers, and protect habitat from snorklers/ divers
Technology and Crowd-Sourcing

- **Smartphones** transmit verifiable photos - eliminate need for supervision of volunteers in the field
- **App development** has become easier to adapt apps for specific projects
- **Data visualization** platforms allow participants to explore datasets
- Many projects don’t use devices – consider potential participants and their access to tech
Collaboration, Communication, and Building Trust

• “Manage expectations” to explain the ways and realistic timeframe in which information from the project will inform conservation actions (Sewell and Parr, Ch. 4).

• Provide “data stories” that show how project data is informing research and management, updates on interesting findings (Parrish et al., Ch. 2).

• Build on local ecological knowledge, participants’ own inquiry and questions, when you can

• Continually revise and improve your citizen science program!
Lessons for the future of marine and coastal conservation, and the role of citizen science?

- **Place Matters** - Connecting people to their place increases sense of responsibility and stewardship over those places, more likely to enact pro-environmental behaviors (Kudryavtsev et al. 2012).

- **Collaborate and Partner Across Sectors** – Make sure essential roles are filled for successful citizen science project:
  - Project coordination, volunteer recruitment and coordination, training or education materials, QA/QC, data management and storage, data analysis and visualization, Super volunteers can help!

- **Learning and knowledge** – Participants can learn science content and skills, but also can contribute local knowledge and expertise – volunteers aren’t blank slates.
Conclusions

• **Participation and Power** – Our cases illustrate how sharing power and voice in scientific research, and conservation, can **benefit the research, the ecosystems, and the public.**

• **Not a silver bullet** - Coastal and marine citizen science can be a unique and effective approach to addressing conservation science questions, but should **be thoughtfully designed and applied to carefully evaluated situations.**
Thank you!

• Questions?
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For more information about the Center for Community and Citizen Science: https://education.ucdavis.edu/community-and-citizen-science