Citizen Science Primer

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Topics

1. What is citizen science?
2. What is driving it?
3. What role does it play?
4. Potential impact on state agencies and regulated entities?
5. Potential concerns?
6. Agency response?
7. Ongoing EPA citizen science projects
8. Takeaways

What is citizen science?

Citizen science is the involvement of the public in scientific research.[3] This activity includes gathering, analyzing, and sharing environmentally related scientific information, often obtained through advanced monitoring (increasingly through the use of new, lower-cost technologies that are deployed by organizations or individuals other than governments or regulated companies). It can take many forms, ranging from projects led by professional scientists in institutions (*contributory* citizen science),[4] to community-led efforts that orient toward community goals (*community science*, *community citizen science*, or *collegial* programs),[5] and many variations in between.

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What is driving citizen science?

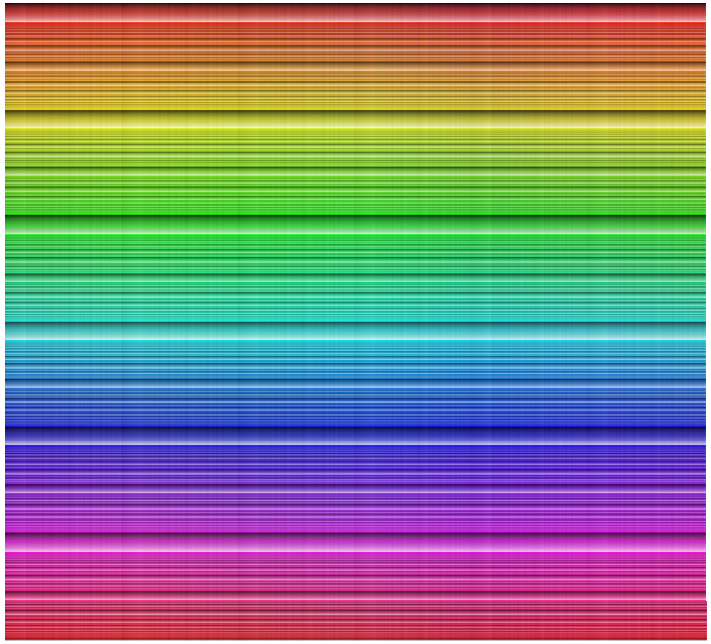
Many citizen science organizations say that the desire to impact government motivates their work,[26] and many citizen science project volunteers are motivated by the impact and relevance—or potential impact and relevance—of their efforts.[27] A recent emphasis in citizen science on the

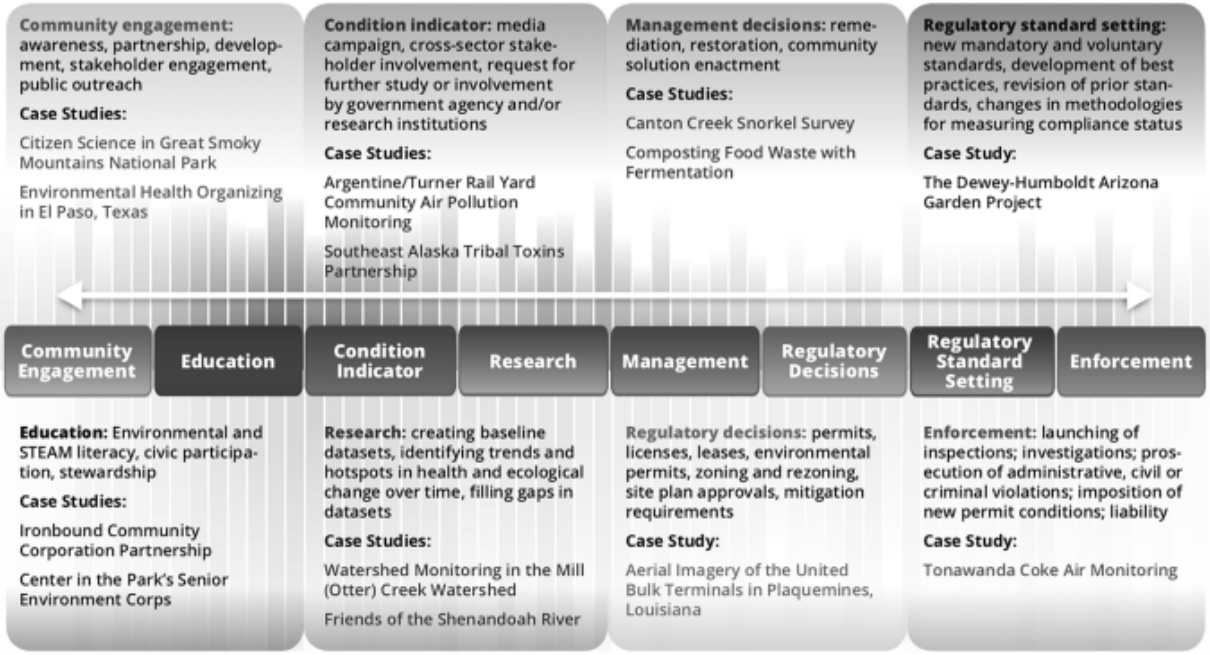
Community citizen science projects are often initiated as a response to the perception that government entities are not taking needed action to deal with local environmental concerns.[29] In this role, citizen and community science groups often perceive themselves, and are perceived by others, as adversarial to government rather than cooperative

might help with improving non-scientist literacy. Likewise, it might help to provide new scientific breakthroughs related to higher spatiotemporal resolution understandings of air pollution. Both claims could be made about our project with BOS. However, "not even the strongest sensor with the highest-resolution open-source real-time data will be enough to magically manifest environmental justice, especially if that injustice is built on a firm foundation of inequality and oppression" (Davies and Mah 2020, 239). We do not want an approach focused just on the gathering of more, "better" data, but instead an approach that sees improving scientific literacy as a two-way street, where scientists and non-scientists learn from each other. Therefore, it was particularly important for our collaboration with BOS to focus on air quality's sociomateriality. This can also be illustrated

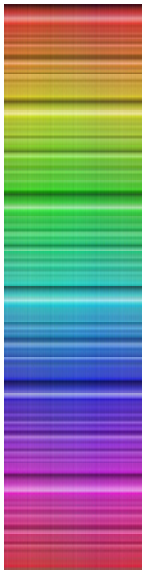
CS is often heralded to provide three main benefits: *democratising science* through wider stakeholder participation in decision-making, which reduces the likelihood of marginalising communities; *improving scientific literacy* to the scientific process; and *providing new scientific breakthroughs* made possible through massive citizen participation (Strasser et al. 2019). It is easy to see the potential links between CAQS's tenets of reflexivity and power and justice, and CS's *democratising science*: both aim to open the black box of knowledge production and reconfigure it with new knowledges in the pursuit of environmental justice. However, some have questioned whether CS necessarily leads to

What role does citizen science play?

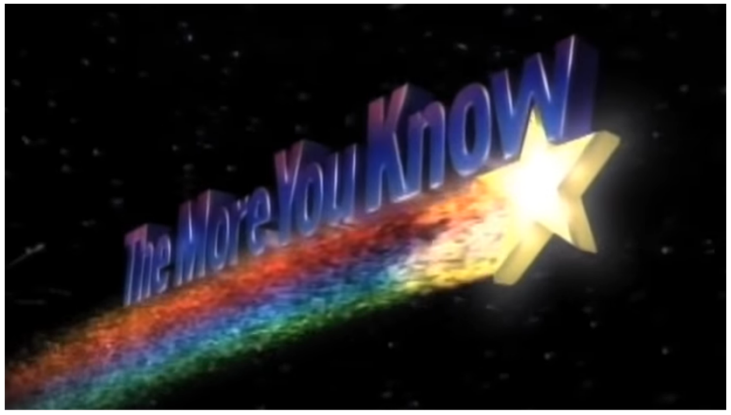




Categories of Data Use	Intended Project Purpose	Quantitative	Qualitative	Level of Detail
Increasing public understanding	Community engagement			
	Education			
Scientific studies and research	Environmental condition indicators (screening, exposure)			
	Studies and research			
Legal and policy action	Regulatory decisions			



Potential Impacts on State Agencies and Regulated Entities:

1. 

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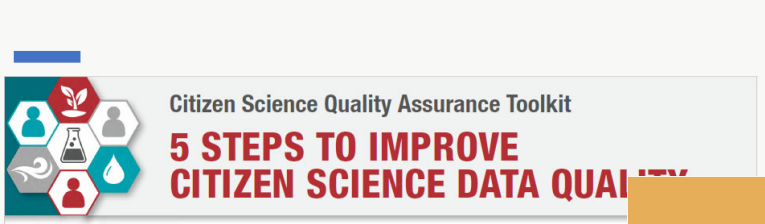
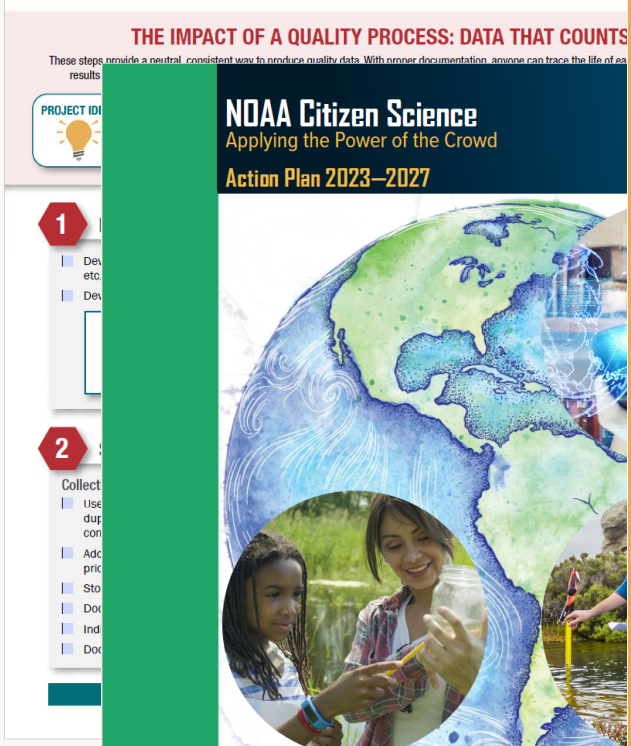
Potential Concerns?

1. How do we ensure quality data?
2. What quality assurance/control measures must people use?
3. Were sampling locations representative?
4. What sampling and instrument calibration methods should be utilized?
5. What controls were used to isolate background and other sources?
6. Documenting chain-of-custody?
7. How are samples stored and shipped?
8. What methods are used to analyze samples?

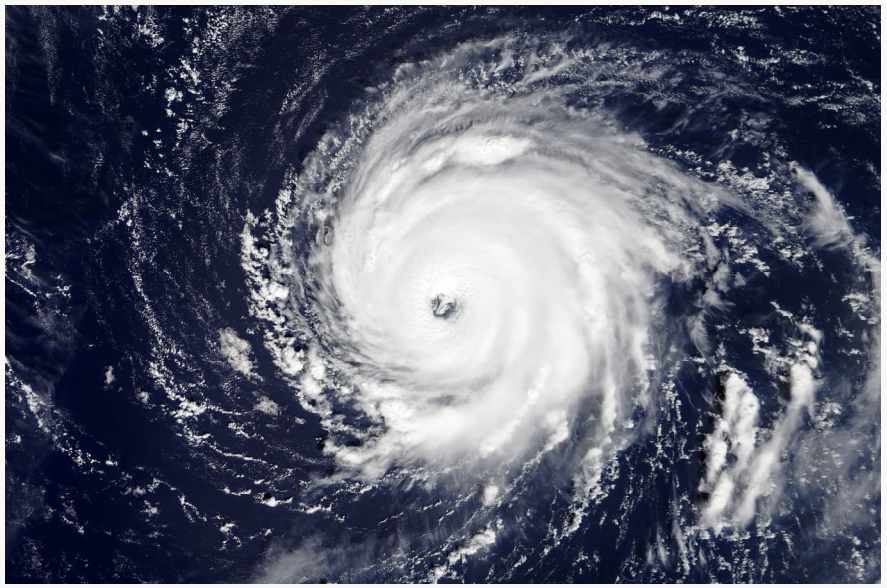
9. What data verification and validation methods are utilized?
10. How is data that does not meet analytical method validation requirements handled?
11. Is the sampling repeatable?

Agency response?





Ongoing EPA projects



EPA's message:

WE WANT YOU!

Takeaways

1. Not all data is created equal from a legal and regulatory perspective
2. Upcoming battles over data quality
3. Significant expert/*Daubert* implications in litigation
4. Increased permit challenges
5. Increased public outreach and stakeholder engagement
6. EJ & ESG implications

Questions?