# Community and Citizen Science Multi-Stakeholder Roadmap

Building a Robust Pathway to Increase the Use of Community and Citizen Science Data to Improve Environmental Outcomes and Public Health.

## Executive Summary

Citizen and community science data is an important and underutilized resource across the country in environmental protection. This document is a roadmap for community and citizen science data management that was co-created between community data intermediary organizations, state, tribal and federal environmental professionals, non-profit organizations and academic researchers as an output to a multi-stakeholder workshop held in fall of 2021. The roadmap is organized around a Theory of Change and is meant to be revisited and iterated as the work continues. This roadmap intends to involve all parties and delineate strategies, activities, and enabling conditions that would aim to achieve outcomes related to advancing the use of community and citizen science data. The body of this roadmap is organized around the three outcomes of the Theory of Change: *Broad, Inclusive and Resourced People Networks, Project Design Built for End-Use and Improved Data Usability and Clarity about Appropriate Use.* Embedded in each of those three sections are the strategies and subsequent actions necessary to achieve that outcome.

## Introduction: Working Together

The way in which states, tribes, communities, and EPA engage in environmental protection is rapidly changing, in response to new technology, more accessible tools and programs, and the inclusion of community members who have been working to identify concerns within their own neighborhoods. The nexus of community and citizen science and the regulatory work conducted by environmental agencies is brimming with opportunities to improve and shift the protection of the environment and human health. Specifically, community and citizen science (CCS), when used appropriately, can inform decision-making by augmenting existing knowledge, highlighting areas of concern for deeper investigation, and/or daylighting new opportunities to address environmental or environmental justice concerns. The use of community and citizen science data additionally provides an opportunity to create meaningful connections between community members and regulatory agencies, to empower communities, and to take the lived experiences of community members into decision-making.

***“Citizen science is much more than collecting data. It provides a way to engage all parts of society in gaining a deeper understanding of human environments, build an informed population that can advocate successfully for environmental protection, and more effectively protect human health and the environment.”*** - EPA’s National Advisory Council for Environmental Policy and Technology (NACEPT) (2016)

To fully realize the potential of community and citizen science data, a collaborative stakeholder effort is required that engages with all partners. This document, referred to hereafter as the roadmap, is one component of a larger body of work underway at EPA to develop a comprehensive vision and strategy for community and citizen science and how the agency itself can support integration of community and citizen science data. This work requires collaboration at all levels and the roadmap is the first iteration of a joint effort to improve the use of community and citizen science data in agency decision-making. We used qualitative methodologies to create this Roadmap by analyzing materials derived from existing initiatives and case studies[[1]](#footnote-2), as well as conducting interviews, and a stakeholder engagement workshop organized by the EPA Office of Research and Development (ORD). The workshop, case studies and interviews involved the following categories of individuals: EPA employees, state environmental agency employees, tribal environmental professionals, non-profit employees and directors, academic researchers and thought-leaders around CCS. Individual community members, the data-collectors of CCS data, were not present at the workshop or interviewed beforehand. Engaging with individual community members will be an important next step and is delineated as such throughout this roadmap. Within their vision document, EPA is also developing a set of principles to support internal agency efforts in advancing the vision for community and citizen science. These principles include guidance on how to advance good science and increase scientific understanding, data quality needs, supporting equity in community projects, building capacity for place-based work, and how informed decisions are strengthened through collaboration and integration of community data.

These principles work in conjunction with this roadmap and are oriented towards the same overall vision: *that community and citizen science data is* ***actively*** *used by communities and agencies, resulting in better protection of public health and our environment.*

From individual community groups, topical and place-based networks, local and state agencies, tribal environmental programs, territories, and EPA program offices – the work to realize the vision above will require a collective effort. This process is designed such that all stakeholders have ownership in this journey; edits to the roadmap and the Theory of Change can and should be proposed by any partner at any stage in the process. This roadmap does not detail any single partner’s role in this work. It instead charts an overall course through a series of desired outcomes, strategies to achieve those outcomes, and a set of example actions and projects that will provide progress towards the strategies. To ensure the CCS activities and projects are working towards the collective goal, the roadmap will require annual review, evaluation, and updates.

## Roadmap Organization: Using a Theory of Change

This roadmap is organized around a theory of change (figure 1 below) which details the types of activities, outcomes, strategies and enabling conditions necessary to arrive at the vision of citizen and community science being actively used by communities and agencies, which results in better protection of public health and the environment. The use of a theory of change provides a nimble framework through which the activities of any one partner are directly connected to desired outcomes and the ultimate vision of increased use of community and citizen science data. This framework also provides a method for frequent evaluation and adaptation of assumptions as projects and activities are completed. For example, if a robust set of guidance documentation is developed and made available and used by community groups, are agencies finding it easier to understand how to use those data?

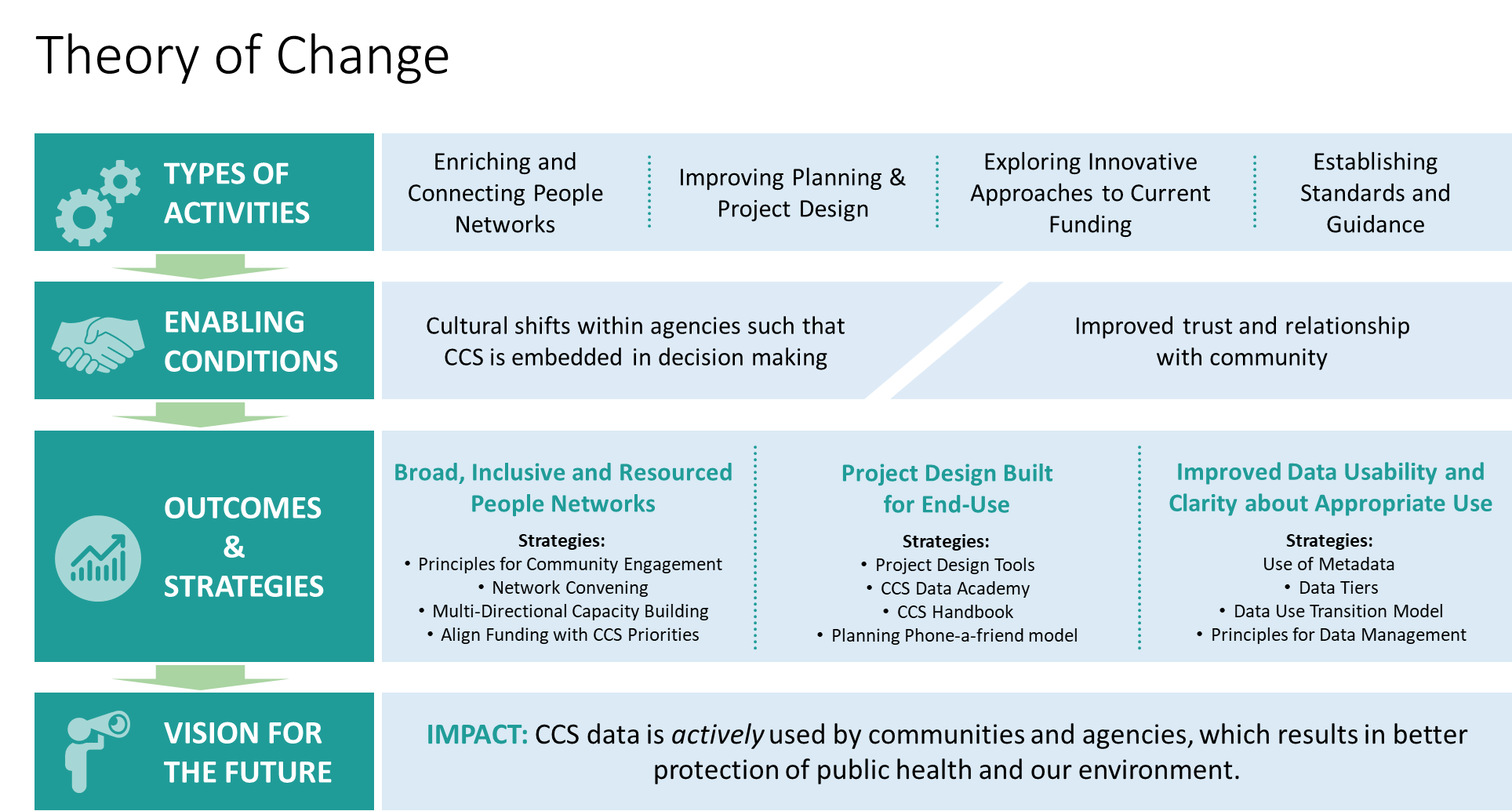
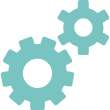


Figure 1: Multi-stakeholder Community and Citizen Science Data Management Theory of Change

For the purposes of this work, ***activities*** reflect the types of projects and actions that can be completed by one or a small group of partners. For this theory of change there are four activity types to help organize the types of projects necessary. The activities listed here were ideas generated via brainstorming activities at a multi-stakeholder workshop and via multi-stakeholder interviews.

***Outcomes*** are the resulting circumstances that will arise from the actions and strategies having been employed. Success towards the vision requires success in each of the three outcomes. ***Strategies*** are the categories that specific actions will fall under. They describe higher-level themes necessary to arrive at the outcomes and provide a way to measure success towards each outcome. Each strategy is comprised of specific actions, some of which are delineated in this roadmap and others that will emerge as the initial actions are operationalized.

This theory of change framework is meant to be dynamic, recognizing that bringing about change to the way that community and citizen science data is viewed, managed, used, and collected is a large undertaking that involves many people and many cross-sector systems. The theory of change is stepwise and at the same time, nonlinear, such that different activities and strategies can be moving forward independent of the pace of another outcome. However, success in any given outcome will enhance and support success in other areas and is in large part, depend on the enabling conditions outlined below. The model is meant to be revisited and reorganized or reconstituted if the moment in time calls for such action.

The roadmap organization follows the theory of change with each section below a more detailed description of the desired outcomes and associated strategies and actions.

## Enabling Conditions for Success

The theory of change highlights two key enabling conditions for the vision to be achieved. The two enabling conditions are strongly linked – success and progress in achieving one condition strengthens and improves the other condition. The first enabling condition is cultural shifts within regulatory agencies such that CCS is embedded into decision-making. Once communities see that their information is valued and is being used in decision-making it will advance the second enabling condition of improved trust and relationship building between the community and regulatory agencies. Alternatively, as the trust relationship is built, regulatory agencies will more rapidly and earnestly change their perspective on the value of CCS data. This virtuous cycle is an imperative dynamic and the assumptions about these enabling conditions and their relationship to one another underpin this theory of change. In other words, these conditions are necessary and are the context within which all of the strategies and actions in this roadmap are couched. This theory of change recognizes that undue burden is often placed on community groups, particularly communities of color, to navigate overly complex, inaccessible, and sometimes harmful systems and/or business processes to elevate community and citizen science data they have collected and advocate for action to be taken from that data. Agencies must adapt to improve their relationships with community groups and welcome frequent collaboration. The activities, strategies, and outcomes in this roadmap aim to provide community groups with tools, capacity building and support and provide agencies with concrete actions to begin the critical task of changing culture so that use of CCS is the norm and not the exception.

## Outcome 1: Develop Broad, Inclusive, and Resourced People Networks

At the heart of community and citizen science projects are the community scientists that collect the data and the service provider organizations that provide project support, from equipment training to quality control checks, to community groups working to identify problems and collect data. A truism of work done as part of a community is that individuals are stronger together. This is made possible through robust collaboration, relationships, and trust. Significant work is already taking place to connect community scientists, connect service provider organizations and build networks. The vision of this outcome is a “network of networks”. This vision honors the individual work that already exists (e.g., the Water Data Collaborative, Chesapeake Monitoring Collaborative) while acknowledging potential gaps in some geographies and content areas and the need to bring networks together. Network coordination would lead to all regional citizen and community science organizations being incorporated and could fill geographic or topical gaps where no current network is covering an area.

Achieving this outcome, however, will not only lead to connected, expanded and, in some cases, newly created networks but also improve access to resources and funding among network participants. Networks will have access to financial and technical assistance and concrete tool-based resources to support effective data collection and management. Groups and individuals will have the opportunity to learn from one another and support peers around the country. The outcome includes supporting the professional development and growth of agency staff as well as capacity building among community members. Additionally, agencies will understand how to engage with each network to improve efficiency and effectiveness of collaboration between community and government. Continued opportunities for multi-stakeholder engagement will also allow a forum for cross-stakeholder information exchange. A strong network of citizen and community science data collectors and service providers will allow for a venue for agency staff to seek data management support and raise data management concerns in a respectful and systematic manner. In this scenario, questions and concerns can be addressed in a group setting.

### Current Activities to Advance This Outcome

Several networks of community monitoring groups, academics, and agencies already exist and should be cataloged, amplified, and leveraged for continued discussions. The lessons learned from these networks are particularly helpful for any new efforts that are identified, especially across content areas. For the most part, existing networks focus on specific geographic regions and either air or water data collection. Examples of on-going activities that support these strategies include:

* Water Data Collaborative (<https://waterdatacollaborative.org/>)
* IVAN Air Monitoring Network (<https://ivan-imperial.org/air>)
* Internet of Water (<https://internetofwater.org/>)
* Citizen Science.org (<https://citizenscience.org/about/>)
* Colorado River Network (<https://www.rivernetwork.org/about-us/>)
* New Jersey Watershed Watch Network (<https://njwatershedwatch.org/about/>)
* North American Lake Management Society (https://www.nalms.org/our-mission/)
* ***[Reviewers: Please provide additional activities that should appear here]***

### Strategies and Activities Designed to Develop Broad, Inclusive, and Resourced People Networks

The following **strategies** will advance progress towards to develop broad, inclusive, and fully resourced networks by content area.

1. Create and Adopt Best Practices for Community Engagement: the collaborative creation and adoption of a set of principles for government agencies to hold in mind as they engage with community members will support improved cross-stakeholder engagement and serve to support governments in developing new, non-extractive, relationships with communities.

Initial **activities** to kick-start this strategy include:

* + An appropriate forum to collaborate on a set of principles for community engagement needs to be identified. It is important that this list of principles be drafted by a group of diverse stakeholders, that includes both data collectors and data users.
  + Once the forum has been identified, the group will draft a set of principles to guide data users in their engagement with community.
  + The principles will eventually be displayed in an accessible, public location and serve as reference material for agencies when appropriate.

1. Coordinate Network Convening: Convening existing networks to engage with the developed principles and encourage continued partnership, information sharing, relationship building, and seeding networks where needed.

Initial **activities** to kick-start this strategy include:

* + Existing community and citizen science networks need to be inventoried to understand where they currently exist and where they are needed.
  + Existing networks will be convened around a shared vision of improving the quality and eventual integration of citizen and community science data and strengthening the connections among networks.
  + EPA will continue to convene multi-stakeholder collaborative workshops as an opportunity for both skill and relationship building in a cross-stakeholder environment.
  + Mechanisms states have used to successfully fund CCS projects, both internally and as grants to community groups will be daylighted and catalogued as resource for others.

1. Improve Multi-Directional Capacity Building: Develop training and capacity for regulatory agencies to better understand and use community science data.

Initial **activities** to kick-start this strategy include:

* + Design and conduct awareness training and conferences for regulators and agencies on the developments of CCS and how it can fit into their work. These events should be structured in a peer-to-peer manner, such that regulators and agencies that are successfully and creatively using CCS data are positioned to lead in sharing their expertise and lessons learned.
  + Connect with academic programs to encourage CCS principles in environmental and public health curricula so that students can be exposed to the practices and emerging environmental and public health professionals will have baseline knowledge around the importance of community and citizen science.
  + EPA may host a data visualization hack-a-thon to resource innovation among projects that have strict budgets. Data visualization is an important element of successful data use but often requires funding that small-scale projects may not have.
  + Designated staff in EPA regional offices will be trained to serve as community science liaisons.

1. Align Funding with CCS Priorities: Strategic and diverse investments of resources and funding are necessary to advance the theory of change. Develop internal EPA alignment of community science priorities with new and existing funding and grant programs.

Initial **activities** to kick-start this strategy include:

* + Make connections and pursue opportunities within existing and emerging funding sources at the federal level.
  + Create guidelines for grant funding for CCS projects to leverage new guidance.
  + Scope out a structural mechanism to encourage the use of supplemental environmental project funding for CCS initiatives.
  + Collaborate with OAR to support community monitoring grants and explore activities to improve efficiency and effectiveness of collaboration.
  + Collaborate with OW to develop language within the grant solicitation notice for community science concepts.

### Indicators for Evaluating Success

*Achieving this outcome will look like:*

* Citizen and community science data collectors have the support of service providers to effectively plan and execute community and citizen science projects.
* Service providers are interconnected to form regional networks, that are among themselves connected to form a national, network of networks.
* The national network of networks covers all geographic and media areas and the nodes that make it up have the resources they need.
* Agency staff at a state, local and EPA level have opportunities for professional development to support them in adopting citizen and community science data management practices for the ultimate improvement of data integration in their systems.
* The national network of networks and agency staff have opportunities to interact, collaborate and problem solve in a supported, multi-stakeholder fashion.

## Outcome 2: Project Design is Built for End-Use

While data use and integration are often considered as the final step in a linear process of data management, it is important to recognize that considering end-use from the outset will ultimately improve the usability of data. Designing projects with data end-use in mind will improve project efficiency, empower projects to incorporate the right technology at the right time, and result in data that serves the success of the project. Focusing project design on the ultimate end use also provides agencies with the information they need to fully consider data in decision-making processes or projects with larger geographic scale (e.g., a regional or national overview build on community data). If the intended application of data is agency use, then agencies need increased clarity around avenues for citizen and community science data and community groups need resources and supports to design projects for agency use.

The strategies and activities outlined in this section will equip community groups with tools and resources such that if a need, desire or interest to collect data arises they will be supported from the outset with project design support. Inherent to this section is a recognition of the complexity and challenges associated with navigating regulatory and governmental spaces. Agencies and community groups will both benefit from increased use of community and citizen science data and these strategies and actions aim to provide accessible tools and supports to community groups for interacting with regulatory and governmental spaces. The tools and resources developed to support with project design will be informed by community needs and created in partnership with community rather than imposed in a top-down manner. Additionally, the process will begin by inventorying resources that already exist as a starting place to learn from and incorporate what is already working.

Current Activities to Advance This Outcome

There are a number of active projects across the country focused on creation and sharing of tools and resources to support the development of community and citizen science projects. These programs should be leveraged, replicated, and amplified as part of the strategies to address this outcome. Example of these programs include:

* The Water Data Collaborative’s Study Design Course (<https://water-data-collaborative.teachable.com/>).
* [Thriving Earth Exchange](https://thrivingearthexchange.org/)
* [Chesapeake Monitoring Collaborative Toolkits](https://www.chesapeakemonitoringcoop.org/resources/toolkits/)
* [Consortium for Scientific Assistance to Watershed (C-SAW) Monitoring and Assessment Support](https://www.c-saw.info/)
* [NJDEP’s Community Science Air Monitoring Site](https://www.nj.gov/dep/airmon/community-science.html)
* Virginia Department of Environmental Quality Water Monitoring
* [South Coast Air Quality Management District Comprehensive Guide Book on Air Quality Sensors](https://www.aqmd.gov/aq-spec/special-projects/star-grant)
* [Cyanobacteria Monitoring Collaborative](https://cyanos.org/)
* [Arizona Water Watch](http://www.azdeq.gov/azww)

### Strategies and Actions Designed to Reach Project Design Built for End Use

The following **strategies** will support progress towards achieving project design build to end use.

1. Create Project Design Tools: In collaboration with community and in response to their expressed needs, resourced agencies should create materials that aid in project design and provide clarity about matching data collection to end-use in a fit-for-purpose model.

Initial **activities** to kick-start this strategy include:

* + Conduct a document review as a mechanism to catalog existing state, federal and tribal guidance documents for CCS data. Identify gaps in existing guidance documents available to data collectors and community groups.
  + Community groups and data collectors should be routinely engaged to surface information around what project design tools are currently working for them and what project design tools do they need to advance their work.
  + Create resources that fill any gaps in project design needs as voiced by community and emerged through document review process.
  + Encourage and seed the development of equipment loaning programs so resources can be directed to project planning rather than equipment acquisition.

1. Launch Community and Citizen Science Data Academy: As a forum for learning, relationship building and collaboration, a national Community and Citizen Science Data Academy should be launched.

Initial **activities** to kick-start this strategy include:

* + Conduct community engagement sessions to discuss project planning and key needs and establish a forum for ongoing community engagement to surface trends that help identify what planning tools and templates are needed.
  + With the end goal of developing a CCS Academy by media area, identify a lead organization for each Academy. EPA should play a supporting and resourcing role while service provider organizations or regional networks lead each Academy.
  + Design, develop and launch a CCS Academy by media area.

1. Develop Community and Citizen Science Data Management Handbook: As a companion to the CCS Data Academy, create a handbook that can be accessed by the public online. This would be a forum to house all documentation and resources, both existing and newly created, surrounding CCS Data Management.

Initial **activities** to kick-start this strategy include:

* + Scope out a set of best practices and guidance documentation for emerging CCS Academy and Project Design Handbook.
  + Multi-stakeholder data group develops Data Management Handbook for CCS projects, available in diverse languages.

1. Plan a “phone a friend” model: A structure should be developed to support community groups when they have an emerging question regarding planning and project design with a clear and accessible place to turn for an answer.

Initial **activities** to kick-start this strategy include:

* + Scoping exercises around out what a phone-a-friend model would look like, and address the following questions: Who would need to be involved? who has piloted or is working on similar programs and how could they be involved? Who would the experts be and what are the expectations on their time should they choose to participate?
  + Conduct outreach to experts to begin process of on boarding a cohort of people who would respond to questions as they arise.
  + Build any necessary bridges between existing and emerging programs, depending on who owns this emerging program.

### Indicators for Evaluating Success

*Achieving this outcome will look like:*

* Data collectors will have access to a robust set of tools, trainings and resources in order to consider data-use in the initial planning stages of any project.
* Community groups will know where to seek information and support regarding project design.
* Agencies will have greater clarity on use pathways for citizen and community science data.
* Increased communication regarding use pathways in agencies will lead to an increase in data that is fit-for-purpose.
* The frequency with which community and citizen science data is used will increase.

## Outcome 3: Improved Data Usability and Clarity About Appropriate Use

The data that community members and groups are collecting to understand, advocate for or change their environments are hugely valuable. Community and citizen science data can provide an on-the-ground perspective at a level of granularity that is virtually impossible for regulators to collect themselves. Additionally, collecting data is laborious and time consuming. For these reasons, this roadmap aims to increase the likelihood that data will be used once it is collected. The strategies outlined in this section require input and work from both governmental and community partners. All the strategies should be viewed as collaborative, non-linear (e.g., work on strategies will likely occur in parallel), and success will require consistent engagement between data collectors and data users.

Many of the activities in this section include the development of standards, models, and other frameworks. The intention behind putting these frameworks is not to impose a top-down model of operating that community members are required to abide by, but rather to encourage the multi-stakeholder community of citizen and community science to take up these issues and arrive at a mutually beneficial end point that will increase the frequency of use as well as utility of community collected data.

Current Activities to Advance This Outcome

There are activities occurring across agencies to fully develop data standards, data tiering, and metadata recommendations by content area. For example, a robust collaborative process was used to develop the data and metadata standards used in How’s My Waterway (<https://mywaterway.epa.gov/>). These processes are not one-time activities, however, and the lessons learned across different content areas will be helpful as these conversations continue for new data types and evolve in existing areas. The follow activities are examples of this level of work and, in some cases, specific toolkits that have already been developed.

* EPA OAR development of data standards associated with increased funding through the American Rescue Plan. This work was coordinated for an existing RFP (released in December 2021). The lessons learned from this process could be used to inform future needs for other funding opportunities that are targeted towards community groups.
* [Water Quality Exchange (WQX)](https://www.epa.gov/waterdata/water-quality-data-upload-wqx)
* [Denver Love My Air Replication Toolkit](https://denvergov.org/Government/Agencies-Departments-Offices/Agencies-Departments-Offices-Directory/Public-Health-Environment/Environmental-Quality/Air-Quality/Love-My-Air)
* Consortium for Scientific Assistance to Watershed (C-SAW) Monitoring and Assessment Support (<https://www.c-saw.info/>)
* [Chesapeake Monitoring Cooperative Program Manual](https://www.chesapeakemonitoringcoop.org/wp-content/uploads/2021/10/CMC-Program-Manual-Final.docx)
* United Water Study and Other Save the Sound initiatives
* [Tribal Habitat Strategy](file:///C:\Users\ssarfatyepstein\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\3ESH7YYQ\Tribal%20Habitat%20Strategy): Information Management Platform
* ***[Reviewers: Please provide additional activities that should appear here]***

### Strategies and Actions Designed to Reach Improved Data Usability and Clarity about Appropriate Use

The following **strategies** will help achieve progress toward improved data usability and clarity about appropriate use.

1. Create Metadata standards (that are then used): Jointly establish the appropriate level of metadata needed for data tier frameworks and set expectations for application.

Initial **activities** to kick-start this strategy include:

* + Review and catalog existing standards to identify where this work exists, where work could be coordinated, and known gaps by content area.
  + Form a tiger team to develop **metadata standards** that includes representation of community members.
  + Develop a robust training program and communication plan that is responsive to community needs and interests to disseminate tools, guidance and skills related to metadata to community data collectors.
  + Develop resources that encourage the adoption of metadata standards with end users in mind, using the increased use of data as an incentive.

1. Get Agreement on Data Tiers: In order to ensure data are used for their appropriate purpose and to promote the use of qualified data, EPA is to adopt a data tier framework to support inclusion of community data within internal programs. Groups that already operate with data tiers will not be expected to alter their practices but these tiers will be available for those who wish to use or incorporate them. The main audience will be EPA internal programs.

Initial **activities** to kick-start this strategy include:

* + Create a multi-stakeholder data group to assess the current data tier frameworks, including the data tiers as described in the EPA Quality Assurance Handbook.
  + Develop a data tier framework that EPA can adopt, including specific case examples of data being used at each tier. This framework will be based off of existing data tiers that are widely used across the industry.

1. Enable Secondary Use of Data: Develop an approach to enable the ability for agencies to use CCS data for uses outside original community needs (e.g., secondary use) that is respectful and clear to communities.

Initial **activities** to kick-start this strategy include:

* + Develop outline for a model that supports a process of data use transition from a primary local use to a secondary regional or state-level use that incorporates collaborative community planning.
  + Launch a pilot project that intends to employ the model to use data at both a local level as well as a secondary regional or state level.
  + Develop a case study that profiles successful community collected data use in an agency setting.

1. Principles for Data Management: Develop a set of principles for community science data management across agencies and communities.

Initial **activities** to kick-start this strategy include:

* + Review existing principles for data management and assess whether new principles are needed (e.g., the Internet of Water Principles and their integration into potential federal funding opportunities).

### Indicators for Evaluating Success

*Achieving this outcome will look like:*

* A metadata structure is readily available for end-users as well as community data collectors.
* Community data collectors were given the opportunity to provide input on the metadata structure as well as data tier schema adopted by the EPA.
* Trainings and tools are available to support the adoption of the metadata structure and community groups are seeing the benefit of adopting the structure.
* EPA has adopted a data tier framework that was developed with multistakeholder input, which provides the means for CCS data to be incorporated into decision making processes.
* A model is created with multistakeholder input that delineates how to ethically transition data from a primary intended use at a local level to a secondary use at a broader scale.
* The data use transition model has is being piloted in a project.

## Summary and Next Steps

This roadmap is a first iteration of interviews, past community and citizen science reports and compilations, and workshop discussions intended to identify the types of activities that would support a robust integration of community and citizen science within environmental agencies. The theory of change, desired outcomes, and strategies will all require additional conversations as activities and projects progress to ensure that continual learning and evaluation is embedded in this work. At this time, it is anticipated that EPA ORD will continue to engage more broadly with community groups, citizen science networks, and state and tribal environmental agencies to identify where work towards the outcomes in this roadmap is underway, where support or amplification of activities would be helpful, and to convene discussions as appropriate. This work will not be possible without a robust coalition of community groups, NGOs, academics, state and local agencies, tribes, and EPA. To support this collaboration, work will continue to be supported by the E-Enterprise Leadership Council (EELC), a coordination body of states, tribes, and EPA program offices. Regular progress report-outs will be provided to the EELC throughout 2022.

Specific next steps include a review of this roadmap with workshop participants and then more broadly with community groups, existing networks, and environmental agency staff to gain additional input and build traction towards the outcomes. Next steps should also include convenings in 2022 to provide space for on-going discussions, specifically to better gather input and needs from organizations working directly in communities to ensure outcomes are supporting work and breaking down barriers to broader data use.

* January-March 2022: Multi-stakeholder Roadmap review period (process TBD)
* Early 2022: Using Community and Citizen Science at EPA: Vision and Principles released
* Early 2022: Identify and communicate a “lead” entity to support on-going coordination across activities and strategies identified in the roadmap.
* Early 2022: Report out and discussion of community and citizen science multistakeholder roadmap with the EELC.
* Summer 2022: Community and Citizen Science Workshop – Community group engagement on data use.
* Fall 2022: Convene interested parties to review progress to-date and suggest any update or evolution of the roadmap.

# Additional Resources

Environmental Law Institute (ELI). (2020). *Citizen Science Programs at Environmental Agencies: Best Practices.* Retrieved from <https://www.epa.gov/sites/default/files/2020-11/documents/citizen_science_programs_at_environmental_agencies_best_practices.pdf>

Inter-Tribal Environmental Council (ITEC). (2021). *Tribal Citizen Science: Investigating Current Activities and Future Aspirations.* Retrieved from <https://itec.cherokee.org/media/tknc42l1/tribal-citizen-science_white-paper_february-26-2021.pdf>

National Advisory Committee on Environmental Policy and Technology (NACEPT). (2016). *Environmental Protection Belongs to the Public: A Vision for Citizen Science at EPA* (EPA 219-R-16-001). Retrieved from <https://www.epa.gov/sites/production/files/2018-04/documents/nacept_citizen_science_publication_eng_022318_rf508_508.pdf>

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U.S. Environmental Protection Agency Office of Inspector General (USEAP-IG). (2018). *EPA Needs a Vision and Strategy for Citizen Science that Aligns with Its Strategic Objectives on Public Participation* (Report OPE-FY18-0002). Retrieved from <https://www.epa.gov/sites/production/files/2018-09/documents/_epaoig_20180905-18-p-0240.pdf>

Water Data Collaborative. (2021). *Fostering the Community for Water Monitoring Practitioners.* Retrieved from <https://drive.google.com/file/d/17HvKZ6DZ9vsHuB7rC07wXc6XjvSCApFD/view>

* Case Study Website Link (either E-Enterprise.net or EPA Website)
* Using Community and Citizen Science at EPA: Vision and Principles[[2]](#endnote-2) (once released)

1. [Linked in “Accomplishments”](https://e-enterprisefortheenvironment.net/our-projects/community-and-citizen-science-initiative/) [↑](#footnote-ref-2)
2. Pending citation upon release [↑](#endnote-ref-2)