

EPA, State & Tribal Use of Community/Citizen Science

Association of Air Pollution Control Agencies

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If you had 1,000 people
to help you with your
work, what would you do?

Community/Citizen Science is . . .

- The involvement of the public in scientific research often in collaboration with professional scientists and scientific institutions.
- A transformational approach to environmental protection that engages volunteers, allowing large numbers people to contribute to science.

Example of Citizen Science Impact

Flanders Environment Agency

Volunteers helped validate air quality models for nitrogen dioxide in Belgium

- Volunteers helped test a computer model of air quality
- 20,000 people paid €10 to join
- Participants installed NO₂ samplers (using a standard set-up)
- Initial findings, e.g., some buildings concentrate traffic exhaust in “street canyons” which the model underestimated

Rigorous Science

Policy Relevance

Extensive Citizen Participation

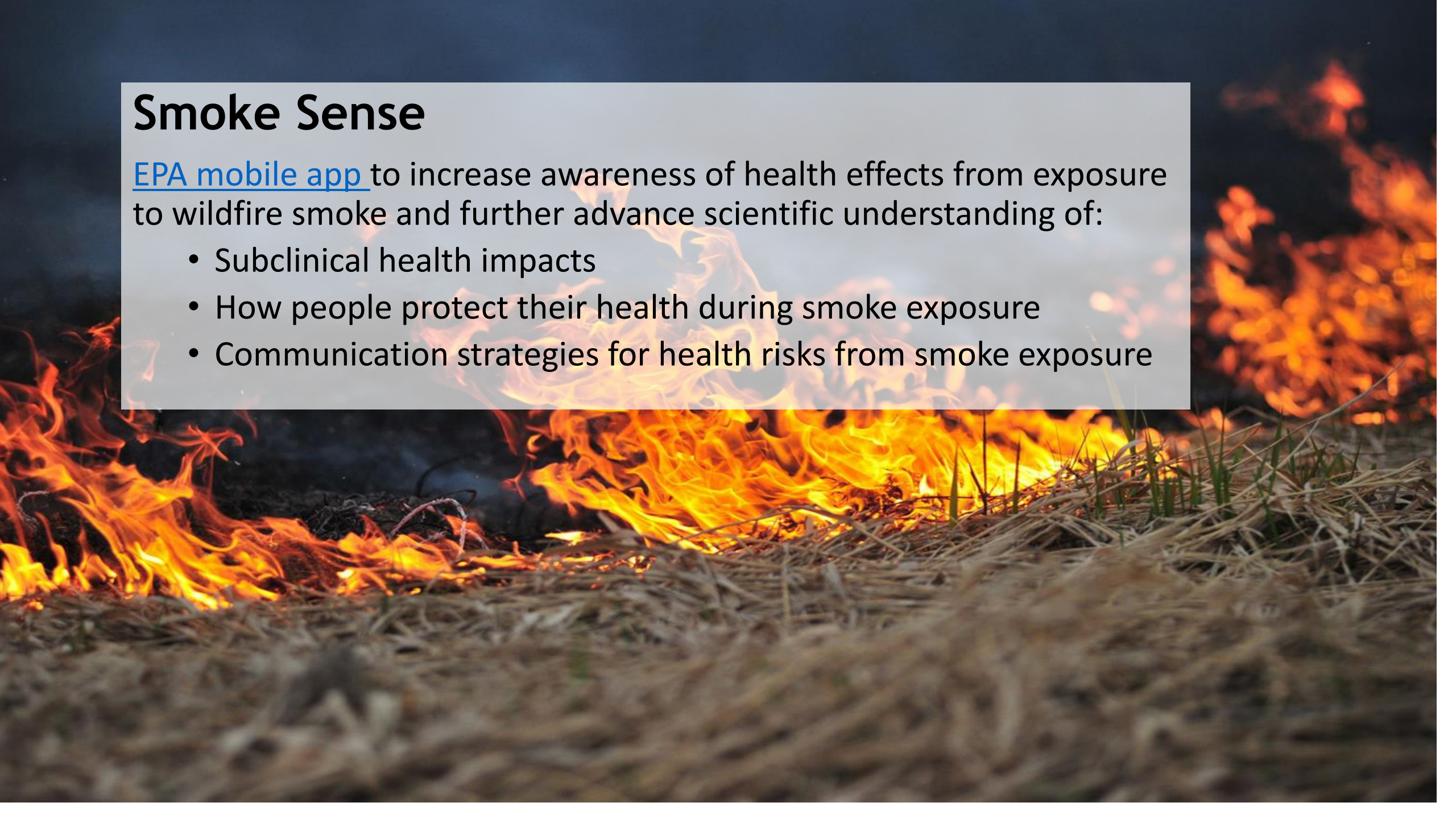
Aisling Irwin, 2018. Citizen Science Comes of Age. Nature. Volume 562, pp 480-482.

For more information: <https://curieuzeneuzen.be/in-english/>

Smoke Sense

[EPA mobile app](#) to increase awareness of health effects from exposure to wildfire smoke and further advance scientific understanding of:

- Subclinical health impacts
- How people protect their health during smoke exposure
- Communication strategies for health risks from smoke exposure



Another Example: Virginia Water Quality Monitoring

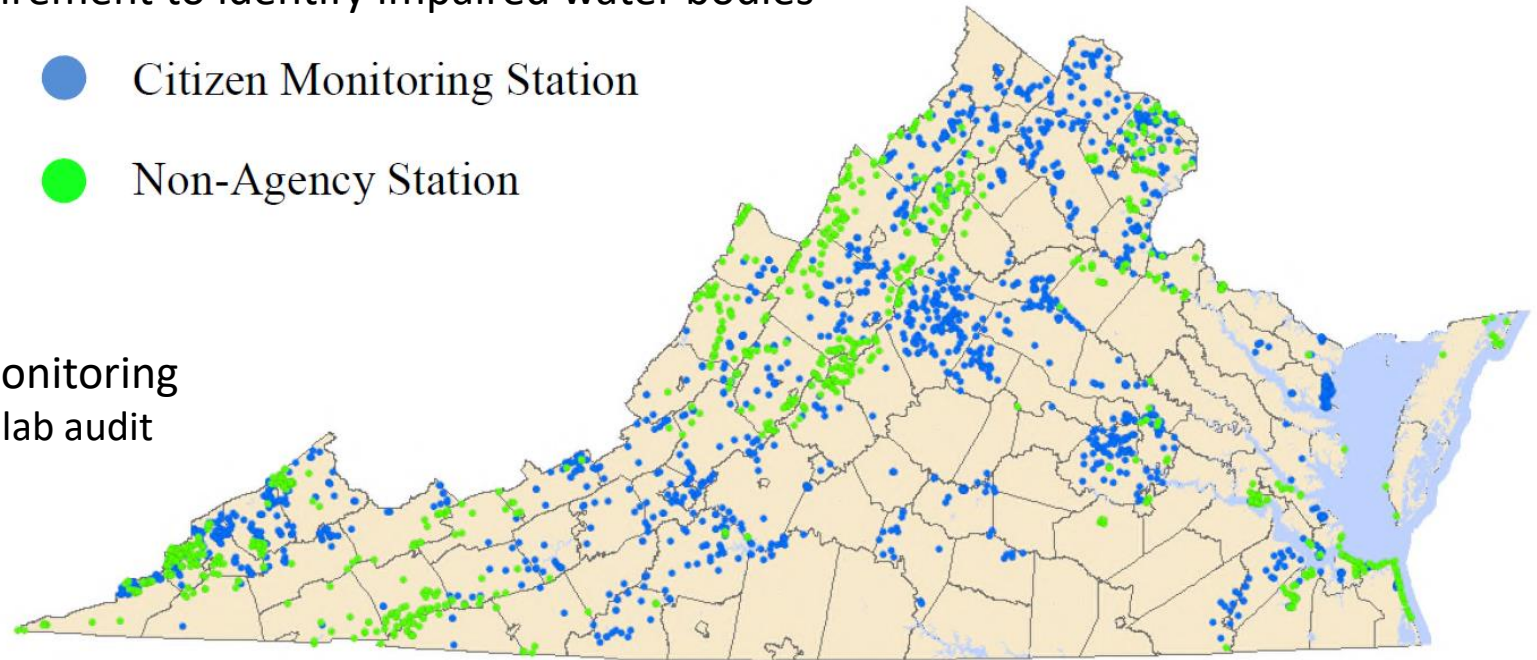
- Virginia DEQ began working with volunteer monitoring organizations in 2004
- [State Law](#) authorizes a Citizen Water Quality Monitoring Program
- Data sent to EPA -- Clean Water Act requirement to identify impaired water bodies

- [Citizen monitored areas in 2016](#)

- ✓ 3,800 stream miles
- ✓ 90 square miles of estuaries
- ✓ 15,000 acres of lakes and reservoirs

- Growth in technical capacity of citizen monitoring
 - 2004: < 50 stations passed DEQ field or lab audit
 - 2016: > 1000 stations met the standard

- Citizen Monitoring Station
- Non-Agency Station



[Results -- 2018 VA DEQ Survey](#)

- Over 140 monitoring groups; 81,000 hours annually
- Estimated value of volunteer monitoring = \$3.2 million per year

Diversity of EPA Citizen Science Applications

Some recent EPA examples*

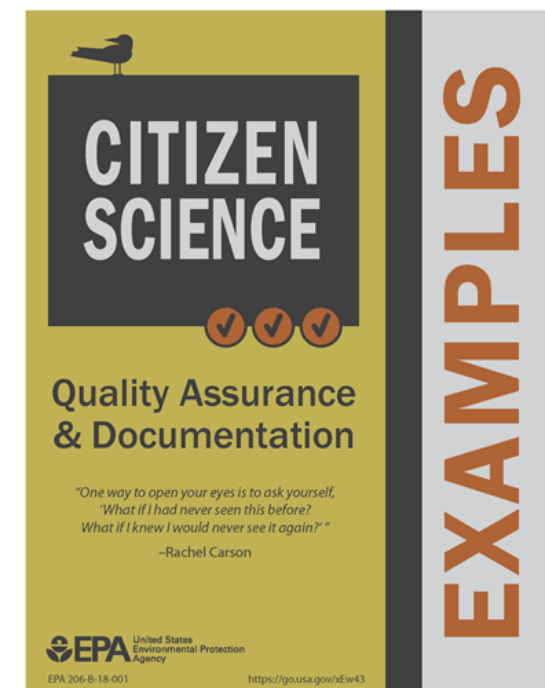
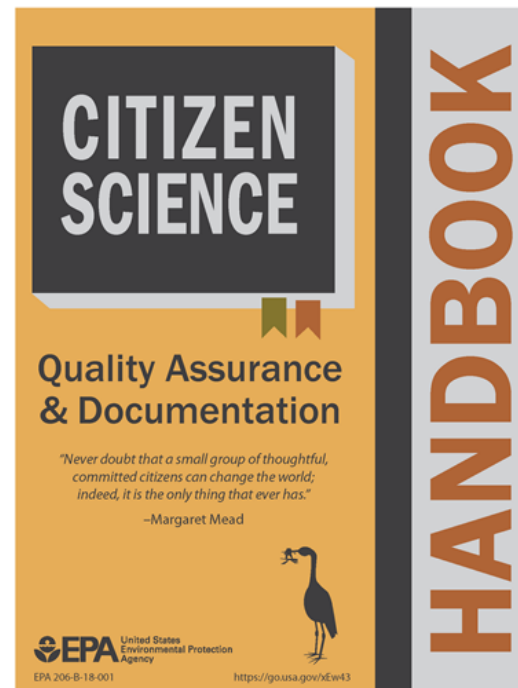
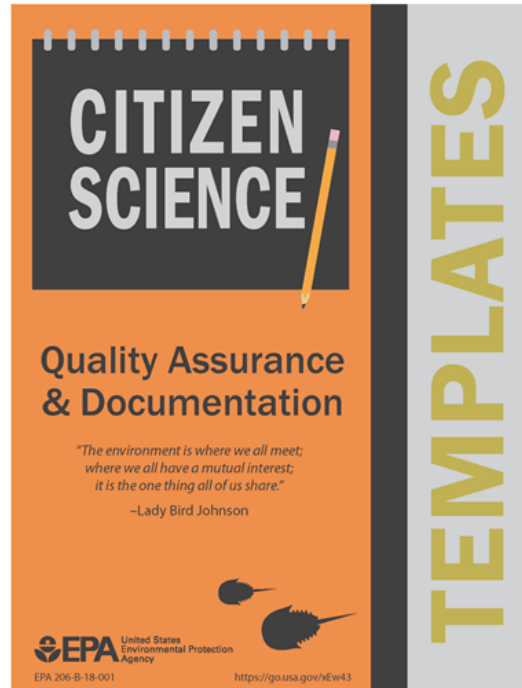
- Harmful algal blooms
- Drinking water
- Beach contamination
- Coastal acidification
- Invasive species
- Water quality
- Wildfire smoke
- Air pollution

* Projects in the 2019 [Report to Congress](#), prepared by the White House Office of Science and Technology Policy (OSTP)

Citizen science can contribute to all EPA work



EPA QA Handbook for Citizen Science (March 2019)



[EPA Handbook for Citizen Science Quality Assurance and Documentation](#)

Understanding the Use of Citizen Science in State, Tribal and Local Gov't Environmental Programs

Assessment by the Environmental Law Institute

- 15 Case studies
- Best practices report
- Interactive webinars
- Final report and recommendations



Diversity of Program Design and Purpose

Types of environmental issues

Agency roles

Uses of the data

Strategies to support citizen science organizations

Water Quality Case Studies

Meta-analysis of State Water Quality Monitoring Programs
Example: AZ Water Watch Program

Reporting Harmful Cyanobacteria Blooms in Idaho

Public can identify toxic blooms, which identifies problem areas and allows state staff to alert the public about risks

Evaluating Wetland Health in MN

Volunteers collect data for use by local gov't and watershed groups in management programs

Alaska-Yukon Indigenous Observation Network

Community-based monitoring tracks water quality across a vast area in Alaska & Canada

Southwest Wisconsin Groundwater/Geology Study

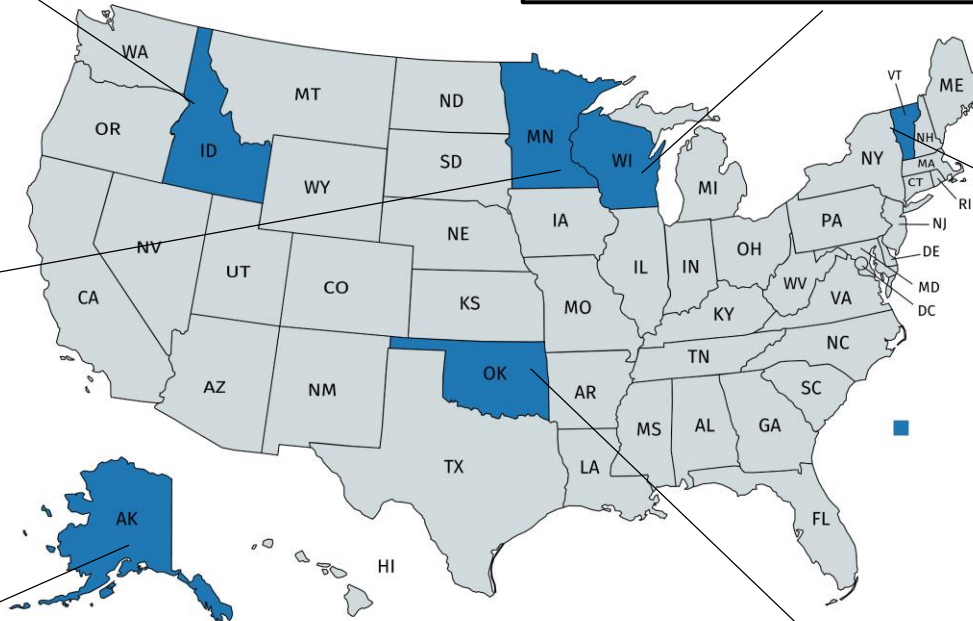
Private well owners contribute water samples to help assess geographic extent of well contamination

Tracking Cyanobacteria in Lake Champlain

Volunteer monitoring data used to alert the public to risks and identify areas that are safe

Oklahoma Fish Kill Response Management Program

A telephone hotline to report fish kills and respond to these events



Created with mapchart.net

Air Quality Case Studies

Puget Sound Air Quality Sensor Map

Compiles data from local low-cost sensors and adjusts the data to the standard of agency monitors

West Oakland Community Action Plan

Collaboration with community activists helped create a long-term plan to reduce air pollution

Imperial County Community Air Monitoring Project

Community members help gather data in an air-monitoring network

New York State Community Air Screen Program

Community-based program in which volunteers can sample for toxic air pollutants

DC and NYC Anti-Idling Ordinances

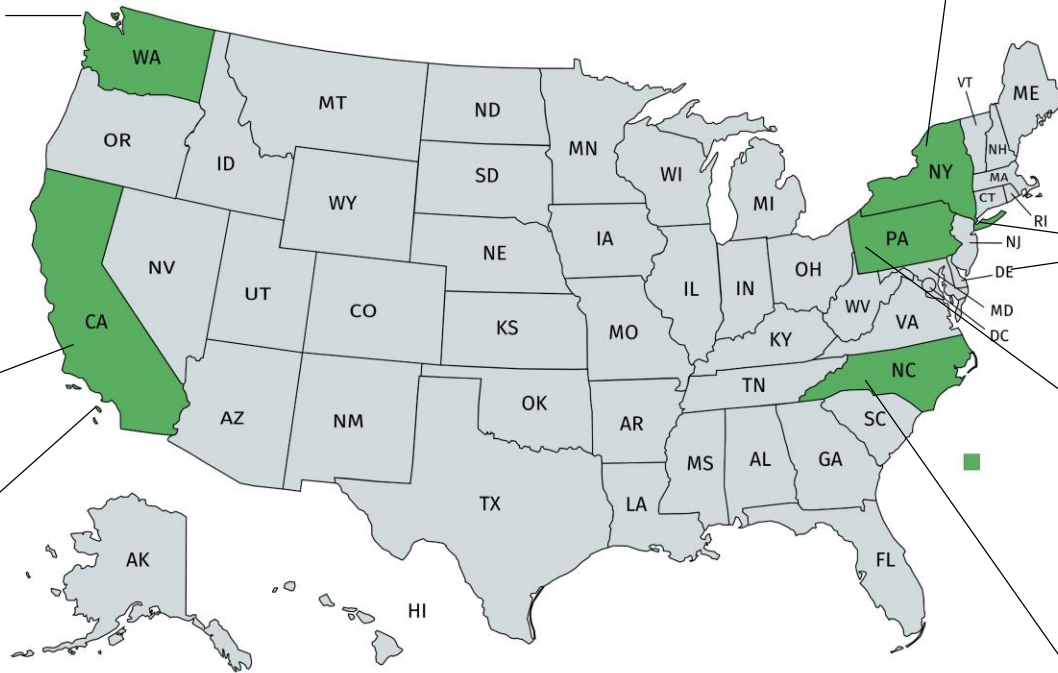
App allows public to report violations

Smell Pittsburgh

Smartphone App crowdsources reports on offensive odors

Mecklenburg County Community Science Station

Allows the public to test accuracy of personal air sensors



Key Success Factors

Air Projects

- Trusted relationship w/ community organizations
- Formal legislative framework
- Technical assistance, equipment, guidance
- Creative use of technology



Best Practices of Successful Programs

01

**Generate
Valuable
Data**

(Fill a key data gap)

02

**Create
A Partnership
Network**

(To leverage \$'s)

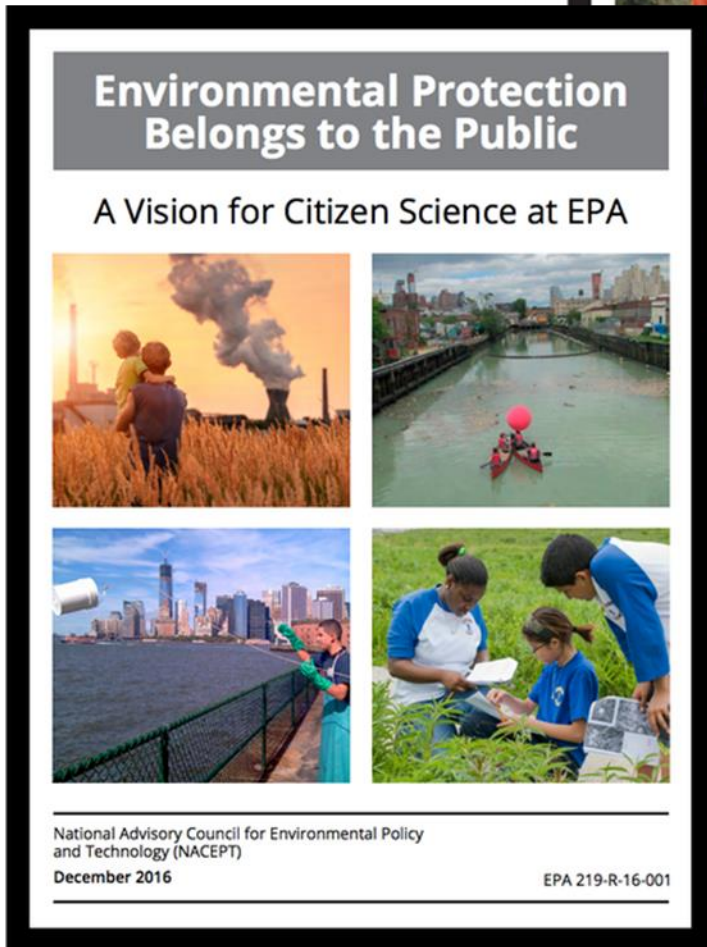
03

**Demonstrate
and Document
Success**

(Outcomes/Impacts)

EPA

2016



2018

“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.”

Report from EPA’s National Advisory Council for Environmental Policy and Technology (2016)

Using Citizen Science at EPA: *Draft* Vision and Principles

Scope

- Use in its EPA programs
- Collaboration with other Federal agencies
- Cooperation with state and tribal governments
- Support for citizen science work done outside of government

Proposed future vision for citizen science at EPA

EPA envisions a future where the public is engaged and empowered to help advance scientific knowledge that informs environmental protection actions.

In this future vision, citizen science data are abundant, accessible and useful for environmental decision-making.

Why Invest in Citizen Science?

Fill data gaps

Improve public understanding of environmental issues

Create a stronger, more inclusive and collaborative network

Yield cost savings and efficiency

Proposed Principles to Guide Citizen Science at EPA

1. Design for scientific quality
2. Plan and document data quality
3. Maximize transparency and accessibility
4. Strengthen shared governance with states and tribes
5. Support collaborative partnership networks
6. Encourage a diversity of project approaches
7. Integrate into the full range of EPA's work
8. Build capacity for place-based problem solving
9. Create equity in community projects
10. Use innovation, experimentation and evaluation

Action Areas

1. Implement an EPA data management strategy for citizen science
2. Increase staff skills and institutional capacity within EPA
3. Expand EPA cooperation with states and tribes
4. Strengthen collaborative partnerships and networks
5. Enhance private sector understanding and participation
6. Support community-driven citizen science
7. Incorporate citizen science results into EPA program strategies
8. Develop metrics to measure and evaluate projects



The Untapped Power of Citizen Science

A Collaborative Future:

EPA Working with States, Tribes and Local Environmental Agencies

“EPA must advance a positive, proactive agenda—to work in partnership with communities and state, territorial and tribal governments in ways that strengthen citizen science infrastructure and standardize citizen science methods.”

“One of the great benefits that citizen science offers EPA is the opportunity to leverage expertise, networks and resources of other parties.”

Report from EPA’s National Advisory Council for Environmental Policy and Technology (2018)