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INNOVATIVE RESEARCH FOR A SUSTAINABLE FUTURE

CITIZEN SCIENCE OPPORTUNITIES FOR MONITORING AIR QUALITY

What is Citizen Science?

Citizen science includes projects and programs designed to engage the public in scientific investigations, such as asking questions, collecting data or interpreting results. Citizen science includes volunteer monitoring, public participation in scientific research, and many other activities.

The U.S. Environmental Protection Agency fosters citizen science in a number of ways. The Agency creates citizen science projects, participates in projects managed by other organizations and helps individuals identify and develop citizen science projects for the public.

Citizen Science and Air Quality Monitoring

Air quality in the United States is tracked using a network of national monitors located across the country. The monitors use established technologies that provide accurate regional data on air quality for use in implementing the nation's air quality standards, enforcement and research.

The monitoring network, however, does not always lend itself for use by citizens because it is designed to provide regional data, and has limited utility for direct personal or local air quality information. The monitoring systems are also large and stationary, expensive to operate and require frequent maintenance by trained staff.

Citizens are interested in learning more about local air quality where they live, work and play. New technologies are being developed and evaluated to fill this need through EPA's Next Generation Air Monitoring research activities.

Equipment at a typical regulatory monitoring site.

A wide variety of small, portable and lower-cost monitoring devices are being developed by industry, universities and individuals to potentially enhance air quality monitoring capabilities in the future. EPA scientists are collaborating with other federal, state and non-governmental institutions to encourage the development of new sensor and app technologies for measuring air quality and are evaluating the performance of these new technologies. Such technologies are not yet approved for regulatory monitoring.

The next generation air monitors are:

- Inexpensive ($100 to $5,000)
- Highly portable and easy to operate (often mobile)
- Require minimal training to start collecting data
- Inexpensive to operate (replace or recharge batteries)

The AirCasting App and Air Monitor enable users to record, map and share health and environmental data using their Smartphone and the portable air monitor. This example and the one below represent types of new technologies available for citizen science activities. EPA encourages new technology development, but does not endorse any products.

The CairClip air sensor fits in the palm of a hand and collects data on ozone and nitrogen dioxide in the air.

Citizen Science Toolbox

EPA's Air Sensor Toolbox for Citizen Scientists provides information and guidance on new low-cost compact technologies for measuring air quality. Since citizens are interested in learning more about local air quality where they live, work and play, EPA scientists are collaborating with other federal, state, and non-governmental institutions to encourage the development of new sensor and app technologies for measuring air quality.

The Toolbox provides information to help citizens more effectively and accurately collect air quality data in their community, including information on;

- Sampling methodologies
- Generalized calibration/validation approaches
- Measurement methods options
- Data interpretation guidelines
- Education and outreach
- Low cost sensor performance information

C-FERST

EPA is developing the Community-Focused Exposure and Risk Screening Tool (C-FERST) — a web-based mapping tool designed to assist communities with the challenge of identifying and prioritizing environmental issues, and making decisions about environmental exposures and risks within their community. Citizen scientists could use C-FERST to map and analyze the air quality data they collect. The tool can be used to access guidance and best practices on using citizen science methods and data.

EnviroAtlas

EPA is developing EnviroAtlas, a web-based mapping tool that allows communities to estimate the potential benefits and costs of decisions related to community planning and development, including environmental impacts.

Community leaders can assess air quality levels and their health impacts from different planning scenarios to reduce exposure to pollutants and increase respiratory and heart health.

Resources / More Info:

Air Sensor Toolbox for Citizen Scientists
http://www.epa.gov/heasd/airsensortoolbox/

EPA Next Generation Air Monitoring
www.epa.gov/research/airscience/next-generation-air-measuring.htm

EPA Community-Focused Exposure and Risk Screening Tool (C-FERST)
http://www.epa.gov/heasd/c-ferst/

EPA Air Sensors Evaluation
http://www.epa.gov/nerl/features/sensors.html

EPA EnviroAtlas

http://www.**epa**.gov/research/**enviroatlas**

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