

Participatory Science Data Management Case Studies

Arizona Water Watch



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Improving Data Management for Participatory Science

AZWW's electronic-based program and dashboard allow the AZWW Volunteer Coordinator to perform real-time preliminary assessments to identify data gaps and quickly assign other participant groups or staff to collect data to fill these gaps.

Project Overview & Goals

Arizona Water Watch (AZWW) is a relatively new participatory science program within the Water Quality Division of the Arizona Department of Environmental Quality (ADEQ). The goal of AZWW is to use participant groups to gather water quality data to support bi-annual state assessments, identify pollution sources, and assess the effectiveness of Best Management Practices. The program, which began in 2017, is funded by the state.

Role of Project Participants

Working under the guidance of the paid AZWW Volunteer Coordinator, project participants are provided with sensors, lab kits and other supplies. AZWW provides training, including brief videos, that complies with Clean Water Act (CWA) requirements. Based on Arizona's Credible Data Rule, sample plans are developed or updated on an annual basis by ADEQ, the project participants using an AZWW template, or collaboratively. Project participants process samples according to the plans and report results through the Environmental Systems Research Institute (ESRI)'s ArcGIS Survey123 mobile app or via computer. Participants can also upload photographs and record comments.

Data Management

Data are stored on ESRI's ArcGIS Online Data Cloud. The data are validated before they are added to the ADEQ database. The

sample plans are also stored in the database and serve to document and preserve how the data were collected. Per the CWA, sensors are calibrated quarterly and adherence to protocols is audited. Increasingly, AZWW provides specific equipment which also promotes data quality and easier technical assistance on the part of the AZWW Volunteer Coordinator.

An open-source free software and dashboard provide real-time assessment information within the 2-year monitoring cycle of the state assessment reporting. This process allows the AZWW Volunteer Coordinator to minimize gaps in data coverage by quickly assigning other project participant groups or deploying state employees to do the collection. Other software tools are used for visualization. Immediate access to photos and project participant comments impact decisions about data quality.

Data Use

Data are used directly for the state assessments, which are officially done every two years with a 5-year look-back period. The assessments provide the information to prioritize resources for clean-up and to identify water bodies that need special status protection. AZWW data and

Issue:
Water Quality

Location:
Arizona

Tools:
Photography &
Sample
Collection

Contact:
[Meghan Smart](#)

other data from ADEQ are submitted to EPA's Water Quality Exchange (WQX) on a twice-weekly basis, where they provide a picture of national water quality and support national, state, regional and local decisions. The data generated from these monitoring activities help water resource managers know where pollution problems exist, where to focus pollution control energies, and where progress has been made. Participatory science groups also use the data for their own local purposes.

Issues & Lesson's Learned

Issues include limited staffing, logistical issues getting the equipment calibrated on a quarterly basis and sharing expensive equipment across the state, and the limited flexibility in reporting when using ESRI's cloud-based service. AZWW learned that it is necessary to provide alternatives to the mobile app, including recording on paper forms and then entering the data via computer because of the range of technical capabilities among their project participants. Additionally, standardization of equipment reduces technical support issues.

Outcomes & Success Factors

Participatory science is all about relationships and community. The AZWW

program is doing both. The use of Survey123 both as a mobile and computer app, and the use of open-source free software have improved data quality and significantly reduced the need for manual data entry. Success factors include enthusiastic and committed project participants, a strong training program, an equipment loan program that allows for standardization and improved technical support, and the paid AZWW Volunteer Coordinator position, which strengthens the development of relationships with project participants.

Opportunities

- Develop or support a database/portal/website for the states to learn and share. Sharing technology has been very effective in the past. AZWW has leveraged equipment, training, etc. and would be willing to share their code.
- Develop a basic, off-the-shelf water watch option at the federal level for states lacking robust water watch programs.
- A centralized project participant database would save time for the states.
- Hold classes for project participants on water quality data analysis and provide free statistical programs and scientific literature access to project participants.