

Community-Based Responses to Climate-Related Water Challenges

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End Users: Santa Cruz Watershed Collaborative; Cobre Valley Watershed Partnership; Aravaipa Watershed Conservation Alliance; Town of Superior, AZ; Town of Patagonia, AZ; City of Benson, AZ; City of Globe, AZ; U.S. Bureau of Reclamation; U.S. Department of Agriculture; Arizona Department of Water Resources; Central Arizona Project; Salt River Project

Additional Resource Support: Water Resources Research Center, University of Arizona

Project Dates: 2020 – 2023

Summary of Impact

Information access: This project supported three rural communities in Arizona to proactively address water scarcity challenges. By providing accessible data, planning support, and research opportunities, the project fostered collaboration and informed decision-making.

Increased capacity for watershed management: The project equipped local partners local and regional water and climate data through an online data hub and resulted in three watershed management plans for future planning.

New funding and action: The Town of Superior and Queen Creek received \$385,000 in additional funding for community water projects, green infrastructure, and workshops by using information from this collaborative research process.

Problem Statement

Rural communities in the Southwest face increasing water scarcity due to climate change. Information about risks to their local water supplies and tailored assessments of adaptation and mitigation strategies is needed for watershed management and planning.

Research Focus

This project aimed to develop a replicable method for co-producing resilient, water-related community climate adaptation and mitigation strategies. Research focused on identifying the drivers of water-related risks and evaluating the feasibility of adaptation and mitigation options as identified through a collaborative process in each of three communities.

Options included investing in built infrastructure, adopting incentive-based risk-sharing agreements, and investigating watershed ecosystem services.

Project Activities

Meetings and workshops: Conducted in-person and virtual advisory meetings and workshops with community partners in rural Arizona: Town of Patagonia, Town of Superior, City of Globe, and City of Benson.

Data collection and analysis: Economic and policy analysis of adaptation and mitigation strategies. Development of an online data hub with community specific information.

Plan development: Development of Community Drought Preparedness and Response Plans for each community

Project Outputs

Data:

Hullinger, A. [Community Drought Data Hub on ArcGIS Online](#): This geospatial database uses publicly accessible information sources for the three study areas. Visitors can access local and regional climate and water data for their community, and mapping and visualization tools to explore these resources. Sources include: wells, Analyses and Designations of Assured or Adequate Water Supply, Community Water Systems, annual water use (ADWR); land ownership, rangelands (AZSLD); stream gage data (USGS); precipitation data (PRISM); critical habitat, riparian areas (USFWS); watershed condition class by HUC 12 units, rangelands, fire history (USFS); land cover, land use (NLCD).

Reports:

Watershed Management Plan. 2022. Santa Cruz Watershed Collaborative, Benson and Patagonia, AZ.

Watershed Management Plan. 2022. Cobre Valley Watershed Partnership, Globe, AZ.

Watershed Management Plan. 2023. Aravaipa Watershed Conservation Alliance, Superior - Queen Creek, AZ.

Workshops:

Drought Response Planning for Water Resilient Communities. 2021. Town of Superior, Queen Creek Working Group.

Engaging Rural Arizona Communities for Resilient Water Planning. 2022. Coordination Meeting hosted by Santa Cruz Watershed Collaborative.

Drought Response Planning for Water Resilient Communities. 2022. Town of Patagonia Flood & Flow Committee.

Drought Response Planning Workshop for Town of Superior. 2023. Town Council Chambers of Town Hall.

[Drought Response Planning Workshop for Town of Patagonia](#). 2023. Patagonia Public Library.

Presentations:

Tribal Water Settlements: Economic Innovations for Addressing Water Conflicts. 2020. Symposium Series, University of Arizona.

Water Limitations and How They Impact Us. 2022. Phoenix, Arizona. Panel discussion with Sarah Porter (ASU), Tom Davis (Agribusiness Water Council), and Stefanie Smallhouse (Redington NRCO and Arizona Farm Bureau). [Arizona's Conservation Districts Annual Conference](#).

Economic Incentives and Resilience in Western Water. 2022. INFEWS Workshop. Golden, Colorado.

Replicable groundwater monitoring methods for rural Arizona. 2023. University of Arizona.

Engaging Rural Arizona Communities for Resilient Water Solutions. 2023. Water Resources Research Center, University of Arizona.

Peer-reviewed Publications:

Colby, B. 2023. Teaching Water Resource Economics for Policy Analysis. *Applied Economic Teaching Resources* 5(3):1-18. <https://doi.org/10.22004/ag.econ.338382>

Colby, B. 2020. Acquiring environmental flows: ecological economics of policy development in western U.S. *Ecological Economics* 173:106655. <https://doi.org/10.1016/j.ecolecon.2020.106655>

Colby, B.G., H. Hansen. 2022. Colorado Basin Incentive-Based Urban Water Policies: Review and Evaluation. *Journal of the American Water Resources Association* 55:1098-1115. <https://doi.org/10.1111/1752-1688.13041>

McGreal, B., B. Colby. 2023. Effects of Economic and Climatic Factors on Arid Agricultural Water Use. *Journal of Soil and Water Conservation* 78(5):397-411. <https://doi.org/10.2489/jswc.2023.00130>

Master's Theses:

Ford, M. 2022. [Connections Between Cropping Trends, Water Availability, and Groundwater Regulations](#). M.S. Thesis. Hydrology & Atmospheric Sciences, University of Arizona.

Hansen, H. 2022. [Climate, Prices, and Federal Programs: Choices for Irrigated Agriculture](#). M.S. Thesis, Agricultural and Resource Economics, University of Arizona.

Pereira, M. 2022. [Statistical Relationships Between Groundwater, Climatic, and Economic Factors in Southeastern Arizona](#). M.S. Thesis. Hydrology & Atmospheric Sciences, University of Arizona.

Societal Impacts by Category

Capacity Building:

- The online data hub gathered local water and climate data for three communities in Arizona. Regional drought planning data and research can be difficult to find and interpret. The data hubs enhanced community partners' capacity to use and engage with these data sources.
- Four graduate students gained research experience through this project. After graduation they continued related work at Resources for the Future, Salt River Project, Montgomery and Associates, and Arizona Municipal Water Users Association
- The project provided three rural communities in AZ with drought response planning consulting services that were otherwise cost prohibitive. Consultant fees for development of planning studies for communities can range from \$20,000 - \$100,000.
- The online database and other project research were cited in a successful funding application from the Town of Superior to the Bureau of Reclamation WaterSMART Cooperative Watershed Management Program for \$245,000, to prioritize community water projects.
- The online database was cited in a successful funding application to the Water Infrastructure Finance Authority of Arizona's Water Conservation Grant Fund for \$140,000, to install green infrastructure and host community workshops.

Instrumental:

- This project developed Community Drought Preparedness and Response Plans for the three listed communities,
- Three community groups applied new and emerging data from this project to develop Watershed Management Plans for their regions, including the Santa Cruz Watershed Collaborative (Benson and Patagonia, AZ), Cobre Valley Watershed Partnership (Globe, AZ), and the Aravaipa Watershed Conservation Alliance (Superior and Queen Creek, AZ).