

Water and Climate Equity in Rural Water Systems in the United States

Executive Summary



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ABOUT LiKEN

Livelihoods Knowledge Exchange Network (LiKEN) is a nonprofit organization that links communities, organizations, and researchers with one another to build strong, lasting communities. As a link-tank, LiKEN's core mission is to support local economies and community happiness and health by strengthening local resources, encouraging reliable teamwork, and creating open and fair information-sharing groups. We link communities with scholarly expertise and government resources to co-design projects in climate resilience, forest farming, water quality, land use, and cultural narratives. Our current and emerging work focuses on communities affected by environmental injustice and boom and bust economies — primarily in Indigenous communities, Appalachia, and the U.S. South. Our research design is informed by the LiKEN Framework for Collaborative Actionable Research, which features asset-based and appreciative inquiry; empowerment, community science, Participatory Action Research (PAR); and democratic knowledge sharing networks centered on the local. Learn more at www.likenknowledge.org.

ABOUT THE PACIFIC INSTITUTE

The Pacific Institute envisions a world in which society, the economy, and the environment have the water they need to thrive now and in the future. In pursuit of this vision, the Institute creates and advances solutions to the world's most pressing water challenges, such as unsustainable water management and use; climate change; environmental degradation; food, fiber, and energy production for a growing population; and basic lack of access to fresh water and sanitation. Since 1987, the Pacific Institute has cut across traditional areas of study and actively collaborated with a diverse set of stakeholders, including leading policymakers, scientists, corporate leaders, international organizations such as the United Nations, advocacy groups, and local communities. This interdisciplinary and independent approach helps bring diverse groups together to forge effective real-world solutions. More information about the Institute and our staff, directors, funders, and programs can be found at www.pacinst.org.

ABOUT RCAP

The Rural Community Assistance Partnership (RCAP) is a national network of nonprofit partners working with small, rural, and Indigenous communities to elevate rural voices and build local capacity to improve quality of life — starting at the tap. Our more than 350 technical assistance providers (TAPs) act as trusted primary care providers in the training and technical assistance they provide. TAPs are locally based and, with deep trust built over time, we meet communities where they are to co-develop solutions for the challenges that matter most to them. Our TAPs annually work in over 2,000 small, rural, and Tribal communities in every U.S. state, the U.S. territories, and on Tribal lands on issues ranging from gaining access to safe drinking water to creating economic development opportunities that can improve livelihoods and long-term individual and community-wide prosperity. Learn more or find assistance at www.rcap.org.

About the Authors

BETSY TAYLOR

Betsy Taylor is Executive Director of LiKEN. She has worked for community-driven development in Appalachia and South Asia — seeking to integrate issues of health, agriculture, forestry, culture, and environmental stewardship. Her many scholarly writings focus on environmental and social justice movements, democratic planning and participatory research, regional development, and sustainability studies. With Herbert Reid, Dr. Taylor co-authored the book, *Recovering the Commons: Democracy, Place, and Global Justice* (University of Illinois Press, 2010). At the University of Kentucky, she served as Co-Director of Environmental Studies, Research Director for the Appalachian Center and on the faculty of the Social Theory program. Dr. Taylor was a research faculty member in the Appalachian Studies program at Virginia Tech. She received her doctorate in Cultural Anthropology from the University of Michigan.

SHANNON MCNEELEY

Shannon McNeeley is a Senior Researcher at Pacific Institute and the Water and Climate Equity Lead. Her work focuses on water and climate equity and justice for frontline communities. This engages an interdisciplinary and cross-cultural co-production approach, incorporating the social and natural sciences along with different ways of knowing to understand human-environment relationships and how people are impacted by and respond to environmental change. Her research has focused on climate change science and policy, water resources and drought preparedness, and climate planning and action, all with a strong focus on supporting those who are overburdened and under resourced through just and equitable solutions. Dr. McNeeley has worked closely for decades with a multitude of different partners, organizations, decision-makers, Tribes and Indigenous peoples, and frontline communities bridging technical research with applied decision support information and tools. Prior to joining the Pacific Institute, she was at the North Central Climate Adaptation Science Center at Colorado State University and before that at the National Center for Atmospheric Research. Shannon holds a master's in International Environmental Policy from the Middlebury Institute of International Studies at Monterey and a doctorate in Environmental Change and Sustainability Science, which integrated anthropology, ecology, and climatology, from the University of Alaska Fairbanks.

MARIA BARELI

Maria Bareli is LiKEN's Commons Governance Fellow. At LiKEN, she plays a lead role in research design and in the coding and analysis of the participatory data emerging from LiKEN's community listening projects. Dr. Bareli studied economics at the University of Athens and received her doctorate in Sociology from the University of Crete. Her research is situated at the crossroads of anthropology, history, and ecology. Her doctoral thesis involves the study of the annual festivals (*paniyria*) held in the Greek island of Ikaria, which she has approached from a historical perspective, through theories of the gift and the commons. Bareli's research interests include mountain communities, alternative economies and festivals, decolonial and community-based research methodologies.

LAURA LANDES

Laura Landes is RCAP's Associate Director of Research and Data. Her career has been focused on environmental and water topics. She earned a Bachelor of Arts in Economics and Environmental Policy from the College of William & Mary and a Master's in Environmental Management with a concentration in Environmental Economics and Policy from the Nicholas School of the Environment at Duke University. During her time at Duke, she focused on water and wastewater challenges and policy. Laura's research has focused on topics such as regionalization, issues of water, climate, and equity, rural broadband, and rural innovation, and her years at RCAP have expanded her perspective on the challenges and opportunities that rural communities and their water systems face. Laura manages RCAP's research, data and impact, and software engineering teams, which together provide the ability for RCAP and its partners to track, understand, and report on the essential work being done in the field to create more resilient communities.

LENA SCHLICHTING

Lena Schlichting is a Senior Research Specialist at RCAP. Her research at RCAP includes climate change impacts on communities and their water systems, equitable approaches for funding, emerging contaminants in drinking water, and integrating mapping technologies into RCAP's work. Prior to joining RCAP, Lena worked in the public sector to assist communities in New Mexico with source water protection and drought adaptation, used mapping technologies in the forestry sector for stream and post-fire restoration, and worked on impacts of climate change on flooding and hydrology in Norway. She holds a Master of Geography from the University of Heidelberg, Germany, and has lived and worked in all four-corners states of the American Southwest.

DEBORAH THOMPSON

Deborah Thompson serves as LiKEN's Impact Director and supervises LiKEN's Community Engagement Coordinators. She holds a doctorate in Geography from the University of Kentucky and a master's in Appalachian Studies from Appalachian State University. Her deep knowledge of Appalachian geography and cultures has been informed by her decades of living, learning, and working in the region, including over 25 years of teaching on the undergraduate level, field research, directing cultural study programs, organizing music and dance events, and performing traditional music and dance. Dr. Thompson's dissertation examines how racialized and gendered scripts and habits in artistic expressions and processes reflect and influence ideas about the Appalachian region. Her peer reviewed articles on these topics have been published in *GeoJournal*, *Journal of Appalachian Studies*, and other scholarly publications.

RACHEL WILL

Rachel Will joined the Pacific Institute in 2023 as a Researcher in Water and Climate Equity. She co-produces research focused on equitable and climate resilient water systems in rural communities and WASH. Before joining the Pacific Institute, Rachel worked as a regional planner, focusing on social equity and climate resilience projects. She has extensive experience leading and contributing to interdisciplinary research on water equity, environmental justice, and climate resilience issues. Rachel holds a master's in Geography from Kent State University, and a doctorate in Integrative Conservation and Geography from the University of Georgia.



Executive Summary

Rural water and wastewater systems face clear and growing dangers from climate change impacts. Many factors converge to create inequitable risks, and decision-makers must grapple with complex realities when devising and implementing strategies to build resilience. This complexity requires evidence-based approaches to collaborative problem solving. To better understand climate change impacts on water and sanitation in rural frontline communities, the Livelihoods Knowledge Exchange Network (LiKEN), Pacific Institute (PI), and the Rural Community Assistance Partnership Incorporated (RCAP) partnered to form the Water and Climate Equity project. By integrating multiple lenses and forms of expertise across these organizations, the project was co-designed and co-produced to nurture community-centered climate resilience in an era of mounting water crises. The project focuses on rural frontline communities, which often lack sufficient financial, technical, and managerial resources to handle existing challenges, including water affordability, access, safety, inadequate or aging infrastructure, and disaster recovery. Climate models indicate that climate change will exacerbate these issues, necessitating community-specific solutions rooted in local knowledge, leadership, and networks of support. The aim of this project was to document and understand water and climate resilience in rural, frontline communities and investigate opportunities to scale evidence-based decision support information and tools in the future so that additional communities can move toward more equitable, climate-resilient water systems.

Collaborative Co-Production of Knowledge

The Water and Climate Equity project developed an innovative and scalable model for integrating diverse types of knowledge to analyze multifaceted challenges. The project was designed to include local knowledge to get a grounded understanding of how risks and solutions play out in some rural communities. We held discussions and deep listening in communities and among national networks of technical assistance providers (TAPs) who are immersed in the unique and varied local challenges of water and wastewater management in the rural communities they serve. We worked closely with the TAPs to co-develop resources that help them serve those communities in shared efforts to build and maintain equitable, climate resilient water systems. With local leadership from historic coal-producing counties, we undertook extensive listening activities in Appalachian communities hard hit by job loss, capital flight, persistent poverty, injustices, and climate stressors and disasters. We also conducted a collaborative review of literatures on water and climate vulnerability and resilience, cross-sector knowledge translation, and climate change impacts on small, rural water and wastewater systems.

This report summarizes what we learned from listening to TAPs and underserved communities. We identified recurrent factors that intersect in vicious cycles to amplify inequities and risk in rural communities. The report looks at these patterns that generate community and cross-sector capacity for collaborative co-production of actionable knowledge to help build climate resilience and equity in rural water systems. We did this iteratively through vulnerability and resilience lenses (that identify risks and resilience to prioritize strategies) and with an asset-based approach (that centers existing capacities in communities to build on success and unique local realities). We contextualized this community-based, bottom-up analysis in scholarly and policy literatures, to create an integrative **Water and Climate Resilience Framework** designed to scale laterally for adaptation in other rural contexts and in trans-local comparison that can inform national scale policy innovation.

Key Findings

- 1 **Development pathways and legacies of injustice disadvantage many rural water and sanitation systems and make them highly susceptible to the impacts of climate change.**
- 2 **Climate change is already having devastating impacts on rural water systems and communities through increased weather variability, extremes, unpredictability; extreme heat and cold; heavy precipitation and catastrophic flooding; drought; wildfire; and declining water quality. The scientific community expects these to continue and worsen.**
- 3 **An integrative community-centered and asset-based approach is necessary for better understanding and addressing climate vulnerability and resilience in rural water systems.**
- 4 **While significant barriers and challenges exist related to inequities, funding, and technical or managerial capacity, for example, existing community-based social, natural, and physical assets provide opportunities to build on inherent community resilience for achieving equitable, climate-resilient rural water.**
- 5 **Tailored and easily accessible technical assistance and tools can support rural communities in achieving equitable, climate-resilient water and sanitation systems.**

From Listening to Action

Building on the insights summarized in this report, the project partners are moving into a new phase in which they will pilot tools and capacity-building for dislodging barriers to equity and resilience. These include educational toolkits, participatory exercises, and communicational materials for community engagement, water and climate resilience, disaster role and scenario-playing. In the next phase of this work (beyond this report), they will also explore policy solutions, strategic actions, and approaches to end the recurrent causal patterns identified in this report that drive inequity and weaken resilience. The project will monitor, evaluate, and learn from the future pilot activities to develop an evidence-based theory of change that is structured to show areas and issues that new policy must address to create durable solutions.



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