



Breaking the Barriers: Advancing Rainwater Harvesting Adoption in the United States

Executive Summary

Rainwater harvesting (RWH) offers a viable, sustainable solution to water scarcity, stormwater management, and urban resilience challenges across the United States. Despite proven environmental and economic benefits, adoption remains slow due to policy barriers, inconsistent standards, public perception, and gaps in data. This white paper identifies critical obstacles, outlines a national research and innovation agenda, and proposes actionable steps for policymakers, researchers, and practitioners to expand RWH as a mainstream component of sustainable water infrastructure.

1. Introduction

Rainwater harvesting (RWH) is the practice of collecting, storing, and using natural precipitation that has only contacted a rooftop or other man-made above ground surface and has not been put to beneficial use. Rainwater harvesting systems collect and utilize rainwater and consist of a cistern(s), pipes, fittings, pumps, and/or other plumbing appurtenances, required for and/or used to harvest and distribute rainwater. They are also called a rainwater catchment system or rainwater collection system. [ARCISA, 2020 and 2023]

The technique has been used for millennia, but in the U.S., it remains underutilized due to fragmented policy frameworks, public misunderstanding, and uneven integration into modern water management strategies. As communities face increasing droughts, aging infrastructure, and climate-related water stress, the need for decentralized, resilient water systems is more urgent than ever. [EPA, 2024 and 2025]

2. Key Barriers to Adoption

2.1 Regulatory and Policy Barriers

Inconsistent or restrictive regulations across states and municipalities discourage adoption. In some jurisdictions, outdated water rights laws classify rainwater as state property. Others lack clear permitting or inspection guidelines. This regulatory patchwork leads to confusion, costly compliance, and limits scaling. [USGS, 2023 and 2025]

2.2 Technical and Infrastructure Barriers

Limited technical data on long-term system performance, material standards, and health safety impedes professional confidence. Engineers and builders often face uncertainty about integrating RWH systems due to unclear codes or standards. [EPA, 2021]

2.3 Financial and Market Barriers

Upfront costs for design, materials, and installation—combined with limited financial incentives—restrict adoption. Financing models rarely account for the long-term value of water savings, flood prevention, and ecosystem benefits. [J.P. Morgan, 2024]

2.4 Public Awareness and Education Barriers

Public understanding of RWH remains low. Many perceive it as niche or unnecessary in temperate climates. Educational outreach and public engagement are inconsistent and fragmented, reducing public trust and willingness to invest. People think of RWH as a water conservation technique not a water source. [Radonic, 2019 and Snelling et al., 2024]. Additionally, instead of seeing rainwater as a first-time use, high-quality water, it is seen as a reuse water that needs to be treated and/or be used as a dilutant for other polluted waters.

3. Analysis of Critical Challenges

Rainwater harvesting adoption is limited by systemic gaps between research, policy, and practice. While RWH aligns with federal sustainability goals, lack of coordination between jurisdictions, inconsistent certification standards, and limited data collection hinder progress. National datasets on RWH performance and public health outcomes remain sparse, constraining policy decisions. To overcome these barriers, a unified approach integrating research, education, and policy reform is needed.

4. Research and Innovation Agenda

A coordinated research agenda can guide federal, academic, and private stakeholders toward overcoming knowledge and implementation barriers. The following priorities are proposed:

| <u>Research Area</u> | <u>Key Questions / Goals</u> |
|---------------------------------|--|
| Performance and Data Collection | How effective are RWH systems in different climates and building types? Develop national datasets and monitoring protocols. |
| Health and Safety Standards | What are the microbial and chemical risks? Support standardized treatment and maintenance guidance found with ARCSA International. |
| Economic Modeling | What are the long-term cost savings and ecosystem service values of RWH? |

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|-------------------------------|--|
| Policy Harmonization | How can model codes and policies be aligned to encourage national adoption? |
| Public Education and Behavior | What communication strategies improve public understanding and adoption rates? |

5. Recommendations for Policy and Practice

To accelerate RWH adoption, this white paper recommends the following strategic actions:

- Support alignment of national codes, standards, and clean water standards that exist for RWH systems. (UPC, ICC, Standards 63 and 78, WEstand, etc.)
- Establish federal and state-level incentive programs for installation and research. (Established the ARCSA International Advisory Council on Policy to help organize Legislative actions)
- Create a national RWH data repository for performance and water quality outcomes. (Look at repository established years back with Dr. Sarah Sojka to see if it can be refreshed and advertised to solicit more systems)
- Expand public education campaigns linking RWH to climate resilience and water security.
- Advertising campaign to support existing ARCSA/ASSE 21000 series workforce training and certification programs for rainwater harvesting system designers, installers and inspectors.
- Demonstrate benefits of decentralized water supplies versus relying on centralized municipal systems.

6. Conclusion

Rainwater harvesting represents an essential tool in building resilient, adaptive, and sustainable communities. With coordinated research, supportive policies, and public engagement, the United States can unlock the full potential of decentralized water systems. This white paper calls for a cross-sector commitment to removing barriers, standardizing practices, and empowering communities to take part in the water resilience transformation.

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