

BĀRĀN (Balkh Rain Network) A Citizen Science-Based Rainfall Monitoring Pilot in Northern Afghanistan

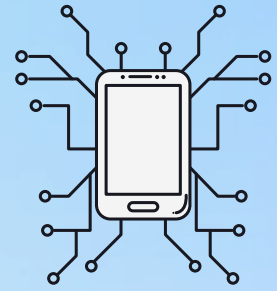
Annual Report (Oct 2024 to Sep 2025)

SmartPhones4Water (S4W)

About Us

SmartPhones4Water (S4W) is a non-profit organization focused on mobilizing young researchers and citizen scientists to quantitatively tell their water stories. Stories of too little, too much, or too dirty. Practically, this involves generating, managing, and understanding the hydro-meteorological data necessary to support wise water management decisions.

S4W = Young Researchers + Citizen Scientists + Mobile Technology



About the Project

BĀRĀN is a pilot initiative, led by S4W, to establish a reliable and low-cost rainfall monitoring system across Balkh Province in Northern Afghanistan. Using low-cost rain gauges and smartphones, local citizen scientists recorded daily rainfall data to help fill critical gaps in the region's climate information.

We can't manage a resource we don't measure.

-Lord Kelvin

Goal

The main goal of the project is to demonstrate the feasibility of community-led rainfall monitoring efforts in a fragile and resource-limited setting.

Why It Matters

Afghanistan faces critical gaps in rainfall monitoring due to decades of conflict and institutional collapse. Yet, rainfall data is essential for agriculture, disaster preparedness, and climate resilience. Without it, communities face greater uncertainty in an already fragile environment. The BĀRĀN project offers a community-based solution to this data crisis.



How It Worked



Monitoring Sites

Spread across rural and urban districts of Balkh Province



Citizen Scientists

Trained community members recorded rainfall each day

Smartphones

for data reporting

Data submitted via ODK Collect, an open-source smartphone app



Months of Monitoring

Daily observations collected from Oct 2024 to Sep 2025



Daily Rainfall Records

Consistent daily submissions verified, and quality checked



Model

Cost per observation: ~\$1, proving affordable and effective

What We Learned

Rainfall monitoring is possible—even in fragile settings



Local volunteers submitted rainfall data consistently, achieving a 93% daily reporting rate across 14 sites.

Ground truth matters



Citizen data helped identify where satellite estimates (CHIRPS) were inaccurate—especially in capturing light rainfall or mountainous areas.

Simplicity works



Low-tech tools, minimal training, and regular check-ins created a reliable, low-cost monitoring system.

Youth engagement is key



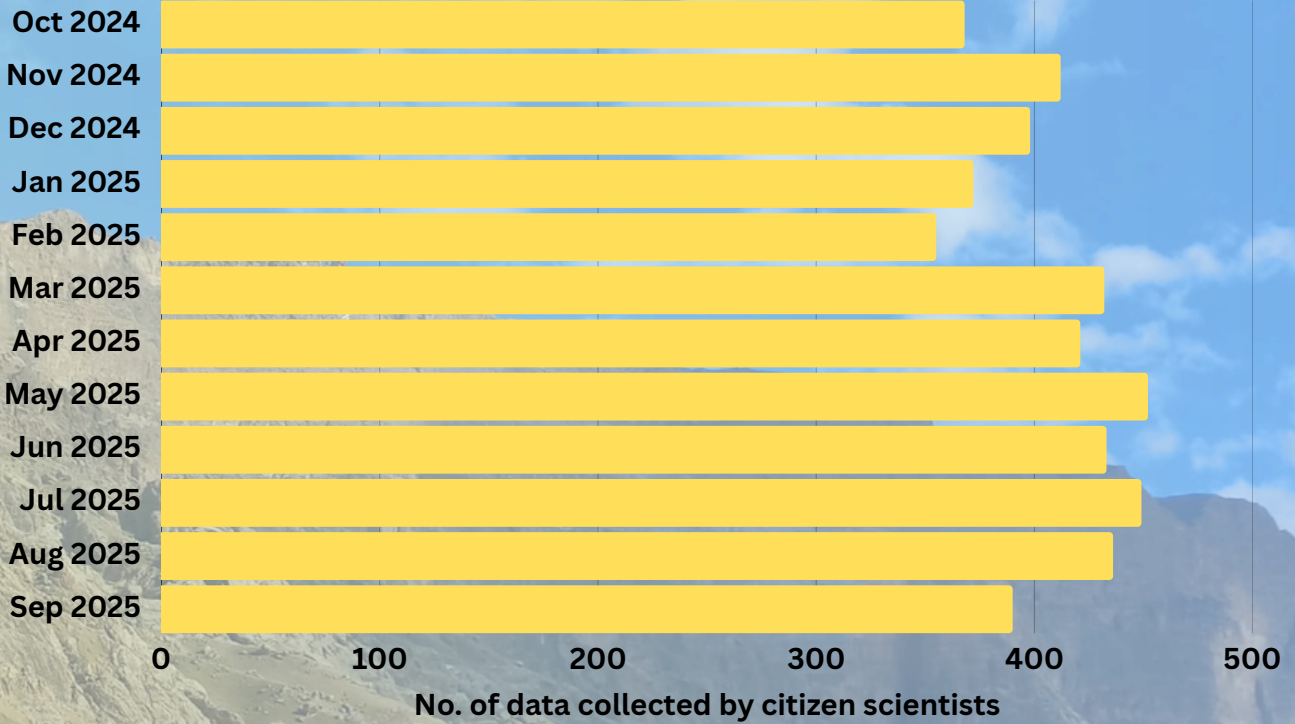
Younger volunteers showed the highest consistency, especially when recruited through personal networks.

Cost-efficient data collection

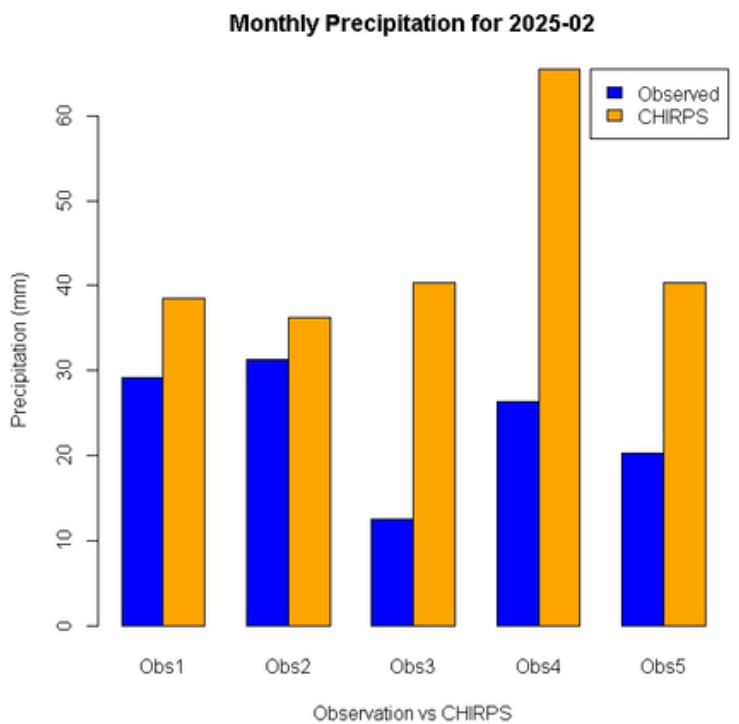
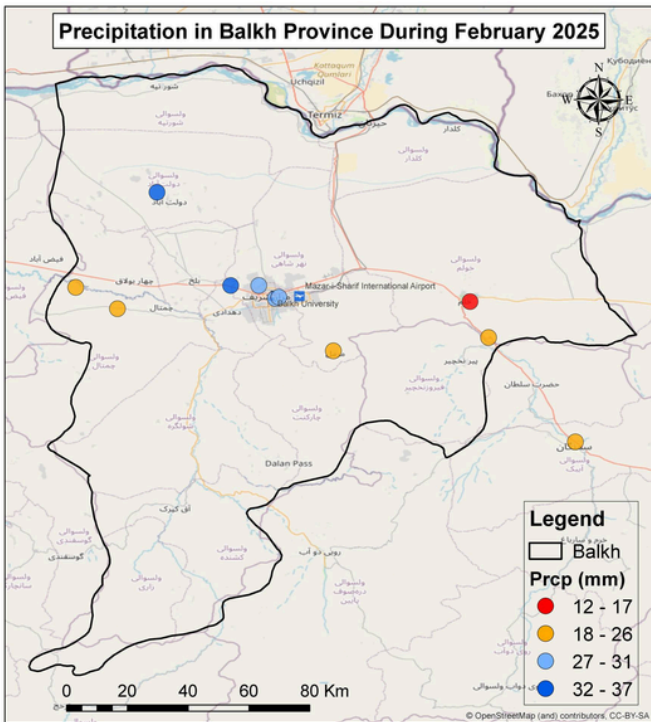


The entire project operated on ~\$6,000, averaging ~\$1 per data point — far less than traditional weather stations.

Citizen Scientists-Based Water Data



Data Visualization

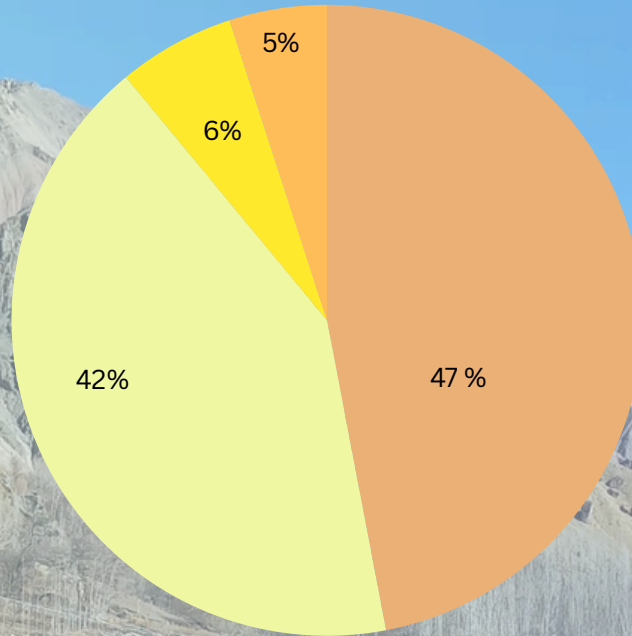


Spatial variation of rainfall data collected by citizen scientists

Comparison of citizen science-based rainfall data with satellite data

Finances

- Personnel
- Citizen Scientist Support
- Rain gauge
- Training and materials



What's Next?

🌐 Scale to more provinces

Expand the rainfall network to other underserved regions in Afghanistan.

📶 Offline & SMS reporting

Introduce tools for areas with poor connectivity to ensure no data is lost.

📊 Use data for action

Apply rainfall insights to support drought early warning, crop planning, and climate adaptation.

🤝 Build local partnerships

Collaborate with schools, NGOs, and farmers to expand reach and impact.

💡 Share learnings


Document and share the BĀRĀN model as a replicable approach for other fragile or data-scarce regions.

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