FRESH INSIGHTS
Understanding tomorrow's water risks

How can climate science and operational data support Teuk Saat 1001 anticipate risks across its rural water kiosk network in Cambodia?

Background

Why This Assessment Was Needed

Cambodia's rural water systems are increasingly exposed to **climate-related hazards** such as drought, flooding, seasonal variability, extreme rainfall, and declining water quality. For years, Teuk Saat 1001 has been navigating these operational realities through its nationwide rural water kiosk network, using continuous field adaptation and operational monitoring to limit service disruptions and steadily improve performance over time.

Building on this experience, **Teuk Saat 1001**, together with **1001fontaines** and **UTS Institute for Sustainable Futures**, commissioned this assessment to build an evidence-based model that can characterize and predict climate-related risks, and inform long-term resilience planning—recognizing that a one-size-fits-all risk model would not capture the diversity and complexity of the network.

Methodology

When Operational Data Meets Climate Science

The assessment combined **Teuk Saat 1001's rich historical operational dataset** — covering more than 400 kiosks operations, hazards records, and monthly water quality data – with climate datasets capturing rainfall, runoff, river discharge, soil moisture, aridity, dry spell length, and temperature. Statistical modeling was then used to assess relationships between climate conditions, kiosks' performance and water quality, and to **develop a framework** capable of projecting how operational risks may change under future climate conditions at kiosk level.

Early Findings

What the Data Reveals

Climate risks at kiosk-level differ by season, location, and water source type, so any credible risk framework must reflect this diversity. Two key findings stand out from the study:

1. Climate risks are projected to affect regions of Cambodia differently.

Projections suggest contrasting regional patterns rather than uniform change. In general, in eastern regions, higher rainfall intensity is expected to increase floods, runoff, and water quality deterioration, while in western regions, longer dry periods are likely to place greater pressure on water availability. In other words, **climate risk is being redistributed across Cambodia depending on local climatic and hydrological conditions** — not simply rising everywhere.

2. Rainfall-related variables are the strongest predictors of operational and water quality risks

Across all operational disruptions — scarcity, flooding, and water quality non-compliance — rainfall emerges as the single strongest predictor. Low rainfall and long dry spells drive scarcity, while high rainfall intensity and wetter conditions are associated with flooding and higher microbial contamination. **Monthly and cumulative rainfall** is therefore not just a weather variable — it **is an operational signal for water kiosk risk**.

Practical Implications

From Insights to Action: The Climate Risk Dashboard

The main output of this initial collaboration between Teuk Saat 1001, 1001fontaines, and UTS, is an Excel-based climate risk classification tool to support operational planning and resilience decision-making across the Teuk Saat 1001 network. It models future risks by linking climatic variables with operational and water quality outcomes and applies these relationships to projected climate scenarios. Key features include:

- **Kiosk-level scoring**: Individual risk classification for each operational and water quality outcome, across the full Teuk Saat 1001 network.
- **Three time horizons**: Compared risk profiles across 2011–2040, 2041–2070, and 2071–2100.
- **Flexible model**: Coefficients that can be updated as new data or projections become available.

Particularly relevant for Teuk Saat 1001, this approach provides the granularity needed **to move from reactive management to anticipatory resilience** — supporting operational decision-making, targeted investments, and long-term service sustainability under increasing climate variability.

LOOKING AHEAD - PHASE 2

Stay tuned — More Insights Are Coming Soon!

Phase 2 will build on the dashboard outputs to develop targeted operational recommendations by province, source type, and risk level; support the design of Teuk Saat 1001's rehabilitation and resilience planning strategy; and disseminate the study's findings across the sector.

UTS Institute for Sustainable Futures visiting water systems in rural Cambodia

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