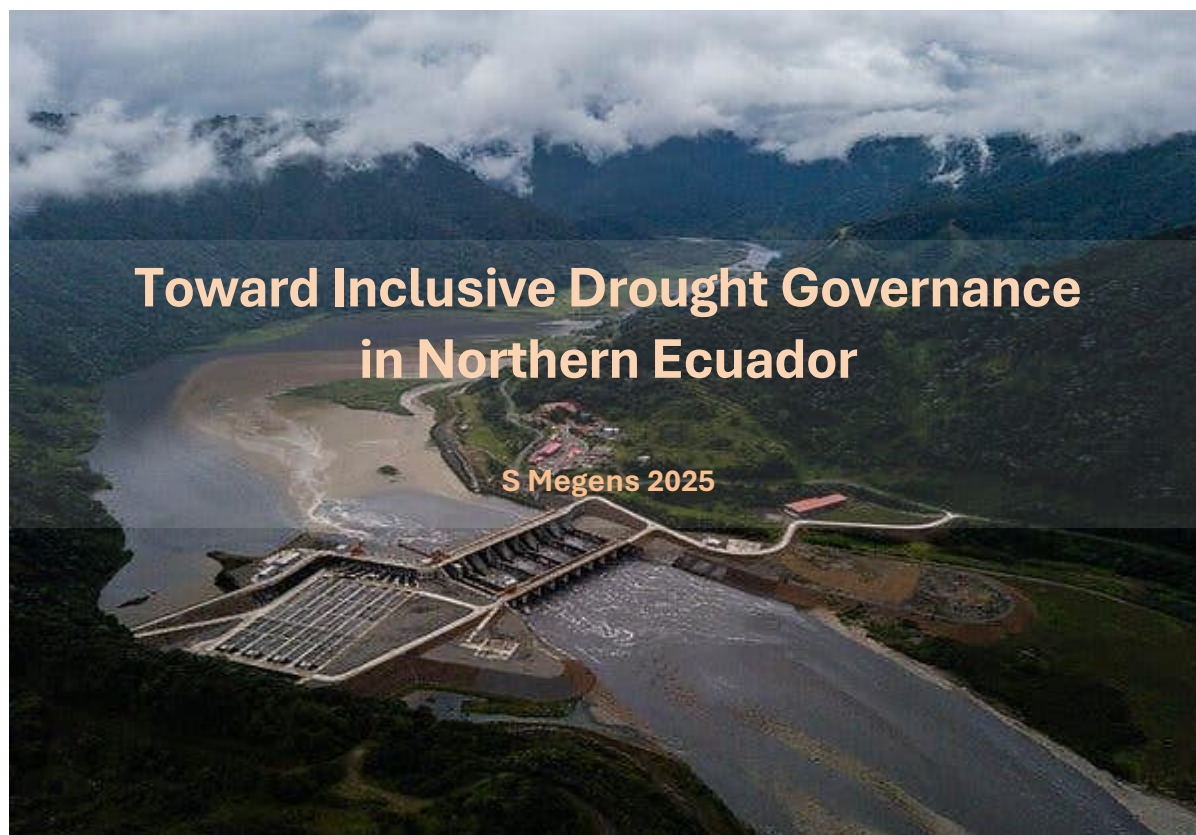




Scientific knowledge is critical to understanding drought, but it is not enough. In northern Ecuador, the push for a National Drought Plan (2021–2025)¹ risks repeating the failures of centralized governance by excluding local actors and reinforcing top-down, technocratic approaches, “real change doesn't happen by adding a few spaces to a negotiation table. It occurs when the rebuilding of the negotiation skin avoids private conveniences”.

A DNP should not be limited to a four-year political or presidential term [beyond short-term political cycle], it must reflect a long-term state vision, rooted in inclusive, sustainable, and context-specific responses that integrate local knowledge and build enduring resilience.

Efforts remain constrained by a state structure that resists decentralization, limiting the flexibility of water boards and local managers, especially in transboundary and high-conflict areas. Without room for communities to define their own priorities, drought governance remains disconnected from the realities it aims to address.

The challenge is not only technical but also political. Drought is not a singular event but a slow, context-driven process, often invisible until its impacts are severe. Without a shared

¹ <https://www.ambiente.gob.ec/wp-content/uploads/downloads/2022/01/PLAN-NACIONAL-DE-SEQUIA.pdf>

definition rooted in both science and lived experience, responses remain fragmented and reactive.

A meaningful national drought plan must be built with, not for, the actors across sectors and regions. That means engaging communities as co-creators of policy, recognizing local strategies, and rejecting one-size-fits-all models imported from elsewhere. This is not just a matter of inclusion; it is a matter of effectiveness and social justice. *“As researchers, our role is not only to produce data but to support the emergence of governance models that reflect local capacities, histories, and rights to shape their own futures”*.

Understanding the Transition from Meteorological to Ecological Drought

Meteorological droughts occur when high atmospheric water demand and low water supply lead to water scarcity. These conditions can evolve into ecological droughts, affecting ecosystems through hydraulic failure, carbon limitation, and even plant mortality. The transition between these drought types is complex and shaped by the interplay of three key factors: the characteristics of the drought (hazard), the susceptibility of the ecosystem (vulnerability), and the environmental conditions (exposure). In Ecuador, where data on these components is fragmented or lacking, the capacity to anticipate and respond effectively remains severely limited.

In the Ecuadorian Andes and Amazon, recent drought events have led to crop failures, increased wildfire risk, and stressed both surface and groundwater systems. Yet responses remain fragmented due to the lack of reliable environmental data. This disconnect highlights the urgent need for anticipatory governance models that do not just react to crises but are designed to detect, understand, and prepare for them.

The Limitations of Frameworks and the Potential of Protocols

While conceptual frameworks are useful for understanding drought dynamics, they often remain abstract and disconnected from practice. In contexts like Ecuador, where governance structures are weak and data is limited, a protocol offers a more grounded, actionable alternative. A protocol, unlike a framework, outlines specific steps, responsibilities, and thresholds for action. It serves as a negotiated, locally relevant guide for decision-making under uncertainty.

The protocol we propose builds on our ongoing work in the northern Ecuadorian basins, where Indigenous, Afro-descendant, and peasant communities face compounding risks. The protocol is structured around co-defined indicators of drought status, incorporates environmental monitoring with community participation, and enables rapid coordination among institutions. It also incorporates the Drought Status Interpretation Model (DSiM), which collects local perceptions alongside scientific indicators to define when and how to

activate responses. This approach is the product of evidence collection and data assimilation from my own research and will be implemented as a direct consequence of the findings, hopefully to create more inclusive and adaptive drought response strategies for the region.

This protocol is designed to be adaptive, rooted in local governance structures like water boards, and attentive to regional particularities, such as the intersection of environmental stress with political conflict and border dynamics. Crucially, it centers local knowledge not just as supplementary data, but as core evidence in drought assessment. This is a shift from participation as consultation toward genuine co-decision making.

Bridging Scientific and Community Knowledge for Resilient Governance

These practices challenge the idea that data must be centrally collected and validated before informing national plans. Instead, this work shows that decentralized, community-anchored systems can feed into larger policy cycles, particularly when supported by state institutions and research organizations. What is needed is not just a technical integration but a political agreement to redistribute decision-making power.

From Data to Decisions, Toward Justice-Based Governance

Building drought resilience in Ecuador is not just about gathering better data or refining scientific models. It is about transforming who gets to define the problem, deciding on solutions, and determining when action is taken. My experience shows that effective drought governance depends on co-produced knowledge, locally grounded protocols, and institutional arrangements that value the political, cultural, and ecological diversity of the territories involved. Incorporating community-collected data bridges the gap between scientific modeling and the lived realities of vulnerable populations.

In the Mira River Basin, I have worked with local actors to document drought signs through participatory mapping and seasonal calendars. This approach will enhance data reliability and foster community ownership in future monitoring and governance efforts. Therefore, the future of drought governance in Ecuador, and similar regions, will not be shaped by frameworks imported from external models but by protocols negotiated and built in place by those who know the land and live its changes. This is the foundation of anticipatory, inclusive, and just environmental governance.

The Rivers Run Dry and the Lights Go Out: A Warming Nation's Doom Loop:

An extraordinary drought has drained Ecuador's rivers and reservoirs, leading to power outages of up to 14 hours. Some fear this is the beginning of a larger global crisis, (The New York Times, 2024)²

² NYT: <https://www.nytimes.com/2024/12/30/world/americas/ecuador-hydropower-drought.html>