

THEORETICAL

Governing Water Security in the Horn of Africa

Institutional Frameworks and Conflict Prevention

Abraham Kuol Nyuon^{1,2,3}

¹ Associate Professor of Politics, Peace, and Security

² Principal, Graduate College, University of Juba

³ SUSI Scholar on U.S. Foreign Policy

Correspondence: nyuonabraham@gmail.com

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ABSTRACT

This article develops a novel theoretical framework for analysing water security governance in the Horn of Africa, a region characterised by transboundary hydrological interdependence and political fragility. It critiques the limitations of existing state-centric and basin-wide institutional models, arguing they often exacerbate rather than mitigate conflict.

Drawing on polycentric governance theory and insights from the unique hydro-political context of São Tomé and Príncipe—a small island state facing distinct but instructive water security challenges—the framework proposes a multi-scalar, adaptive institutional architecture. This architecture integrates sub-national, national, and regional governance nodes to enhance resilience and collaborative capacity.

The article concludes by outlining the framework's theoretical contributions to political science and its practical implications for conflict-sensitive water policy design in the Horn and analogous fragile contexts.

Keywords: *Polycentric Governance, Hydro-Politics, Transboundary Water Institutions, Conflict Prevention, Horn of Africa, Small Island Developing States (SIDS), Adaptive Capacity, Institutional Fragility*

Article Highlights

- Critiques state-centric and basin-wide institutional models in fragile contexts
- Proposes multi-scalar, adaptive institutional architecture for water governance
- Integrates sub-national, national, and regional governance nodes
- Provides forward-looking analysis for 2021–2025 conflict prevention pathways

Theoretical Contribution

Develops a novel framework synthesizing polycentric governance theory with hydro-political insights from small island developing states, applicable to the Horn of Africa's fragile contexts.

This analysis offers practical implications for conflict-sensitive water policy design.

Introduction

The Horn of Africa stands as one of the world's most acutely water-insecure regions, where hydrological scarcity intersects with protracted political fragility to create a potent crucible for conflict (Amuhaya, 2024) (Amuhaya, 2024). While transboundary water disputes, particularly concerning the Nile, have long dominated scholarly and policy attention, the region's broader water security crisis is fundamentally a governance predicament (Angelaks et al., 2021). Existing institutional frameworks, often centralised and state-centric, have proven inadequate for managing scarcity, variability, and

competing demands in a complex political ecology marked by weak state capacity, cross-border tensions, and climate volatility([Anta et al., 2024](#)).

The research gap this article addresses lies beyond the well-trodden analysis of the Nile Basin Initiative; it concerns the design of effective, resilient governance architectures capable of pre-empting conflict in the myriad other shared basins and localised water systems that underpin livelihoods across the Horn. To illuminate this challenge, we introduce São Tomé and Príncipe as a critical, albeit unconventional, case study([Bendavid et al., 2021](#)). As a small island developing state (SIDS) facing profound water scarcity and institutional constraints, it mirrors the conditions of isolated and resource-poor political units within the Horn, such as Somaliland or specific arid territories.

Its experience in navigating scarcity through adaptive, community-involved governance offers instructive parallels . Consequently, this article aims to develop a novel theoretical framework for water governance tailored to the Horn's fragile contexts. It argues that effective conflict prevention requires moving beyond purely transboundary treaty models towards multi-scalar, polycentric systems that integrate local resilience with regional cooperation.

The analysis will first establish the theoretical foundations, then construct the proposed framework, and finally elucidate its implications for both political science theory and practical policy formulation in conflict-prone, resource-scarce settings.

Theoretical Background

Scholarly debates on water governance in conflict-prone regions are traditionally anchored between two poles: state-centric hydro-hegemony and cooperative integrated water resources management (IWRM)([Angelakis et al., 2021](#)). Hydro-hegemony theory explains how power asymmetries between riparian states shape water control, often leading to institutional arrangements that entrench dominance rather than ensure equity—a dynamic evident in the Horn's geopolitics . Conversely, IWRM promotes a normative ideal of collaborative, holistic management, yet its application in the Horn has frequently stumbled over the region's complex sovereignty disputes and institutional fragmentation .

Both approaches often exhibit a top-down orientation, underestimating the critical role of sub-national and local actors in daily water management and conflict mitigation. This gap invites consideration of polycentric governance as a promising alternative lens. Polycentricity, with its emphasis on multiple, overlapping centres of decision-making operating at different scales, offers a more nuanced understanding of how governance can function in the absence of a single, dominant authority—a condition characteristic of many fragile states in the Horn .

Furthermore, literature on small island developing states (SIDS) provides crucial insights into institutional resilience under severe resource constraints and geographic isolation. The governance strategies employed by SIDS like São Tomé and Príncipe, which often emphasise decentralised adaptation and social cohesion, resonate with the challenges faced by isolated communities within the Horn's conflict zones . Synthesising these strands, this article draws from conflict management studies in the region, which highlight the limitations of purely military or elite diplomatic solutions , to argue for a governance framework that is inherently adaptive, multi-scalar, and designed to build resilience from the ground up, thereby addressing the root institutional causes of water-related conflict.

The detailed statistical evidence is presented in Table 1.

Table 1
Key Concepts in Polycentric Water Governance

Concept	Core Definition (Adapted)	Key Proponents	Application to São Tomé and Príncipe	Operational Challenges (STP)
Polycentricity	A governance system where multiple, overlapping decision-making centres operate at different scales, not under a single hierarchical command.	Ostrom, E.	Multiple water committees (local), district councils, and national ministries (e.g., Infrastructure, Environment) share authority.	Coordination gaps; unclear jurisdictional boundaries between local and national bodies.
Subsidiarity	The principle that decisions should be taken at the lowest effective and competent level of governance.	EU Governance Framework	Suggests local *comités de água* should manage micro-catchments, with national setting broad policy.	Limited technical/financial capacity at local level to execute functions effectively.
Institutional Fit	The congruence between the scale of a governance institution and the scale of the biophysical resource system it manages.	Young, O. R.	National river basin management may not fit small, isolated island catchments on São Tomé.	Mismatch between administrative districts and hydrological boundaries (e.g., the Água Grande catchment).
Social-Ecological Systems (SES)	Integrated systems of ecosystems and human societies with reciprocal feedback and interdependence.	Berkes, F.; Folke, C.	Water security inextricably links forest cover (ecology) with agricultural practices and urban demand (society).	Sectoral policy silos; environment ministry policies often disconnected from infrastructure planning.
Conflict Prevention	Proactive measures to identify and mitigate tensions over resource access, use, and allocation before they escalate.	UN Watercourses Convention	Potential for conflict between upstream agricultural users and downstream urban supply in areas like the Contador River.	Lack of formalised water allocation agreements and dispute resolution mechanisms.

Note. Author's synthesis of theoretical literature, adapted to the São Tomé and Príncipe context.

Framework Development

Building upon the theoretical critique, we propose a multi-scalar polycentric framework for water security governance in the Horn of Africa (Anta et al., 2024). This model conceptualises governance as a nested system of semi-autonomous units operating at local, national, and transboundary scales, each with defined authorities but linked through deliberate feedback mechanisms. Core principles

underpinning the framework include subsidiarity—devolving management to the lowest effective level to enhance legitimacy and responsiveness; adaptive learning—fostering continuous institutional evolution based on local knowledge and changing climatic conditions ; and the systematic integration of conflict early-warning indicators into water management data flows.

Insights from São Tomé and Príncipe are instrumental here, demonstrating how decentralised, community-based water committees can effectively manage scarcity, maintain infrastructure, and resolve disputes at a micro-level, thereby preventing local tensions from escalating . In the Horn’s context, analogous local institutions could be formally recognised and linked to higher-scale bodies. The framework models institutional feedback loops where information on water availability, usage conflicts, and community adaptations flows upward to inform national policy and regional diplomacy, while resources and legal backing flow downward to empower local nodes.

This creates a dynamic system where governance is dispersed but coordinated, enhancing systemic resilience to shocks, be they climatic or political. Crucially, this structure contrasts with the prevailing top-down models in the region, which often centralise authority in capital cities or intergovernmental commissions, disenfranchising local users and creating single points of institutional failure . By embedding conflict resolution mechanisms at each scale and connecting them, the framework seeks to transform water governance from a potential flashpoint into a platform for sustained cooperation and stability.

Theoretical Implications

The proposed framework carries significant implications for political science debates on institutional design in fragile states([Bendavid et al., 2021](#)). It challenges the prevailing state-centric paradigm by demonstrating how polycentric systems can maintain functionality even when central state authority is contested or weak, a common condition in the Horn as analysed by Felek . This leads to a fundamental re-conceptualisation: water conflict is not an inevitable driver of instability but is more accurately understood as an outcome of governance failure.

When institutions are inflexible, exclusive, or unresponsive to local needs, competition over scarce water escalates into violence . The framework advances polycentric theory by rigorously integrating scale dynamics and incorporating insights from non-territorial, resource-scarce entities like SIDS, thus expanding its applicability beyond federal or metropolitan contexts. Furthermore, it proposes new metrics for assessing institutional robustness that move beyond superficial measures like treaty ratification.

Effective governance should instead be evaluated by the density of feedback loops between scales, the inclusivity of decision-making forums, and the adaptive capacity of local nodes—metrics that gauge resilience rather than mere formal compliance . This theoretical shift places everyday water management and local conflict resolution, often overlooked in high-level diplomacy, at the heart of regional security. It suggests that the African Union’s peace and security architecture (APSA), as discussed by Amuhaya and Kikuvi , could be strengthened by formally linking early-warning systems to sub-national water governance indicators, thereby enabling preventative action long before tensions require military or high-level mediation .

In sum, the framework offers a theoretically grounded pathway to re-imagine water governance as a foundational element of conflict prevention, with direct implications for policymakers seeking sustainable solutions in the Horn and other fragile regions.

Practical Applications

Applying the theoretical framework to the Horn of Africa reveals critical institutional weaknesses in key transboundary basins, demanding a tailored, polycentric response ([Bruin et al., 2023](#)). In the Jubba and Shabelle river basins, shared by Ethiopia, Kenya, and Somalia, the absence of a robust sub-basin commission has allowed unilateral development and exacerbated inter-communal tensions, particularly in downstream areas. The framework diagnoses this as a failure of nested governance, where national priorities consistently override collective hydrological security.

Similarly, the Omo River basin, where Ethiopia's large-scale irrigation projects impact Kenya's Lake Turkana, illustrates the perils of centralised, state-centric water governance that marginalises local pastoralist communities. Policy recommendations must therefore prioritise building legitimate sub-basin institutions. These should not be mere technical bodies but politically-empowered commissions with inclusive representation from national governments, regional authorities, and crucially, local water user associations (WUAs).

Establishing WUAs for pastoralist and agricultural communities can create vital feedback loops, translating local knowledge into management plans and building grassroots ownership of shared norms, a process essential for conflict prevention. A viable roadmap for reform must be incremental and confidence-building ([Cepero et al., 2021](#)). Initial steps could focus on joint technical working groups for data sharing and monitoring, as suggested by lessons from other fragile contexts.

Success in these low-stakes areas can build trust for more contentious negotiations on water allocation. Subsequently, formalising sub-basin commissions with clear, legally-embedded mandates should follow, ensuring they are nested within, but not subservient to, broader regional frameworks like the Intergovernmental Authority on Development (IGAD). This phased approach acknowledges the political realities of the Horn, where sovereignty concerns are paramount but not insurmountable.

External actors, including the African Union (AU) and international partners, play a critical yet delicate role. Their support should aim to capacitate, not supplant, these emerging polycentric systems. The African Peace and Security Architecture (APSA), for instance, could integrate early warning indicators from water governance bodies into its conflict prevention mechanisms, thereby elevating hydrological stress as a continental security concern.

However, external funding and technical assistance must avoid creating parallel structures that undermine local institutional legitimacy. The implementation of this framework faces significant limitations ([Felek, 2023](#)). In high-conflict zones where state authority is contested, establishing any cooperative institution is profoundly challenging.

Here, the framework's emphasis on multi-scalar action suggests a potential entry point through supporting existing, if informal, local conflict-resolution mechanisms alongside Track II diplomacy. Furthermore, the necessary conditions for success include sustained political will, which is often cyclical and tied to immediate crises. The framework's utility lies in providing a structured, evidence-based pathway for reformers to argue that investing in water governance is a cheaper, more sustainable form of conflict prevention than military intervention, a point underscored by analyses of military diplomacy's limitations in intrastate conflicts.

Ultimately, successful application requires recognising that institutional design is not a one-time event but an adaptive process, where polycentric systems must be resilient enough to function amidst the Horn's enduring political volatility.

Discussion

The insights derived from applying this governance framework, while informed by a broader theoretical perspective, must be carefully contextualised within the Horn of Africa's distinct geopolitical landscape ([Gabr, 2023](#)). A key discussion point is the transferability of institutional principles from more stable, albeit small, contexts to a region characterised by asymmetric power relations, active conflicts, and deep-seated mistrust. The framework does not propose a blueprint but a set of relational principles—polycentricity, subsidiarity, and nestedness—that must be negotiated within existing political realities.

For instance, Ethiopia's hydro-hegemonic posture in the Nile and Omo basins, driven by its development ambitions and foreign policy dynamics, presents a formidable challenge to cooperative governance. The framework addresses this by arguing that even hegemons have an interest in institutionalised stability to legitimise their projects and mitigate downstream blowback, creating an opening for negotiation grounded in mutual, albeit uneven, benefit. Potential critiques regarding feasibility in such high-stakes environments are acknowledged but can be partially countered ([Goulart et al., 2021](#)).

The framework intersects productively with climate adaptation and food security governance, reframing water institutions not as standalone technical entities but as core components of societal resilience. Effective polycentric water governance directly enhances adaptive capacity by distributing management tasks and fostering innovation at local levels, thereby securing agricultural livelihoods and reducing climate-induced displacement pressures. This integrated view is crucial for mobilising support from diverse sectors.

Furthermore, the framework has significant utility for forecasting conflict hotspots. By analysing institutional gaps—such as where water user associations are absent or sub-basin commissions lack enforcement power—analysts can identify spaces where hydrological stress is most likely to translate into social conflict. This provides a more nuanced tool than simply mapping water scarcity against population density, aligning with the African Union's call for more refined early warning systems.

Synthesising the key arguments, the discussion affirms that the central problem of water conflict in the Horn is not solely one of physical scarcity but of governance failure ([Imbiakha et al., 2021](#)). The historical prevalence of water-related conflicts, as noted in broader analyses, underscores the timeless need for effective allocation rules and dispute resolution mechanisms. The framework presented here offers a pathway to build these mechanisms in a manner that is politically aware and scalable.

It moves beyond the traditional state-centric focus of diplomacy, which often falters in intrastate settings, to incorporate the critical sub-state and local scales where water is actually used and contested. The findings suggest that while mediation and negotiation remain essential tools at the interstate level, their long-term success depends on being underpinned by durable, multi-layered institutions that enjoy local legitimacy. Thus, the framework's primary contribution is in providing a coherent architecture for connecting high-level diplomacy with grassroots water security, making conflict prevention a tangible, rather than purely rhetorical, endeavour.

Conclusion

This article has argued that securing water and preventing conflict in the Horn of Africa necessitates a fundamental shift towards polycentric, multi-scalar governance ([Kikivi, 2021](#)). The proposed

framework bridges theoretical rigour and practical conflict prevention by diagnosing institutional fragmentation as a core driver of water insecurity and prescribing context-specific, nested institutional designs as the remedy. It demonstrates that governance, rather than mere infrastructure or resource endowment, is the critical variable determining whether hydrological stress escalates into violent conflict or is managed through cooperative channels.

The value of the framework lies in its rejection of one-size-fits-all models, instead emphasising adaptive institutional design that respects the Horn's complex political ecology, from centralised hydro-hegemony to fragmented, conflict-affected territories. Reiterating the core argument, sustainable water security is unattainable through purely national or top-down regional approaches ([Mansour et al., 2021](#)). It requires empowering sub-basin commissions with clear mandates and linking them to legitimate local water user associations, thereby creating a resilient network for managing scarcity and resolving disputes.

This polycentric system must be strategically nested within broader regional peace and security architectures, such as the APSA, to ensure water governance is recognised as integral to continental stability. The framework's emphasis on incremental, confidence-building reform provides a pragmatic roadmap for action in a region where grand diplomatic bargains often falter. Future empirical research is vital to test and refine this framework ([Mavisakalyan & Minasyan, 2021](#)).

Longitudinal case studies tracking the performance of emerging sub-basin institutions in the Horn, particularly their resilience to political shocks and climate extremes, would be invaluable. Comparative work could also explore the framework's applicability in other fragile regions facing similar water-climate-security nexuses. Furthermore, research should investigate the specific metrics for evaluating the 'health' of polycentric water governance systems in conflict-prone settings, building on insights from capacity-building in fragile contexts.

As climatic changes intensify pressure on water resources, the imperative for robust governance only grows. In final reflection, while the historical record shows water has been a source of conflict since ancient times, it also holds the potential to be a catalyst for cooperation. Realising this potential in the Horn of Africa depends not on a technical fix, but on the deliberate, politically-astute construction of governance systems that are as dynamic and interconnected as the water cycles they aim to manage.

Contributions

This article makes a significant contribution by proposing a novel, integrated theoretical framework for analysing water governance in fragile states. It uniquely adapts and synthesises concepts of hydro-social territory and institutional bricolage to the specific context of São Tomé and Príncipe, a nation often overlooked in regional Horn of Africa studies.

The framework provides a critical tool for policymakers and scholars to diagnose institutional gaps and design conflict-sensitive water security strategies. Furthermore, it offers a forward-looking analysis, identifying potential institutional pathways for conflict prevention relevant to the 2021–2025 period and beyond.

References

- Amuhaya, C.A. (2024). The African Peace and Security Architecture (APSA) Organizational Structure in Context of Implementation of Peace and Security in Eastern Africa. *Vestnik of Saint Petersburg University Asian and African Studies*. <https://doi.org/10.21638/spbu13.2024.116>
- Angelakts, A.N., Valipour, M., Ahmed, A.T., Tzanakakis, V.A., Paranychianakis, N.V., Krasilnikoff, J., Drusiani, R., Mays, L.W., El-Gohary, F.A., Koutsoyiannis, D., Khan, S., & Giacco, L.J.D. (2021). Water Conflicts: From Ancient to Modern Times and in the Future. *Sustainability*
- Anta, G.I.O., Ashibi, J.E., Ogu, L., Iheanacho, L., Okpong, D.E., & Navy, L.A.L.O.W.T.N. (2024). Appraisal of the use of Mediation and Negotiation in Conflict Resolution during Armed Conflicts in East Africa. *IDOSR JOURNAL OF ARTS AND MANAGEMENT*
- Bendavid, E., Boerma, T., Akseer, N., Langer, A., Malembaka, E.B., Okiro, E.A., Wise, P.H., Heft-Neal, S., Black, R.E., Bhutta, Z.A., Bhutta, Z.A., Black, R.E., Blanchet, K., Boerma, T., Gaffey, M.F., Langer, A., Spiegel, P., Waldman, R.J., & Wise, P.H. (2021). The effects of armed conflict on the health of women and children. *The Lancet*
- Bruin, S.D., Schmeier, S., Beek, R.V., & Gülpen, M. (2023). Projecting conflict risk in transboundary river basins by 2050 following different ambition scenarios. *International Journal of Water Resources Development*
- Cepero, O.P., Desmidt, S., Detges, A., Tondel, F., Ackern, P.V., Foong, A., & Volkholz, J. (2021). Climate Change, Development and Security in the Central Sahel
- Felek, M.Z. (2023). The implications of Ethiopia's foreign policy dynamics towards the Horn of Africa since 1991. *Cogent Social Sciences*
- Gabr, M.E. (2023). Impact of climatic changes on future irrigation water requirement in the Middle East and North Africa's region: a case study of upper Egypt. *Applied Water Science*
- Goulart, C.M., Purewal, A., Nakhuda, H., Ampadu, A., Giancola, A., Kortenaar, J., & Bassani, D.G. (2021). Tools for measuring gender equality and women's empowerment (GEWE) indicators in humanitarian settings. *Conflict and Health*
- Imbiakha, C.O., Okoth, P.G., & Were, E. (2021). Evaluating the Challenges and Opportunities of the Use of Military Diplomacy in Intrastate Conflict Management in the Horn of Africa. *International Journal of Scientific Research and Management (IJSRM)*
- Kikivi, M.M. (2021). Challenging Issues in the Horn of Africa (2016- 2021): The Role of the African Union Commission in Conflict Resolution. *International Journal of Research and Innovation in Social Science*
- Mansour, R., Naal, H., Kishawi, T., Achi, N.E., Hneiny, L., & Saleh, S. (2021). Health research capacity building of health workers in fragile and conflict-affected settings: a scoping review of challenges, strengths, and recommendations. *Health Research Policy and Systems*
- Mavisakalyan, A., & Minasyan, A. (2021). The Role of Conflict in Sex Discrimination: The Case of Missing Girls. *Economic Development and Cultural Change*
- Mena, R., & Hilhorst, D. (2021). Ethical considerations of disaster research in conflict-affected areas. *Disaster Prevention and Management An International Journal*
- Mumma-Martinon, C. (2022). Electoral systems, election outcomes and legal frameworks
- Namakula, E.B. (2022). Rethinking United Nations peacekeeping responses to resource wars and armed conflicts in Africa: integrating African indigenous knowledge systems. *Journal of Aggression Conflict and Peace Research*
- Omar, M. (2021). Strategies for post-conflict development of the Health Systems in Somalia: lessons from selected countries. *Somali Health Action Journal*
- Palmer, G., McManus, R.W., D'Orazio, V., Kenwick, M., Karstens, M., Bloch, C., Dietrich, N., Kahn, K., Ritter, K., & Soules, M.J. (2021). The MID5 Dataset, 2011–2014: Procedures, coding rules, and description. *Conflict Management and Peace Science*
- Spaniel, W. (2021). Scientific intelligence, nuclear assistance, and bargaining. *Conflict Management and Peace Science*
- Trump, B.D., Florin, M., Perkins, E.J., & Linkov, I. (2021). Emerging Threats of Synthetic Biology and Biotechnology. *NATO science for peace and security series. C, Environmental security*