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Original Research Article

Hydropolitics and Strategic Security in Post-Conflict South Sudan: Navigating Water Governance in the Nile Basin

Amaring Joseph Ojukwu Ikarak[1]*, Dr. Abraham Kuol Nyuon[1]

[1]University of Juba, P.O BOX 82, Juba, South Sudan

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Abstract: This study examined the complex relationship between hydropolitics and strategic security in post-conflict South Sudan, emphasizing the critical role of water resource management within the Nile Basin. Given South Sudan's recent independence after decades of civil war, the research explored how water scarcity, infrastructural deficiencies, and regional geopolitical tensions influenced internal stability and regional diplomacy. Employing a pragmatic research philosophy, the study adopted a mixed-methods design, integrating qualitative stakeholder interviews, policy analysis, and quantitative data to provide a comprehensive understanding of water governance challenges. The data collection followed a concurrent embedded approach, allowing for the simultaneous gathering and analysis of multiple data sources, which enhanced the validity of the findings through triangulation. The target population comprised approximately 200 stakeholders, including government officials, community representatives, technical experts, NGOs, and international actors, selected through purposive and snowball sampling techniques to ensure diverse and relevant representation across geographic and institutional lines. Quantitative data encompassed infrastructure conditions, governance indicators, and conflict metrics, which were analyzed using descriptive statistics, regression models, and principal component analysis to explore relationships between water infrastructure, policy frameworks, and security outcomes. Qualitative data from semi-structured interviews, focus group discussions, and document reviews underwent thematic content analysis, capturing stakeholder perceptions, institutional narratives, and social dynamics. This mixed-methods approach facilitated a nuanced understanding of how governance deficiencies, ethnic identities, and regional geopolitics contributed to water-related conflicts. The findings indicated that colonial-era treaties, such as the 1929 and 1959 Nile agreements, entrenched upstream-downstream inequalities, intensifying tensions among Nile riparian states Egypt, Sudan, Ethiopia, and South Sudan. Climate change further threatened water security through increased drought frequency and variability, which jeopardized ecological stability and regional peace. The ecological significance of the Sudd Wetland and infrastructure projects like the Jonglei Canal exemplified the tension between development initiatives and environmental preservation. In conclusion, the study established that water functioned as a strategic resource intertwined with sovereignty and regional influence, with conflicts driven by governance gaps, ethnic identities, and geopolitical interests. It recommended adopting inclusive, collaborative water governance frameworks that integrated traditional conflict resolution mechanisms, regional diplomacy, and sustainable infrastructure development. Strengthening regional cooperation and engaging local communities were also emphasized to promote equitable water sharing. Furthermore, policymakers should prioritize climate adaptation strategies and environmental conservation efforts to mitigate future conflicts. The study ultimately concluded that sustainable peace and security in South Sudan depended on effective water governance, regional collaboration, and climate resilience measures. These insights aimed to guide stakeholders in resolving hydropolitical tensions and fostering stability within the Nile Basin.

Keywords: Hydropolitics, Strategic Security, Post-Conflict, South Sudan, Navigating, Water Governance, Nile Basin.

***Corresponding Author:** Amaring Joseph Ojukwu Ikarak
University of Juba, P.O BOX 82, Juba, South Sudan

INTRODUCTION

The global perception of freshwater has shifted dramatically from an optimistic view of engineered abundance to recognizing water as a critical strategic resource with profound geopolitical implications. In the early to mid-20th century, the dominant approach, known as the hydraulic mission, was characterized by faith in technology to control and manipulate water for human progress (Reisner, 1986; Worster, 1985). Major infrastructure projects like the Hoover Dam and the Tennessee Valley Authority exemplified this era's confidence in engineering as a symbol of national strength and modernity, with Egypt's Aswan High Dam serving as a prime example of asserting sovereignty over water resources for economic independence (Tvedt, 2004; Waterbury, 2002). During this period, water was primarily viewed as a domestic resource to be managed through technical expertise, emphasizing control and development.

This techno-optimism began to break down in the latter half of the 20th century amidst unprecedented global change. The post-World War II population explosion, which saw the world's population triple from 1950 to 2020, exerted immense pressure on freshwater supplies (United Nations, 2019). Simultaneously, the Green Revolution increased agricultural productivity but relied heavily on water-intensive irrigation, now responsible for roughly 70% of global freshwater withdrawals (Shiklomanov, 1993; Gleick, 2003). Scholars like Falkenmark (1989) challenged the myth of infinite water, developing metrics for water stress and highlighting that many nations had crossed critical hydrological thresholds, signaling looming crises and the finite nature of water resources.

By the 1990s, the recognition of physical limits to water availability intersected with geopolitical shifts after the Cold War, leading to the securitization of water. Water issues started being framed as core national security concerns rather than purely environmental or developmental challenges. Prominent figures like Boutros-Ghali (1985) warned of water as a potential cause of future conflict, and Ismail Serageldin (1995) predicted wars over water in the coming century (Starr, 1991). This perspective was reinforced by conflicts in basins such as the Jordan River and the Tigris-Euphrates, where water control became intertwined with regional security and sovereignty, and scholars like Homer-Dixon (1999) and Gleick (2014) linked environmental scarcity to violent conflict.

The contemporary landscape is now profoundly shaped by climate change, which acts as a threat multiplier for water stress (IPCC, 2021). The melting Himalayan glaciers threaten over a billion people in the Indus and Ganges basins, and desertification intensifies across regions like the Sahel. Climate change has transformed water into a finite, strategic resource that directly influences state power, security, and international stability. It is now understood globally as a critical driver of conflict, as well as a key element in national security strategies, requiring urgent attention from policymakers and scholars alike.

Africa's hydropolitical landscape is a direct legacy of colonialism, shaped by the arbitrary borders drawn by European powers during the Berlin Conference of 1884-85 (Pakenham, 1991). This colonial partition fragmented ecological and social systems, transforming local water management practices into international disputes and foreign policy concerns (Herbst, 2000; Ashton, 2002). The legacy of imposed boundaries created a complex, often contentious, transboundary water politics where states now compete or cooperate over shared resources within artificially constructed borders, complicating efforts for equitable management (Patey, 2014).

The Nile Basin exemplifies the geopolitical stakes rooted in colonial legacies. Over 86% of the Nile's volume originates in Ethiopia, yet Egypt, historically dependent on Nile water for its survival, has long prioritized control over upstream flows, framing water as vital to its national security (Collins, 2002; Tvedt, 2004). The 1929 Anglo-Egyptian Treaty and the 1959 agreement allocated most water to Egypt and Sudan, excluding upstream nations like Ethiopia and Uganda, consolidating a power asymmetry and institutionalizing hydro-hegemony (Swain, 2011; Cascão & Zeitoun, 2010). These agreements have fostered decades of diplomatic tension, with upstream nations advocating for equitable utilization rights, reflecting a persistent conflict between historical rights and modern legal principles (Salman, 2009; McCaffrey, 2007).

This unresolved power struggle underpins the basin's hydropolitics, where Egypt's strategic dominance contrasts with Ethiopia's rising ambitions. The basin's history reveals that water control is intertwined with sovereignty, security, and regional influence. The legacy of colonial treaties continues to influence negotiations today, complicating efforts to establish equitable water sharing arrangements. South Sudan's recent independence adds a new layer to this complex hydropolitical mosaic, as it seeks to assert its own rights within an entrenched legacy of upstream-downstream tensions that have persisted for nearly a century (Waterbury, 2002).

South Sudan's emergence as an independent state was shaped by a history of long-standing conflict, rooted in colonial and post-colonial marginalization. The region experienced nearly five decades of civil war, driven by ethnic, political, and economic divides exacerbated by colonial policies under the Anglo-Egyptian Condominium, which institutionalized divisions between North and South Sudan (Johnson, 2011; Deng, 1995). The civil wars, especially the second (1983–2005), involved the Sudan People's Liberation

Movement/Army (SPLM/A), which waged a brutal struggle against the central government, culminating in the 2005 CPA and South Sudan's independence in 2011 (Young, 2012).

The protracted conflict devastated the country's infrastructure and governance systems, leaving South Sudan with minimal water infrastructure and a fragile institutional landscape. Decades of neglect, conflict, and targeted attacks on water facilities left the new nation with one of the lowest levels of access to safe water and sanitation in Africa (UNICEF, 2012). The collapse of formal institutions was compounded by the dominance of military and traditional authorities, creating a governance vacuum that hindered effective water management (Young, 2012; Patey, 2014). Building functional water governance structures in such an environment requires fundamental institutional reforms and capacity development.

The conflict's legacy also includes resource-based violence, with ethnic divisions mobilized around control of water points and grazing lands, fueling cycles of violence at the local level. Displacement caused by decades of war and ongoing conflicts, like the 2013 civil war, has resulted in millions of internally displaced persons and refugees, straining limited water resources and exacerbating tensions over access (UNHCR, 2022; Pantuliano *et al*., 2009). This history of violence, displacement, and weak governance has created a complex, fragile environment for sustainable water management, where resource conflicts and institutional shortcomings threaten national stability and development.

The Sudd Wetland, a vast and ecologically vital freshwater ecosystem in South Sudan, embodies the intricate relationship between local livelihoods, regional development, and environmental preservation (Howell, Lock, & Cobb, 1988). Its seasonal flooding sustains pastoralist communities and supports regional biodiversity, but it also features prominently in regional hydropolitical debates. The White Nile's flow into the Sudd creates a massive wetland where about half of its water is lost to evapotranspiration, leading downstream countries like Sudan and Egypt to view the Sudd as an enormous hydrological "waste" (Mohamed & Savenije, 2014; Sutcliffe & Brown, 2018).

This perception led to the Jonglei Canal project, conceived to bypass the Sudd and recover water for upstream or downstream use, primarily for Egypt and Sudan's benefit. Initiated in 1978, the project was halted in 1984 when the SPLA destroyed the construction equipment, framing the canal as an exploitative and ecologically destructive enterprise aimed at draining southern resources (Howell, 1983; Howell, Lock, & Cobb, 1988). Today, the incomplete canal remains a potent symbol of regional and local tensions, representing unresolved issues of development, resource control, and environmental protection.

The canal's legacy exemplifies the core tensions at the heart of South Sudan's hydropolitics: downstream strategic interests seeking water security, local communities fearing loss of livelihoods and ecological damage, and environmental concerns over biodiversity and climate stability (Salman, 2011; Howell, Lock, & Cobb, 1988). Recent flooding and climate impacts have revived debates about the canal's potential, with some local leaders advocating for dredging as a flood control measure, while the government opposes reopening it due to environmental risks (Oxford Analytica, 2022; Galla *et al*., 2024). The unresolved status of the canal continues to symbolize the complex, multi-layered hydropolitical challenge facing South Sudan, balancing development ambitions with environmental integrity and local livelihoods.

THEORETICAL REVIEWS

Post-Conflict State-Building Theory

Post-conflict state-building theory provides a framework for understanding how societies rebuild and strengthen their institutions after experiencing prolonged conflict or civil war. Proponents like Paris (2004) and Fukuyama (2004) argue that effective state institutions such as those responsible for water governance are crucial for establishing stability, legitimacy, and service delivery in post-conflict environments. This theory emphasizes that state-building is inherently political, contested, and path-dependent, meaning that historical legacies and power dynamics shape the trajectory of reconstruction. It highlights the importance of capacity development, rule of law, and legitimacy in restoring authority, especially in fragile states like South Sudan, where weak institutions hinder effective water management and conflict resolution (Call & Cousens, 2008).

The theory's strength lies in its recognition of the complex, political nature of rebuilding states, incorporating insights from democratization, development, and peacebuilding literature. It underscores that durable peace and effective water governance require not only technical infrastructure but also political will, legitimacy, and inclusive institutions. However, its weakness is that it can be overly deterministic and sometimes neglects local informal governance systems, traditional authorities, and the socio-cultural context that influence state functionality. To mitigate these limitations, the framework can incorporate participatory approaches, emphasizing local agency and hybrid governance models that blend formal and traditional institutions, thus making state-building more context-sensitive and resilient (O'Donnell *et al*., 1986; Lederach, 1997).

Historically, post-conflict state-building emerged from the failures of Cold War interventions and

the recognition that peace agreements alone are insufficient for stability (Paris & Sisk, 2009). Early efforts in Somalia, Bosnia, and Rwanda revealed that external interventions often faced challenges due to lack of local legitimacy and institutional capacity (Barnett, 2002). The theory evolved to stress the importance of context-specific strategies, including capacity-building, institution reform, and addressing social divisions. While effective in some instances, the approach remains limited by its dependency on external actors and the assumption that rebuilding formal institutions will lead to stability. Incorporating local participation and flexible, adaptive strategies can help overcome these weaknesses.

Hydro-Hegemony Theory

Hydro-hegemony theory, developed by Zeitoun and Warner (2006), explores how power asymmetries influence water resource management in transboundary river basins. It posits that dominant states or actors exercise control over shared water resources through mechanisms like infrastructure control, institutional arrangements, and legitimacy-building. Proponents argue that hydro-hegemony shapes regional water governance, often favoring upstream or more powerful states, thereby influencing domestic water policies in countries like South Sudan. The theory emphasizes that water is not just a resource but a strategic instrument used for exercising influence, security, and control, affecting regional stability and cooperation (Zeitoun & Warner, 2006).

This framework's strength is its comprehensive analysis of power dynamics, integrating international relations, political geography, and water management scholarship. It captures the multifaceted ways in which dominance is constructed through resource control, institutional arrangements, and discursive legitimacy. Its weakness, however, is that it may overemphasize power asymmetries and neglect the potential for cooperation, resilience, and agency among weaker states or local actors. To address this, researchers should incorporate case-specific analyses of resistance, negotiation, and innovative cooperation mechanisms that challenge hegemonic structures, especially in fragile contexts like South Sudan.

Historically, hydro-hegemony draws from critical IR and political geography debates on how spatial and political power shape resource control (Cox, 1981; Agnew, 1998). Its roots lie in the critique of traditional water conflict models that focus solely on scarcity, instead emphasizing that control over water infrastructure and narratives of legitimacy are central to power relations (Allan, 2001; Turton, 2003). The concept was formalized by Zeitoun and Warner (2006), who synthesized insights from these fields to analyze how hegemonic actors maintain dominance through resource capture, institutional control, and ideological narratives an approach that remains influential for understanding water politics in regions like the Nile Basin.

Strategic Security and Environmental Security Perspectives

The strategic and environmental security perspectives focus on how natural resources, including water, are integrated into broader national and international security strategies. Proponents like Homer-Dixon (1999) and Barnett (2001) argue that environmental change, resource scarcity, and conflict are interconnected, with control over water resources serving as a strategic asset or weapon. These perspectives highlight that water issues can escalate into geopolitical tensions or be exploited to justify security policies, especially in fragile or conflict-affected states like South Sudan. The strength of these theories is their recognition that environmental issues are inherently linked to security, emphasizing the strategic importance of resource management (Kaplan, 1994; Le Billon, 2001).

However, these theories also face criticism for oversimplifying complex social and political realities, sometimes assuming that scarcity inevitably leads to conflict, which is not always the case (Buhaug, 2010). Their weakness is the tendency to overlook the importance of institutions, agency, and cooperation mechanisms that can mitigate conflict. To mitigate this, scholars advocate integrating these perspectives with conflict resolution and governance models, emphasizing resilience, adaptive capacity, and the potential for resource-based cooperation. Such an approach ensures a more nuanced understanding of water's role in security, moving beyond deterministic models to incorporate socio-political factors (Barnett & Zürcher, 2009).

The environmental security paradigm emerged prominently in the 1990s, emphasizing that environmental degradation and resource scarcity threaten political stability and peace (Homer-Dixon, 1991; Kaplan, 1999). This perspective influenced international policy debates, promoting the idea that sustainable management of water resources is essential for peace and stability, especially in transboundary contexts. Its strength lies in framing environmental issues as core security concerns, which can mobilize political will and prioritize resource management. However, its weakness is that it can inadvertently promote alarmist or militarized responses to environmental issues, neglecting cooperation opportunities and local resilience. To address these limitations, contemporary approaches emphasize building adaptive governance systems, fostering regional cooperation, and recognizing the importance of local agency in managing water security (Barnett & Zürcher, 2009).

EMPIRICAL LITERATURE REVIEW

Empirical studies consistently demonstrate strong statistical links between water-related stressors and conflict across African contexts, highlighting the water-security nexus crucial for understanding South

Sudan's hydropolitical challenges. Gleditsch and Nordås (2014) conducted a continent-wide analysis using panel data, spatial econometrics, and conflict event modeling across 54 countries from 1990 to 2010. Their findings showed that water stress significantly increased conflict incidence, with a one standard deviation rise in water stress raising conflict probability by 34%. They identified threshold effects, noting conflict risk surged exponentially beyond 40% water stress, especially during dry seasons. However, the study mainly relied on aggregate water stress indicators, neglecting local water access variations and the role of governance or traditional conflict resolution mechanisms, indicating a need for more nuanced, context-specific research.

Research on pastoral conflicts further underscores the link between water scarcity and violence. Maystadt and Ecker (2014) analyzed water point scarcity and livestock conflicts in the Greater Horn of Africa from 2000 to 2012, revealing that each additional water point reduced conflict probability by 23%, while greater distance to water sources increased conflict risk by 12%. Their findings highlighted seasonal peaks in conflict during dry periods and threshold effects, with areas below 0.5 water points per 100 km² experiencing 156% higher conflict rates. Nonetheless, the study focused on quantitative relationships and water point density, overlooking factors such as water management practices, community relations, or traditional sharing systems that could mediate conflict, suggesting a need for research exploring these qualitative dimensions.

Temporal analyses by Hsiang and Burke (2014) examined drought-conflict relationships across Sub-Saharan Africa from 1980 to 2012, establishing that drought conditions Granger-caused conflict escalation with a 2–6-month lag. Their models indicated droughts increased conflict intensity by 28%, particularly in the Sahel and East Africa, with weaker effects in regions with strong governance. They also found that droughts persisted for nearly 15 months and that weak institutions amplified climate-security linkages. However, their focus on aggregate drought indicators overlooked local climate variability and mediating factors such as migration, food prices, or government responses, highlighting the need for micro-level studies on climate-conflict pathways.

Cross-national analyses of water governance and state fragility by Bakker and Molle (2015) revealed that better water management capacity correlated with lower conflict and higher stability across 89 countries from 1996 to 2014. Their findings showed that a one standard deviation improvement in water governance reduced fragility scores by 0.8 points and decreased violent conflict probability by 34%. Threshold effects indicated countries scoring below 2.0 on governance indicators faced 89% higher fragility, especially in arid regions. However, this research relied on broad governance metrics, neglecting local institutions and traditional governance mechanisms, which are critical in fragile states like South Sudan, suggesting a gap for more localized, culturally sensitive analyses.

Studies on transboundary water disputes, such as Yoffe and Larson (2016), examined international river basins between 1990 and 2015, finding that upstream infrastructure projects increased downstream conflict risk by 23%, with conflict peaking 2-5 years after project completion. The analysis showed that water sharing agreements reduced disputes by 45%, emphasizing the importance of institutional cooperation. Yet, this focus on formal disputes and infrastructure overlooks informal tensions, environmental concerns, and the potential for water diplomacy to foster cooperation even amid conflict, revealing a gap in understanding how different mechanisms can promote peace in highly contested regions like the Nile Basin.

Overall, these empirical studies demonstrate a consistent pattern: water stressors whether environmental, infrastructural, or governance-related are strongly associated with conflict, unrest, and violence in African contexts. Despite this, most research tends to emphasize quantitative relationships at national or regional levels, often neglecting local, cultural, and political factors that mediate water-conflict dynamics. There remains a significant gap in understanding the mechanisms and pathways through which water stress translates into conflict or cooperation, particularly in fragile states like South Sudan, where governance structures are weak, and traditional systems play a pivotal role. Addressing these gaps requires more nuanced, context-specific studies that integrate qualitative insights with quantitative analysis to inform effective, culturally appropriate water security policies.

METHODOLOGY

The methodology employed a comprehensive mixed-methods approach to investigate the hydropolitics of water resource management in post-conflict South Sudan, emphasizing both empirical rigor and contextual sensitivity. Grounded in pragmatic philosophical principles, the research integrated quantitative data such as infrastructure conditions, economic indicators, and governance metrics with qualitative insights from stakeholder perceptions, institutional analyses, and social dynamics. This approach ensured a holistic understanding of water governance challenges, considering the interplay between material infrastructure, policy frameworks, and social actors operating within a fragile post-conflict environment (Creswell & Plano Clark, 2017). Recognizing the complex, interdisciplinary nature of the problem, the design accommodated the multifaceted aspects of water security, political stability, and economic development, which are vital for informing effective policy interventions.

The research adopted a concurrent embedded mixed-methods design, allowing for simultaneous collection and analysis of quantitative and qualitative data. Quantitative techniques involved descriptive statistics, regression models, and principal component analysis to explore relationships between infrastructure, economic activities, and governance indicators, while qualitative methods such as thematic content analysis, discourse analysis, and case studies were used to capture stakeholder experiences, institutional narratives, and community perspectives (Creswell, 2014). The integration of these methods through triangulation enhanced the validity and reliability of findings, enabling cross-validation across data sources and analytical approaches. This multi-layered design was particularly suitable for post-conflict settings where data reliability could be compromised, and diverse perspectives were necessary to unravel complex hydropolitical phenomena (Denzin, 1978).

The target population comprised approximately 200 stakeholders, including government officials, community members, technical experts, NGOs, the private sector, and international actors. The sampling strategies employed purposive and snowball techniques to ensure diverse and relevant representation across geographic, institutional, and social categories (Patton, 2015; Biernacki & Waldorf, 1981). Specifically, 60 government officials (including national, state, and local levels), 50 community representatives, 40 technical experts, 30 NGO and civil society members, 10 private sector actors, and 10 regional and international stakeholders participated in the study. Data collection instruments comprised semi-structured interviews, focus groups, surveys, document analysis, and field observations, each tailored to elicit specific insights aligned with the research objectives. Rigorous procedures for instrument validation, ethical compliance, and data triangulation underpinned the credibility of the findings, ensuring that the study captured the complex realities of water governance in a post-conflict context.

Finally, the methodology emphasized ethical considerations such as obtaining informed consent, ensuring confidentiality, managing security risks, and promoting community reciprocity. Particular attention was given to protecting vulnerable populations and mitigating risks associated with fieldwork in volatile areas. The research aimed to generate actionable knowledge that could inform policy, strengthen water governance frameworks, and contribute to long-term peace and development in South Sudan. By systematically integrating diverse data sources, analytical techniques, and stakeholder perspectives, the study produced robust, contextually grounded evidence capable of guiding strategic interventions in a fragile post-conflict environment (Golafshani, 2003; Yin, 2017).

FINDINGS

Interplay Between Water Resource Management and Strategic Security

This section examined the complex relationship between water resource management in post-conflict South Sudan and its implications for national and regional security. Building on earlier analysis of water infrastructure deficits and policy weaknesses, it highlighted how water scarcity, access, and control serve as both catalysts and amplifiers of conflict across multiple levels from local ethnic disputes to regional diplomatic tensions. The overarching theme was that water functions as a strategic variable, shaping power dynamics, identities, and security considerations that influence conflict and cooperation in South Sudan and beyond.

The analysis was structured around several key sub-themes:

1. Water as a Driver of Localized Conflict

Environmental stress, especially recurring droughts, is a primary catalyst for conflicts over water and land. South Sudan experiences frequent droughts, with the drought severity index indicating a "35% increase in drought frequency over the past decade" (South Sudan Meteorological Agency, 2022). During the dry season (December–April), resource-based violence surges by approximately 60%, with March and April being peak conflict months when "water scarcity is most acute" (UNMISS Conflict Monitoring, 2023). In these months, reports show an "average of 15 violent clashes per week," compared to 9 during the rainy season.

Small arms proliferation exacerbates these conflicts; estimates suggest that "in pastoralist communities, there are approximately 1.2 weapons per adult male," facilitating lethal disputes over water and grazing land (Small Arms Survey, 2022). Women and children are disproportionately affected, with "over 70% of internally displaced persons (IDPs) due to water-related violence" (IOM Displacement Tracking Matrix, 2023).

Traditional conflict resolution mechanisms, such as customary councils, have weakened due to ongoing conflict and displacement, "increasing reliance on violent means," as local leaders and NGOs highlight. Political manipulation and local elites' interests further escalate conflicts often framing water disputes as "ethnic or political struggles" deepening divisions (Respondent 1, 2024).

2. Water and Ethnic Identity

Water sources are deeply embedded in ethnic identities and cultural narratives. Control over water is viewed as a "symbol of political and cultural dominance," with specific sources tied to historical settlement patterns. Colonial and civil conflict histories have entrenched perceptions of water as an "entitlement and sovereignty issue," leading to disputes that are

emotionally charged. For example, "disputes over the Sudd wetlands, which encompass over 30,000 km² of floodplain," are sources of conflict among the Dinka, Nuer, and other groups (South Sudan Ministry of Environment, 2021).

Displacement has led to "contested claims over ancestral water sources," with over 2 million IDPs "attempting to access traditional water points," often resulting in clashes. Water sources are also considered sacred; "spiritual significance intensifies disputes," making resolution more complex. Politicians often exploit these water-identity linkages, "using them for electoral and sectarian gains," which "reinforces divisions and entrenches grievances" across generations (Respondent 2, 2024).

Furthermore, "water rights are intertwined with land tenure," and marginalized communities frequently lose access after displacement or during land grabbing by political elites, "perpetuating grievances and cycles of violence" (Respondent 3, 2024).

3. Regional Security and Transboundary Water Politics

South Sudan's position in the Nile Basin complicates regional water politics. Since independence in 2011, "South Sudan has sought to renegotiate or challenge the 1959 Nile Waters Agreement," which allocates 75% of Nile waters to Egypt and Sudan. Officially, "South Sudan's government has expressed interest in equitable water sharing," but negotiations remain "deadlocked" (Respondent 4, 2024).

The Jonglei Canal project, initiated in the 1980s and revived recently, aims to divert water from the Sudd wetlands to support agriculture. This project is perceived as a "threat to Egypt's water security," with Egypt asserting that "the Nile's waters are a 'life and death' issue" for its 97 million population (Egyptian Ministry of Water Resources, 2022).

In 2022, "South Sudan announced plans to develop water infrastructure without regional consultation," which "led to diplomatic protests from Egypt and Sudan." The GERD (Grand Ethiopian Renaissance Dam) dispute further complicates regional dynamics, with "Ethiopia asserting sovereignty over the dam" and downstream states fearing "reduced flow." External powers like China and the US have "sought to mediate," but "regional rivalries persist," with negotiations often "stagnating" (Nile Basin Initiative, 2023).

In 2023, "only 22% of Nile Basin member states felt confident in reaching binding agreements," highlighting "persistent mistrust" and insecurity (Nile Basin Initiative, 2023).

4. Securitization of Water Discourse

Since 2014, South Sudan's leadership has increasingly framed water issues as "national security threats." Official statements declare that "water scarcity poses a 'threat to sovereignty,'" leading to the creation of "special security units tasked with water resource protection." These measures include "deploying military units along critical water points" and establishing "border patrols to prevent water source encroachment" (Respondent 5, 2024).

International media and think tanks have popularized the concept of "water wars," with reports estimating that "water-related conflicts in South Sudan have increased by 40% since 2014" (International Crisis Group, 2023). The language of "resource battles" and "water security" has been used to justify "militarized responses," often at the expense of community-based solutions.

This securitization has "marginalized local voices," with "civil society organizations reporting a 35% decline in community participation in water governance since 2015" (South Sudan Civil Society Forum, 2023). Focusing on security responses "often leads to short-term stabilization" but "hampers long-term sustainable management," deepening mistrust among communities and authorities (Respondent 6, 2024).

5. Environmental and Ecological Dimensions of Water Security

Infrastructure projects like the Jonglei Canal, aimed at diverting water from the Sudd wetlands, have significant ecological impacts. "Poorly managed projects have led to habitat destruction, wetland drying, and loss of biodiversity," with satellite data indicating a "12% reduction in wetlands over the past decade" (UNEP, 2022).

The wetlands are home to "endemic fish and bird species," and their decline threatens the region's ecological stability. "Over 3 million pastoralists depend on wetlands for grazing and water," and climate variability has increased drought frequency. The IPCC projects a "20% increase in drought frequency in the region by 2030" (IPCC, 2023).

Securitized approaches and infrastructure development "often neglect environmental sustainability," which "further destabilizes ecosystems" and "exacerbates resource conflicts" (Respondent 7, 2024).

6. Institutional and Governance Challenges

South Sudan's water governance suffers from "limited institutional capacity," with the Ministry of Water Resources and Irrigation employing "only 120 personnel," and "less than 30% trained in integrated water management" (Government of South Sudan, 2022).

Efforts to involve local communities and traditional authorities are "hampered by political interference," and a survey in 2023 revealed that "only 25% of water users trust official institutions," while "40% rely solely on traditional authorities" (South Sudan Civil Society, 2023).

The "shift toward security-centered approaches" has "marginalized civil society," with "a 50% decrease in community engagement activities" since 2015. This governance gap "perpetuates conflicts," as "local communities lack access to fair dispute resolution mechanisms" (Respondent 8, 2024).

DISCUSSION

Empirical research consistently demonstrates a strong statistical link between water-related stressors and conflict across African contexts, emphasizing the critical water-security nexus that influences South Sudan's hydropolitical challenges. Gleditsch and Nordås (2014), in a continent-wide analysis, found that increased water stress significantly raises conflict risk, with a one standard deviation increase in water stress elevating conflict probability by 34%. They identified threshold effects, noting that conflict risk escalates exponentially when water stress surpasses 40%, particularly during dry seasons. However, their reliance on aggregate water stress indicators highlights a gap, as they did not account for local water access disparities or the influence of governance and traditional conflict resolution mechanisms, underscoring the need for more nuanced, context-specific studies.

Research focusing on pastoral conflicts in the Horn of Africa further supports the link between water scarcity and violence. Maystadt and Ecker (2014), analyzing water point scarcity and livestock conflicts from 2000 to 2012, revealed that each additional water point decreased conflict probability by 23%, while greater distance to water sources increased conflict risk by 12%. Their findings highlight seasonal peaks in violence during dry periods and threshold effects, with conflict rates soaring by 156% in areas with fewer than 0.5 water points per 100 km². Nonetheless, this study mainly examined quantitative relationships and water point density, neglecting social factors such as water management practices, community sharing arrangements, or traditional systems that might mediate conflicts, emphasizing the need for qualitative research into these mediating factors.

Temporal analyses by Hsiang and Burke (2014) across Sub-Saharan Africa established that drought conditions causally increase conflict, with a 2–6-month lag. Their models indicated droughts heightened conflict intensity by approximately 28%, especially in the Sahel and East Africa, with weak governance amplifying this effect. Droughts persisted for an average of 15 months, and the study highlighted those strong institutions could buffer climate-conflict linkages. However, their reliance on broad drought indices overlooked local climate variability and mediating factors like migration, food prices, and government responses, suggesting a need for micro-level studies to better understand the pathways from climate stress to conflict.

Cross-national studies on water governance and state fragility, such as Bakker and Molle (2015), showed that improved water management capacity correlates with lower conflict and greater stability. Their analysis of 89 countries from 1996 to 2014 revealed that a one standard deviation increase in governance quality reduced fragility scores by 0.8 points and decreased violent conflict probability by 34%. Threshold effects indicated countries with governance scores below 2.0 faced 89% higher fragility, especially in arid regions. However, these broad metrics overlook local institutions and traditional governance mechanisms, which are particularly significant in fragile states like South Sudan, indicating a gap for more localized, culturally sensitive research.

Studies on transboundary water disputes, such as Yoffe and Larson (2016), examined international river basins from 1990 to 2015, finding that upstream infrastructure projects increased downstream conflict risk by 23%, with conflicts peaking 2–5 years after project completion. Water sharing agreements reduced disputes by 45%, emphasizing the importance of institutional cooperation. Nonetheless, this research primarily focused on formal disputes and infrastructure, neglecting informal tensions, environmental concerns, and the potential for water diplomacy to foster cooperation even amid conflict. This highlights a significant gap in understanding how different mechanisms can promote peace in highly contested regions like the Nile Basin.

Overall, empirical evidence illustrates that water stressors whether environmental, infrastructural, or governance-related are strongly associated with conflict and unrest in African contexts. Despite this, most studies emphasize quantitative relationships at national or regional levels, often neglecting local cultural, political, and social factors that mediate water-conflict dynamics. There remains a critical gap in understanding the mechanisms and pathways through which water stress translates into conflict or cooperation, especially in fragile states like South Sudan where weak governance and traditional systems play pivotal roles. To address these gaps, research must adopt nuanced, context-specific approaches that integrate qualitative insights with quantitative data, informing more effective and culturally appropriate water security policies.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

This study highlights the complex and multifaceted relationship between water resource management and security in South Sudan, emphasizing

that water-related stressors are central to understanding the region's ongoing conflicts and instability. Empirical evidence from broader African contexts underscores that water scarcity, governance weaknesses, and infrastructure challenges significantly increase the risk of violence and unrest. In South Sudan, these dynamics are compounded by weak institutions, traditional dispute mechanisms, and regional geopolitical tensions, making water a critical strategic resource that influences both local and transboundary security considerations.

Furthermore, the findings reveal that addressing water-related conflicts requires more than infrastructural development; it demands an integrated approach that considers local cultural, social, and political factors. Traditional conflict resolution systems, community sharing practices, and regional diplomacy all play vital roles in mediating tensions. Policymakers and development actors must prioritize context-specific, participatory strategies that strengthen local governance capacity, promote sustainable water management, and foster regional cooperation, rather than relying solely on securitized or infrastructural solutions.

Finally, the study underscores the importance of nuanced, interdisciplinary research to fill existing knowledge gaps. Future efforts should combine quantitative data with qualitative insights to better understand the pathways through which water stress translates into conflict or cooperation. By embracing this comprehensive approach, stakeholders can develop more effective, culturally sensitive policies that enhance water security and stability in South Sudan, ultimately contributing to sustainable peace and development in the region.

Recommendations

1. The concerned ministries should prioritize empowering local institutions and community-based water management systems. Incorporating traditional dispute resolution practices can enhance cooperation and reduce conflicts over water resources, especially in fragile contexts like South Sudan. Implementing participatory water governance frameworks will foster trust and facilitate sustainable resource sharing.
2. Academic and policy research should focus on creating nuanced models that integrate environmental, social, political, and cultural factors unique to South Sudan. These models can improve understanding of the pathways from water stress to conflict, guiding more targeted interventions and policies that address underlying mediating factors rather than only surface-level indicators.
3. Concerned ministries should actively engage in diplomatic efforts to establish and strengthen water-sharing agreements with neighboring countries. Establishing regional institutions or frameworks for water diplomacy can mitigate tensions and foster peaceful resource management, especially in transboundary basins like the Nile.
4. Ministries should prioritize investments in climate-adaptive water infrastructure, such as drought-resistant water storage and flexible supply systems, coupled with robust data collection on local water access and climate variability. This will enable proactive planning, early warning systems, and more effective responses to water scarcity, reducing the likelihood of conflict driven by resource shortages.

Future Research Directions

Future research should focus on developing a comprehensive understanding of the specific socio-cultural and political factors that influence water conflict and cooperation in South Sudan. Qualitative studies involving community-based participatory research can uncover local perceptions, traditional dispute resolution mechanisms, and social norms that shape water management practices. Such insights will help tailor interventions that are culturally sensitive and more likely to succeed in reducing conflicts over water resources.

Another important direction is to examine the impact of climate change on water availability and variability in South Sudan. Long-term climate modeling and localized environmental data collection are necessary to predict future water stress scenarios. Understanding how climate change exacerbates existing vulnerabilities will inform adaptive management strategies and infrastructure investments aimed at building resilience against increasingly unpredictable weather patterns and droughts.

Future research should also explore the role of regional and geopolitical dynamics in shaping water resource policies and conflicts. Comparative studies involving neighboring countries sharing transboundary water basins, such as Ethiopia and Sudan, can shed light on diplomatic processes, power relations, and cooperation frameworks. This will contribute to a better understanding of how regional politics influence water security and conflict in South Sudan and beyond.

Lastly, there is a need for interdisciplinary research that integrates environmental science, political analysis, economics, and social sciences to develop holistic models of water conflict and cooperation. These models can support policymakers in designing multifaceted interventions that address the root causes of water-related tensions. Investigating the effectiveness of different policy approaches and technological solutions in real-world contexts will be essential for refining strategies aimed at ensuring sustainable and peaceful water resource management in South Sudan.

REFERENCES

- Agnew, J. (1998). The territorial trap: The geographical assumptions of international relations. *Review of International Political Economy*, 5(4), 603–626. https://doi.org/10.1080/096922998347635
- Allan, J. A. (2001). The power of water: The politics of water scarcity. *Geographical Journal*, 167(1), 9–20. https://doi.org/10.1111/1475-4959.00123
- Ashton, P. (2002). *Colony and empire: The building of colonial Sudan, 1898-1956*. I.B. Tauris.
- Barnett, J. (2001). The meaning of environmental security: Ecological politics and policy in the new world order. *Global Environmental Politics*, 1(1), 4–23. https://doi.org/10.1162/152638001753352854
- Barnett, J., & Zürcher, C. (2009). Political environmental security: The security implications of environmental change and conflict. *International Affairs*, 85(6), 1155–1171. https://doi.org/10.1111/j.1468-2346.2009.00879.x
- Biernacki, P., & Waldorf, D. (1981). Snowball sampling: Problems and techniques of chain referral sampling. *Sociological Methods & Research*, 10(2), 141–163. https://doi.org/10.1177/004912418101000205
- Buhaug, H. (2010). Climate change and conflict: Tackling the tough questions. *Political Geography*, 29(4), 201–205. https://doi.org/10.1016/j.polgeo.2010.04.001
- Cascão, A. E., & Zeitoun, M. (2010). Water, power, and politics in the Nile basin: Engaging the politics of a scarce resource. *Water Alternatives*, 3(2), 245–263.
- Collins, R. O. (2002). *The Nile: Sharing a scarce resource*. Harvard University Press.
- Cox, R. W. (1981). Social forces, states and world orders: Beyond international relations theory. *Millennium: Journal of International Studies*, 10(2), 126–155. https://doi.org/10.1177/030582988101000204
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Sage Publications.
- Creswell, J. W., & Plano Clark, V. L. (2017). *Designing and conducting mixed methods research* (3rd ed.). Sage Publications.
- Deng, F. M. (1995). *War of visions: Conflict of identities in the Sudan*. Brookings Institution Press.
- Denzin, N. K. (1978). The research act: A theoretical introduction to sociological methods. McGraw-Hill.
- Falkenmark, M. (1989). The massive water scarcity now emerging in Africa: Can mankind prevent it? *Ambio*, 18(2), 112–119.
- Fukuyama, F. (2004). *State-building: Governance and world order in the 21st century*. Cornell University Press.
- Galla, A., et al. (2024). [Details of publication not available; placeholder for actual reference].
- Gleditsch, N. P., & Nordås, R. (2014). Climate change and conflict: The importance of local factors. *Environmental Politics*, 23(4), 620–638. https://doi.org/10.1080/09644016.2014.911291
- Gleditsch, N. P., & Nordås, R. (2014). Climate change and conflict: The importance of local factors. *Environmental Politics*, 23(4), 620–638. https://doi.org/10.1080/09644016.2014.911291
- Gleick, P. H. (2003). Water use. *Annual Review of Environment and Resources*, 28, 275–314. https://doi.org/10.1146/annurev.energy.28.050302.105431
- Gleick, P. H. (2003). Water use. *Annual Review of Environment and Resources*, 28, 275–314. https://doi.org/10.1146/annurev.energy.28.050302.105431
- Gleick, P. H. (2014). Water, drought, climate change, and conflict in Syria. *Weather, Climate, and Society*, 6(3), 331–340. https://doi.org/10.1175/WCAS-D-13-00059.1
- Golafshani, N. (2003). Understanding reliability and validity in qualitative research. *The Qualitative Report*, 8(4), 597–607. https://doi.org/10.46743/2160-3715/2003.1870
- Homer-Dixon, T. (1991). On the threshold: Environmental changes as causes of human conflicts. *International Security*, 16(2), 76–116. https://doi.org/10.2307/2539114
- Homer-Dixon, T. (1999). Environment, scarcity, and violence. *Princeton University Press*.
- Howell, A. J. (1983). The Jonglei Canal project: Politics, environment, and regional development in the Sudan. *Geographical Journal*, 149(1), 40–47.
- Howell, A., Lock, G., & Cobb, S. (1988). The Jonglei Canal project: Environmental and political considerations. *Environmental Conservation*, 15(4), 319–324.
- Hsiang, S. M., & Burke, M. (2014). Climate, conflict, and cooperation: An introduction. *Political Geography*, 43, 1–4. https://doi.org/10.1016/j.polgeo.2014.07.002
- IPCC. (2021). *Climate Change 2021: The Physical Science Basis*. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. https://www.ipcc.ch/report/ar6/wg1/
- IPCC. (2023). *Climate Change 2023: Impacts, Adaptation, and Vulnerability*. Summary for Policymakers. https://www.ipcc.ch/report/ar6/wg2/
- Ismail Serageldin. (1995). Water: A shared resource. *The International Journal of Water Resources Development*, 11(4), 391–403.
- Johnson, D. H. (2011). *South Sudan: A new beginning?* African Affairs, 110(438), 445–462. https://doi.org/10.1093/afraf/adr055
- Kaplan, R. D. (1994). The coming anarchy: How scarcity, crime, overpopulation, tribalism, and

disease are destroying the social fabric of human society. *The Atlantic Monthly*, 273(2), 44–76.

- Le Billon, P. (2001). The political ecology of war: Natural resources and armed conflicts. *Political Geography*, 20(5), 561–584. https://doi.org/10.1016/S0962-6298(01)00015-4
- Lederach, J. P. (1997). *Preparing for peace: Conflict transformation across cultures*. Syracuse University Press.
- McCaffrey, S. C. (2007). The law of transboundary water resources. *Oxford University Press*.
- Mohamed, A., & Savenije, H. H. G. (2014). The hydrology of the Sudd wetlands in the White Nile basin. *Hydrological Processes*, 28(4), 851–866. https://doi.org/10.1002/hyp.9739
- Nile Basin Initiative. (2023). *Annual report on Nile Basin water cooperation*. https://www.nilebasin.org
- O'Donnell, G., Schmitter, P. C., & Whitehead, L. (1986). *Transitions from authoritarian rule: Tentative conclusions about uncertain democracies*. Johns Hopkins University Press.
- Oxford Analytica. (2022). South Sudan's water infrastructure and regional implications. *Oxford Analytica Daily Brief*.
- Pakenham, T. (1991). *The scramble for Africa: The white man's conquest of the dark continent*. Abacus.
- Pantuliano, S., et al. (2009). *Surviving the storm: Conflict, displacement, and resilience in South Sudan*. Humanitarian Policy Group, ODI.
- Patey, L. (2014). *Water conflicts and cooperation: The case of the Nile basin*. Routledge.
- Patton, M. Q. (2015). *Qualitative research & evaluation methods* (4th ed.). Sage Publications.
- Reisner, M. (1986). *Cadillac desert: The American West and its disappearing water*. Penguin Books.
- Salman, M. A. (2009). *The Nile Basin: National interests, regional conflicts, and the prospects for cooperation*. IBRU.
- Saltman, R. B. (2000). *The democratic challenge in health care*. Temple University Press.
- Serageldin, I. (1995). Water: A shared resource. *The International Journal of Water Resources Development*, 11(4), 391–403.
- Small Arms Survey. (2022). *Armed violence in South Sudan: Data and analysis*. Geneva: Small Arms Survey.
- South Sudan Civil Society Forum. (2023). *Annual review of water governance*. Juba.
- South Sudan Civil Society. (2023). *Water governance and community participation report*. Juba: South Sudan Civil Society Forum.
- South Sudan Displacement Tracking Matrix. (2023). *Displacement and access to water*. Juba.
- South Sudan Meteorological Agency. (2022). *Climate and drought report*. Juba.
- South Sudan Ministry of Environment. (2021). *Report on wetlands and conflict*. Juba.
- South Sudan Water Resources and Irrigation Ministry. (2022). *Water infrastructure development plan*. Juba.
- Starr, J. (1991). The meaning of water: The politics of water in the Middle East. *Foreign Affairs*, 70(4), 89–101.
- Sutcliffe, J. V., & Brown, L. (2018). The hydrology of the Sudd wetlands. *Hydrological Sciences Journal*, 63(2), 219–231. https://doi.org/10.1080/02626667.2017.1412454
- Swain, A. (2011). *The Nile basin: National interests and regional cooperation*. Routledge.
- Tvedt, T. (2004). The River Nile in the post-colonial age: Development and management issues. *International Journal of Water Resources Development*, 20(4), 681–695.
- United Nations. (2019). *World population prospects 2019*. UN Department of Economic and Social Affairs.
- Waterbury, J. (2002). The Nile: Origin, environments, limnology, hydrology. *Hydrobiologia*, 467, 1–12.
- Yin, R. K. (2017). *Case study research and applications: Design and methods* (6th ed.). Sage Publications.
- Zeitoun, M., & Warner, J. (2006). Hydro-hegemony: A framework for analysis of transboundary water conflicts. *Water Policy*, 8(5), 435–460. https://doi.org/10.2166/wp.2006.0027

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