OPEN ACCESS

ISSN: 2835-7868

Riak, JDC, et al. (2025): 10452
J Earth Envi Sci, 2025; 4(3):100140
DOI: 10.71010/JEES.2025-e140

Research Article

Journal of Earth & Environment Science

The Hydro-Political Security Threats Amongst the Nile Basin States and the Role of the African Union in Bridging Shared Trans-Boundary Water Resources Conflicts

Jacob Dut Chol Riak[1*], Ph.D.; Emmanuel Ayok Akol Wol[2]

[1]Senior Researcher and Associate Professor. Department of Political Science. School of Social and Economic Studies, Director (Dean), Institute of Japanese Studies. University of Juba. South Sudan.
[2]Teaching Assistant (TA), University of Bahr El Ghazal. South Sudan.

[*]**Corresponding author:** Jacob Dut Chol Riak, Email: dutsenior@yahoo.com

Citation: Riak, JDC and Wol, EAA. (2025). The Hydro-Political Security Threats Amongst the Nile Basin States and the Role of the African Union in Bridging Shared Trans-Boundary Water Resources Conflicts. *J Earth Envi Sci*: *JEES*-140. 1-17

Received Date: 17 Nov, 2025; **Accepted Date:** 25 Nov, 2025; **Published Date:** 01 Dec, 2025

Abstract

This study investigates the role of the African Union in bridging shared trans-boundary resources conflicts amongst the riparian states. It deeply explores security threats that are facing Nile river in the region. The study further identifies challenges created by the colonial powers and how the African Union continued to intervene to address those negative legacies and further mitigations to address these shared trans-boundary rivers contestations. Doing so, the study deploys descriptive survey design which employed structured questionnaires to respondents drawn from Nile Basin Communities. The study sample size consisted of 70 participants, selected using simple random sampling to ensure representation across gender, age and educational background. Data were analyzed using descriptive statistics, with findings presented in percentages. The findings showed that all respondents (100%) recognized the critical importance of rivers in sustaining life and ecosystems. About 74.3% agreed that Nile Basin states heavily depend on the Nile river, while 44.3% disagreed that these states fully own the Nile, revealing the influence of colonial legacies. Furthermore, 72.9% believed such legacies contribute to political tensions. A significant majority (68.6%) attributed water scarcity to rapid population growth and poor management, whereas 81.4% agreed that water hegemony by downstream countries especially Egypt has intensified regional disputes. Lastly, 55.7% strongly agreed that the African Union should play a stronger mediating role than the feeble role it is currently doing to resolve the water conflicts, and 57.1% believed the AU can foster lasting peace, although some respondents expressed doubts about its effectiveness. The study concludes that while the Nile river remains a vital lifeline for the Basin's countries, its management continue to be hindered by historical injustices, population pressures, and unequal power relations. Effective and sustainable governance of the Nile river requires regional cooperation, modernization of colonial-era treaties, and strong institutional frameworks underpinned by fairness and inclusivity. The study recommends the establishment of National Water Institutes (NWI) in each Basin country, strengthening of AU mediation mechanisms, and enhanced collaboration through the Nile Basin Initiative (NBI). It also calls for national water policies addressing population growth and pollution, environmental education, and increased support from civil society and donor agencies to promote sustainable water use.

Keywords: *Hydro-Political, Security Threats, Shared, Trans-boundary, Water Resources, Nile Basin States, Colonial Legacies, Role, the African Union, Nile River.*

1. Introduction

The modern history of hydro-politics in the Nile Basin is very complex and has had wide ramifications for both regional and global security. Water is a critical resource for all countries that share the basin but it is especially important for the development and survival of Egypt, Sudan, South Sudan, Uganda, Eritrea and Ethiopia. For many years, there have been tensions among these countries over the use of the Nile water. Therefore, this study aims to analyse hydro-political security threats and the role of the African Union in bridging conflict in shared trans-boundary rivers in the region and particularly, Nile river. The analysis critically explored the hydro-political security threats and how African Union addresses such implications of trans-boundary shared rivers in the continent due to insufficiency of water resources in the region. This study aims to encourage many African countries and particularly, the Nile Basin States that signed protocols and treaties during colonial era. to implement the signed protocols.

1.1. Background of the Study

This study is intended to explore the scarcity of water in the world and specifically in Africa where some African countries went for direct security threats and confrontations with each other due to shortages of water resources. Trans-boundary rivers are shared by multiple sovereign states, creating conflicting demands on the river's resources management and further complicating already difficult political legacies. The construction of the Grand Ethiopian Renaissance Dam (GERD) on the Blue Nile, which commenced on April 2011 and inaugurated on September 2025 has been a significant source of tensions between upstream Ethiopia and downstream Egypt and Sudan respectively. Crucially, the British mainly favoured Egypt's use of the Nile water resources to protect their agricultural interests in the Nile Delta. As the world waters cover 70% of the earth, the fresh water constitutes only less than 3% of the world's total water. Within this, two thirds of fresh water is locked in glaciers and polar ice caps while most of the remaining water resides in the soil and underground aquifers. Furthermore, approximately 0.01 of all water is accessible to the

human and animal populations in the world. Hence, between 1850s and 1990s, the world population doubled water usage which grew to 300%. During the past 70 years, the world population grew by more than 3 billion people from 2.6 billion in 1950 to over 9 billion in 2020 which greatly contributed to scarcity of water. "If this rate of increase persists, we will soon be using 100% of the world's available supply probably by the mid-21st century", (Klare, 2002). Similarly, water shortage had created deep tensions and which has led to Hydro-political security threats between upper and lower riparian states which requires the effective role of the African Union in maintenance of peace and security in the continent. Henceforth, African Union had a great role of maintaining peace and security in the region when such confrontations emerged among countries that are sharing water sources. Finally, Water scarcity is thus a global challenge and the equitable usage of trans-boundary water bodies is essential for sustainable peace in the region.

1.2. Problem Statement

Since the time of earliest civilization, the Nile river is assumed by many to be the sole property of its downstream countries, especially, those of Egypt, which start from the era of ancient civilization, the Egyptians have made most use of the water of the Nile River. Also, the struggle over the rivers had a long history and which basically compounded within the upper and lower riparian countries having both conflict and cooperative behaviour of countries. As stated, "throughout its history, Egypt has jealously guarded its claim to the Nile waters, threatening for military action against upstream Sudan and Ethiopia whenever they have announced water projects on the river" (Wiebe, 2001). The 1929 and 1959 agreements also empowered Egypt to use and control the water of the Nile, while the first agreement grants Egypt veto power over any projects involving Nile water, the later allows for full utilization of the resource, obliging Egypt for sharing only 15.5% of the water with Sudan. Since those treaties placed Egypt in a hydro-hegemonic position, Egypt has managed to control the use and course of water from source to mouth. As a result, the Nile river has no basin-wide agreement and governing body, as other major international rivers do, (Arsano & Tamirat, 2005). The waters of the Nile and other rivers in Africa are utilized for irrigation, hydro-electric power production, water supply, fishing, tourism, flood control, water transportation and the production of public health, (Kazimbazi, 1998). In particular, it should be noted that the economy of the entire Nile Basin almost entirely consists of agricultural activities of the co-riparian states of the Nile which include Rwanda, Burundi, Congo, Tanganyika, Kenya, Uganda, Sudan, Ethiopia, Eritrea and Egypt. The Nile water treaties have been the subject of many studies and comments, most notably by (Batstone, 1959), (Garretson, 1960), (Teclaff, 1967), (Okidi, 1982 & 1994), (Godana, 1985) and (Carrol, 1999) among others. The Nile Basin has witnessed several changes in territorial sovereignty over the years, just as European occupation and colonization was the most important influence in state-formation in the region, decolonization has been the most important cause of the state succession.

In socio-economic terms, scarcity occurs when the lack of water endangers food production constrains economic development and jeopardizes a country's natural systems, (Gleick, 1993). Due to colonization factors, including population growth, consumption practices and patterns, diversionary activities of water resources, climatic and environmental conditions, the Nile Basin states are beginning to experience water scarcity, with four of them (Egypt, Kenya, Rwanda & Burundi) already classified as water-scarce states, (Kukku & Deese, 1996). Some Nile riparian states have spoken strongly and consistently on the Nile water treaties, making it clear that they are not bound, and the treaties are not valid. These countries include Tanzania, Ethiopia, Sudan and Burundi. It was also reported that the Local Legislative Councils of the territories of East Africa have indicated their dissatisfaction at what they consider to be United Kingdom 's inadequate international expression of their interests as upper riparian as regards the Nile water treaties, (Garretson, 1960). In the absence of bilateral or multilateral agreements, member states should continue to apply generally accepted principles of International Law in the use of development of shared water resources (Biswas, 1993). There are two conflicting water rights theories known to international law, these are the doctrine of absolute territorial sovereignty (the harmon doctrine) and its antithesis, the absolute territorial integrity doctrine. Absolute territorial sovereignty doctrine holds that a state has the right to do whatever it chooses with the water that flow through its boundaries, regardless of its effect on any other riparian state, while absolute territorial integrity is the opposite view.

1.3. Purpose of the Study

The purpose of the study was to investigate security threats of hydro-politics and the roles of the African Union in the shared trans-boundary rivers in the region. The study analyzed thoroughly the emerging threats that could create security and tensions in the region, the role of the African Union in maintenance of peace and security in the region. Although the African Union helped in mitigating emerging threats, the articulated policy of shared trans-boundary rivers has not been implemented by the African Union. These policies if implemented could have helped the young nation-state of South Sudan understand the importance of water resources. It is therefore critical that the role play by the African Union in the shared trans-boundary rivers in the region could attract the Republic of South Sudan, Uganda and Ethiopia, regional academics and national researchers to exert much efforts on the similar role.

1.4. Research Objectives

1.4.1. Broad Objective

The overall general objective of the research is to investigate the hydro-political security threats and the role of the African Union in bridging conflict in shared trans-boundary rivers in the region.

1.4.2. Specific Objectives

i. To explore security threats caused by shared trans-boundary rivers in the region.
ii. To identify challenges created by the colonial powers and how the African Union intervene to address those negative legacies.
iii. To mitigate possible methods and ways on how the African Union can solve these arising conflicts in the region.

1.4.3. Research Questions

i. What are security threats caused by trans-boundary rivers in the region?
ii. What legacies are left by colonial masters, and how African Union intervenes in addressing these problems and challenges?
iii. What mitigations and possible methods and ways on how the African Union can solve the arising conflicts in the region?

1.4.4. Justification of the Study

This research will contribute knowledge to mitigate the hydro-political security threats, roles of the African Union in bridging conflict in shared transboundary rivers in the region. The African Union will be required to lead renegotiating the treaties and protocols of shared trans-boundary rivers in the region and adopt policy of shared trans-boundary rivers and discourage taking it for granted.

This study shall help contribute knowledge in hydro-politics, national interest and threats within the greater Nile basin states. The regional states will use the knowledge to educate students and other foreign policy practitioners on how to promote national interest through hydro-politics and fight against threats using hydro-politics and diplomacy toward achieving collective security in the Nile basin states. The topic of hydro politics and its intersection conflicts and threats and the role of the African Union is highly relevant in today's world. As water resources become increasingly scarce, competition between countries over their use is intensifying. This competition not only affects the sharing of water resources but also extends to the use of water for violent activities. Understanding the strategies used by countries to promote their water resources and how extreme groups exploit water resources and infrastructure is crucial for policymakers and security analysts. By conducting this research, we can gain a better understanding of the complexities of water resource management and the potential security implications of water scarcity and competition. In terms of promoting water resources, countries may engage in various strategies such as building dams, constructing canals, and implementing water conservation measures. These efforts are often aimed at increasing the amount of water available for domestic use and industrial production. However, they can also have significant environmental and social impacts, leading to conflicts with neighboring countries and local communities. For example, the construction of the Grand Ethiopian Renaissance Dam (GERD) on the Blue Nile rive and its inauguration has led to tensions between Ethiopia, Egypt and Sudan due to concerns about water scarcity and the potential impact on their respective economies.

1.5. Significance of the Study

The significance of the study will help African governments in implementing policies concerning water treaties, protocols and ways to mitigate and prevent conflicts on water bodies considering water as trans-boundary resources that are entitled to every country in the region and the role of AU in bridging conflict and work for mutual understanding, peace and security in the region. This research will help the governments and regional organizations to come up with initiatives and programs that can mitigate areas of conflicts among African countries which have conflicting interests on water resources due to effects of global warming and shortages of water based on increased population in the region. This research will strengthen the African Union to mitigate challenges at the earlier stage, it will also suggest possible methods and means that can be applied for the resolutions of conflicts that might arise among African countries. It will make an awareness to the colonies and particularly countries which had signed fallacies agreements and treaties on the natural rights they had claimed on Shared Water Resources.

The research will inject to the existing knowledge possible solutions in reducing security threats in hydro-politics on the shared water resources, particularly, the contestations of the Nile river. This research was intended to fill up the gap on the hydro-political security threats and the main roles of the African Union on water resources, as researchers noted issues of concern in shared trans-boundary water resources such as Nile river rivalry between Egypt and Ethiopia, on the construction of Grand Ethiopia Renaissance Dam (GERD) and other dams constructed along the rivers. Learning about the inadequate knowledge on the ownership of water resources and how it has been taken for granted, the African Union has great role of sensitization of upper and lower riparian states to know that each and any other society living alongside the Nile that had natural rights to utilize water with consideration of other countries who don't claim the Nile river ownership. What is more, the study will enlightened researchers to carryout similar investigations in this field and add intensive studies for the possible solutions to the existing problems of shared trans-boundary rivers in Africa and beyond.

1.6. Limitations/Delimitations of the Research

The limitation of the study was that it replied heavily on secondary data collection method which was more accessible than the primary data method which its acquisition was very limited. The secondary data was drawn from different books and articles that had discussed similar concerns whereas the primary data was collected from the accessible population and particularly the target population where questionnaires were assigned for the purpose of getting intended information. This research therefore focuses on the hydro-political security threats and the role of the African Union in bridging conflict in shared trans-boundary water resources in Africa. The study limitations also include the time factor, limit of resources and access to African Union data.

1.7. Conceptual Framework

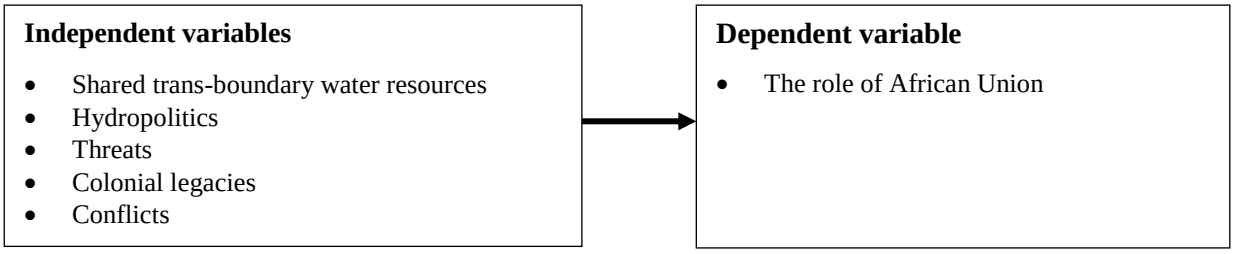


Figure 1: Source: Researchers

1.8. Theoretical Framework

This study adopted two key theories to analyze hydro-political security threats and the role of the African Union in resolving conflicts emanating from shared trans-boundary water resources. These theories include:

i. Human security theory
ii. Political ecology theory

a) Human Security Theory

Human security theory shifts focus from the state to the individual, emphasizing protection from threats to survival, livelihood and dignity, (UNDP, 1994). Hydro-political security threats are closely tied to human security, as water scarcity directly affects food, health and socio-economic well-being. In South Sudan, Uganda, and Ethiopia, shared Nile river disputes impact communities through displacement, food insecurity, and restricted access to potable water. Human security theory helps analyze how these threats affect local populations beyond interstate tensions. This approach considers non-military security threats, such as environmental degradation, migration pressures, and public health risks caused by disrupted water supply. For example, flood-induced displacement along the Sobat river exacerbates vulnerability and increases competition for resources. Human security theory emphasizes the need for policies that prioritize community resilience, equitable resource access, and conflict prevention. The AU interventions can be assessed for their contribution to human security, such as facilitating community-based water management programs. Literature shows that many hydro-political studies remain state-centric, focusing on interstate dynamics while overlooking human-level impacts. This creates a significant knowledge gap regarding the lived experiences of riverine communities. Filling this gap requires empirical research on community vulnerabilities, coping strategies and participation in water governance. Participatory approaches such as focus groups and household surveys, can illuminate human-level consequences of trans-boundary water conflicts. Human security theory also highlights the interconnection between environmental sustainability and conflict mitigation. Access to clean water sanitation and sustainable livelihoods reduces the likelihood of tensions escalating into armed confrontations. The theory is particularly relevant for understanding the inter-sectionality of security threats. For instance, hydro-political insecurity interacts with ethnic marginalization, gender inequities, and poverty, creating complex local dynamics that state-centric analyses often miss. In practice, AU-led programs that integrate human security considerations such as local water management committees and conflict-sensitive development projects align with this theoretical framework, illustrating how continental policies can impact local well-being. This study employed human security theory to assess both the direct and indirect impacts of hydro-political threats on communities, providing a holistic perspective that complements state-focused analyses.

b) Political Ecology Theory

Political ecology theory examines the interactions between political, economic and environmental factors in shaping resource access, control and conflict (Robbins, 2012). It is particularly relevant for understanding trans-boundary rivers, where water governance intersects with power dynamics and environmental constraints. In South Sudan, Uganda and Ethiopia, rivers are not only natural resources but also arenas of political negotiations and contestations. Political ecology highlights how upstream-downstream dynamics, land tenure systems and environmental policies influence hydro-political security threats. This theory considers historical processes, including colonial legacies that shaped unequal access to water and entrenched social hierarchies along river basins. Colonial interventions often favored extractive industries and elite groups, leaving marginalized communities vulnerable. Political ecology also emphasizes the role of institutions, including the AU, in mediating conflicts over natural resources. Institutional interventions can redistribute access, manage disputes and mitigate ecological risks, but they often reflect power imbalances. Literature demonstrates that environmental stressors, such as droughts, floods, and sedimentation, exacerbate preexisting inequalities, creating flash-points for conflict. For example, Ethiopia's dam projects have implications for both ecological sustainability and downstream livelihoods. A major gap in the literature is the limited integration of environmental and political dimensions at local scales. Many studies focus on national or regional governance while underestimating micro-level ecological stressors and community-level political dynamics. Addressing this gap requires multi-scalar research that combines environmental monitoring, participatory mapping and political analysis. Such approaches reveal how ecological changes intersect with social, economic, and political factors to influence security. Political ecology theory also highlights the importance of power asymmetries in shaping access to water resources. Upstream states often exercise control over water infrastructure, while downstream states experience vulnerability, leading to potential conflicts. The theory informs policy recommendations by emphasizing equitable and sustainable resource governance. Strategies include inclusive decision-making, adaptive water management and conflict-sensitive environmental planning. The study therefore applies political ecology theory to analyze how ecological conditions, historical legacies and power relations collectively influence hydro-political security threats in shared rivers and particularly, Nile river.

2. Literature Review

2.1. Security threats influenced by shared trans-boundary rivers in the region

Trans-boundary rivers in Africa are central to national development, socio-economic growth and regional stability. However, shared water resources often generate tensions due to competing interests in water allocation, infrastructure development and environmental degradation. According to Dinar and Nigatu (2015), trans-boundary water conflicts arise when upstream and downstream riparian states perceive unequal benefits or bear disproportionate costs from water usage. In the context of South Sudan, Uganda, and Ethiopia, rivers such as the Nile and Sobat have historically been sources of hydro-political tensions in the region. Conflicts often stem from the upstream construction of dams and irrigation schemes which downstream countries view as threats to water availability and food security. For instance, Ethiopia's Grand Renaissance Dam has been a point of contention with downstream states due to concerns over water flow management and ecological consequences. Several scholars emphasize that hydro-political threats extend beyond resource scarcity. They also encompass migration crises, ethnic disputes and militarization of riverine regions. As highlighted by Zeitoun and Warner (2006), water conflicts are often linked to broader security concerns, including political instability, weak governance and limited institutional capacity for cooperative management. Climate change exacerbates these tensions by altering river flow patterns, causing droughts, floods

and unpredictable water availability. According to Mirumachi (2015), these environmental stressors intensify competition over water resources, thereby elevating the risk of hydro-political conflict. In South Sudan, seasonal flooding of the Sobat river has historically displaced populations and escalated local disputes over land and fishing rights. Water-related insecurity also intersects with economic development. Access to water for agriculture, hydropower and industry is critical for economic stability. Disruptions in water supply can therefore destabilize national economies, triggering cross-border political disputes. The work of Wolf, Yoffe and Giordano (2003) illustrate how trans-boundary rivers often function as both drivers of conflicts and opportunities for cooperation, depending on governance mechanisms. While several scholars note the lack of robust institutional frameworks as a major factor in hydro-political insecurity. The African Union (AU) and regional bodies like the Nile Basin Initiative (NBI) have attempted to mediate disputes, yet enforcement mechanisms remain weak, creating persistent vulnerabilities. Additionally, security threats from trans-boundary rivers are compounded by militarization and competition for strategic water infrastructure. According to Ohlsson (1999), hydro-political insecurity can escalate into localized armed confrontations, particularly when water scarcity intersects with ethnic or political grievances. The literature also identifies water piracy, illegal fishing and riverine smuggling as emerging security threats. These activities undermine state authority and exacerbate tensions between neighboring states. In Uganda and South Sudan, riverine criminality has occasionally escalated into cross-border disputes. Despite the wealth of literature on hydro-political security, gaps remain regarding localized case studies in South Sudan, Uganda and Ethiopia. Most studies focus on general trans-boundary river management or major rivers like the Nile, leaving smaller rivers and localized disputes under-explored. This study addresses this gap by providing an in-depth analysis of selected shared rivers in these countries.

2.2. Challenges created by the colonial powers and how the African Union intervened to address those negative legacies

The colonial legacy in Africa left artificial borders that divided ethnic groups and disregarded hydrological realities. Colonial powers often prioritized extraction and control over sustainable water management. For example, British and Italian colonial administrations in Eastern Africa designed riverine infrastructure to serve colonial economic interests rather than local communities, creating long-term inequities in water distribution (Conca, 2006). These colonial interventions entrenched unequal access to water and reinforced power asymmetries among riparian states. In South Sudan and Uganda, colonial policies influenced land ownership patterns along rivers, creating enduring social and political grievances. Similarly, in Ethiopia, historical treaties with colonial powers often limited the country's participation in cooperative river management frameworks. The African Union, building on the legacy of the Organization of African Unity (OAU) has sought to address these colonial legacies through peace-building, mediation and institutional support. The AU's role includes promoting regional water treaties, fostering dialogue among riparian states and supporting integrated water resources management (IWRM) practices. The literature reveals that while the AU has made strides in conflict mediation, its interventions are often constrained by member states' sovereignty concerns and limited enforcement capacity, (Swain, 2004). In the Nile Basin, the AU has facilitated negotiations between Ethiopia, Sudan and Egypt, but binding agreements remain elusive.

Furthermore, AU interventions emphasize multilateral cooperation and technical assistance. Programs often focus on joint water monitoring, hydrological data sharing, and capacity-building for river basin commissions. However, critics argue that these initiatives sometimes lack inclusivity, particularly, regarding local communities most affected by hydro-political conflicts. Climate adaptation strategies promoted by the AU also aim to mitigate the risks of trans-boundary water conflicts. Initiatives like the African Water Facility support investments in sustainable water infrastructure and climate-resilient agriculture, addressing both environmental and security dimensions. Despite these efforts, literature shows gaps in evaluating the effectiveness of AU interventions. There is limited empirical evidence on how AU-mediated agreements translate into tangible reductions in hydro-political tensions. Moreover, studies rarely assess the long-term sustainability of these interventions, leaving questions about institutional durability and political commitment unanswered.

2.3. Alternatives for mitigating hydro-political security threats in the region

Several scholars propose alternatives to mitigate hydro-political conflicts, focusing on cooperative frameworks, technology and conflict prevention strategies. Cooperative water management, including joint river basin commissions, is considered essential for equitable water distribution and conflict reduction, (Giordano & Wolf, 2003). Trans-boundary water treaties provide legal frameworks for negotiation and resource sharing. Treaties that incorporate principles of equitable utilization, prior notification, and dispute resolution mechanisms can significantly reduce conflict potential. The Nile river Cooperative Framework Agreement (CFA) is an example of such efforts, albeit with contested acceptance by some riparian states. Technological solutions, such as water-efficient irrigation, satellite monitoring of river flows, and early warning systems, also mitigate potential conflicts. These interventions enhance transparency and reduce uncertainty over water availability, helping to preempt disputes. Conflict prevention strategies include capacity-building for local institutions, participatory water governance, and integration of environmental and social considerations into water management planning. The AU and other regional organizations emphasize these approaches to strengthen resilience and reduce the likelihood of violence. The literature also highlights the importance of regional integration and economic interdependence as conflict prevention tools. By linking water resources to broader development projects, riparian states can create mutual benefits that discourage unilateral exploitation. Despite these recommendations, implementation remains uneven due to political tensions, financial constraints and limited technical capacity. Field studies indicate that local populations often remain excluded from decision-making processes, reducing the legitimacy and sustainability of interventions.

2.4. Literature Gaps

The hydro-political security threats focus on major rivers, particularly, Nile river, neglecting smaller or local rivers where most literature is state-centric, overlooking local impacts because of the limited empirical evaluation of AU-mediated agreements. The integration of environmental and political

dynamics studies endeavour to separate ecological and political factors. Sustainability of conflict mitigation often focuses on short-term management rather than transformation.

2.5. How to fill these Gaps

The conduct of empirical field studies in South Sudan, Uganda and Ethiopia as well as the integrate participatory research, surveys and focus groups and case-study analysis and monitoring of outcomes at local and regional levels. The researchers applied human security theory as well as political ecology theory to analyze the intersection of hydro-politics and environmental stressors and the role of African Union in addressing trans-boundary water resources conflicts.

3. Research Methodology

3.1. Research Design

The research design outlines plan and framework for conducting a study as well as methods and procedures used to collect and analyze data in order to answer research questions. The research design should ensure that the study is conducted systematically and effectively leading to valid and reliable results. It has to explain specific questions the research aims to answer, the techniques used to gather information, such as surveys, interviews, or experiments, how participants are selected for the study, the methods used to analyze the collect data, such as statistical analysis or qualitative analysis, the estimated time and resources needed for the research and how the research will be conducted in an ethical manner, ensuring the well-being and rights of participants (Flick, 2011). This study has deployed mixed research design taking both qualitative and quantitative approaches. This mixed research design was chosen to ensure extensive analysis to enhance specific findings.

3.2. Area of Study

The study is conducted at South Sudan, Uganda and Ethiopia as major countries that controlled much parts of the Nile river. Then the role of African Union in addressing conflicts emanating from Nile river from the three countries was ascertained. The study reviewed other researchers work that were conducted before regionally and internationally where it identified the gap of theories' application based on the understanding of that particular country that might resulted to confrontations and conflicts over trans-boundary water resources.

3.3. Source of Information

The source of information for this research is drawn mainly in the primary source, secondary source or mixed of both sources. The primary data of information deals with the information obtained from the subjects in the sample which are in the field direct from the population. The researchers collected primary data from the respondents through used of questionnaires and interviews guides that were answered by the respondents. Whereas secondary data focused on the information that was obtained from books, articles, journals, newspapers, documented articles, manuscripts, etc, the primary source was driven directly from the respondents.

3.4. Population and Sampling Techniques

This study targeted a population of 126 people to represent the whole population in that particular area. The population included both males and females from different age groups and different levels of education where participants can be randomly selected from the population. The target population was determined to 70 sample size using Yamane, 1967 formula.

3.5. Determination of Study Sample

As noted earlier, the target population was determined to 70 sample size using Taro Yamane, 1967 formula as follows.

$n = \frac{N}{1+N(e)2}$ Where

n is the sample size

N is the population

e is the margin error

Target population = 126

Let the margin area be at the confident interval of 90%

100% - 90% = 10%

Whereby 10% = 0.1

$$n = \frac{126}{1 + 80(0.1)2}$$

$$= \frac{126}{1+80(0.1)}$$

$$= \frac{126}{1+0.8}$$

$$= \frac{126}{1.8} = 70$$

Therefore, the sample size is 70 respondents.

3.6. Variables Definitions and Measurements

This study has been carried out on the hydro-political security threats and the role of the African Union in bridging conflict in shared trans-boundary water resources in the region. The terms are defined when conducting research project which included hydro-political which means water politics in the region. Security threats means threats emerged due to water shortage among countries that are sharing water, African Union means regional organization which was established to maintain peace and security in the continent of Africa. Conflict means insecurity created by water shortages, utilization and its management. Shared trans-boundary water resources are water shared in different borders of all those countries. Region is an area where water resources pass through.

3.7. Procedures for Data Collection

Procedures for data collection began from written permission from Ministry of Higher Education, Science and Technology that granted researchers freedom to undertake this contentious study on hydro-politics. Data collection as a main stage in research can promote the quality of achieving results by decreasing the possible errors which may occur during a research project processes. Then, alongside a good design for the study, plenty of quality time should be spent in the collection of data to gain appropriate results since insufficient and inaccurate data which prevents and ensures the accuracy of findings (Kabir, 2016). On the other hand, although a suitable data collection method helps to plan good research, it cannot necessarily guarantee the overall success of the research project, (Olsen, 2012). Data collection methods are divided into two (2) main categories of primary data methods and secondary data methods. In other words, researchers use different approaches to gather and collect primary data for a specific purpose, using primary sources which helps to gain high-quality data that can be improve results and researchers also have the opportunity to add further data when required during the research procedures, (Kabir, 2016) & (Taherdoost, 2021). While secondary data is the data gathered from published sources meaning that the data is already gathered by someone else and can be used for other purposes in a research as well. Thus, secondary data is an essential part of research that can help to get information from

past studies as basis conduction for implementing a research or as the required background information. Secondary data is cheaper and easier to obtain in comparison to primary data, (Hox & Boeij, 2005) & (Kabir, 2016). This study has used questionnaire and interview guide to collect the data.

3.7.1. Questionnaire

The questionnaire is one of the common devices for collecting information and a form or instrument including a set of questions and secure answers that respondents from a specific population to fill up gap the researchers needed for the study. The data given from a questionnaire cannot be achieved from the secondary resources, (Pandey & Pandey, 2015). These forms are suitable to gather for quantitative data and even mixed data at some cases. Although they are not the most common methods used in qualitative research, they are useful in case of facing a large sample in a study. Sir Francis Galton designed a questionnaire for the first time in late 1800s and which had remained for the rest of life of human persons. A questionnaire is utilized for different purposes although it is commonly used to gather statistical data. It can be designed for measuring separate variables such as behaviors, preferences and facts (Kabir, 2016). Although the preparation and administration of a questionnaire are not hard, specific points in these processes should be required. This form is used normally when it is not possible to discuss each participant personally (Pandey & Pandey, 2015). Thus, it helps to gather data from different individuals, groups, and companies easily. Questionnaires can be categorized based on different aspects such as types of questions and administration modes. It is defined as an essentially structured technique for collecting primary data, (Bell, 1999). It was generally a series of written questions for which the respondents have to provide the answers. Because of the above merits, this study chose it.

3.7.2. Interview Guide

The interview was able to infer the extent of reliance on what the interviewee is saying his/her interest and expression. Key informant interview was therefore used as a method of collection data in this research work for it was very effective and efficient way of communication to the specific people with knowledge on hydro-politics and role of the African Union. Thus, the chance of getting confidential data from key interviewees was also possible; however, it required special skills which the researchers had to earned. Researchers can employ different methods to conduct an interview, (Pandey & Pandey, 2015) & (Taherdoost, 2021. Usually, the researchers execute questionnaires on individuals or group face-to-face interviews as well as using personal contacts such as telephones, emails or online meetings etc (Kabir, 2016).

3.8. Data Collection Instruments

There are various tools used for data collection when conducting research which included the statistical tools are used for collection and classifications of the data that may be in numerical or alphabetic form and which provided accurate interpretation of results identification of data in correct form. Also, the variables and its measurements are critical components of statistical analysis. The instruments such as questionnaires and interview guides explore the concept of variables, their types and how they are measured in research studies. The variables are classified into different categories according to their characteristics where the values of these variables can be measured using different scales of measurement. Measurement scales are used to determine the level of measurement and they included nominal, ordinal, interval and ratio scales and each scale has its unique characteristics and researchers must select the appropriate scale for their data collection and use. In this study, researchers used nominal and ordinal measurement scales in their data analysis and presentation.

3.9. Piloting the Study

The research piloting aims to help the researcher adjust and correct some unclear questions to conduct interview easier to the respondents during data collection processes. The pre-test permitted the researchers to check on whether the variables collected could easily be processed and analyzed. After the piloting procedure the questions in the questionnaire and interview guide remain evaluated and those that were found unclear to respondents are made clear to avoid inconvenience on the questionnaire and interview guide and questionnaire. A piloting study can be defined as a small study to test research protocols, data collection instruments, sample recruitment strategies and other research techniques in preparation for and to identify potential problem areas and deficiencies in the research instruments and protocols prior to implementation during the full study. It can also help members of the research team become familiar with the procedures in the protocol and can help them decide between two competing study methods such as using interviews rather than a self-administered questionnaire for data analysis processes. In this study, piloting helped the researchers to correct question 4 and 5 in the questionnaire.

3.10. Quality/Error Control

Quality control is the use of techniques and activities that monitor specific project results to determine if they comply with relevant quality standards or criteria based on the project stakeholder and beneficiary expectations. Quality control as a process has one of three outcomes namely: firstly, acceptance, where the project stakeholders and beneficiaries accept or reject the product or service delivered. Acceptance usually occurs after the project output has been evaluated or tested in some way. Secondly, rework, where the action taken to bring a rejected product or service into compliance with the quality requirements or stakeholder expectations. Rework can be expensive and costs associated with it may not be refundable by the project funder or from project partners. Thirdly, adjustments, where corrections and necessary steps required preventing further quality problems or defects. Adjustments are made to the processes that produce project outputs.

3.11. Reliability

Reliability is literally the extent to which researchers can rely on the source of the data and the reliable data is dependable, trustworthy, unfailing, sure, authentic, genuine and reputable. Consistency is the main measure of reliability and in literary accounts, the reputation of the source is critical. Hence, the indicators of reliability include proximity to events whether the writer was a participant or observer, likely impartiality and whether as the police say the record was really contemporaneous or an eventide reflection on the day's events. Very few politicians admit to real failings, all too often, their own agenda appears to justify their actions or to criticize others. Therefore, reliability as an extent to which a questionnaire got tested, observation or any measurement procedure produces the same results on repeated trials. Cronbach's Alpha is calculated to measure internal consistency. A source of 0.70 or higher

indicates acceptable reliability, (Bell, 1999). The reliability test yielded a Cronbach's Alpha Coefficient of 0.82, which was above the recommended threshold of 0.70, indicating that the research instrument of questionnaire was reliable.

3.12. Validity

The researchers usually takes care of the research to ensure correctness and validity of findings that intended to study. For the researchers to control the quality and ensure validity of the study, the researchers disseminated questionnaire to different groups at different times and the results that was acquired thereafter was measured in order to ascertain consistency which entailed that the results obtain can be generalized to other populations and other group settings. Validity measures the accuracy of the instruments used in capturing the intended information. This study uses triangulation by combining questionnaires and interviews to confirm findings. Criterion-related validity is also tested by comparing the instrument scores with established validated tools. A value of 0.70 or higher indicates acceptable validity using Content Validity Index (CVI) (Oso & Onen, 2008). The validity test yielded a CVI of 0.76, which exceeded the recommended threshold of 0.70, indicating that the research instruments were valid.

3.13. Data Processing and Analysis

Before collection of data, the researchers followed procedures given by the institution to guide the research processes. Both closed- ended and opened-ended questionnaires were designed and distributed to the sample size to manually fill them and then the researchers collected questionnaires and critically checked and analyzed them critically to observe whether the answers given were correctly related to the problem being investigated. Therefore, data analysis is the process which involves critical verification of the data collected from various studies. The researchers mostly used SPSS and other tools for analysis.

3.14. Ethical consideration

The ethical considerations should be noted during the data collection processes where the confidentiality of data must be considered by the researchers. The research took several ethical considerations which included voluntary participation, informed consent, and confidentiality of data collected and communication of the results to the public. Voluntary participation ensured that no respondents were to be coerced to participate in the study through misrepresentation or promise of rewards, (Coolican, 2014). The participants were informed of the purpose of the study and were requested to voluntarily participate in this study prior to their participation. In other words, there are different legal problems that can stem from research studies. The researchers required to ensure and consider the necessary points to avoid them during the research processes. The legal issues can be health risks happening for the voluntary participants that may risks against the reputation of the organizations and institutions or injuring the team. These issues are affected by the laws of the country in which the study is conducted. Ethical clearance processes are used to assure a project is designed based on the required ethical rules. In this process, it must be examined what kinds of considerations are applied based on the provided guidelines (Olsen, 2012).

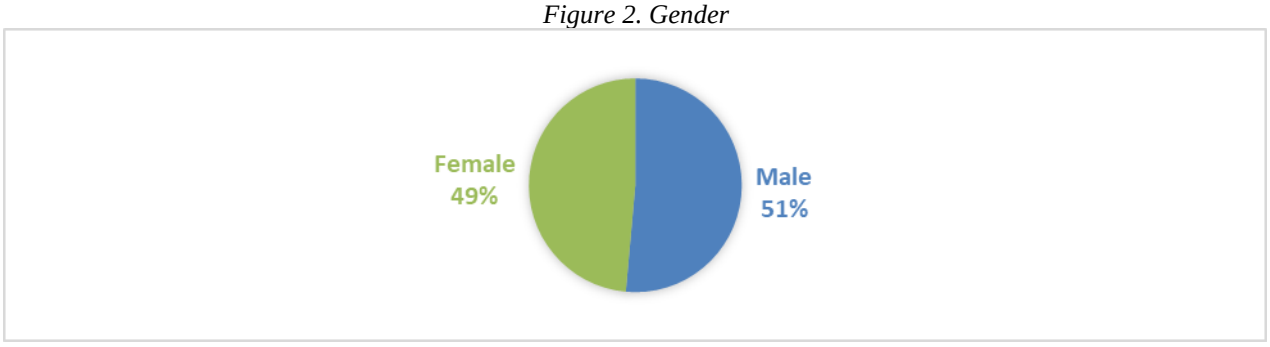
4. Results and Discussions

Table 1. Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	36	51.4	51.4	51.4
	Female	34	48.6	48.6	100.0
	Total	70	100.0	100.0	

Source of Data: Primary Data, 2025.

Figure 2. Gender



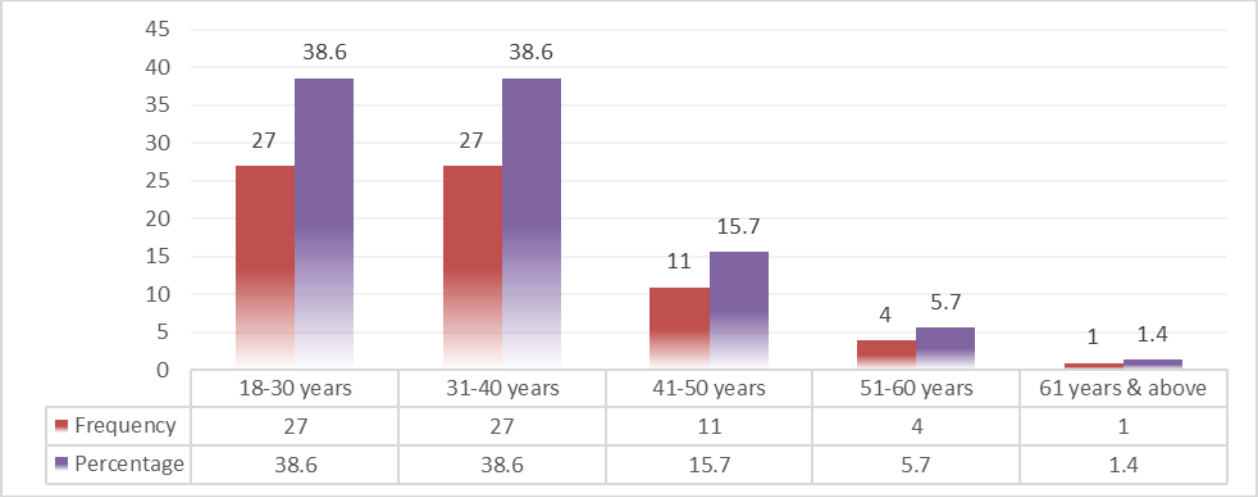
The findings show that the majority of respondents were male 36 (51.4%), while females represented 34 (48.6%). This demonstrates that both genders were fairly well represented in the study, with men slightly outnumbering women. The near balance indicates inclusivity and gender diversity in the sample.

Table 2. Age distribution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-30 years	27	38.6	38.6	38.6
	31-40 years	27	38.6	38.6	77.1
	41-50 years	11	15.7	15.7	92.9
	51-60 years	4	5.7	5.7	98.6
	61 years & above	1	1.4	1.4	100.0
	Total	70	100.0	100.0	

Source of Data: Primary Data, 2025.

Figure 3. Age distribution



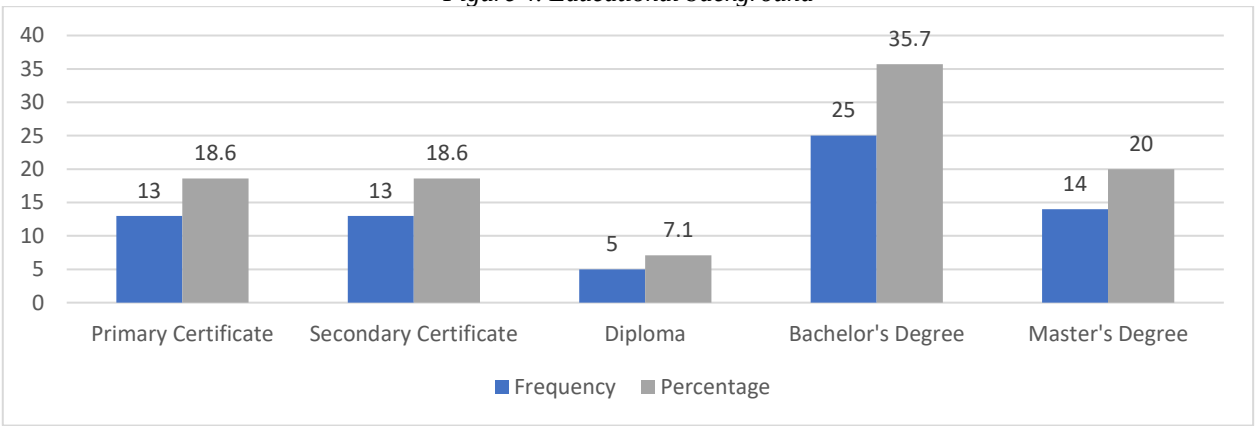
The results indicate that the largest age groups were respondents aged 18–30 years 27 (38.6%) and those aged 31–40 years 27 (38.6%). These were followed by participants aged 41–50 years 11 (15.7%), then those aged 51–60 years 4 (5.7%), and the smallest group were respondents aged 61 years and above 1 (1.4%). This pattern suggests that most participants were young or middle-aged, reflecting active engagement of these groups in Nile Basin issues.

Table 3. Educational background

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Primary Certificate	13	18.6	18.6	18.6
	Secondary Certificate	13	18.6	18.6	37.1
	Diploma	5	7.1	7.1	44.3
	Bachelor's Degree	25	35.7	35.7	80.0
	Master's Degree	14	20.0	20.0	100.0
	Total	70	100.0	100.0	

Source of Data: Primary Data, 2025.

Figure 4. Educational background



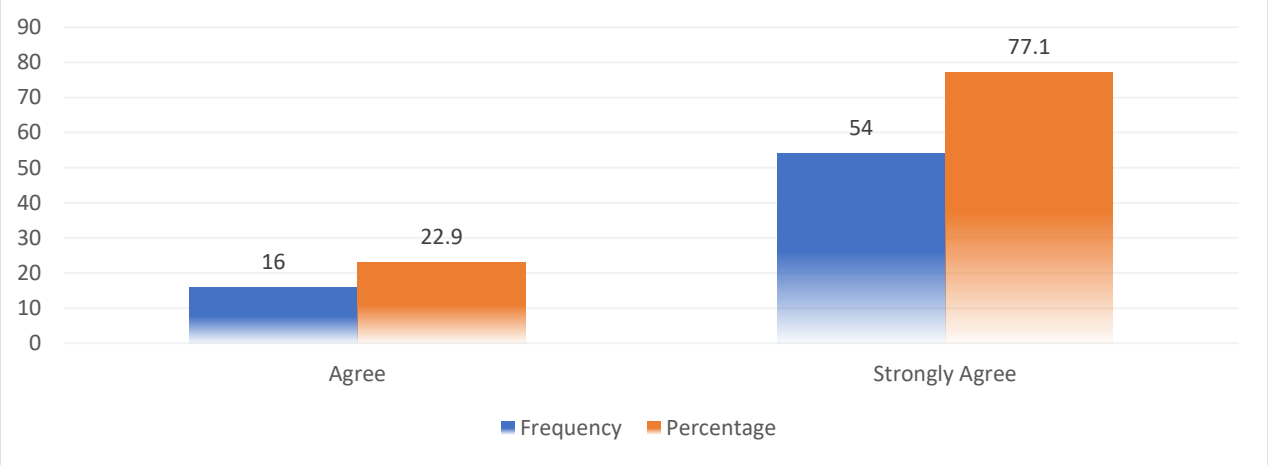
Out of 70 respondents, most had attained a Bachelor's Degree 25 (35.7%), followed by Master's Degree holders 14 (20.0%). Those with Primary and Secondary Certificates each numbered 13 (18.6%), while the smallest group were Diploma holders 5 (7.1%). This shows that the majority of respondents had higher education, which likely enhanced their awareness and understanding of the subject matter.

Table 4. Security threats that influenced by the shared trans-boundary rivers in the region

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	16	22.9	22.9	22.9
	Strongly Agree	54	77.1	77.1	100.0
	Total	70	100.0	100.0	

Source of Data: Primary Data, 2025.

Figure 5. Security threats that influenced by the shared trans-boundary rivers in the region



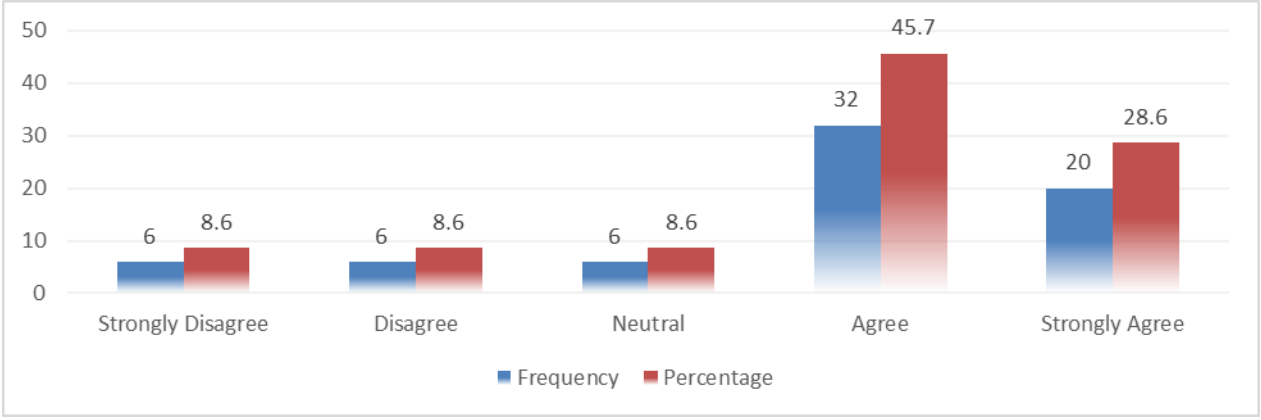
The majority strongly agreed that security threats influenced by the shared trans-boundary in the region rivers 54 (77.1%), while 16 (22.9%) agreed. None of the respondents disagreed. This demonstrates a clear consensus that shared trans-boundary rivers are sources for the conflicts and instability in the region.

Table 5. Challenges created by the colonial powers and how the African Union intervene to address those negative legacies

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	6	8.6	8.6	8.6
	Disagree	6	8.6	8.6	17.1
	Neutral	6	8.6	8.6	25.7
	Agree	32	45.7	45.7	71.4
	Strongly Agree	20	28.6	28.6	100.0
	Total	70	100.0	100.0	

Source of Data: Primary Data, 2025.

Figure 6. Challenges created by the colonial powers and how the African Union intervene to address those negative legacies



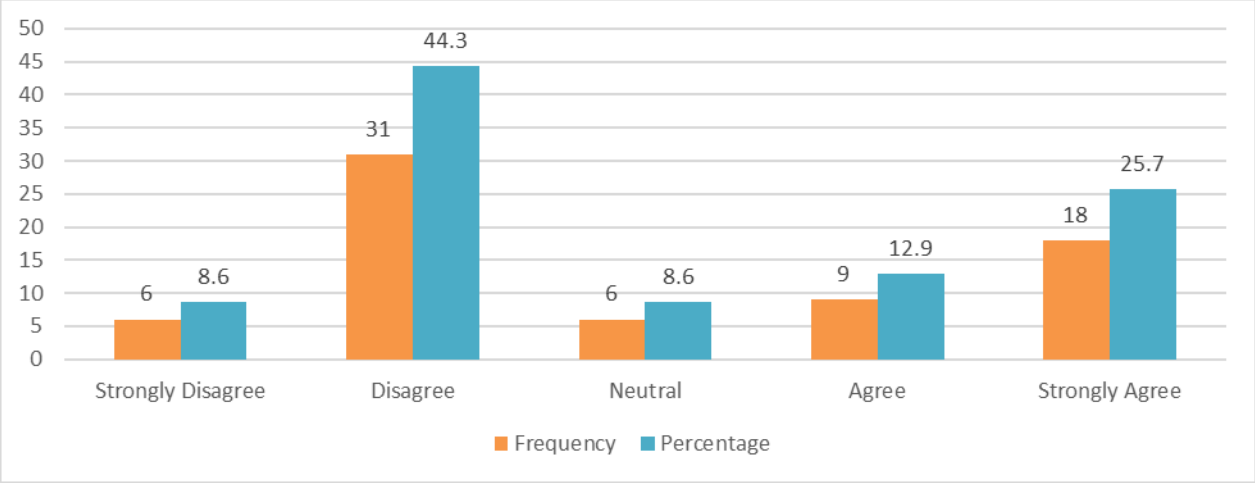
The findings reveal that most respondents agreed 32 (45.7%) that colonial powers created wars and conflicts in the region, followed by 20 (28.6%) who strongly agreed. Meanwhile, 6 (8.6%) disagreed, 6 (8.6%) strongly disagreed, and 6 (8.6%) were neutral. This indicates that while the majority view colonial masters as the main water crisis contributors. Indeed, a small proportion consider alternative sources is also relevant.

Table 6. Nile Basin States' owned River Nile and its tributaries

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	6	8.6	8.6	8.6
	Disagree	31	44.3	44.3	52.9
	Neutral	6	8.6	8.6	61.4
	Agree	9	12.9	12.9	74.3
	Strongly Agree	18	25.7	25.7	100.0
	Total	70	100.0	100.0	

Source of Data: Primary Data, 2025.

Figure 7. Nile Basin States owned River Nile and its tributaries



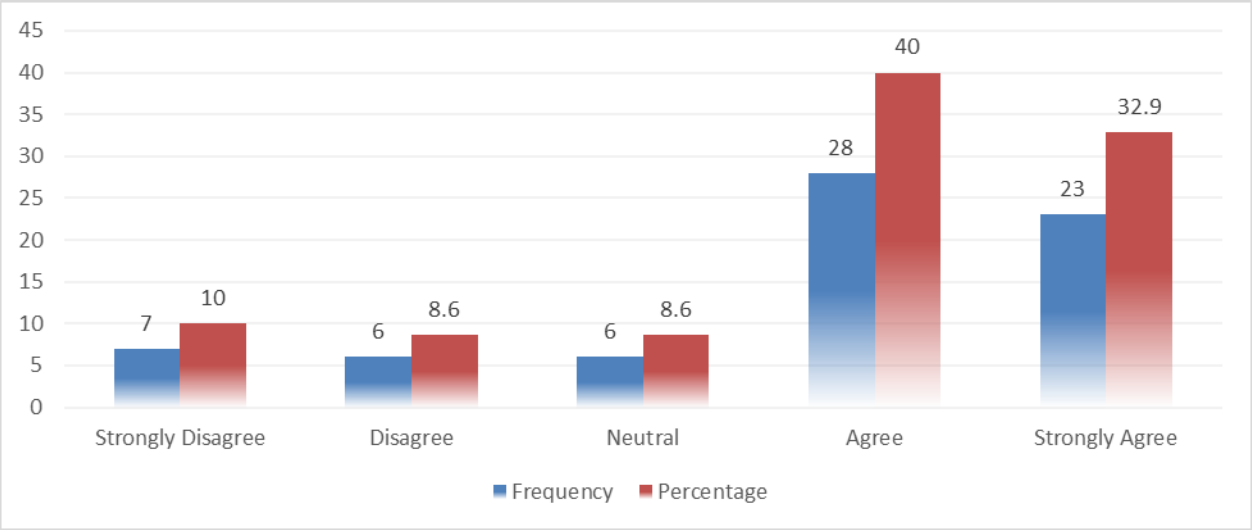
The majority of respondents disagreed 31 (44.3%) with the statement that Nile Basin countries own the River Nile and its tributaries, while 18 (25.7%) strongly agreed. Another 9 (12.9%) agreed, whereas 6 (8.6%) strongly disagreed and 6 (8.6%) remained neutral. This shows that many respondents reject the notion of full ownership, likely due to historical treaties that granted disproportionate rights to Egypt and Sudan.

Table 7. Colonial legacy of natural rights of the low riparian states caused conflicts and instability in the region

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	7	10.0	10.0	10.0
	Disagree	6	8.6	8.6	18.6
	Neutral	6	8.6	8.6	27.1
	Agree	28	40.0	40.0	67.1
	Strongly Agree	23	32.9	32.9	100.0
	Total	70	100.0	100.0	

Source of Data: Primary Data, 2025.

Figure 8. Colonial legacy of natural rights of the low riparian states caused conflicts and instability in the region



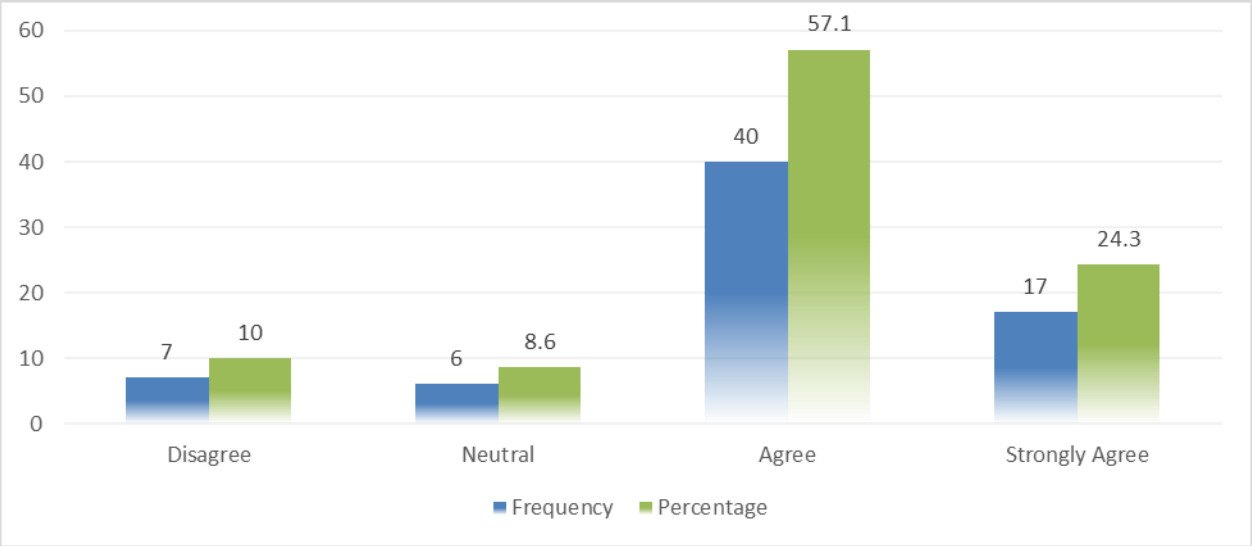
According to the findings, 28 (40.0%) agreed that the colonial legacy of natural rights for low riparian states caused conflicts, followed by 23 (32.9%) who strongly agreed. A smaller proportion strongly disagreed 7 (10.0%), while 6 (8.6%) disagreed and 6 (8.6%) were neutral. This suggests that many respondents connect current conflicts with unfair colonial-era water agreements.

Table 8. Water hegemony by low riparian states to conflicts and wars

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	7	10.0	10.0	10.0
	Neutral	6	8.6	8.6	18.6
	Agree	40	57.1	57.1	75.7
	Strongly Agree	17	24.3	24.3	100.0
	Total	70	100.0	100.0	

Source of Data: Primary Data, 2025.

Figure 9. Water hegemony by Low Riparian States to conflicts and wars



Source of Data: Primary Data, 2025.

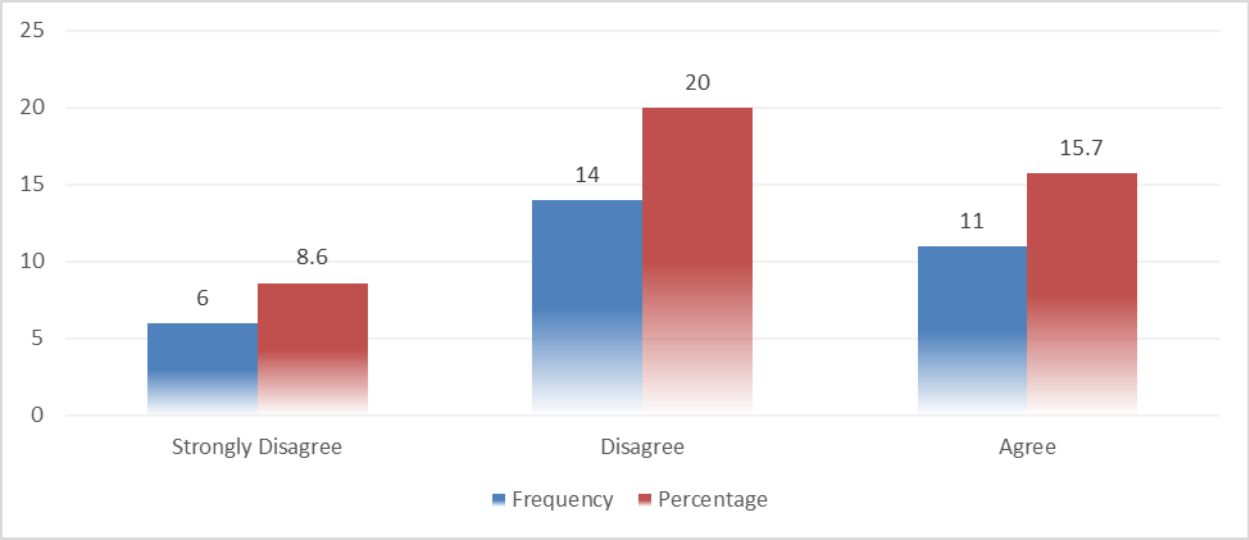
The majority agreed 40 (57.1%) that water hegemony by low riparian states has led to conflicts and wars, while 17 (24.3%) strongly agreed. Fewer respondents disagreed 7 (10.0%), and 6 (8.6%) were neutral. This highlights the perception that control by downstream states has been a major source of instability in the region.

Table 9. African Union has ability to rectify colonial water agreements

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	6	8.6	8.6	8.6
	Disagree	14	20.0	20.0	28.6
	Agree	11	15.7	15.7	44.3
	Strongly Agree	39	55.7	55.7	100.0
	Total	70	100.0	100.0	

Source of Data: Primary Data, 2025.

Figure 10. African Union has ability to rectify colonial water agreements.



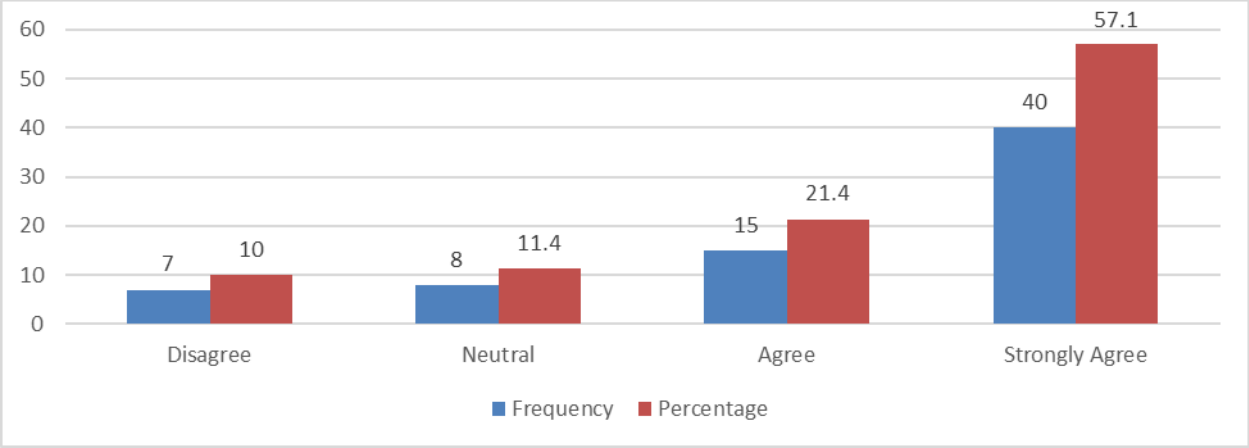
Most respondents strongly agreed 39 (55.7%) that the African Union has the capacity to rectify colonial water agreements, followed by 11 (15.7%) who agreed. However, 14 (20.0%) disagreed and 6 (8.6%) strongly disagreed. This reflects cautious optimism in AU's ability to mediate and reform unjust treaties, though some skepticism remains.

Table 10. African Union can provide permanent peace and security to Nile Basin Countries and its tributaries

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	7	10.0	10.0	10.0
	Neutral	8	11.4	11.4	21.4
	Agree	15	21.4	21.4	42.9
	Strongly Agree	40	57.1	57.1	100.0
	Total	70	100.0	100.0	

Source of Data: Primary Data, 2025.

Figure 11. African Union can provide permanent peace and security to Nile Basin States and its tributaries



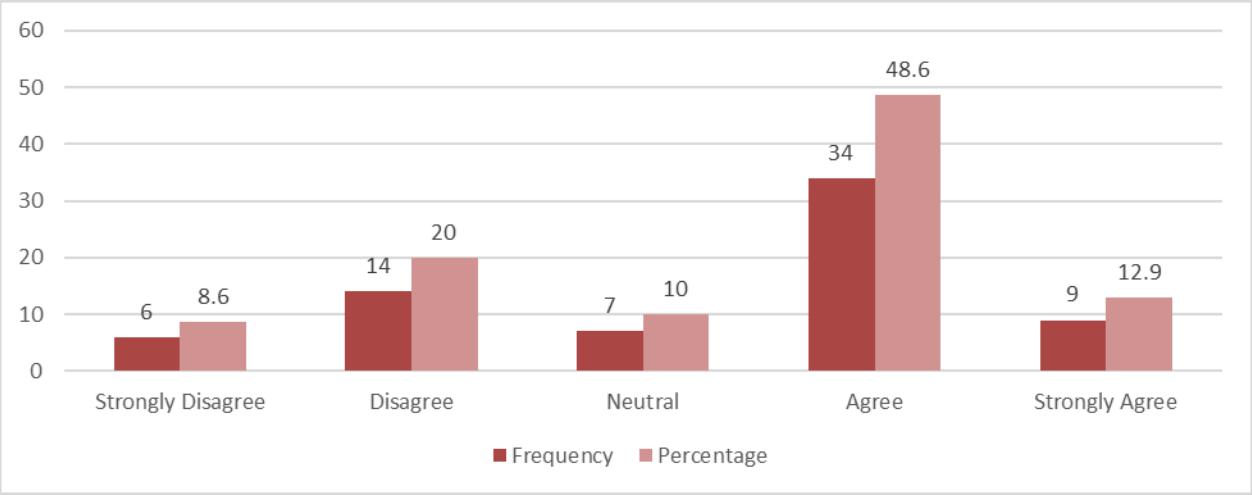
The results show that the majority strongly agreed 40 (57.1%) that the African Union can ensure permanent peace and security in the Nile Basin, followed by 15 (21.4%) who agreed. Meanwhile, 8 (11.4%) were neutral, and 7 (10.0%) disagreed. This reflects confidence in the AU as a peace building body, with only a small percentage of respondents doubtful.

Table 11. African Union can mitigate conflicts and apply preventive measures to the conflicts

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	6	8.6	8.6	8.6
	Disagree	14	20.0	20.0	28.6
	Neutral	7	10.0	10.0	38.6
	Agree	34	48.6	48.6	87.1
	Strongly Agree	9	12.9	12.9	100.0
	Total	70	100.0	100.0	

Source of Data: Primary Data, 2025.

Figure 12. African Union can mitigate conflicts and apply preventive measures to the conflicts



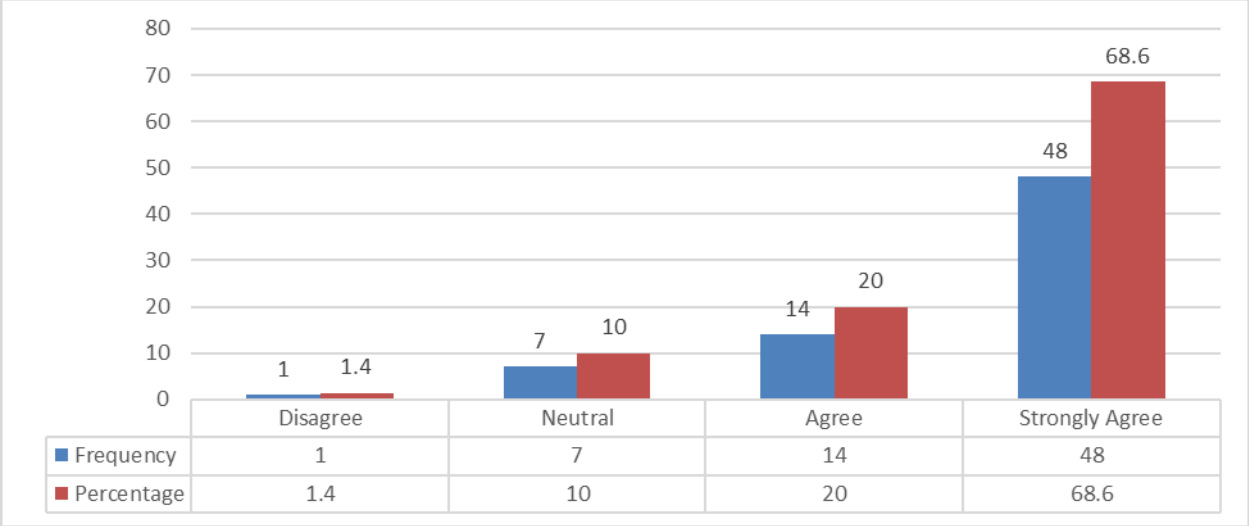
The majority agreed 34 (48.6%) that the AU can mitigate conflicts and apply preventive measures, followed by 9 (12.9%) who strongly agreed. A smaller group disagreed 14 (20.0%), while 7 (10.0%) were neutral and 6 (8.6%) strongly disagreed. This suggests that while the AU is seen as capable of preventive measures, doubts about its effectiveness still exist.

Table 12. Mitigation on possible methods and ways on how the African Union can solve these arising conflicts in the region

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	1	1.4	1.4	1.4
	Neutral	7	10.0	10.0	11.4
	Agree	14	20.0	20.0	31.4
	Strongly Agree	48	68.6	68.6	100.0
	Total	70	100.0	100.0	

Source of Data: Primary Data, 2025.

Figure 13. Mitigation of possible methods and ways on how the African Union can solve these arising conflicts in the region



The majority strongly agreed 48 (68.6%) that African Union has contributed to stability of the region, followed by 14 (20.0%) who agreed. A smaller group 7 (10.0%) remained neutral, while only 1 (1.4%) disagreed. This indicates strong recognition that African Union has vital role in addressing arising conflicts along the Nile River and equitable distribution of water among the Nile Basin countries.

5. Conclusions

The findings of this study highlight the multifaceted importance of Nile river as a critical lifeline for the socio-economic and ecological well-being of the Nile Basin countries and more importantly, riparian states. The river supports millions of people through agriculture, fishing, transportation, and hydroelectric power, making it an indispensable natural resource. However, the management and ownership of this vital water body remain highly contested, rooted in both historical injustices and present-day political dynamics. One of the major conclusions drawn from the study is that while there is overwhelming recognition of the Nile's significance, access and control over its waters continues to be shaped by colonial-era treaties that disproportionately favour downstream countries, particularly Egypt and Sudan. These outdated agreements have led to long-standing grievances and have hindered efforts toward equitable and sustainable water-sharing practices. The majority of respondents view these historical legacies as a major barrier to regional integration and peace, reinforcing the urgent need to revise and modernize legal frameworks governing the Nile river.

Furthermore, the study reveals that population growth; poor water governance, environmental degradation, and unilateral exploitation of water resources are significant stressors on the Nile Basin. These challenges have contributed not only to increasing water scarcity but also to heightened political tensions and the potential for conflict. Respondents strongly believe that without deliberate and coordinated action, the future of water security in the region is at serious risk. Another key insight is the belief in the potential role of regional organizations, particularly, the African Union and the Nile Basin Initiative, in fostering cooperation and resolving disputes. Respondents largely support the idea that these bodies can mediate negotiations, promote equitable access, and encourage collective investment in water infrastructure and conservation. Nonetheless, the existence of skepticism among some participants suggests that these institutions must undergo institutional reforms, increase transparency and demonstrate greater political will to be truly effective. In light of the above, the study concludes that the only sustainable path forward lies in strengthening regional cooperation and establishing inclusive, science-based and legally binding water-sharing frameworks. Nile Basin countries must prioritize diplomacy over competition, shared responsibility over unilateralism, and long-term sustainability over short-term national interests. It is only through mutual trust, transparency, and collaborative governance that the Nile Basin can transform from a source of tension into a symbol of unity and shared prosperity.

6. Recommendations

The following recommendations were made:

1) **Establishment of National Water Institutes (NWI).** Each Nile Basin state should establish National Water Institutes to identify and address daily/annual fluctuations of water and its management.
2) **African Union (AU).** Should strengthen its mechanisms for mediating trans-boundary water disputes and work towards revising unfair colonial-era treaties.
3) **National Governments.** Nile Basin countries should engage in continuous dialogues and co-operations to ensure equitable water distributions.
4) **Nile Basin Initiative (NBI).** Should promote data sharing, joint projects and capacity building among member states.
5) **Ministries of Water and Environment:** Must develop national water management policies that address population growth and pollution.
6) **Educational Institutions.** Should include environmental and water resource management topics in their curricula to raise awareness among youth.
7) **Civil Society Organizations (CSOs).** Should promote advocacy and community-level awareness on sustainable water usage and environmental protection.
8) **Donor Agencies and Partners.** Should provide financial and technical assistance to enhance infrastructures for water conservation and conflict prevention mechanisms

7. Suggested Areas for Further Studies

These are the suggested areas for further studies:

1) Examination of the socio-economic impacts of water scarcity on agricultural productivity in Nile Basin states.
2) Focusing on the role of international diplomacy in resolving trans-boundary water conflicts.
3) Conduct on the effectiveness of regional institutions like the Nile Basin Initiative and the African Union in promoting integrated water resource management.

References

1. Aman, M. (2014). Water Politics and Hydro-Diplomacy in the Nile Basin: A Case Study of Egypt and Ethiopia. Addis Ababa University Press.
2. Arsano, Y., & Tamrat, I. (2005). Ethiopia and the Nile: The Dilemmas of National and Regional Hydropolitics. Amsterdam Press
3. Ariel, D. (2007). Comparative Political Institutions and Regional Cooperation in Developing Nations. Oxford University Press.
4. Barkhuizen, H. (2014). Revisiting Narrative Frames: An Instrument for Investigating Language Teaching and Learning. The System, 47, 12–27. https://doi.org/10.1016/j.system.2014.09.014
5. Batstone, R. (1959). The Nile Waters: A Case Study in international law. City World Printers
6. Bell, J. (1999). Doing Your Research Project: A Guide for First-time Researchers in Education and Social Science (3rd ed.). Open University Press.
7. Biswas, A. K. (1993). Management of International Waters: Problems and Perspectives. Oxford University Press.
8. Boddy, C. R. (2016). Sample size for qualitative research. Qualitative Market Research: An International Journal, 19 (4), 426–432. https://doi.org/10.1108/QMR-06-2016-0053
9. Cardenas, Y. V., & Frederic, P. (2017). The Legal Framework for the Management of Trans-boundary Water Resources. International Water Law Journal, 29 (2): 145–158.
10. Cascão, A. E. (2009). Changing Power Relations in the Nile River Basin: Unilateralism vs Cooperation? Water Alternatives, 2 (2): 245–268.
11. Carrol, J. E. (1999). International Environmental Diplomacy: The Management and Resolution of Trans-Frontier Environmental Problems. Duplex Printers.
12. Conway, D., & Hulme, M. (1993). Recent Fluctuations in Precipitation and Runoff over the Nile Sub-Basins and their Impact on Main Nile discharge. Climatic Change, 25 (2), 127–151.
13. Coolican, H. (2014). Research Methods and Statistics in Psychology (6th ed.). Psychology Press.
14. Elhance, A. P., Drammeh, K., Diop, S., Mimayi, P., Henson, C., Schaefer, J., & Lindblom, A. (2005). Hydropolitics in the Developing World: A Southern African Perspective. Pretoria: African Water Issues Research Unit.
15. Elshamy, M. E. (2009). Impacts of Climate Change on the Hydrology and Water Resources of the Blue Nile Basin. University of Exeter.
16. Farrag, M. (2005). Water and Development in Egypt: The case of the Nile Basin. Cairo University Press.
17. Fishere, E. (2021). Nile Disputes: Geopolitical Stakes and the Role of Regional Organizations. Middle East Policy Forum, 27(1), 58–75.
18. Flick, U. (2011). Introducing Research Methodology: A Beginner's Guide to Doing a Research Project. Sage Publications.
19. Garretson, A. H. (1960). The Law of International Drainage Basins. Capital Printers
20. Gebreluel, G. (2014). Ethiopia's Grand Renaissance Dam: Ending Africa's Oldest Geopolitical Rivalry? The Washington Quarterly, 37(2), 25–37.
21. Gleick, P. H. (1993). Water in Crisis: A Guide to the World's Fresh Water Resources. Cairo University Press.
22. Godana, B. A. (1985). Africa's Shared Water Resources: Legal and Institutional Aspects of the Nile, Niger, and Senegal river Systems. Oxford University Press.
23. Harmon, J. (1895). Opinion on the Use of Waters of the Rio Grande. U.S. Attorney General Reports.
24. Hox, J. J., & Boeije, H. R. (2005). Data Collection, Primary vs. Secondary. In K. Kempf-Leonard (Ed.), Encyclopedia of Social Measurement (Vol. 1, pp. 593–599). Elsevier. https://doi.org/10.1016/B0-12-369398-5/00041-4
25. Hussein, H. (2014). Managing Water Conflicts in the Nile Basin through the Lens of Hydro-hegemony. Water International, 39(3), 318–333.
26. Jacques, S. (2012). Les eaux partagées et le Droit International: Le cas des fleuves Transfrontaliers. Paris: L'Harmattan.
27. Kabir, S. M. S. (2016). Methods of data collection. In Basic Guidelines for Research: An Introductory Approach for all Disciplines (pp. 201–275). Book Zone Publication.
28. Kazimbazi, E. (1998). Hydropolitics and Security in the Nile Basin: The Role of National and International Institutions. Cambridge University Press.
29. Kim, U., & Kaluarachchi, J. J. (2009). Climate Change Impacts on Water Resources in the Upper Blue Nile River Basin. Journal of the American Water Resources Association, 45(6), 1361–1378.
30. Klare, M. (2001). Resource wars: The New Landscape of Global Conflict. New York: Henry Holt & Co.
31. Klare, M. T. (2002). Resource wars: The New Landscape of Global Conflict. Everest Publishers.
32. Knife, J. (2004). Governance and Institutional Fragmentation in Post-conflict Regions. Cambridge University Press.
33. Kukku, E., & Deese, D. A. (1996). Energy and Environment: Conflict and Cooperation in International Policy. Lagest Publishers
34. Marie, C. (2013). Droit International et Partage Des Eaux Transfrontalières: La doctrine Harmon Revisitée. Revue Générale de Droit International Public, 117(2), 215–240.
35. Mason, M. (2010). Sample Size and Saturation in PhD Studies Using Qualitative Interviews. Forum: Qualitative Social Research, 11(3). https://doi.org/10.17169/fqs-11.3.1428
36. McCaffrey, S. C. (2007). The Law of International Watercourses: Non-navigational Uses. Oxford University Press.
37. Moser, A., & Korstjens, I. (2018). Series: Practical Guidance to Qualitative research. Part 3: Sampling, Data Collection and Analysis. European Journal of General Practice, 24(1), 9–18. https://doi.org/10.1080/13814788.2017.1375091
38. Nakkeeran, N. (2016). Knowledge, Truth, and Social Reality: An Introductory Note on Qualitative Research. Indian Journal of Social Psychiatry, 32(1), 10–15. https://doi.org/10.4103/0971-9962.176762

39. Niang, I., et al. (2014). Africa. In Climate Change 2014: Impacts, Adaptation, and Vulnerability. IPCC WGII AR5. Cambridge University Press.
40. Nienaber, B. (2014). African water policy and the role of AMCOW in Governance. African Affairs, 113 (452), 642–660.
41. Okidi, C. O. (1982). Legal and Policy Regimes of the Nile: Major Issues for Consideration in a Cooperative framework. Lagacy Printers.
42. Okidi, C. O. (1994). History of the Nile Basin and Legal Frameworks. Cambridge University Press.
43. Olsen, W. (2012). Data Collection: Key Debates and Methods in Social Research. SAGE Publications.
44. Oso, W. Y., & Onen, D. (2008). A General Guide to Writing Research Proposal and Report: A Handbook for Beginning Researchers (2nd ed.). Jomo Kenyatta Foundation.
45. Pandey, P., & Pandey, M. M. (2015). Research Methodology: Tools and Techniques. Bridge Center.
46. Paquerot, S. (2007). La Gouvernance de l'eau: Du Droit International à la Démocratie Locale. Québec: Presses de l'Université Laval.
47. Riak, J. (2023). Introduction to Comparative Politics: Political Conundrums and the Changing World. Africa World Books Press.
48. Rocha Loures, F. (2013). International Water Law and Trans-Boundary Aquifers. IUCN Environmental Policy and Law Paper.
49. Salman, S. M. A. (2007). The Helsinki Rules, the UN Watercourses Convention and the Berlin Rules: Perspectives on International Water Law. Water Resources Development, 23 (4), 625–640.
50. Salman, S. M. A. (2011). The Grand Ethiopian Renaissance Dam: The Road to the Declaration of Principles and the Nile Basin cooperation. Water International, 41(4), 512–527.
51. Schroeder-Wildberg, E. (2002). Sharing the Nile: Egypt, Ethiopia and the Geo-politics of water. Bonn International Center for Conversion.
52. Sironneau, J. (2012). L'eau dans les Relations Internationales. Paris: Economica.
53. Swain, A. (2011). Challenges for Water Sharing in the Nile Basin: Changing Geopolitics and Changing Climate. Hydrological Sciences Journal, 56(4), 687–702.
54. Taherdoost, H. (2021). Data Collection Methods and Tools for Research: A Step-by-Step Guide to Choose Data Collection technique for academic and business research projects. International Journal of Academic Research in Management (IJARM), 10 (1), 10–38. https://doi.org/10.2139/ssrn.4108318
55. Teclaff, L. A. (1967). The River Basin in History and Law. Pentam Publishers.
56. UNDP. (2006). Beyond Scarcity: Power, Poverty and the Global Water Crisis. Human Development Report. United Nations Development Programme.
57. UNWWDR. (2003). Water for People, Water for Life: The 1st United Nations World Water Development Report. UNESCO & WWAP.
58. Vega Cardenas, Y., & Frederic, P. (2017). La gouvernance des eaux transfrontalières: Enjeux et perspectives. Bruxelles: Bruylant.
59. Wasara, S. S. (2002). Conflict and State Security in the Horn of Africa: Militarization of Civilian Groups. African Journal on Conflict Resolution, 2 (2), 31–50.
60. WaterAid. (2004). The Crisis in Africa: Children Dying from Preventable Water-Related Illnesses. London: WaterAid Report.
61. Wiebe, K. (2001). Water and Conflict in the Middle East and North Africa. Cairo Printers.
62. World Bank. (2021). Trans-Boundary Water Cooperation: A global Review. Washington, DC: World Bank Publications.
63. Yamane, T. (1967). Statistics: An Introductory analysis (2nd ed.). Harper & Row.
64. Young, S., & Casey, E. A. (2019). An Examination of the Sufficiency of Small Qualitative Samples. Social Work Research, 43 (1): 53-65.