INFLUENCE OF WATER GOVERNANCE AND SOCIO-CULTURAL FACTORS ON WOMEN'S PARTICIPATION IN WATER MANAGEMENT DECISIONS AND CONFLICT RESOLUTION IN RWANDA AND KENYA

MUREITHI ZIPPORAH NYOKABI

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DECLARATION AND RECOMMENDATION

Declaration

This thesis is my original work and has not been presented in this university or any other for the award of a degree.

Signed:  Date: 23rd September 2025

Mureithi Zipporah Nyokabi
(NM11/13101/21)

Recommendation

This thesis has been submitted with our approval as university supervisors.

Signed:  Date: 30th September, 2025

Dr. Margaret Ngeci Githiri (PhD)
Department of Natural Resources
Egerton University

Signed:  Date: 30th September, 2025

Dr. Ernest Uwayezu (PhD)
Department of Geography
University of Rwanda

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DEDICATION

This work is dedicated to my father David Mureithi, my mother Teresa Wangui and my siblings for their unwavering support and encouragement throughout my academic journey. Thank you for your love, support and prayers. Be blessed abundantly.

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ABSTRACT

Conflicts over water resources have profound implications for women who utilize water resources to meet domestic and productive needs. The critical contribution of women to the management of these water conflicts is overlooked and underappreciated. This dual role as primary water users and the under recognition of their peace efforts underscores their vulnerability to the impacts of water conflicts and highlights the importance of understanding their roles in conflict resolution processes. Thus, the aim of this study was to examine the influence of water governance and socio-cultural factors on women's participation in water management decisions and conflict resolution in Rwanda and Kenya. Tuyiteho Mukunguli Water Users Association (TMWUA) in Rwanda and Nyando Water Resource Users Association (NWRUA) in Kenya were used as case studies. Specific objectives were to assess the efficacy Integrated Water Resources Management Framework (IWRM) in enhancing women's participation in water resource conflict resolution, determine the impacts of socio-cultural factors on women's participation in decision making and conflict resolution processes and evaluate the effectiveness of water regulations in Rwanda and Kenya in promoting women's participation in water governance. Using a cross-sectional research design, 244 women respondents from TMWUA and 140 from NWRUA were selected through proportionate stratified sampling. Primary data was collected using structured questionnaires. Data analysis was done using descriptive statistics and Chi-square. Study findings reveal that application of IWRM framework has been effective in enhancing women's participation in water resource conflict resolution. The success rate of water conflict resolution in TMWUA was 80.86% while in NWRUA it was 51.52%. Despite minimal perceived influence of socio-cultural factors on decision making, disparities in women's inclusion in water governance, data dissemination, stakeholder engagement, and pollution management exist between the two countries, with TMWUA in the positive lead. There are still a mixture of challenges and successes that reduced the effectiveness of institutional and legal water policy frameworks. The major challenges were insufficient funding, poor committee leadership, members' intra conflicts and lack of transparency and accountability. The study recommends that there is need for strengthening the capacity of water associations to effectively manage conflicts and promote women's participation in decision making through sustained funding, regular trainings and transparent leadership. Results from this study will benefit policy makers, watershed planners and governments in designing gender inclusive policies and programs.

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LIST OF ABBREVIATIONS AND ACRONYMS

ACFC	Agro-Chemical and Food Company Limited
AMCOW	African Minister's Council on Water
FPCT	Feminist Peace and Conflict Theory
GGG	Global Gender Gap
GoK	Government of Kenya
GoR	Government of Rwanda
IWUA	Irrigation Water Users' Associations
IWRM	Integrated Water Resources Management
KDDS	Kamonyi District Development Strategy
LVEMP II	Lake Victoria Environmental Management Project
NEMA	National Environment Management Authority
NWRUA	Nyando Water Resource Users Associations
OECD	Organization for Economic Co-operation and Development
REMA	Rwanda Environmental Management Authority
RNRA	Rwanda Natural Resources Authority
RSSP	Rural Sector Support Project
SDGs	Sustainable Development Goals
SPSS	Statistical Package for Social Sciences
TMWUA	Tuyiteho Mukunguli Water Users Associations
WASREB	Water Services Regulatory Board
WRUAs	Water Resource Users Associations
WSTF	Water Sector Trust Fund
WUA	Water Users Associations

CHAPTER ONE
INTRODUCTION

1.1 Background information

Water conflicts stemming from access, use, pollution, control, distribution and availability pose significant threat to sustainable development and peace. These conflicts are driven by a range of environmental factors such as resource scarcity and degradation, deteriorating water quality, climate change, over abstraction and over consumption as well as socio economic factors such as rapid population growth, unequal distribution, economic growth and politics which increase the strain over water supplies (Mishra *et al.,* 2021; Mulwa *et al.,* 2021; Naderi *et al.,* 2024). According to USAID Water and Conflict Toolkit 2023, these factors coupled with climatic, political, institutional, cultural and socioeconomic aspects trigger new conflicts, act as conflict multipliers or further intensify existing conflicts. Given the current global water problems, anthropogenic activities such as irrigation, water abstraction and land use change will reduce water flows in rivers and cause competition among water users (Bizuhoraho, 2018; Maingey *et al.,* 2022). Intensive exploitation of ecosystems has led to conflicts over fresh water resources between man and ecosystems (Yang & Cai, 2014). Water conflicts accentuate social vulnerabilities and water security risks (Koubi, 2019). All these factors exacerbate gender inequalities and conflicts with women bearing the highest cost.

Globally, water conflicts impact women at different scales and magnitudes. The impacts disproportionately affect women as they bear the burden of water collection, intra-household distribution and other water related activities (Geere & Cortobius 2017). When there is water scarcity and competition, women face intimidation, coercion and harassment. In India, girls are harassed on their way to water points and they are always in a state of constant fear (Narang, 2014). In Africa, women are the most vulnerable groups to environmentally induced conflicts like water competition because of overreliance on the natural resource base for livelihoods which are sensitive to climatic variability (Jaggernath, 2014). In Mali, women are often affected most and hit hardest by effects of environmental degradation and water scarcity (O'Rourke and Martin, 2023). Conflicts hamper water access (Sadoff *et al.,* 2017). In Burkina Faso, there has been heightened conflicts over water access between women or with women at water points (Dickin *et al.,* 2021). Similarly, in Isiolo County in Kenya, water scarcity has heightened ethnic hostilities with these conflicts affecting women's access for domestic use (Rao *et al.,* 2019). In Nyando Wetland in Kenya, resource conflicts have significantly impacted women, including their exclusion from resources, the diversion or blockage of water sources, the destruction of crops and the loss of husbands who die in conflicts (Atieno, *et al.,* 2016).

Women's vulnerability increases due to heightened risks of physical and sexual abuse because of household water management (Tallman *et al.,* 2023). In Kisii Kenya, cases of rape and murder of women have been reported as women collect water at odd hours to avoid daytime queues and water-related conflicts (Abu *et al.,* 2019). The overreliance on water dependent livelihoods, economic marginalization and androcentric systems further disenfranchise women.

The critical role that women play in water resource management and the complex challenges it presents have called for the development of global frameworks and commitments that promote gender inclusive water governance. The Dublin Principles of 1992 acknowledge that women play an integral role in the collection, management and safeguarding of water (Jenniskens, 2022). The Beijing Platform for Action 1995 calls for increased participation of women in leadership, power structures and decision making (Debusscher, 2015). Agenda 21 advocates for full involvement of women in water resource management and planning at all scales (Mohamed, 2017).The African Minister's Council on Water (AMCOW) Policy and Strategy for Mainstreaming Gender in Africa's Water Sector (2011) has strategic goals for mainstreaming gender action, policies and programs in the water sector by all member states (Salo, 2014). Frameworks such as Integrated Water Resource Management (IWRM) call for participatory water management and strengthening of the role of women in water management (Elias, 2017). These global governance frameworks have been influential in shaping regional and national policies and practices on gender responsive water governance. However, the implementation of gender commitments in the water sector by countries has been uneven and many of the countries are lagging behind (UNESCO WWAP, 2021). The intricate relationship between gender and water remains inadequately addressed (Acevedo-Guerrero *et al.*, 2025).

The disparity in the implementation of gender responsive water governance is evident in both Rwanda and Kenya where women share common set of gender-based disadvantages such as limited access to water, land, livestock, credit facilities, agricultural inputs and income (Bikketi *et al.,* 2016). For women in Rwanda, there is lack of protection of property rights and widows are not offered full protection by the law. The women often report agreeing to accept less land than their legal entitlement in the interests of maintaining good relationships with their family or because they have little option (Abbott & Malunda, 2016). Existing legal and institutional frameworks have not been efficient in addressing the issue of gender in management of water resources (Mwangi, 2017). The effectiveness of water management policies is constrained mainly because of conflicting interests among water users and the disparities in their political powers (Esteban Gracia *et al.,* 2016). In Rwanda, it is unclear

whether the set policies have had any significant influence on the lives of the majority of Rwandan women (Abbott & Malunda, 2016). Women are often excluded from decision making processes related to water resource management, policies and strategies, tariff setting and technology setting leaving them underrepresented in water governance (Jenniskens, 2022). There is a dearth of information on how communities and people have established structures, associations, resources, norms and traditions to handle issues associated with water (Hayre & Adams, 2024). Based on this premise, this research study sought to examine how existing frameworks such as IWRM promote women's participation in water resource conflict resolution, the impacts of socio-cultural factors on women's decision-making processes and how water regulations promote women's access to water and its use in both Rwanda and Kenya.

1.2 Statement of the problem

Wetlands are importance natural resources that provide essential goods and services that support human wellbeing. However, they are under increasing pressure from competing uses, anthropogenic activities and development interventions that generate recurring resource-based conflicts. For Mukunguli Wetland in Rwanda there has been development interventions, combined with competing demands for grazing, crop production and water infrastructure. According to the Government of Rwanda, Ministry of Agriculture and Animal Resources 2016, these pressures have altered local access regimes and generated grievances over land and water use rights. Similarly, Nyando Wetland in Kenya agricultural expansion, papyrus harvesting, fishing, settlement and firewood collection have significantly reduced wetland size and undermined provisioning ecosystem services. These human activities have exacerbated livelihood insecurity and fuelling resource disputes among local users (Maithya *et al.,* 2022). The resulting pressures have led to recurrent disputes over land, fishing grounds, papyrus harvesting and water access in Lower Nyando floodplains (Atieno *et al.,* 2015). Both Mukunguli Wetland and Nyando Wetland face similar challenges and this has entrenched conflicts around access, ownership, control and use of wetland resources.

Women who are primary water users are impacted by water conflicts. However, their contribution to the management of conflicts and tensions arising from the utilization of this critical resource is overlooked. Their efforts to local water peace processes are under recognized and underappreciated. Politicians and individuals in positions of power overtake their reconciliation efforts. When it comes to water decision making processes they are at the periphery. In Nyando, despite policy efforts, irrigation and land-use decisions remain male-dominated, with women only gradually gaining joint control over key resources such as water (Elizabeth *et al.,* 2024). They are viewed as victims that have no contribution to conflict

resolution processes and decision making. In Lake Victoria region women are often side lined and ignored from formal conflict resolution processes despite being among the most affected by wetland degradation and scarcity (Oyataoh *et al.*, 2023). This is mainly because of existing androcentric systems, systemic inequalities and normative beliefs on their roles and responsibilities. Consequently, it is not yet clear to what extent and magnitude existing water regulations have enhanced women's active participation in water conflict resolution processes and decision making. Existing authorities have been hesitant to address the issue of women and water, and as such, there is a paucity of research on the efficacy of IWRM in enhancing women's participation in water resource conflict resolution, the impact of socio-cultural factors in women's decision making and how existing water regulations promote women access to water and its use in Rwanda and Kenya.

1.3 Objectives

1.3.1 Broad objective

The broad objective of this study was to assess the influence of water governance and social cultural factors on women's participation in water management decision and its contribution to conflict resolutions in Rwanda and Kenya.

1.3.2 Specific objectives

i. To assess the efficacy of the Integrated Water Resources Management (IWRM) framework in enhancing women's participation in water resource conflict resolution in Rwanda and Kenya.
ii. To determine the impacts of socio-cultural factors on women's participation in decision-making and conflict resolution processes in Rwanda and Kenya.
iii. To evaluate the effectiveness of water regulations in promoting women's access to water and its use in Rwanda and Kenya.

Research questions

i. How efficacious is Integrated Water Resources Management Framework (IWRM) in enhancing women's participation in water resource conflict resolution in Rwanda and Kenya?
ii. What are the impacts of socio-cultural factors on women's participation in decision-making and conflict resolution processes?
iii. How effective are water regulations in promoting women's access to water and its use in Rwanda and Kenya?

1.5 Justification of the study

Studies indicate that women are rarely women are rarely acknowledged as stakeholders in peace efforts despite the role that they play in daily water management (Iloh *et al.*, 2021). This dual role underscores their vulnerability to the impacts of water-related conflicts, as disruptions in water utilization affect their ability to sustain households and engage in income generating activities. This research study aligns with global commitments and ongoing discussions such as the International Decade for Action on Water for Sustainable Development 2018-2028 and the UN Water Action Agenda 2023. At regional level, this research study is line with the African Union Agenda 2063 and Africa Water Vision 2025 which call for inclusive and sustainable utilization of water resources. At national levels, this study contributes to the achievement of Rwanda's Vision 2050 and Kenya Vision 2030. Governments, water authorities and stakeholders will be able to reinforce and reaffirm their commitment and growth objectives which recognize the importance of women in water resource management.

At the sub-national scales, it resonates with the Kamonyi District Development Strategy 2018-2024 in Rwanda and Kisumu County Integrated Development Plan (CIDP) 2023-2027 in Kenya and which emphasizes highlight the important involvement of women in community-based resource management. The findings will benefit the both TMWUA and NWRUA by providing concrete strategies for effectively strengthening women's participation in decision making and conflict resolution processes. For Mukunguli Wetland and Nyando Wetland the findings will help improve water distribution, pollution management, biodiversity conservation and watershed protection. This study with the Sustainable Development Goals mainly ensuring clean water and sanitation (Goal 6), promoting gender equality (SDG 5), reducing inequalities (Goal 10) while promoting peace, justice and strong institutions (Goal 16).

Research findings from this study provide baseline data for stakeholders such as policy makers, governments and watershed planners in designing gender inclusive policies and programs. The Ministry of Environment in Rwanda and Ministry of Water, Sanitation and Irrigation in Kenya are expected to apply the findings from this study in the planning and implementation of gender-responsive policies. They will be able to develop context specific mechanisms for dispute resolution. Information on gender discriminatory legislation and retrogressive socio-cultural factors that predispose women and girls to vulnerability will help in the formulation of mechanisms that increase women's participation in decision making and water conflict resolution processes. Both Government of Rwanda and Government of Kenya will apply the findings from this study in developing regional and international dialogue

mechanisms that encourage women's full participation in peace processes. Thus, the research findings will contribute to a better understanding of the gendered aspects of water diplomacy and the levels at which women's engagement influences peace processes.

1.6 Scope of the study

This research was carried out in Rwanda and Kenya in order to determine the nature of water governance between Rwanda and Kenya. The emphasis was on the role that women play in water conflict resolution process, the factors that influenced their effective participation in decision making processes and how existing legal water policies promote their participation.

1.7 Assumptions of study

i. Women actively participated in conflict resolution and decision-making processes.
ii. Socio-cultural factors influenced women's participation in water decision making and conflict resolution processes.
iii. Information collected from this study are factual and reflects situation on the ground.

1.8 Limitations of the study

i. Linguistic barrier was experienced in Rwanda from the respondents and this was managed by engaging translators.

1.9 Operational definition of terms

The terms listed below are described in the context of this study:

Conflict: Tensions, pressures and frictions between various water users as a result of pollution, water use, water availability, water distribution and the underlying forces between them (Anushiya *et al.*, 2018; Petersen-Perlman *et al.*, 2017).

Conflict resolution: Mechanisms for preventing and ending conflict using non-violent means.

Effectiveness of water governance: The role of governance in creating clear sustainable water policy and targets at various levels of government, implementing those goals, and accomplishing the objectives (OECD, 2015).

Efficacy: Ability of water frameworks to solve water conflicts (OECD, 2015).

Frameworks: Rules and regulations set by governments and organizations that have been stipulated in legal documents.

Gender: Roles and responsibilities linked to either being a boy, girl, man, or woman.

Gender disparity: Access differences between men and women to resources, which often favour men.

Gender mainstreaming: Integrating all gender perspectives into water planning, management and decision making.

Governance: Mechanisms and procedures that have been put in place to provide rule of law, accountability and openness.

Institutional factors: Administrative constraints that influence participation by an individual or community.

Integrated Water Resources Management: Coordinated stewardship of water resources in order to generate maximum benefits from resource utilization in an equitable and environmentally sound manner (Global Water Partnership, 2015).

Peace process: Initiatives aimed at preventing or ending conflicts.

Socio-economic factors: Linkages between social norms, traditions, and belief systems and economic activity.

Stakeholders: All parties interested in the use of a resource.

Sustainable peace - Peace that is long-lasting.

Water governance: Combination of formal and informal political, institutional and administrative laws, customs, practices and procedures that enable stakeholders to express their interests and concerns and hold decision-makers accountable for water management (OECD, 2015).

Water conflicts: Tensions or conflicts between various users because of competing claims over water resources, its allocation or use.

Water resource management: Proper planning and utilization of water resources with regards to quality and quantity

Water resources: Bodies of water found naturally that are used by man.

Water user associations (WUAs) – A local association of water users having legal entity in view of management, of enhancement, of production and protection of water resources.

Wetland: A region of land that has either been completely or heavily inundated by water.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

In depth interrogation of various works of literature that are in line with the study objectives are carried out in this section. Literature embracing the role of women in water resource management and conflict resolution is critically reviewed in sub-section 2.2. In sub-section conflict dynamics in water resources are examined in subsection 2.3. Followed by an assessment of the role of water resource users associations (WRUAs) in water governance and conflict resolution in subsection 2.4. In subsection 2.5 the application of IWRM promoting women's participation in water management across the world, in Rwanda and in Kenya is carried out. This is followed by sub-section 2.6 which shows how socio-cultural factors influence women's participation in water governance. In sub-section 2.7, water resource governance structures in Rwanda and Kenya are examined while in sub-section 2.8, the rationale for selecting Rwanda and Kenya as study countries is examined. The main research gaps are highlighted in subsection 2.9 and are summarized in Table 1. The conceptual framework and the theoretical framework are discussed in sub-section 2.10 and 2.11 respectively.

2.2 Role of women in water resource management and conflict resolution

Women utilize water resources for both domestic and productive uses such as agricultural production and fisheries. They play a key role in influencing the way water is utilized, distributed and allotted both within communities and across borders. Because of the gendered division of labour, women are responsible for daily water management, decision making on how to use water, household water provision and participating in sanitation and water related income activities (Agesa & Agesa, 2019). They have extensive indigenous knowledge on water resource management that has been used for many generations to satisfy household and productive requirements (Kernecker *et al.,* 2017). Women in Bhutan have utilized their knowledge to manage water channels along tributaries of the Brahmaputra during long periods of drought for agricultural productivity (Fauconnier *et al.,* 2018). They are custodians of natural resources and have the skills and knowledge for water management. They have shown interests in managing and maintaining community water projects such as boreholes (Omwer, 2018).

Women are seen to have a positive influence when it comes to management of water conflict resolution and peace processes. Traditionally, they have shown their mediation and negotiation skills in duties assigned to them within their tribes and rural communities (San

Pedro, 2019). Their peacekeeping activities begins at household levels and this reveals itself in societal stability. They use nonviolent strategies that require proper planning and execution and they have proven to successfully achieve this (Kamau, 2016). For women in Brazil, they organize themselves into surveillance groups in order to protect their water resources (de Assis Machado *et al.,* 2023). Women in Sudan fast and pray, organize marches and nigh vigils in order to achieve peace processes (Gardner & Bushra 2016). In Kenya women from Kamba and Pokomo tribes are involved in conflict management initiatives through organized committees and traditional means (Mwangi 2015). The critical contribution of women to the management of water conflicts and is under recognized and their efforts in conflict resolution processes are underappreciated. When women's important role as users, managers and sharers of water resources is overlooked, their role becomes limited thus reinforcing their exclusion. Therefore, there is need for scholarly investigation of the role of women in water resource conflict resolution processes. This research study highlights the contribution of women, their capacity to adapt and develop innovative solutions for water conflicts in their communities.

2.3 Conflict dynamics in water resources

Water conflicts have intensified across the globe. They manifest themselves in different scales and magnitudes presenting themselves in form violent fights, confrontations, arguments, disputes, hostility, loss of lives, property loss and livelihood disruption (Lesrima, 2019). They also reveal themselves at different institutional levels, political settings, cultural contexts and hydrological scales. In Jucar River Basin in Spain, there has been persistent water conflicts between upstream and downstream water users because of excessive over-abstractions (Esteban Gracia *et al.,* 2016). Exacerbated competition over dwindling water resources in Karachi Pakistani due to climate change has led community violence wars (Sawas *et al.,* 2020).

In Sub-Saharan Africa, water related conflicts and tensions are expected to intensify (Nkiaka *et al.,* 2021). Dwindling water resources, water scarcity and high-water demand are closely inter-twined mainly because of the economic activities dependent on them. In Rwanda, tensions and issues regarding water issues include water shortage, pollution, high water costs and unsustainable utilization of water resources (Gasirabo *et al.,* 2019). Disputes over access to, control and use of water resources stem from competing interests and unequal power dynamics. In Kigali City in Rwanda water access is restricted because of water scarcity and institutional inefficiencies (Gasirabo *et al.,* 2019). Similarly, in Yala Swamp in Kenya, the introduction of a wetland leasing system that restricts communities' access to the wetland resources, resource use and unclear ownership rights has led to intensified conflicts (Raburu, 2015). Catastrophic weather events directly affect livelihood resource base and exacerbate

competition and conflicts over available resources. Both Rwanda and Kenya experience extreme events with dry seasons causing severe water shortages while heavy rainfalls cause floods and contamination of water resources (Billman, 2014). Unpredictable climatic patterns and high population growth rates and have intensified pressure on Nyando Wetland by adjacent communities, leading to more resource conflicts. (Obiero *et al.*, 2012). Water conflicts are common in areas where adjacent communities rely on common pool of resources. Frequent alterations in the River Nyando watercourse and water levels, unsustainable papyrus harvesting and sand harvesting have resulted into frequent human-human conflicts (Maithya *et al.*, 2020). Pollution further increases social and environmental inequalities with women disproportionately being affected as main water users (Jaggernath, 2014). Social issues such as inequality, discrimination and limited economic activities intensify water conflicts as the disadvantaged groups such as women heavily reliant on them (Meyer *et al.*, 2016).

Women bear the disproportionate burden when water conflicts occur (Jaggernath, 2014). Their low adaptive capacities, high vulnerability, socially ascribed roles and over-reliance of water to meet livelihood needs affects the ability of women to adapt to the impacts of conflicts (Bob *et al.*, 2014). Women in Quetta Pakistan are the most afflicted by water conflicts because of their limited social, economic and political position which renders them unable to adapt to water related issues (Barech & Ainuddin, 2019). In rural Ghana, competition over water resources especially during farming season leads to disputes and misunderstandings among women (Apatinga *et al.*, 2024). There exists a strong relationship between women and water conflicts. However, the role that women play in handling water conflicts that they face has not been fully explored, and as such there is need for assessing the critical role that women play and how context specific conflict resolution mechanisms can be established and successfully be implemented.

2.4 Role of water resource users associations (WRUAs) in water governance and conflict resolution

Water is a common pool resource and its exploitation could cause immense harm, conflicts and inequalities to human beings and the environment (Engler *et al.*, 2021). By establishing local governance institutions such as water associations these risks are minimized. Water resource users' associations (WRUAs) are community-based organizations that are established with an aim of protecting a given catchment or river. WRUAs serve as a bridge between ecological services provided by water resources and livelihoods of locals' users (Richards & Syallow, 2018). A user is defined as one who utilizes water resources to meet their needs. Water associations provide platforms for all stakeholders and users including women in

water resource management and resolution of water conflicts. They offer institutional arrangements to grassroots water management ensuring all users benefit.

WRUAs are created to ease the burden on national institutions and corporations and to give the end users more responsibilities (Schmitt, 2015). They operate using bottom-up approach where decisions on water use are made at the lowest decision-making levels (Mugwaneza, 2019). WRUAs are mandated to protect catchments and rivers, conflict resolution, pollution management, water allocation, information dissemination, offering trainings, promotion of legal water use activities, collection and management of water use fees and managing water infrastructures within their jurisdiction (Nyanchaga & Owiti, 2017; Theobald & El-Sayed 2019). They are also platforms for decision making, negotiations and conflict resolutions. Members take part in meetings, give suggestions and feedbacks and engage in key decision-making processes of management (Chai *et al.,* 2014).

WRUAs are participatory water institutions where all water users are involved. However, within these institutions the participation of women is very low and limited. In South Asian countries, the participation of women in water associations is minimal despite their critical contribution in production and decision making (Khandker *et al.,* 2020). Decisions related to water use are made by men and women are at the periphery of decision making. Based on this gap, this research study sought to examine how WRUAs as local governance institutions influence the participation of women in water decision making and conflict resolution processes.

2.5 Overview of integrated water resources management framework (IWRM)

The interconnectedness of water, nature, man and various sectors of the economy necessitates the adoption of holistic approaches such as IWRM to manage the conflicts and pressures associated with water use. The IWRM Framework was established following a ministerial recommendation at the Agenda 21 and the World Summit on Sustainable Development Conference 1992 in Rio de Janeiro Brazil (Johansson, 2016). Subsequently, the UN endorsed IWRM as one of its Millennium Development Goals, and the European Union's Water Framework Directive included some of the concepts (Benson *et al.,* 2015). It is an internationally recognized framework for governing water resources (Bertule *et al.,* 2018). IWRM is defined as a process which promotes the coordinated development and management of water, land and related resources in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems (Global Water Partnership, 2015). Some of the tenets of IWRM include river basin planning, stakeholder involvement, gender inclusion, pollution prevention, water allocation systems,

monitoring and evaluation, economic and financial expansion and knowledge management are some of the tenets of these techniques (Petit, 2016). The application of IWRM incorporates the concept of sharing water and has created precise dispute resolution and mediation techniques (Marini *et al.,* 2018). IWRM calls for the strengthening the capacity if water institutions to solve conflicts through negotiations and proper communications (Meran *et al.,* 2021). It aims at strengthening water user associations and community-based organizations (Meran *et al.,* 2021).

Countries have made significant progress in establishing plans for IWRM following the Johannesburg World Summit on Sustainable Development in 2005 (Sehlke, 2016). These nations are creating watershed plans and integrating water management into their long-term national development goals (Obando *et al.,* 2018). They are implementing their IWRM plans depending on the nature of water, services and the existing problem (Ondieki & Kitheka, 2017). It is an important framework for implementation of laws, and institutional arrangements that promote coordinated water management. (Perry *et al.*, 2021). At national levels, IWRM produces a supportive environment for socio-cultural and economic objectives (Aboniyo *et al.,* 2017). It contributes significantly to livelihoods improvement (Granit *et al.,* 2014). The Management of Aquatic Ecosystems through Community Husbandry (MACH) project in Bangladesh which ran from 1998-2007 is an example of a successful livelihood based IWRM. The project focused on ecosystem restoration and had direct positive impacts through increased income and food production (Thompson *et al.,* 2018). IWRM offers a great platform for stakeholder involvement by fusing their various needs and interests as it is more participatory and trans-disciplinary (Sigalla *et al.,* 2021). In 2015, the Indian government organized a stakeholder engagement forum of Land Subsidence and Analysis in India. There were discussions on ground water regulation and land management. The government was able to put the considerations into action. Together with the Japan International Cooperation Agency (JICA), the Indonesian government developed an initiative to handle the land problems and adopt the IWRM (Nagata *et al.,* 2022).

IWRM Framework is based on the Dublin Principles which acknowledge that 'women play a central part in the provision, management and safeguarding of water' (Mohammed, 2017). It emphasizes on the vital contribution of women and promotes gender mainstreaming by advocating for 50% of female leadership in water users' associations (Elias, 2015). However, IWRM fails to define what full and active involvement of women looks like. Women's roles as farmers, irrigators or as people participating in income generating activities related to water resources are overlooked and underrepresented when it comes to planning and

decision-making processes within IWRM Framework (Johansson, 2016). IWRM lacks a well-defined execution plan and fails to take into consideration the historical and political contexts of events (Petit, 2016; Zinzani & Bichsel, 2018). In Tanzania, IWRM has failed to address the systemic gender inequalities and limited women's autonomy which has hindered their effective participation (Eaton *et al.*, 2021). Thus, there needs to be a vivid definition of who women are, the activities they do, what they care about, their concerns, their needs and the structural barriers and opportunities that influence their participation in water resource management and governance (Lasiter & Stawicki, 2014).

2.5.1 Application of integrated water resources management framework (IWRM) framework in Rwanda and Kenya

IWRM is a holistic approach for addressing water governance and related conflicts. Rwanda's National Policy for Water Resources Management (2011) has established a framework for IWRM as the primary policy approach to managing its water resources. IWRM approach has been effective in management of the country's water resources as it has ensured that the water resources have been sustainably managed. The formulated policy on Water Resources Management has strong provisions for water use efficiency, climate change adaptation, and hydropower production. Rwanda's Water Resources Management Policy and Strategy (2012) emphasize on the need to manage Rwanda's water resources through a coordinated approach. The application of IWRM approach is expected to address water resource management challenges. The GoR has significant capacity issues in spite of its dedication and determination to execute IWRM. Water resource management institutions are new and under-staffed (GLOWS-FIU, 2012). A programme performance evaluation report on IWRM show that it lacked specific gender considerations in distribution of services and benefits. The focus on economic empowerment was limited to a good ratio of women participation while other gender considerations were lacking (MetaMeta, 2023).

Kenya has established a legislative and policy framework for IWRM, which puts it well ahead of other nations in the East African region (Global Water Partnership, 2015). Water Resources Authority (WRA) has been responsible for coordination and implementation of the IWRM Plan through working with various stakeholders. The stakeholders include Kenya Water Partnership, Catchment Area Advisory Committees and Water Resource Users Association among others. Implementation of IWRM in Kenya has helped address the problems faced by local stakeholders and has contributed to enhanced resource mobilization. IWRM has enhanced the formation of bodies for localized natural resource management. There has been development of sub catchment management plans which help Water Resource Users

Associations (WRUAs) solve issues associated with water (Obando *et al.,* 2018). Local participatory governance mechanisms (WRUAs) that assist in managing the major basins in Kenya; Ewaso N'giro River Basin, Athi River Basin, Tana River Basin, Rift Valley Basin, Lake Victoria North Basin and Lake Victoria South Basin (Richards & Syallow, 2018). The Mara River Basin Management Initiative (2003 – 2012) between Kenya and Tanzania was successful in implementing IWRM. There was increased stakeholder participation and devolved governance administration through WRUAs (Malmros, 2014). Based on this premise and the existing application of IWRM in both countries in promoting gender inclusive water governance, this research seeks to assess the efficacy of IWRM framework in enhancing women's participation in water resource conflict resolution in Rwanda and Kenya.

2.6 Social-cultural factors influencing women's participation in decision making and conflict resolution processes and their impacts

Women play an important role in the varied sectors water resource use but are highly marginalized in governance, planning and decision-making process at the various levels of water resource governance. This is attributed to the under recognition of the critical role that they play as primary resource users (Fauconnier *et al.,* 2018). Women have no place in society because male family members hold all the power in social, economic, cultural and political spheres. This limits their ability to influence decisions and resolve disputes (Nkumbuku, 2013). The government of Rwanda through its constitution (2010) is 'committed to ensuring equal rights between Rwandans and between women and men without prejudice to the principles of gender equality and complementarity in national development' (Du Rwanda, 2003). According to the Constitution of Kenya (2010) 'women and men have the right to equal treatment, including the right to equal opportunities in political, economic, cultural and social spheres'. However, deeply ingrained social cultural barriers patriarchal gender norms, limited access to property ownership and economic **e**mpowerment, low literacy levels and retrogressive cultural norms have impeded their effective participation in water governance and decision making.

2.6.1 Influence of patriarchal gender norms

Patriarchy influences gender roles and social interactions in communities (Vasavada, 2012). Responsibilities assigned to both genders are different, with women suffering most from hard work and labour. This affects women's ability to take on positions of power and leadership. Women are forbidden from engaging in activities outside the home due to patriarchal and religious beliefs. In Kajiado County in Kenya, women cannot actively engage in water projects as their husbands restrict them from attending meetings (Gathagu *et al.,* 2014). For women who

practice Islam, they are negatively impacted by the strict Sharia Law, which is mostly patriarchal-based. Additional factors that influence how women make decisions and engage in local initiatives include gender bias, domestic chores, inferiority complexes, religious bias and political interference.

Patriarchal gender stereotypes have influenced the way society views women in positions of power and leadership. Power is defined along gender lines and this has perpetuated misogynistic ideologies and attitudes towards women in positions of power. The women have to deal with negative behaviours and attitudes that are profoundly ingrained in sexist stereotypes. Women who are firm and aggressive in their workplace are viewed as repulsive and unpleasant to work with. Women who climb up the corporate ladder and challenge the gendered hierarchy face harsh competition from their fellow colleagues who believe in leadership by men (Mavin & Grandy, 2012). At work place women face sexual harassment, unfavourable working conditions, harsh work policies, work-family balance and work rivalry. The number of women in the political space is very minimal as political parties are dominated by prominent men. In Kakamega County, women have a problem airing out their views as they are underrepresented in the political sphere (Ndiso, 2012).

Women from Rwanda and Kenya share similar experiences in male-dominated water governance schemes. For women in water governance, they are under-represented in transboundary water management and decision-making processes (Stockholm International Water Institute, 2022). Men control formal functions in peace building and decision-making process leaving women excluded. The traditional Rwandan society was patriarchal and allowed uneven power relationships between men and women (Kagaba, 2015). Retrogressive cultural practices are also based on patriarchy. They include female genital mutilation, early marriages, domestic violence, sexual abuse, widow inheritance and polygamy. These harmful practices demean women and influence their decision-making abilities. The adverse effects of patriarchal gender structures continue to dominate today and affect how women participate in decision making.

2.6.2 Literacy levels

Gender division of roles and responsibilities has been a barrier for women and girls to access academic opportunities. This continues to manifest itself in modern society, where women still face educational discrimination. The introduction of a Eurocentric curriculum by colonialists continued to reinforce educational marginalization. This system of education was designed to enhance men's full participation in politics, decision making and employment (Ilesanmi, 2018). At institutions of higher learning, disparities in enrolment for science,

technology, engineering and mathematics fields is high. In Kenya, 34% of male students pursue STEM courses while only 11% of female students undertake the same. In Rwanda, female enrolment in higher education institutions is at 45.24% while that of Kenya is 41% (CUE, 2019). The perceived nature by society of women as bearers and homemakers limits their participation in academics. Women are expected to cook, clean, and take care of their homes. In schools, girls tend to orient themselves to courses such as hospitality, music and home science. Boys on the other hand focus more on technological and scientific courses. Investment for girl child education by the community is low. Girls are denied the opportunity to be in school in favour of boys (Omoniyi, 2013). Girls from poor upbringing are less likely to be sent to school as compared to boys. Women and girls who are not offered opportunities to successfully complete education are unable to actively participate in political processes or contribute to national and local discussions. (Parsons *et al.,* 2015). The exposure of young girls to these vulnerabilities denies them academic opportunities and causes physical, emotional and intellectual effects.

Rwanda and Kenya have made substantial progress for increasing gender equality in education. The GoR has developed the Girl Education Policy 2008 and National Education Policy 2010 all which are aimed at increasing female participation in academic opportunities. The Gender in Education Policy 2015 was established by the Kenya's Ministry of Education, Science and Technology in order to enhance gender equality in education (Hailu *et al.,* 2023). Both GoR and GoK have also developed strong legal frameworks for the protection of girls against child marriage. This a strong measure for ensuring stay in school and that their human rights are protected.

2.6.3 Property ownership and economic empowerment

Property ownership and economic empowerment increase the financial security of women. When women are given the power to oversee village water projects and participate in village water committees, they are able to influence decision making at local levels. The development and establishment of quota systems have proven to be an effective mechanism for increasing women's participation in water management in local water management groups (Mandara *et al.,* 2017). As compared to profit margins for men's enterprises, women's businesses generate lower incomes (UNAIDS, 2012). Women's access to water and land ensure that they are independent and can practice sustainable livelihoods. When women are granted property rights, they are able to boost household productivity (Doss *et al.,* 2014). Property ownership increases the financial security of women and they are able to meet household demands. There is reduced domestic violence, increased food production, improved nutrition

and children are able to stay in school. Women are able to influence decisions at the household, local and national levels.

Backward cultural norms have nonetheless prohibited women from owning property, thus limiting their economic empowerment. They experience inherent problems with regards to land access, inheritance, unequal property division and challenging formalization processes (Ireri, 2016). Lack of access to and control over property such as land and livestock reduces the financial security of women. They do not have direct property ownership rights and can only do so via their husbands or male husbands (Djurfeldt, 2020). Husbands fail to register their wives in land ownership documents (Bayisenge *et al.*, 2015). Widows cannot own land, and they may be chased out of it. Discriminatory traditional practices restrict the capacity of women to be self-sufficient. Their capacity to generate income and maintain control over their resources is hindered (Bayu, 2015). When they are denied the opportunity to own land, they become vulnerable and homeless. Women are disadvantaged by patriarchal traditions on lineage, marriage, divorce, property ownership and inheritance. In Rwanda, land ownership was patrilineal, and women were only allowed to cultivate (Bayisenge *et al.*, 2015). Women with no children could not inherit property in the event of the death of their husbands. In Kenya, only 5% of women have their own land registered (Ireri, 2016).

2.7 Water resource governance structures in Rwanda and Kenya

The creation of water governance structures such as laws and policies, frameworks, regulations, treaties, binding agreements and institutions at both the local and regional level is important to ensure sustainable utilization and exploitation of water resources. These governance mechanisms offer a means by which waters are managed in a sustainable way, thus enhancing prosperity and maintaining peace. The Rwanda National Policy for Water Resources Management 2011 was designed to serves as a guide for the nation's water resource management and utilization. This policy recognizes the importance of stakeholder involvement. It has set out principles of water management and sustainable conservation (Government of Rwanda, 2011). Kenya's National Water Policy of 2021 establishes a system for managing water resources that is aligned with its economic plans. This policy also has provisions for gender mainstreaming, conflict management and dispute resolution and intergovernmental relations (Government of Kenya, 2021). Rwanda's Strategic Plan for The Environment and Natural Resources Sector 2018 – 2024 recognizes women as major users of Rwanda's natural resources and their contribution is key in planning and policy considerations. The Rwandan National Water Supply Policy 2016 is concerned with ensuring that waste water

treatment systems are safe and sustainable. It emphasizes on fulfilling the needs of women and enhancing equal gender participation in resource management (Government of Rwanda, 2016).

Both GoR and GoK recognize the importance of stakeholder participation and citizen engagement in their policies and acts. For Rwanda, the National Policy for Water Resources Management 2011 recognizes the need for participation through catchment-based water resources management (Government of Rwanda, 2011). It emphasizes on the need for local governments, authorities and water users' organization to closely work together in water management. In Kenya, the Water Act (2016) acknowledges the importance of citizen participation in collaborative management of water resources and water conflict resolution (Government of Kenya, 2016), WRA helps establish WRUAs, while WASREB helps create Water Action Groups (WAG), which are local community-based organizations for water management (Mwihaki, 2018). It recognizes the importance of catchment advisory committees who are in charge of water resources in a given catchment.

Rwanda does not have a single institution that is responsible for water management. There are numerous institutions mandated to oversee the management of water resources in Rwanda and this has led to the duplication of efforts. The Ministry of Environment is responsible for managing the country's natural resources and developing environmental laws. Rwanda Environmental Management Authority (REMA) was established through Law No. 53/2010 and it is mandated to carry out sector-specific environmental tasks relating to industries such as water, mining, forestry, and agriculture (IGAD, 2012). Water and Sanitation Corporation (WASAC) was created in 2014 to oversee the services for water and sanitation (Twagirayezu *et al.,* 2020). The Rwanda Natural Resources Authority (RNRA) is responsible for managing natural resources including water. In Kenya, WRA is responsible for management of water resources and it lays up the regulatory framework for the distribution, utilization and preservation of water resources. Under the Water Act (2016), there are other institutions that work closely with WRA to help manage Kenya's water resources. They include Ministry of Water, Sanitation and Irrigation as the head organizing water body, the National Water Harvesting and Storage Authority for the development of national public water works for water resources storage and flood control, National Environment Management Authority (NEMA) enforces laws related to water quality and conservation and WASREB for protecting the interests and rights of consumers in the provision of water services (Chepyegon & Kamiya, 2018; Richards & Syallow, 2018).

In Rwanda, law No 62/2008 of 10/09/2008 on management of water resources states that water is a devolved function to district and user organizations. However, there has been

lack of any administrative autonomy at the basin level because each district implements its own solutions without taking the entire catchment into account. Conflicts between administrative offices have been witnessed as a result of this (Aboniyo *et al.*, 2017). In contrast, Kenya's water management at county levels has made it improve in managing its water resources effectively. Water resource management is decentralized both at national and local levels. County governments are mandated to deliver this responsibility to every citizen. There are 47 county water ministers that work closely with affiliated water ministers to achieve the objectives of democracy and accountability in order to achieve social and economic development (Government of Kenya, 2010).

2.8 Rationale for selecting Rwanda and Kenya as study countries

Both Rwanda and Kenya are upstream countries of the Nile Basin. They are hydrologically connected as their waters contribute to the White Nile. Both Rwanda and Kenya have undertaken major reforms to enhance inclusion and water governance but there exists disparities in institutional frameworks, level of implementation and enforcement management strategies and approaches to water governance and conflict resolution. For example, the aftereffect of the 1994 genocide heavily influenced the mechanisms for conflict and dispute resolution in Rwanda (Chelogam, 2022). Periods of political unrest in Kenya have also impacted the country's dispute settlement processes.

Politically, registered political parties in Kenya have a direct role in shaping policies. Existing institutions mandated to check vested interests have been weak and although the 2010 Constitution sought to strengthen them, the outcomes have been inconsistent. There have been challenges in terms of devolution implementation across the 47 levels of county governments. In contrast in Rwanda, the process of policy development is not hindered by the severe politically driven coordination challenges as observed in Kenya (Booth *et al.*, 2014).

In terms of policy development, Kenya has well established policies and laws for water governance and gender equality, positioning it at the forefront of other countries in East Africa (Global Water Partnership, 2015). Kenya's Water Act 2016 acknowledges that water is multi-sectoral and has created WRA to be in charge of managing the nation's water resources. However, there has been exclusion of women in decision making structures because of the different socio-political dynamics across the counties (Kivoi, 2014). Rwanda on the other hand is leading in Africa in promotion of gender equality across its various sectors of the economy because of existing robust legal frameworks, and a societal commitment to gender equality (Niyonzima & Bayu, 2023). However, water resource management in Rwanda is complex and this has directly impacted the coordination and implementation of water policies. There are

several entities engaged in creating policies. Rwanda does not have a national water body for overseeing water resource management (Aboniyo *et al.*, 2017). Also, devolution and water laws, regulations and policies are still in their early stages and this is affecting the overall water resource management (Stoa, 2014). Therefore, there was need to assess whether social, and legal disparities influence water resource governance and gender equality. Other factors that influenced the assessment between the two countries included common water demands, political history and similar climatic conditions. Cross-country comparisons between Rwanda and Kenya supports the identification of the most effective policies to close gender gaps.

2.9 Research gaps

Previous research studies have assessed the participation of women in water resource management and governance. Most of these studies are fragmented and overlook how water frameworks such as IWRM, socio cultural dynamics and existing water regulation interact to influence women's participation in decision making and conflict resolution processes. Table 1 shows the summary of selected studies, key findings and the main gaps identified that this research study aims to address.

Table 1: Summary of research gaps

Author	Themes	Key findings	Gap identified
Elias, 2015; Hu *et al.*, 2014	Women's roles in integrated water resource management: a case study of the Mutale water user association, Limpopo, South Africa	The results show that women have passive involvement in IWRM.	This study generalized the experiences of women in IWRM and lacked information on how the IWRM framework helps different groups of women participate in resolving water conflicts.
Njiriri, 2013; Omweri, 2018	Women's role and participation in water management: A case of Kaiti watershed in Makueni County, Kenya.	The study found that the women experience socio-cultural challenges, economic challenges, and water policy constraints many obstacles in their roles and participation in watershed management.	The study did not examine how the socio-cultural factors impede women's participation in water management. Research is needed to explore how these diverse socio-cultural factors influence women's involvement in water resource management. The study did not explore the impacts of water conflicts on women.
Abbott and Malunda, 2016; Aboniyo *et al.*, 2017	National Water Resources Management Authority for A Sustainable Water Use in Rwanda A study on the reality of women's rights in Rwanda.	Results show that majority of women have benefited little from government policies to promote gender equality and empower women.	The research study did not assess the implications of gender-focused policies in water resource management.

2.10 Theoretical framework

An increasingly important and pertinent topic is the role of women in managing water resources and resolving conflicts, particularly in the context of water resources. This research was centred on the concept of gender and water governance and is best described using the Feminist Peace and Conflict Theory (FPCT). The FPCT analyses and critiques how androcentric systems influence the existing inequalities in society. FPCT uses an analytical approach to showcase the overlooked contribution of women in the process of fostering peace and resolving conflicts (Salaudeen & Gombi, 2019).

The influence of gender on power dynamics, identities and experiences is revealed. Men are seen as the proprietors of war while women are the victims and there is an interconnectedness to all types of abuse. Women are disproportionately affected by conflict and it marks the greatest assault on 'feminine non-violent beliefs' (Weber, 2006). They are deprived of their sole duties as mothers during times of conflict and considered the epitome of suffering (Ruddick, 1998). It is believed that women are the embodiment of peace because of their special maternal responsibilities that come with childbirth and upbringing. Women's daily activities shape them as peacemakers and they try to solve any conflicts amicably (Chatterjee, 2016).

The gender gap in demands, interests and capacities between men and women, according to feminist theory, has an impact on how resources are managed. Women tend to think and act differently as a result of social interactions. They see reality as a series of interconnected experiences and interrelationships leading towards a global perspective (Gilligan, 1993). Women, in particular, are often excluded from decision making processes related to resources, despite their critical role in managing and using these resources. Women are excluded from public spaces and political decision making and they are trapped in the cycles of nature and life (Weber, 2006). While men are the key players in the conflict and at the negotiation table, women are typically seen as perpetual victims (Pagallo, 2017). The integration of women's voices and experiences into conflict resolution and the decision-making process is emphasized in this theory. Therefore, FCPT provided a framework for examining and understanding the gendered dimensions of water conflict and resource management.

2.11 Conceptual framework

The relationship between the independent and dependent variable is shown in Figure 1. For this research study, the independent variables are IWRM Framework, socio-cultural factors and water regulations. For IWRM Framework, it provides clear guidelines and support structures that enhance women women's participation in water resource management and

conflict resolution such as coordination, implementation mechanisms and engagement strategies. A strong IWRM Frameworks results into inclusive decision making while a weak one results into discrimination and exclusion. The different socio-cultural factors (patriarchal gender norms, literacy levels, property ownership and economic empowerment) in Rwanda and Kenya either promote or impede women's effective participation in water conflict resolution processes. Supportive socio-cultural practices provide a safe space for women engagement while retrogressive values hinder the effective participation of women. Water regulations such as laws, by laws and enforcement mechanisms provide a basis for women involvement. Strong water regulations recognize women as stakeholders in local peace processes while weak enforced regulations continue to discriminate them. Strong water regulations and enforcement mechanisms promote increased women participation while weak ones hinder women successful involvement. The intervening variable (women's participation in water resource conflict resolution) influence the dependent variables by determining the extent to which women engage in decision making and conflict resolution processes. The extent and quality of women's involvement determine how effectively conflicts are addressed. The dependent variables are the desired outcomes in this case conflict resolution, inclusivity in decision making, equality in access to water, increased agricultural productivity and improved local water governance.

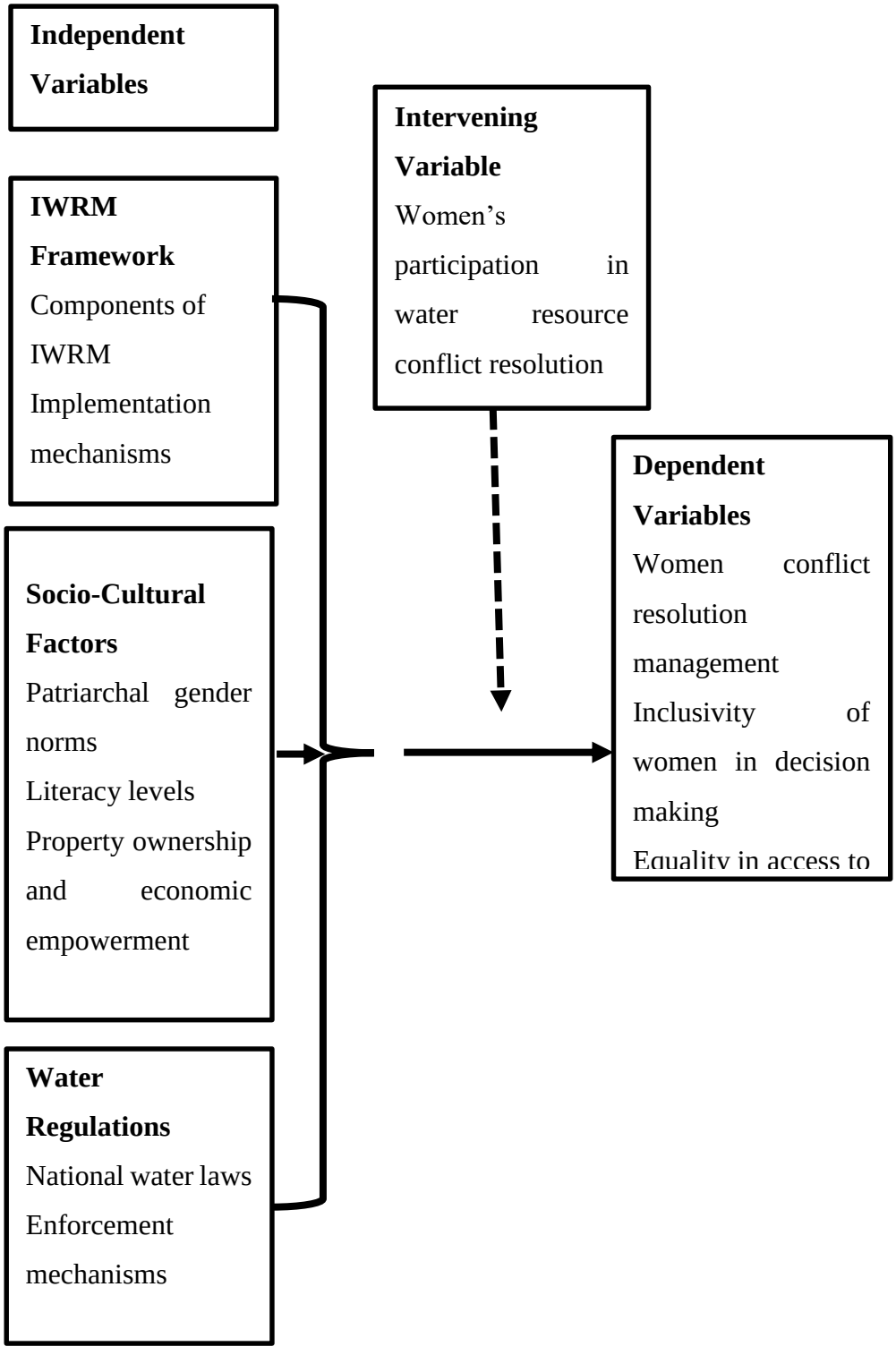

Figure 1: Conceptual framework

Source: Adapted from Makomelo 2022; Mandara *et al.,* 2017; Sehlke 2016; Shunglu *et al.,* 2022

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

In this chapter, the materials and methods used for the study are discussed. They include description of study area, research design, frameworks for assessments, target population, sampling procedure, and data collection procedure and data analysis.

3.2 Study areas

The focus of this study was a riparian ecosystem of the Nile Basin. Rwanda and Kenya were chosen as the study countries as they are part of the Upper Nile Basin. They form part of the shared headwaters of the Nile River System. Rwanda lies between latitude 1°4′–2°51′S and longitude 28°53′–30°53′E while Kenya lies within longitude 34°E, 42°E and at latitudes of 5°S to 5°N (Ayugi *et al.,* 2016; Ngarukiyimana *et al.,* 2021). They are hydrologically connected and their waters contribute to the White Nile. In Rwanda the specific study site was Mukunguli Wetland while in Kenya it was Nyando Wetland. Mukunguli Wetland is found along Mukunguli River and lies within the Southern Province and covers an area of 329 km2 (Rwanda Integrated Water Security Program, 2012). Mukunguli River flows into Nyabarongo River then to Akagera River then northwards to L. Victoria. Nyando Wetland is found along the Nyando River which is 153km long (Raburu, 2015). It is found within the eastern sub-catchment of L. Victoria Basin and is located within Kisumu County. It covers an area of 14,400 ha and is the second largest wetland ecosystem after Tana Delta (Okotto-Okotto *et al.,* 2018). It arises from the Mau Escarpment and pours directly into L. Victoria. The focus of this study was a riparian ecosystem covering Mukunguli Wetland (Figure 2) in Rwanda and Nyando Wetland in Kenya (Figure 3).

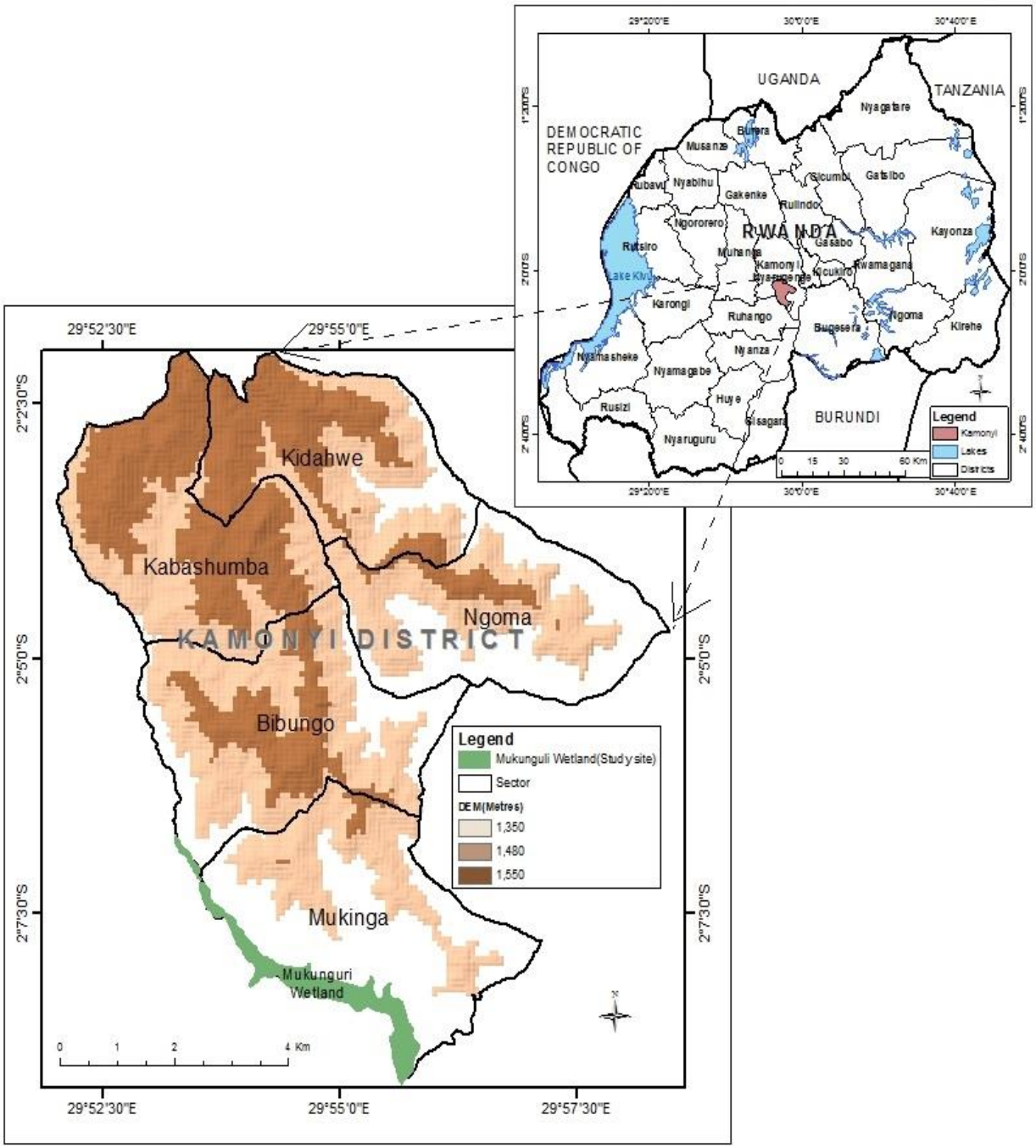

Figure 2: A map of Mukunguli Wetland in Rwanda

Source: National Land Authority (2022)

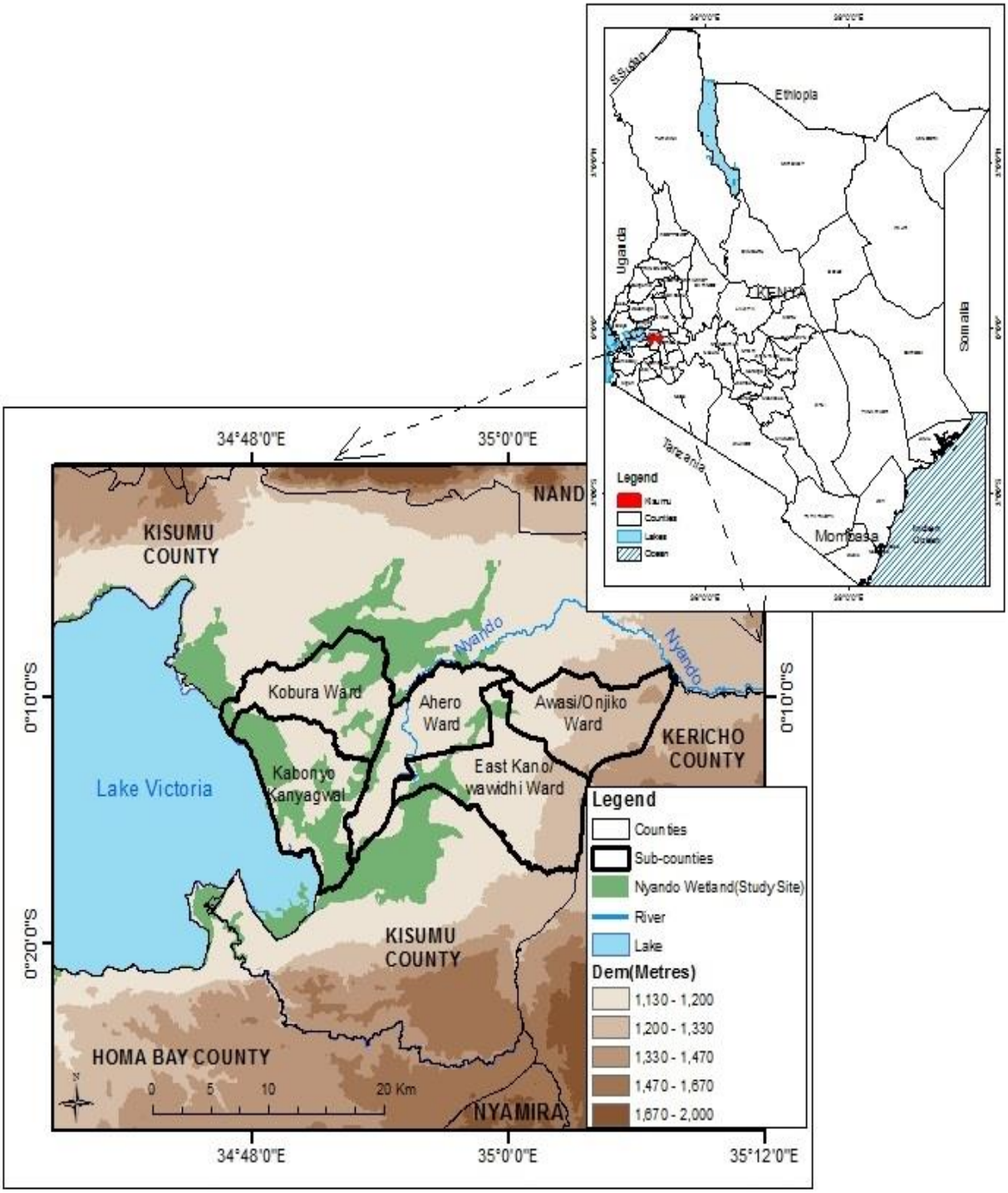

Figure 3: A map of Nyando Wetland in Kenya

Source: Survey of Kenya (2022)

3.2.1 Climate and hydrology

Mukunguli Wetland in Rwanda has an elevation of 1,355 - 1,830m (Rwanda Integrated Water Security Program, 2012). There are two rainfall seasons in a given year, that is, October to November and March to May. The annual mean temperature is 20°C (KDDS, 2018). Nyando Wetland in Kenya has an altitude of 1700m above sea level in the highlands and an elevation of 1135 m in the lowlands (Obiero *et al.,* 2012). The minimum temperature averages between 9^{o}C and 18^{o}C, while the maximum temperatures range between 25 ^{o}C-35^{o}C (Musyimi, 2020). The physiography is defined by the presence of the Nandi and Kendu escarpments and the floodplains of Kano (Khisa *et al.,* 2013).

3.2.2 Land uses

Mukunguli Wetland is under immense pressure because of increased human activities. Anthropogenic activities such as intensive agriculture, loam bricks production, cattle grazing, deforestation, hydropower production and papyrus extraction further exacerbates pressure on this wetland (Fischer *et al.,* 2011). The community that occupies Nyando Wetland depends on the ecosystem goods and services that are provided by the wetland (Oduor *et al.,* 2015). The area covered by the recession waters of L. Victoria provides productive lands for expansive cultivation (Obiero *et al.,* 2012). Approximately 80% of the people depend on subsistence agriculture farming for their income (Okotto-Okotto *et al.,* 2018). The wetland has heavily been utilized for irrigation, sugarcane farming and livestock farming.

3.3 Research design

A cross-sectional research design was used to assess the contribution of women to conflict resolution and peace processes. Cross-sectional design allows the simultaneous collections of information from different groups of individuals and relevant variables (Spector, 2019). This research design allowed for comparisons of data at a single point in time. The different roles women play in conflict resolution was analysed in Rwanda and Kenya. Information gathered from the study areas allowed for comparisons of views and perceptions and provided an in-depth understanding of the current situation. The cross-sectional research design helped in the analysis of variations and similarities in characteristics and how they affected the role of women in water resource conflict management.

3.4 Frameworks for assessments

The OECD Water Governance Indicator Framework 2015 was used to determine efficacy and effectiveness in this study. This framework is an assessment tool used to evaluate how institutions, instruments and frameworks are performing in water governance. It can be applied across various levels of governments and water functions. It has guiding principles that

are used in assessments (OECD, 2018). These principles are applied in a holistic and inclusive manner and they do not consider the multiple dimensions of water. They apply across all sectors of water for example management functions, uses and ownership. They are categorized under three main dimensions which are effectiveness, efficiency and trust and engagement. The focus principles of this study were efficiency and effectiveness. To determine the efficacy of IWRM Framework in enhancing women's participation in water resource conflict resolution, assessment was done in reference to Principle 5 (Data and information), Principle 6 (Finance), Principle 7 (Regulatory Framework) and Principle 10 (Stakeholder engagement). To determine the effectiveness of water regulations if they are being effectively implemented to promote women's access to water and its use the levels of effectiveness were measured against Principle 1 (Roles and Responsibilities), (Roles and Responsibilities), Principle 3 (Policy Coherence) and Principle 4 (Capacity) and Principle 9 (Integrity and transparency).

3.5 Target population

The target audience for this study was women who were members of the water associations. In Rwanda, the women were from TMWUA while in Kenya they were from NWRUA.

3.6 Sample size determination

In Kamonyi District, the study site is found within Nyamiyaga Sector which has 11,594 households according to the National Institute of Statistics of Rwanda (2012). For Nyando Wetland in Kenya, the main study site will be West Nyakach sub-location. According to the Kenya National Bureau of Statistics (2019), the total number of households is 6,628. The unit of analysis will be the households. The unit of observation for each household will be women aged 18 and above. Cochran (1963) formula will be used to get the sample size. This is given by:

$$n = \frac{z^2 pq}{e^2}$$

Where n=desired sample size (the target population is greater than 10,000), z=the standard normal deviate at the confidence level of 95% is 1.96, p=the proportion of the target population estimated to have characteristics being measured is set at 50%, q=1-p (probability of non-success), e=level of statistical significance set at 0.05

$$n = \frac{(1.96)^2 (0.5)\ (0.5)}{(0.05)^2}$$

$$n = 384$$

This figure (384) was proportionately distributed based on the households as shown in Table 2.

Table 2: Sample size of households by location

District/ Sub county	Sector/ Ward	Households	Sample Size
Kamonyi	Nyamiyaga	11,594	244
Nyando	West Nyakach	6,628	140
Total		18,222	384

3.7 Sampling procedure

For this research study, multi stage sampling method was used to select 384 respondents from the study sites. These two sites were chosen because they are the part of the upper sub basin of the Nile which is the Equatorial Nile sub system. In Rwanda, Kamonyi District is part of the Nyabarongo Valley Base while in Kenya Nyando Wetland falls under the Lake Victoria South Basin. These two study sites were chosen because their waters contribute directly to the White Nile. Within these areas, Nyamiyaga Sector in Kamonyi and West Nyakach Ward in Kisumu were chosen as because of their strategic location in Mukunguli Wetland and Nyando Wetland. Participants were selected through simple random sampling and this was based on the data provided by the associations' leaders. Purposive sampling was used to select eight key informants who included respondents from each water association and from government agencies dealing with water and agriculture in both countries.

3.8 Data collection methods

3.8.1 Questionnaire

A structured questionnaire (Appendix A) was used for this study. All questions were phrased in the same manner and were administered to women who were are above 18 years old. The information gathered included demographic information, efficacy of IWRM framework, impacts of socio-cultural factors and effectiveness of water regulations. A 5-point Likert Scale was used to measure the extent to which the women agreed or disagreed with the questions asked. The questionnaires were administered by trained enumerators.

3.8.2 Key informant interviews

A Key Informant Schedule (Appendix B) was used to collect data from people who were knowledgeable about the women, water and conflict management. The key informants provided information about application of water approaches and water regulations. In Kisumu

the audience included Nyando sub-county sub-chief, community engagement officer from WRA, community health volunteer and NWRUA Chairman. In Kamonyi, the participants were the agronomist, TMWUA chairman, women leader and chair of the conflict committee.

3.9 Validity and reliability of instruments

Questionnaires used in data collection were thoroughly scrutinized and checked with guidance from experts. A region proximal to the study area was chosen for the purposes of piloting. The pilot study was conducted in Kolweny, Homa Bay County in Kenya. Kolweny had similar characteristics with the areas identified for this study. It involved selecting 30 women from Lower Asao 'B' WRUA through simple random sampling. This entailed selecting the required number of households from the random number table generated through Excel. The 30 women represented 10% of the total the larger parent study. The 10%of the total sample size is sufficient to test the reliability of the questionnaires (Babey, 2019; Sorzano *et al.*, 2018). The women were probed with questions from the questionnaire and their behaviour observed during the interrogation process. Follow up questions were also asked to assess how respondents understood the questions and the response challenges. The main aim of the pilot study was to improve and refine the questions by identifying the ones that needed to be modified or removed.

After piloting, the Cronbach's Alpha Coefficient was employed to measure the reliability/internal consistency of the questionnaires. For each objective, Cronbach's Alpha Coefficient was established which formed a scale. Each variable in the questionnaire was measured with a five-degree Likert Scale where 1= don't know, 2= somewhat agrees, 3= somewhat disagree, 4 = strongly agree and 5 =strongly disagree. The reliability command was run in SPSS version 27. For this the study the reliability value was of 0.80 (Appendices C) was obtained implying that the instruments were reliable. The recommended criterion for questionnaires to be deemed reliable is when the Cronbach's Alpha Coefficient is 0.70 or higher (Ustun *et al.*, 2022).

3.10 Data analysis

Descriptive statistics were analysed to generate frequency distributions, percentages and measures of central tendencies. Inferential statistics such as Chi-square and regression analysis were run to test the relationship between the independent and dependent variables at 5% level of significance. Results obtained were presented in the form of frequency distribution tables and graphs.

3.11 Ethical considerations

For this research study Ethical Clearance was sought from Egerton University Ethics Committee (Appendix D). A research permit was obtained from National Commission for Science, Technology and Innovations (NACOSTI) before the commencement of the data collection (Appendix E). In Rwanda, research permit was sought National Council for Science and Technology (Appendix F). Permission was also sought from local administrators. Participants were informed about the purpose of the study and all their responses were kept confidential.

Table 3: Summary of statistical data analysis

Research questions	Independent variables	Dependent variable	Analysis tool
How efficacious is integrated water resources management framework (IWRM) in enhancing women's participation in water resource conflict resolution in Rwanda and Kenya?	Components of IWRM Implementation mechanisms Engagement strategies	Conflict resolution	Frequencies, percentages, Chi-square tests of independence Content analysis
What are the impacts of socio-cultural factors on women's participation in decision-making and conflict resolution processes?	Patriarchal gender norms Literacy levels Property ownership	Conflict resolution	Means, frequencies, percentages, Multinomial regression Chi-square tests of independence Content analysis
How effective are water regulations in promoting women's access to water and its use in Rwanda and Kenya?	National water laws Enforcement mechanisms	Conflict resolution	Frequencies, percentages, Chi-square tests of independence Content analysis,

CHAPTER FOUR
RESULTS AND DISCUSSIONS

4.1 Introduction

Data analysis, presentation and interpretation are done in reference to the study objectives. Discussions is done in reference to the findings. The implications of the study findings have been carried out relation to IWRM Framework, socio-cultural factors and the effectiveness of water policies are examined in detailed. The comparisons between TMWUA and NWRUA have been done to reveal the differences and similarities between the associations. Existing relationships and patterns have been established using Chi-Square Tests of Independence.

4.2 Response rate for the household survey in TMWUA and NWRUA

For this research study, a total of 390 questionnaires were administered. The total number of respondents from TMWUA in Rwanda was 244 while in NWRUA in Kenya was 140 as shown in Table 4. All questionnaires (384) were filled, yielding a 100% return rate. A return rate of more than 70% is recommended for data analysis (Mugenda & Mugenda, 2003). The high rate of response was attributed to the fact that the researcher was in the field during the entire data collection period.

Table 4: Response rate for the household survey in TMWUA and NWRUA

WRUA	Target	Achieved	Rate (%)
Tuyiteho Mukunguli water users associations (TMWUA)	244	244	100
Nyando water resource users associations (NWRUA)	140	140	100
Total	384	384	100

4.3 Efficacy of Integrated Water Resources Management Framework (IWRM) in enhancing women's participation in water resource conflict resolution

In this sub-section, the efficacy of IWRM Framework is determined using the OECD Water Governance Indicator Framework 2015. The guiding principles OECD water governance indicators include: knowledge of water rights, fairness in water distribution, participation in decision making (includes stakeholders engagement), regular water inspections, water conflict management, data and information dissemination and fairness in

water distribution. For data analysis, coding was done with 7-Strongly agree, 6-Agree, 5-Somewhat agree, 4-Don't know, 3-Somewhat disagree, 2-Disagree, 1-Strongly disagree. The average score was obtained as in Table 5. On average, TMWUA and NWRUA have succeeded in ensuring efficient water management, with just a slightly different of 1. This implies that while on average, women in NWRUA agree that these institutions are successful in disseminating information on water rights, policies, water inspection, setting up of working conflict resolution mechanisms, and involving the women in the water committees, TMWUA have a stronger efficiency. Examination of these variables highlighted the efficiency of the IWRM framework in promoting gender sensitive water governance.

Table 5: Average score of IWRM indicators

Indicator	Country	
	NWRUA	TMWUA
	Average score	
Knowledge of water rights	6	7
Knowledge on water policies	6	7
Stakeholders collaboration	6	6
Women interested in WRUA leadership	6	7
Regular water inspections	6	7
Conflict resolution mechanisms successful	5	7

4.3.1 Familiarity and knowledge of water rights

Water rights are fundamental as they ensure women who are primary water users have been granted equitable access and control over water resources. This study sought to examine whether the women understood their legal rights to use, allocation and distribution of water resources. In both WRUAs women had great understanding of their water rights. Water rights grant women equal access and control over water resources. In TMWUA, 86.60% of the women had good understanding of their water rights while in NWRUA only 65.91% knew what water rights were (Figure 4). The differences between the respondents in the two countries is attributed to the fact that TMWUA has stronger mechanisms for water rights protection and regular sensitization programs for women. This increased the level of understanding and

compliance. This study is in agreement with Ekane *et al.* (2020) who established that Rwanda has adequate laws and regulations in place thus the higher level of awareness. Conversely, women's knowledge on their water rights in NWRUA is lower because limited trainings and engagements which influences their understanding.

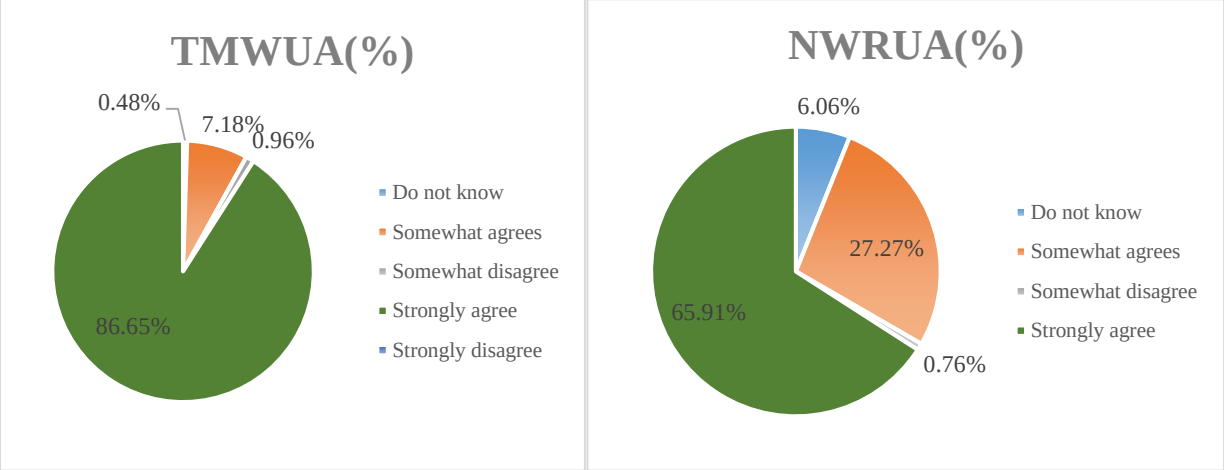

Figure 4: Familiarity and knowledge of water rights

4.3.1.1 Association between knowledge level and respondents' familiarity with water rights

Data from Table 6 presents Chi-Square Tests of independence showing the existing association between literacy knowledge levels (how much the respondents understood about water rights) and familiarity (general awareness or exposure to the concept, not necessarily deep understanding) on water rights in TMWUA and NWRUA. For TMWUA the p-value 0.259 was greater than alpha value 0.05. The conclusion is that knowledge level indeed did not influence one's understanding on water rights. This implies that in TMWUA there was great understanding of the laws regardless of one's knowledge level. Contrastingly, Sherka (2023) found out that women with higher levels of knowledge have higher chances of participating in water conservation activities than those with lower levels of formal education. For NWRUA, the Chi-square value was 12.166 with a corresponding p-value of 0.204. The p-value 0.204 is greater than the alpha value 0.05. These results suggest that there is no significant connection between women's level of education and knowledge on water rights in NWRUA. These results are in contrast with findings from Manji *et al.* (2015) who argues that education level has a relationship with water.

Table 6: Chi-square Tests showing relationship between knowledge level and familiarity on water laws

	Value		df		Asymptotic Significance (2-sided)	
	TMWUA	NWRUA	TMWUA	NWRUA	TMWUA	NWRUA
Pearson chi-square	14.688	12.166[a]	12	9	.259	.204
Likelihood ratio	15.504	13.236	12	9	.215	.152
Linear-by-linear association	.190	10.477	1	1	.663	.001
N of valid cases	209	132				

4.3.2 Role of stakeholder collaboration in empowering women

Women respondents were asked whether they had seen different stakeholders such as NGOs and government working together in establishing water projects, supporting women groups and promoting peace. Collaboration among stakeholders ensures that women are equipped with the necessary support, training, funding and skills for daily water management. It also ensures that there is joint decision making and thus minimizing in resource wastage, redundancy and inefficiency. Power relations and interests from diverse stakeholders influence exploitation and management of water resources. In TMWUA, 59.33% of the women had witnessed the presence and activities different NGOs working together while in NWRUA 56.06% had seen the same as shown in Figure 5. The results are in line with those of (O'Reilly, 2015) who established that stakeholders such as civil organizations and international non-governmental organizations play an important role by working together to support women-led projects. This promotes sustainable peace and enhances inclusive peace building outcomes. However, some women strongly disagreed with this indicating that different stakeholders implemented their own programs without consulting other parties including women as well. The problem with this is that the established projects were short lived and served the community for a short term and thus did not fulfil their intended purpose. This was represented by 3.35% of the women from TMWUA and 6.06% from NWRUA. Projects that fail to take in

to take in the views and perceptions of women have lower chances of success and fail to take advantage women's indigenous knowledge and lived experiences. These findings reflect those of Njiriri (2013) who argues that women's exclusion from decision making often leads to the development of water projects and water programmes that are nonresponsive to women's practical and strategic needs hence reinforcing gender inequalities in the rural communities.

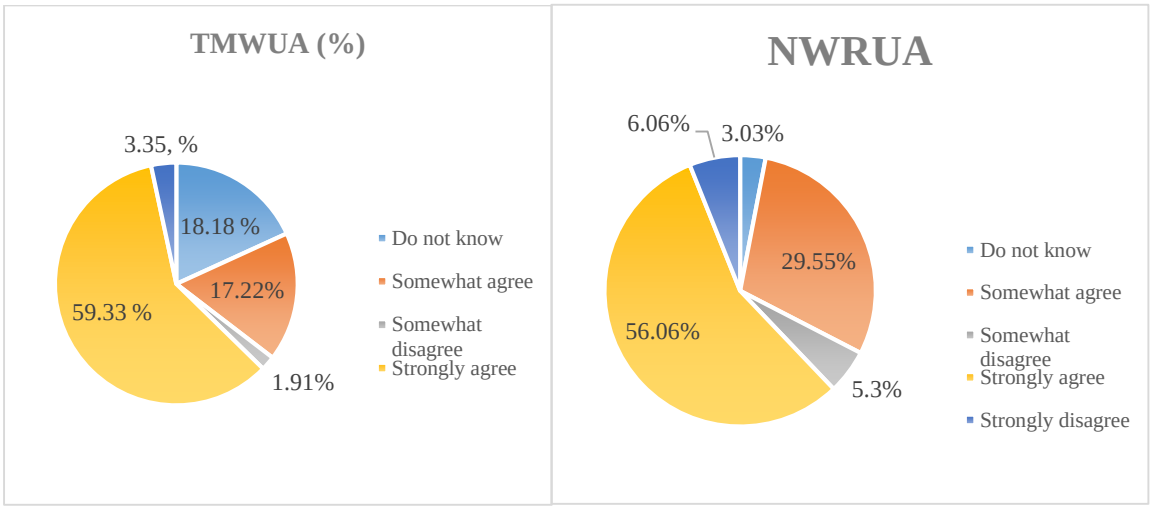

Figure 5: Stakeholder collaboration in women empowerment

4.3.3 Participation in water decision making processes

Study findings presented in Figure 6 indicate that in both associations there was great participation of women in water decision making processes. However, the rate of involvement of women in TMWUA (91.39%) is higher as compared to NWRUA (78.03%) as there is a greater emphasis on women's representation in leadership and decision-making roles. The gender quota system in Rwanda has been effective in promoting women's participation in water related activities without any barriers. The Constitution of Rwanda (2003) mandates that 30% of the positions in decision making organs be assigned to women. Additionally, Umuganda has enhanced women's participation in decision making in local water governance processes. These results relate to the finding of Iloh *et al.* (2021) who found out that *Umuganda* which translates to community engagement has also been instrumental in enhancing the culture of participation especially of women in local governance structures and this extends to water decision making processes. The Kenyan Constitution (2010) has addressed gender participation in governance by mandating that no more than two-thirds of any elective or appointive position be of the same gender across all scales of governance. However, in practices there were lower participation rates for NWRUA because of weak enforcement and

implementation. Kerubo *et al.* (2023) established that the inclusion of women in decision making processes in water associations in Kenya is very low.

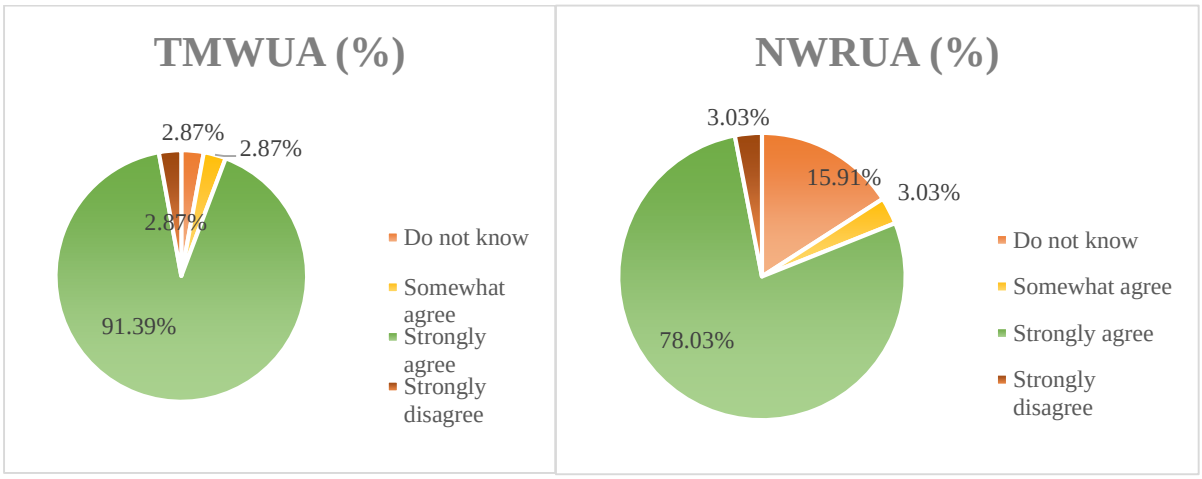

Figure 6: Participation in water decision making processes

4.3.3.1 Chi- Square Tests showing the relationship between traditional gender roles and inclusion in decision making

Results from Table 7 show Chi- Square Tests showing the relationship between traditional gender roles and inclusion in decision making in TMWUA and NWRUA. For TMWUA, the p-value 0.000 is less than alpha 0.05. This shows that gender differential roles influenced women's participation in decision making processes in TMWUA. House chores and domestic responsibilities limited the time that women had to effectively engage in decision making processes in Rwanda. The results of this study are in line with those of Loise (2016) who argues that factors such as childbearing, domestic duties and gender-insensitive approaches to peace building hinder women's their involvement in conflict resolution and decision-making processes. In contrast to TMWUA, gender roles did not significantly influence the inclusion of women in decision making processes in NWRUA. This is because the p-value 0.467 is greater than alpha 0.05. This means that in NWRUA, household responsibilities did not in any way deter women from actively engaging in decision making.

Table 7: Chi-Square Tests showing relationship between gender roles and involvement in decision making processes

	Value		Df		Asymptotic significance (2-sided)	
	TMWUA	NWRUA	TMWUA	NWRUA	TMWUA	NWRUA
Pearson chi-square	27.104[a]	3.573[a]	4	4	.000	.467
Likelihood ratio	28.272	4.156	4	4	.000	.385
Linear-by-linear association	23.429		1		.000	
N of valid cases	247	142				

4.3.4 Regular water inspections in TMWUA and NWRUA

Regular water inspections by WRUA officials involves routine checks and maintenance of water infrastructure, water usage patterns and pollution control. Regular water checks are conducted to minimize the likelihood of conflicts. In Rwanda, most of the respondents (86.1%) agreed that they had on many occasions seen TMWUA officials come to monitor water usage in the farms and the state of water infrastructure. In Kenya, the level of water inspection by NWRUA officials was very low at 35.6% (Figure 7). The disparity between the levels of water inspections is based that TMWUA has fulltime employees who are responsible for infrastructure maintenance and water monitoring in the wetland. Therefore, they carry out their duties as assigned in their work contracts. One respondent from TMWUA commented,

'*I usually see the water irrigators do inspections and maintenance of the water infrastructure in the wetland on daily basis' (Respondent 1, TMWUA, 2024).*

The regular water inspections implies that there is greater implementation and enforcement of water laws thus reducing the likelihood of conflicts such as pollution, unauthorized water abstraction and illegal water diversion.

In Rwanda, WUAs work together with the Irrigation Water Users' Associations (IWUAs) whose main responsibilities is to collect water fees in the irrigation

schemes (Ministerial Order N°001/11.30 of 23/11/2011). Landowners who have a registered irrigation water right through the IWUA are required to join WUA in their jurisdiction. Cooproriz Abahuzabikorwa is the IWUA serving Mukunguli. TMWUA works hand in hand with Cooproriz Abahuzabikorwa which collects fees from farmers. The IWUAs collects 2 Rwandan Franc (Kshs 0.19) per kg per season on the production of each farmer and these funds are used for the running of the TMWUA. These findings are consistent with those of Mbyukansenga (2022) who highlighted that the funds collected are used to maintain the irrigation of infrastructure and other activities such as paying the fulltime employees making the WUAs functional.

In Kenya, IWUAs are mandated to function as members of WRUAs at catchment level (Ministry of Water, Sanitation and Irrigation, 2019). The IWUA serving Nyando is South West Kano Irrigation Scheme IWUA. Key informants stated that members from the IWUA are expected to pay Ksh. 2000 after their harvest to facilitate the operations of the IWUA and WRUA but members have failed to do so. Following up with the members has proven to be a challenge as membership is on volunteer basis. NWRUA and South West Kano Irrigation Scheme IWUA have failed to work together. This implies that the lack of coordination between the two hinders effective collection, coordination and allocation of resources. Officials from NWRUA operates on voluntary basis and they are financially and emotionally constrained to conduct regular water inspections. Key informants from NWRUA suggested that there was need for having employees on payroll and this would ensure NWRUA was able to run its operations consistently. Munyua and Mbugua (2019) ascertain that any WRUA would be effectively managed if it would be able to employ an executive officer accountable to the executive committee but the additional financial costs would affect the overall performance of the WRUA. Additionally, Musyima (2014) ascertains that manpower enhances the overall performance and functionality of WRUAs.

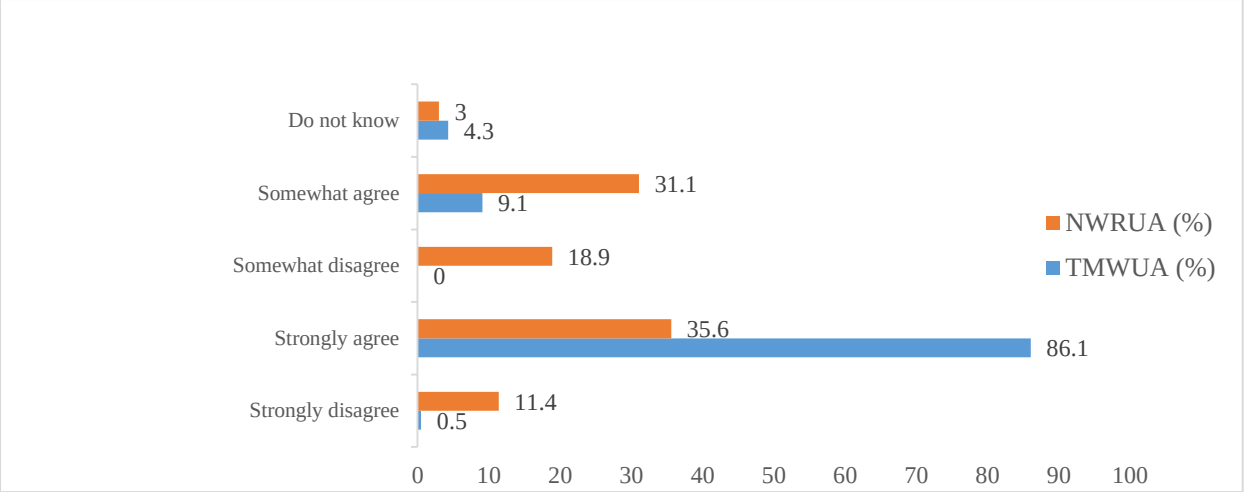

Figure 7: Regular water inspections

4.3.5 Success of WRUA in solving water conflicts

According to the respondents, 80.86% of women from TMWUA acknowledged that water conflicts had successfully been resolved while in NWRUA 51.52% of women acknowledged the same. This finding is in line with that of Munyua and Mbugua (2019), who state that the main responsibilities of water associations is water use conflict resolution within their areas of jurisdiction. However, the high level of acknowledgement of women from TMWUA confirms that TMWUA has been successful in mediating conflicts arising from the use of water mainly through community engagement platforms. One respondent commented,

'We solve all our water issues during Umuganda' (Respondent 2, TMWUA, 2024).

Umuganda has also been effective in promoting active community participation and settlement of disputes among water users. In contrast, the level of solving water conflicts in NWRUA low is because insufficient resources, low community participation and inadequate institutional capacity. These results reflect those of Wangombe (2013) have found out that water associations have limited financial resources for conflict resolution processes.

4.3.6 Data and information dissemination

Information dissemination on floods and droughts ensures that women are equipped with knowledge needed to make informed decisions on water management. Data and information about floods and droughts was in TMWUA found mostly to be delivered through community meetings (42.08%), direct weather observation (33.01%) and media (24.40%). A study by Coulibaly *et al.* (2017) established that in Rwanda, women were noticeably less informed on climate issues as compared to men. The disparity was because of ownership of communication assets and low participation in public spaces where women were lagging behind. In NWRUA on the other hand, direct weather (43.94%) observation was relied,

followed by media (45.45) and community meetings (10.61%). Community meetings are platforms for water users to come together and address the issues there are facing. In Rwanda, *Umuganda* is a platform that brings people together especially water users to address the issues that they are facing. These results compare with those of Aboniyo *et al.* (2017) who affirms that community-based organizations play an important role in enhancing farmer's awareness on climate change. Similar sentiments are shared by Imburgia *et al.* (2021) who posits that water meetings are important platforms for accessing information and participating on water decision making processes.

In Kenya, the practice and culture of community work is low and thus the difference between the two countries. This finding is comparable with that of Sungu (2018) who found out that there is lack of community participation in water resource management in Nyando River Basin. In NWRUA, 45.45% of the women were able to get data and information through media (phone, radio, television, and internet) while in TMWUA it was only 24.40% of the women. This implies that the level of technology uptake in Kenya is higher as compared to Rwanda. Findings reflect those of Osiakwan (2017) who ascertains that Kenya is leading in technology adoption in Africa because of supportive policies, government initiatives and the role of the private sector.

4.3.7 Fate of wetland polluters

Results from this study show that the scale and level of action taken against those who pollute the wetlands depended on power, influence, finances, social ties and magnitude of the offense. Findings show that women from both WRUAs indicated that nothing happens to those who polluted the wetland with TMWUA at 81.12% and NWRUA at 65.15%. In NWRUA, 31.82% of the women knew that wetland polluters were arrested and fined while in TMWUA it was at 16.27%. Women from NWRUA reported that they have been active in warning and reporting wetland polluters to the local chiefs and WRA and the perpetrators brought to book. Key informants from NWRUA stated that they have on several occasions reported Agro-Chemical and Food Company Limited (ACFC) to WRA for discharging effluents to River Nyando. The chemical effluents affect the aquatic life of R. Nyando. WRA closely works with NEMA in handling ACFC for wetland pollution. A respondent commented,

'Whenever we see discolouration in River Nyando as a result of industrial effluent from ACFC, we take pictures and send them to WRA. WRA responds by coming to the ground to verify what is happening and take action.' (Respondent 1, NWRUA, 2024).

Findings from this study are consistent with those of Richards and Syallow, (2018) revealed that WRUAs act as watchdogs for WRA and they are able to whistle blow on any illegal activities.

4.3.8 Fairness in water distribution

Erratic weather patterns experienced in both Rwanda and Kenya have led to diminishing availability and competition of water resources. The high demand for water coupled with climate change causes water conflicts making the situation even more precarious. Results from Figure 8 show that in TMWUA, 87.08% of the respondents felt that water distribution was fair. The fairness in water distribution is because of the role of the irrigators who are officials of TMWUA and are responsible for ensuring fairness in allocation of water resources. Water distribution in the wetland follows a scheduled water timetable and this has greatly minimized conflicts and competition over water. Contrariwise, 76.52% of women from NWRUA felt that water distribution was unfair. There are no officials from NWRUA who oversee the distribution of water resources. The absence of effective oversight by NWRUA committee has led to competing uses amongst the members hence causing conflicts. According to a study by Sungu (2018), the development of a water allocation plan and installation of water monitoring facilities in Nyando River Basin is key in managing conflicts associated with water use.

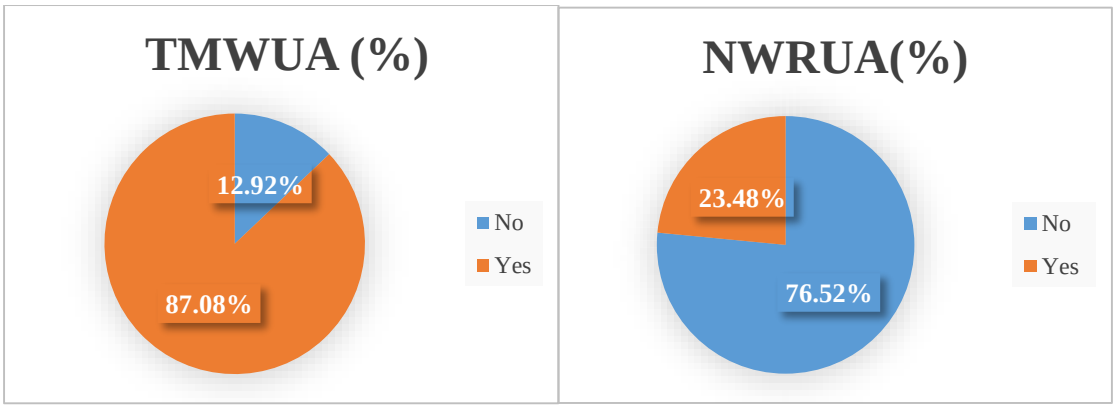

Figure 8: Fairness in water distribution

4.3.9 Participation in WRUA campaigns

This study sought to establish whether the women had tried to seek positions within the WRUAs. Participation of women in WRUA campaigns indicates their willingness to take up leadership positions and responsibilities. The participation in both countries was relatively low. Results indicate that 47.37% of women in TMWUA had ever vied for leadership roles while in NWRUA it was at 35.61%. In TMWUA the rate of participation was higher suggesting that there were a strong political will and commitment for women to join water leadership and

address water related challenges that they face. Women's involvement in peace processes results into increased advocacy for gender and women's rights, all of which are in tandem to peace. This promotes the inclusivity and legitimacy of existing political frameworks (O'Reilly, 2015). On the other hand, majority of the women did not find interest in vying for committee leadership or were denied the chance to do so for one reason or another. In TMWUA 52.63% of the women have never sought any WRUA leadership while in NWRUA it was slightly higher at 54.55%. A study conducted by Konde (2019) reveals that the number of women interested in vying for a public office has been dwindling over the years. Women often receive less financial support compared to men, who typically control family resources. Women give up most of the times as they have to face the cultural barriers. These findings are congruent with the findings of Nyamweya *et al.* (2018) who found out that cultural barriers demotivate women from leadership. Moreover, in NWRUA 9.85% of the women said that they were not aware of the WRUA committee structure indicating that they were not aware of available opportunities of grassroots water leadership and involvement. These results reflect those of Coulter *et al*. (2019) who found out that women had knowledge of WRUA activities but were not aware of the means to become involved due to cultural reasons.

4.4 Influence of sociocultural factors on women's participation in water resources use decisions and conflict resolution

In this subsection, the demographic characteristics (as age, marital status, employment, and education level) of the respondents were analysed to offer insights on the background information of the respondents. The results of socio-cultural factors and their interplay in influencing women's participation in making decision on water resources use and resolving related conflicts were analysed and discussed. Existing relationships were determined using Chi Square Tests and discussed in depth.

4.4.1 Demographic characteristics of the respondents

4.4.1.1 Age of respondents

The distribution of age of the respondents is shown in Table 8. Most members from TMWUA accounted for 28.7% and were aged between 51-60 years. Most of the younger population had moved to urban centres in search of greener pastures leaving behind the elderly. These findings are in line with those of Hitayezu *et al.* (2018) who established that majority of those moving towards cities in Rwanda are young people seeking employment opportunities. On the other hand, the highest number of respondents from NWRUA were aged between 18-30 years and accounted for 28.8% while the least were those aged between 51-60 years with a

representation of 10.6%. The younger population was higher because NWRUA has been conducting advocacy campaigns and membership drives focusing on the young people.

Table 8 : Age of respondents

Age group	TMWUA (%)	NWRUA (%)
18-30	14.8	28.8
31-40	24.9	20.5
41-50	20.6	25.0
51-60	28.7	10.6
60 and above	10.5	15.2

4.4.1.1.1 Chi-Square Tests showing the relationship between age and involvement in water committees

Findings from Table 9 show the Chi-Square Tests showing the relationship between age and involvement in water committees. In TMWUA, the p-value 0.318 is greater than alpha value 0.05 while in NWRUA, the p-value 0.358 is greater than 0.05. This implies that age did not influence women's involvement in water committee groups. In contrast Omweri (2018) established that there exists relationship between age and involvement in water management committees.

Table 9: Chi-Square Tests showing the relationship between age and involvement in water committees

	Value		df		Asymptotic Significance (2-sided)	
	TMWUA	NWRUA	TMWUA	NWRUA	TMWUA	NWRUA
Pearson chi-square	13.738 [a]	13.152[a]	12	12	.318	.358
Likelihood ratio	14.762	15.979	12	12	.255	.192
N of valid cases	250	148				

4.4.1.2 Marital status of respondents

In both countries majority of the respondents were married with TMWUA at 63.2% and NWRUA at 64.4% (Figure 9). This means that for both countries women were expected to get married because of cultural and societal expectations. This finding echo that of Musyima

(2014) who found out that marriage is an indicator of social stability in the community. Widowed respondents in TMWUA accounted for 16.3% while in NWRUA it was at 31.1%. Single respondents in TMWUA were 18.7% while in NWRUA it was 3.8%. For this study it was crucial to determine how the marital status of women influenced leadership and decision making for local water management.

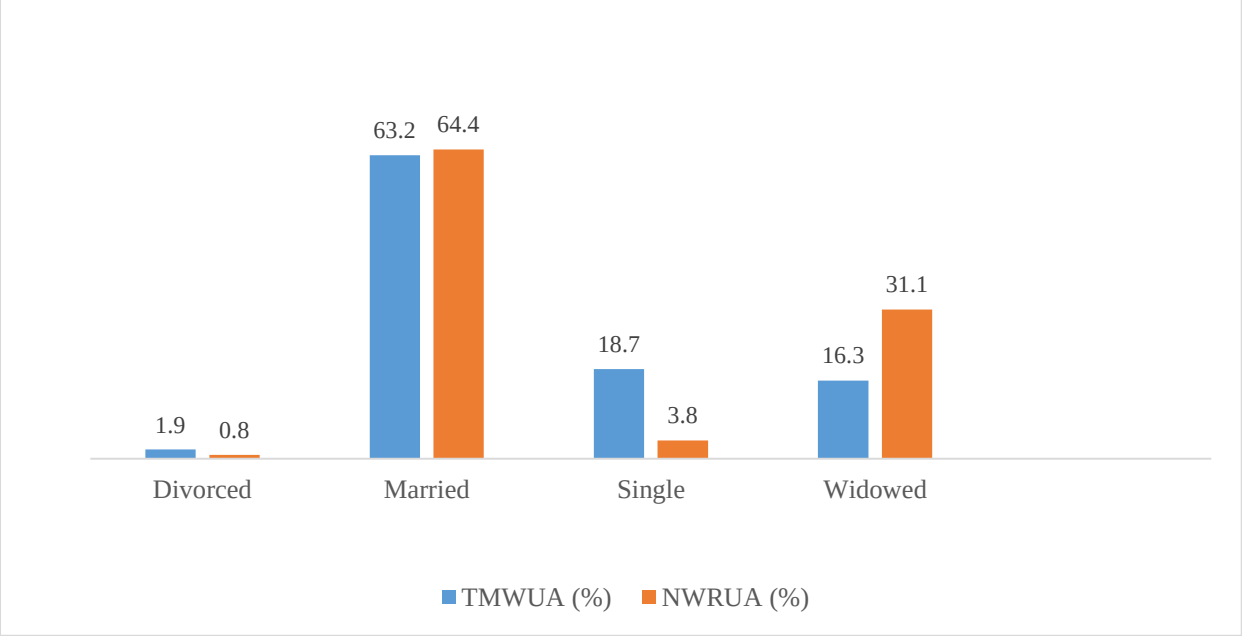

Figure 9: Marital status of respondents

4.4.1.3 Chi-Square Tests showing the relationship between marital status and women participation in water conflict resolution processes

Results from Table 10 show the results of a Chi-Square Test carried out to establish the relationship between marital status and women participation in water conflict resolution processes in TMWUA and NWRUA. Results indicate that in TMWUA the p-value 0.850 is greater than alpha value 0.05. There was no detectable relationship between marital status and participation. This implies that the marital status of the women in TMWUA did not influence their participation in water conflict resolution processes. Similarly, in NWRUA, there was no association between marital status and women inclusion in water conflict resolution for women as the p-value 0.1 is greater than 0.05. In contrast, a study by Mwangi (2017) disclosed that married women had higher chances of being involved in decision making than those who were not.

Table 10: Chi-Square Tests showing the relationship between marital status and women participation in water conflict resolution processes

	Value		df		Asymptotic significance (2-sided)	
	TMWUA	NWRUA	TMWUA	NWRUA	TMWUA	NWRUA
Pearson chi-square	4.822[a]	14.681[a]	9	9	.850	.100
Likelihood ratio	6.854	13.627	9	9	.652	.136
Linear-by-linear association	.054	2.334	1	1	.816	.127
N of valid cases	209	132				

4.4.1.4 Chi-Square tests showing the relationship between marital status and inclusion in WRUA discussions

Results in Table 11 show Chi-Square Tests showing the relationship between marital status and inclusion in WRUA discussions in TMWUA and NWRUA. For TMWUA, the p-value 0.825 is greater than alpha value 0.05. This shows the marital status of the women did not in any way influence their participation in WRUA discussions. Women had equal chances of being engaged regardless of their marital status in TMWUA. In contrast, a study by Boss (2022) reveals that woman's access to social, legal and political power is based on her relationship with her husband. As opposed to TMWUA, women's marital status in NWRUA did influence their participation in leadership spaces. This is because the p-value 0.000 is less than alpha 0.05. This means that married women in Kenya had higher chances of engaging in WRUA discussions as compared as compared to those who are single or divorced. These findings are consistent with those of Omweri (2018) who established that at community and structural levels, married women had higher chances of engaging in community water management than those who were not.

Table 11: Chi-Square Tests showing the relationship between marital status and inclusion in WRUA discussions

	Value		df		Asymptotic significance (2-sided)	
	TMWUA	NWRUA	TMWUA	NWRUA	TMWUA	NWRUA
Pearson chi-square	.902	24.949[a]	3	3	.825	.000
Likelihood ratio	1.167	10.535	3	3	.761	.015
Linear-by-linear Association	.006	4.482	1	1	.937	.034
N of valid cases	247	142				

4.4.1.5 Employment status of respondents

Majority of the female respondents from both WRUAs indicated that they were self-employed as displayed in Figure 10. The rate of self-employment in TMWUA was 75.12% while that of NWRUA was 84.09%. The women were small scale farmers who relied on the water resources to produce their food which explains their strong interest and commitment to WRUA activities. These results echo those of Musyima (2014) who established that WRUA members were interested in water management issues as it is a key factor for their productive activities.

For both WRUAs there was significant unemployment rates with TMWUA at 19.14% and NWRUA 13.63%. This is mainly because of household chores, inadequate employment opportunities and harsh business environments which influence the employment levels. Findings reflect those by Tull (2019) who ascertains that women's domestic and reproductive roles decrease their chances of employment. Only a small percentage of respondents were in formal employment (employed). In TMWUA, 5.74% were in formal employment whereas in NWRUA it was at 2.27%. The low employment rates in both countries is because of the unfavourable labour market conditions. Those in employment were able to afford a decent lifestyle and afford basic commodities to sustain their life.

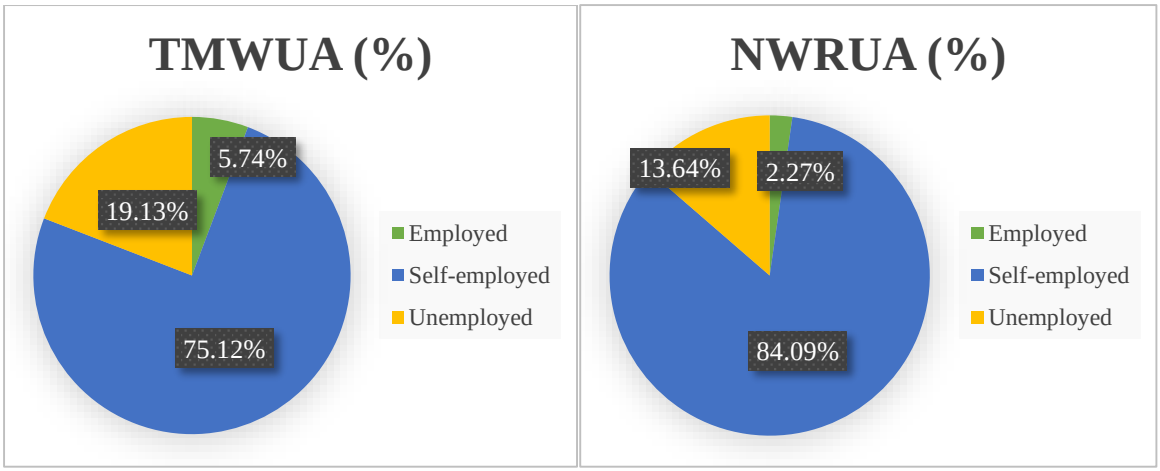

Figure 10: Employment status of respondents

4.4.1.6 Education level of respondents

In this study, the level of education was an important element that influenced women in leadership and decision-making processes. In associations, most of the women indicated that they had completed their education up to primary level as shown Figure 11. This was represented by 67% from TMWUA and 62.9% from NWRUA. Those who had completed their secondary education in NWRUA were higher at 31.1% while in TMWUA it was at 17.7%. The differences are mainly because of the commitment the GoK has made in the investment of girl child education. This is also reflected in the tertiary level where Kenya is at 3% and Rwanda 1.4% indicating that the female respondents had advanced knowledge and skills. These findings reflect those of Sankale (2014) and Beatrice and Muchimuti (2022) who found out that the promotion girl child education, free primary education, reduced academic subsidies and increased bursaries and scholarships have increased enrolment rates of the girl child in Kenya. It was interesting to note that 19% of the women from TMWUA did not have any formal education while in NWRUA it was at 3%. Their lack of education influenced how they understand and apply water governance. This statement is supported by Yerian *et al*. (2014) who found out that lack of formal education serves as a barrier in which water governance is applied.

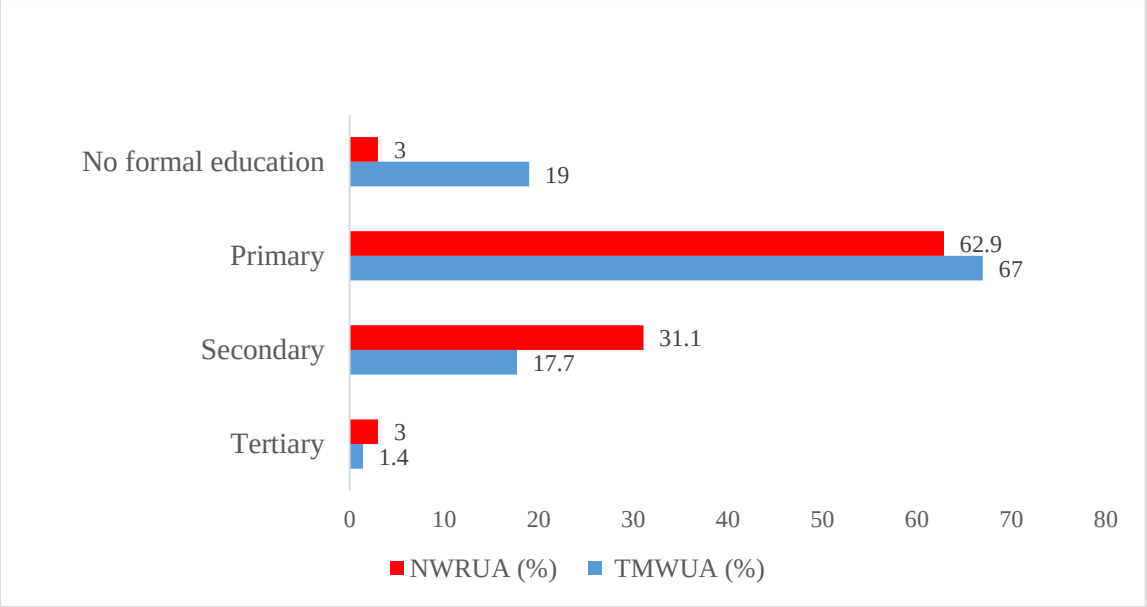

Figure 11: Education level of respondents

4.4.1.7 Relationship between education level and inclusion in decision making

Results from Table 12 show Chi- Square Tests showing relationship between education level and inclusion in decision making in the water associations. For both TMWUA and NWRUA, education did not significantly influence the women's involvement in decision making process. This is because for TMWUA the p-value 0.947 is greater than alpha value 0.05 while for NWRUA p-value 0.690 is greater than 0.05. This implies that women are equally involved in decision making processes despite their education levels. On the contrary, Kamuzora (2014) established that education did influence women's participation in water inclusion in decision making processes.

Table 12: Chi- Square Tests showing relationship between literacy levels and inclusion in decision making

	Value		df		Asymptotic Significance (2-sided)	
	TMWUA	NWRUA	TMWUA	NWRUA	TMWUA	NWRUA
Pearson chi-square	1.681[a]	3.899[a]	6	6	.947	.690
Likelihood ratio	2.355	4.939	6	6	.884	.552
Linear-by-linear association	.002	1.108	1	1	.964	.293
N of valid cases	247	142				

4.4.2 Impacts of socio-cultural factors on women's participation in decision making and conflict resolution processes

4.4.2.1 Socio-cultural impacts on women's participation in decision making and conflict resolution processes in TMWUA

Results in Figure 12 show the impacts of socio-cultural factors on women in decision making in TMWUA. Women from TMWUA (80.7%) affirmed that their views were respected and taken into account. The women said that both men and women had equal opportunities of airing out their views without being discriminated. However, some (5.5%) felt that their views were never appreciated. When asked whether firm and aggressive women faced any judgment, 39.9% of the women in TMWUA strongly disagreed with the statement saying that the women did not face any form of discrimination from the community. The use of customary and informal systems to resolve disputes has proven to be effective methods of strengthening women's participation in conflict resolution processes in TMWUA. Traditional systems such as *Umuganda* in Rwanda had been very influential in solving water conflicts with 68.1% strongly agreeing to this. These results concur with those of Ajayi and Buhari (2014) who establish that these traditional systems focus on restoring harmony. According to Thuranira (2021) traditional justice systems for dispute resolution include the *Njuri ncheke, Jadong'we* in Kenya and *Gacece Courts* in Rwanda.

In TMWUA, the women strongly disagreed (55.5%) that culture hindered their participation. However, some women strongly agreed (26.9%) that there were cultural beliefs that hindered them. A study by Kadaga (2013) shows that women's participation is hindered

by cultural and traditional beliefs. When asked the men respected the women in leadership, 55.9% of the women in TMWUA acknowledged that men indeed respected women in office while 26.4% of the women strongly disagreed with this statement. These results reflect the observations made by Mandara *et al.* (2017) who found out that the creation and existence of women's formal decision-making processes is impeded by existing androcentric structures.

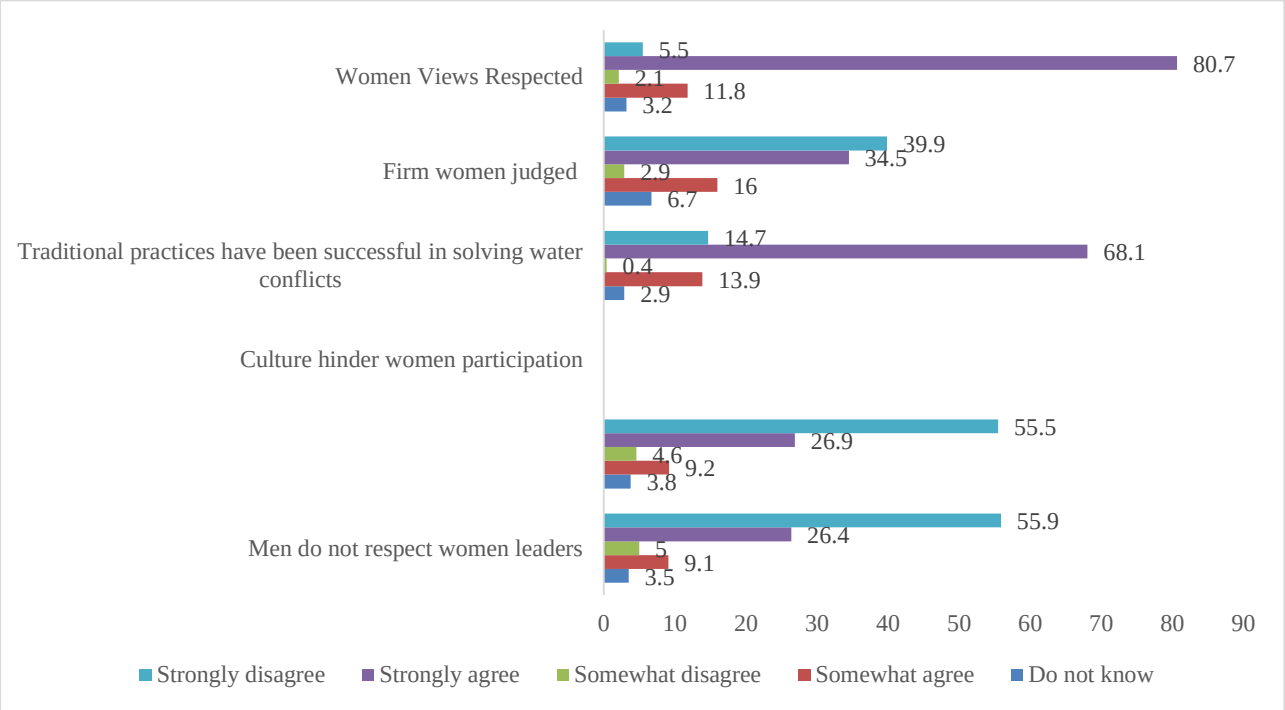

Figure 12: Impacts of socio-cultural factors on women's participation in decision making and conflict resolution processes in TMWUA

4.4.2.2 Socio-cultural impacts on women's participation in decision making and conflict resolution processes in NWRUA

Results from Figure 13 show the influence of socio-cultural factors on women's participation in decision making in NWRUA. In NWRUA, the women acknowledged that their views were respected and appreciated during community water meetings representing this at 77.9%. In NWRUA however some women strongly disagreed (3.6%) with this indicating that most of their decisions were not take into consideration and that men always made the final decisions. This finding reflects that of Nkumbuku (2013) who opines that deeply engrained ideologies support male in decision making duties. Women in NWRUA (42.9%) strongly agreed that bold and firm faced harsh criticism during community water discussions. This is mainly because of societal expectations of women to be quiet and laid back. The result reflects observations made by Makomelo (2022) who revealed that regardless of a female's

intelligence, resourcefulness, creativity or even vocalization, the male counterpart is still considered superior to the female child.

This study also sought to determine whether traditional systems influenced women participation in making decision on water resources use and resolving related conflicts. In NWRUA, 24.3% strongly agreed that the use of traditional systems such as through the *Jadong'we* water conflicts had successfully been solved. *Jadong'we* is a traditional decision-making body of the Luo Tribe. Community based dispute resolution structures help to minimize the water conflict risks. Similar studies by Akiwumi (2018) show that women in Sierra Leone have been given authority to oversee village-based water projects through female governance structures known as *Sande*. Muigua (2014) observed that among the Kenyan people, elderly women act as third parties in conflict resolution processes.

Some women strongly disagreed (35.7%) that culture hindered their active participation while some of them strongly agreed (17.1%) existing cultural barriers influenced their engagements in decision making and conflict resolution processes. One frustrated respondent who felt that culture had an impact commented,

'As a widow I am forced by Jadong'we to marry my brother-in-law even though I do not want to. This is unfair' (Respondent 2, NWRUA, 2024).

This implies that at family level the rights and freedoms of women are curtailed as their rights are subjugated to the decisions of men. Study findings are in line with those of Owiyo (2022) who established that the practice of wife inheritance affects the psychological wellbeing of the widows and leads to their marginalization as their economic, political and social rights are disregarded.

Another respondent said, *'As young woman, I cannot vie for leadership or get any leadership as I am unmarried. I am viewed as incomplete and weak' (Respondent 3, NWRUA, 2024).*

This means that that societal expectations regarding marriage still hold. Participation of women is influenced by cultural perceptions of inferiority, weaknesses and inabilities. Similar sentiments are shared by Nyamweya *et al.* (2018) who argues that negative perceptions that have been ingrained by traditional practices prevent women from actively participating in public spaces. The women also strongly disagreed (36.4%) that men disregard women leaders while 24.3% of the women strongly agreed that men did not respect women in leadership.

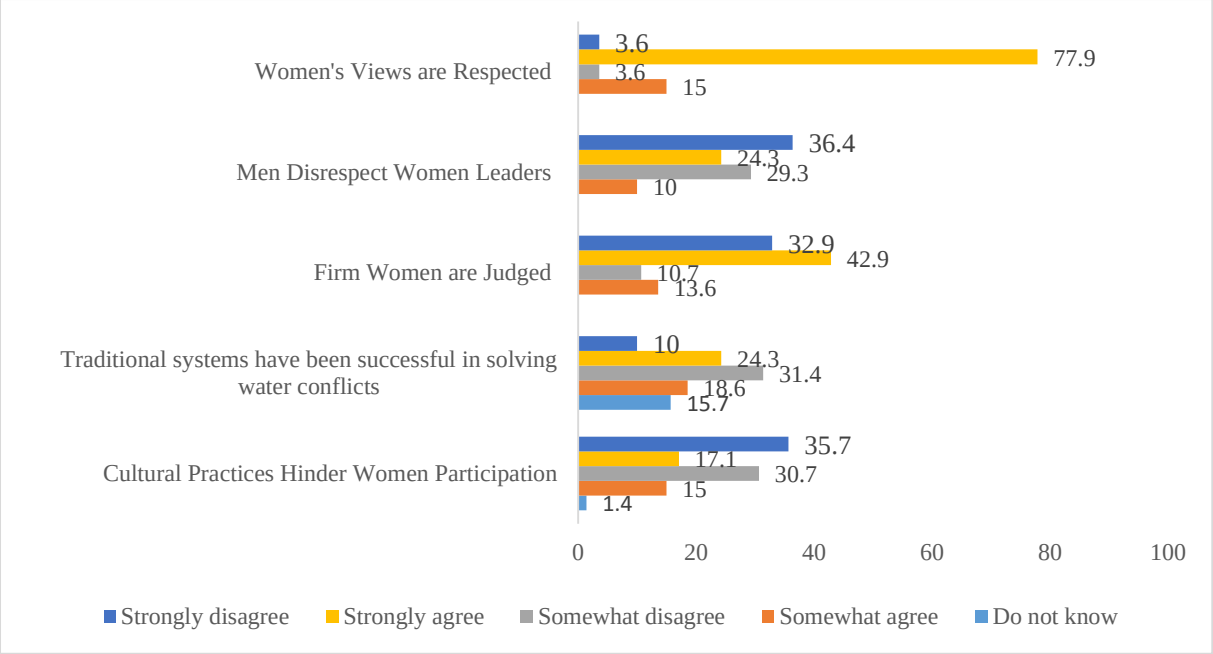

Figure 13: Impacts of socio-cultural factors on women's participation in decision making and conflict resolution processes in NWRUA

4.4.2.2 Multinomial regression results of women inclusion in conflict resolution success.

The results in Table 13 indicate that women's participation in water conflict resolution is generally seen as successful, with most respondents reporting positive outcomes. However, the multinomial regression analysis shows that socio-cultural factors such as lack of respect for women leaders and negative judgment of assertive women do not significantly predict these perceptions. The model was not statistically significant and the explanatory power was very low, suggesting that these variables account for little of the variation. This implies that while socio-cultural barriers exist, other influences such as institutional support, policies or access to decision-making spaces, are critical in shaping outcomes.

Table 13: Multinomial Regression results of women inclusion in conflict resolution is the dependent variable having three outcomes

Aspect	Findings	Interpretation
Dependent Variable	Women's participation in water conflict resolution (Successful, not successful, don't know)	Majority (89.1%) reported 'successful' →
Model fit (Overall)	$X^2 = 20.671$, df = 16, p = 0.191	Model not statistically significant; predictors do not improve prediction over intercept-only
Pseudo R^2	Cox & Snell = 0.050; Nagelkerke = 0.089; mcfadden = 0.062	Very low explanatory power (5–9% variance explained)
Predictor 1: Men do not respect women in leadership	$X^2 = 7.986$, df = 8, p = 0.435	Not significant; respect for women leaders does not predict perceived success
Predictor 2: Women who are firm/aggressive are judged	$X^2 = 12.833$, df = 8, p = 0.118	Not significant (though closer to significance); community judgment not a strong predictor
Overall interpretation	Socio-cultural factors tested do not significantly explain perceptions of women's participation success	Other factors (institutional, structural, policy-related) may play a larger role

4.4.3 Common water use conflicts in TMWUA and NWRUA

Data from Figure 14 shows the major water use conflicts in TMWUA and NWRUA. The main water use conflict in both WRUAs was unequal water distribution with TMWUA at 52.6% and NWRUA at 34.98%. Climatic variability causes increased water scarcity and vulnerability which in turn leads to increased competition among water users. When it comes to wetlands, the variability in water supply reduces the surface area and the quality of goods

and services provided creating tensions between different users (Okotto-Okotto *et al.,* 2018). In TMWUA, illegal water withdrawals which caused reduced water availability accounted for 17.1% while infrastructure damage which caused disrupted water supply was at 15.8%. Meanwhile in NWRUA, infrastructural damage (20.7%) was higher mainly because there were sabotage, vandalism and theft of water pipes and water tanks. No one wanted to be responsible for the losses associated with the damage and the costs of repairs and replacements. The lack of a sense of ownership and responsibility by community from NWRUA has led to ongoing conflicts. This is contrary to a study by Theobald and El-Sayed (2019) who found out that in Rwanda whenever there is damage of water ways, the community works together with their leaders to restore the damaged infrastructure without for government support. Key informant from NWRUA suggested that there was need for fencing of community water projects and introduce charges for their use as this would protect the water projects while generating revenue.

In TMWUA, cleaning of water irrigation channels is a communal responsibility and some women (10%) felt that there was unequal division of labour when cleaning the water canals. A small proportion indicated that there were some minor conflicts (3.5%) amongst members of TMWUA while some (0.5%) denied the existence of any water use conflicts. On the other hand in NWRUA, conflicts over illegal water withdrawals (14.87%) were mainly during the dry seasons where everyone used water pumps to get water and this led to water resource depletion. Conflicts among members of NWRUA was at 9.91% while significant number of the women (13.7%) said that they had not witnessed any water use conflicts. These findings reflect those by Atieno *et al*. (2016) who revealed that some of the conflicts associated with water use include intra members' conflicts, water diversion, obstructing water sources and misusing water to cause shortages.

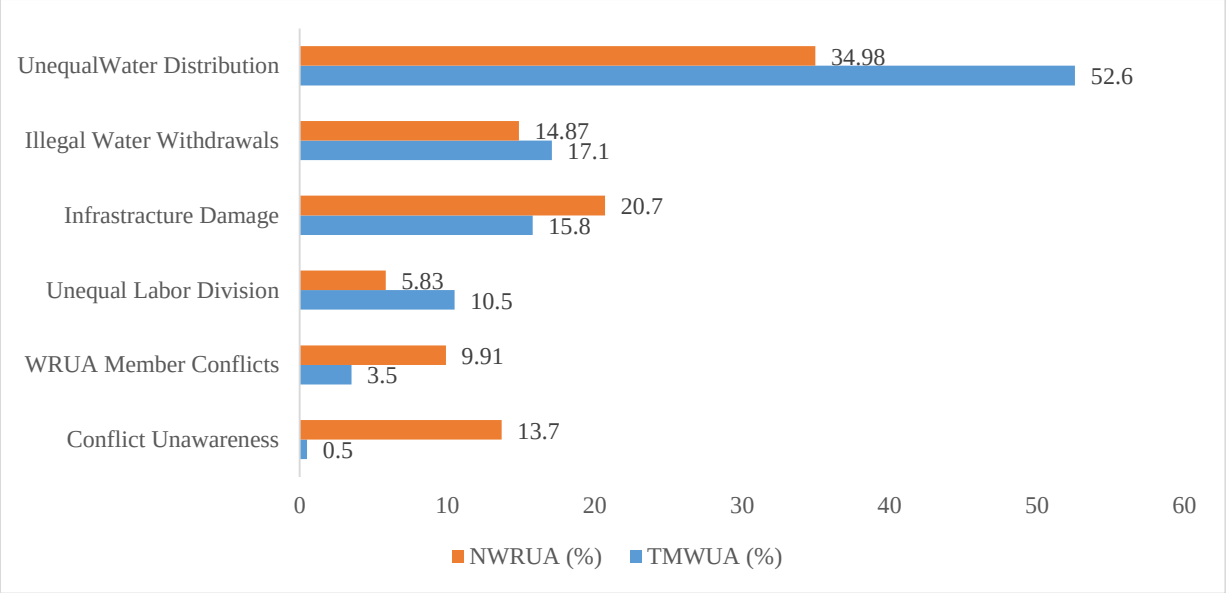

Figure 14: Water use conflicts in TMWUA and NWRUA

4.4.4 Methods of women participation in water conflict resolution

Information in Figure 15 presents the various methods that women participate in water conflict resolution in TMWUA and NWRUA. The main strategy that the women used to solve water use conflicts that they were facing was through *Umuganda* (77.36%) in TMWUA and through *Mijikumi* (64.81%) in NWRUA. This finding echo that of Kioko, (2017) who posits that *Nyumba Kumi* committees solve local level disputes through the application of local norms and values. *Mijikumi* (*Nyumba Kumi*) is a local policing initiative that is made up of ten individuals including the chief that primarily focuses of promoting social cohesion and security within the community (Ndono *et al.*, 2019). Some respondents indicated that they opted to solve the water conflicts through negotiation and mediation with TMWUA at 3.9% and NWRUA 27.78%. This is because negotiation and mediation techniques were fast, effective and helped to minimize violent confrontations. In their study Valipour *et al.* (2020) ascertain that a method of solving water conflicts is through negotiation-based conflict resolution as it helps maintain social harmony. Advocacy involved the women being peace ambassadors and vocal advocates. In TMWUA this was represented by 1.3% while in NWRUA it was at 3.7%. There was establishment of women led initiatives has helped minimize water conflicts. One respondent stated,

'In our group we are 25 women. We established the Ndori Water Project to help address the water conflicts we were experiencing. As peacekeepers this has helped to reduce water related conflicts and foster peace' (Respondent 4, NWRUA, 2024).

These results compare well with those of King (2024) who found that at the grassroots level in Rwanda women used their individual and collective groups to achieve bigger goals. Other methods that the women used when participating in conflict resolution processes included reporting to WRUA officials, creating women water groups and reporting to the police where the water conflicts were more complex. These findings are in line with those of Oduol and Kabira (2018) who argued that women play an important role in water resource conflict resolution by organizing themselves into self-help groups, being custodians of the resource, and providing labour for water management.

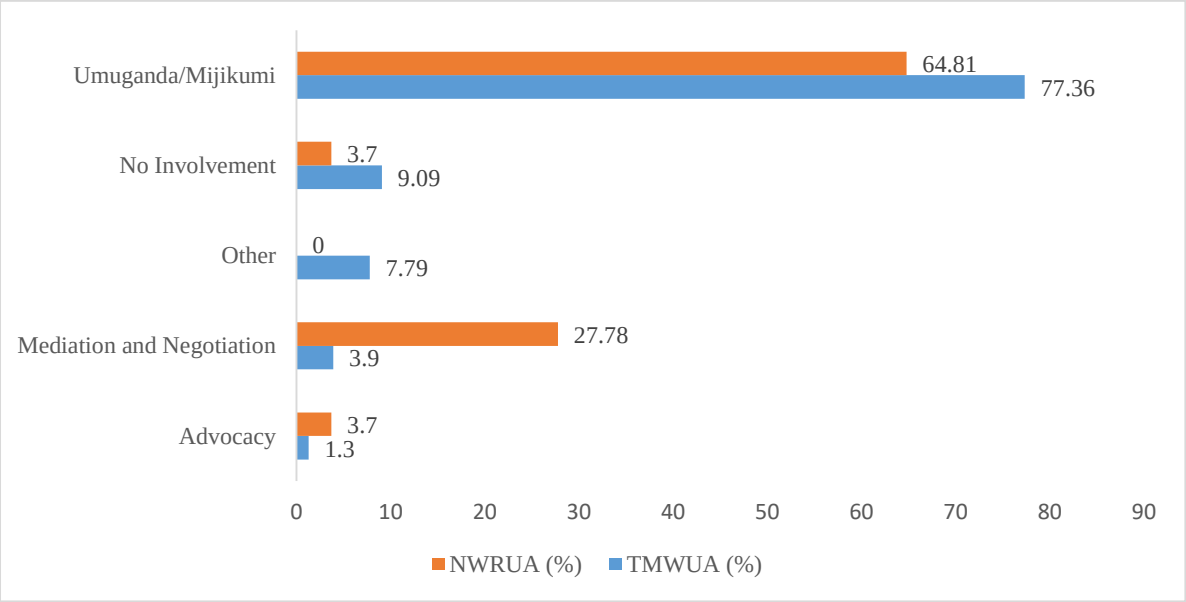

Figure 15: Methods of women participation in water conflict resolution in TMWUA and NWRUA

4.4.5 Comparative analysis of the success of women's participation in conflict resolution

Findings from Figure 16 show that the success of women's participation in the water conflict resolution process in both WRUAs had been very successful. In TMWUA the rate was higher at 94.80% while in NWRUA it was at 78.77%. The high success rates in both countries are because of the various strategies that both associations have developed to help increase women's effective participation such as increasing women posts, having women led initiatives, mobilization and sensitization campaigns and having women negotiators. Mwangi (2015) affirms that there has been an increase of women involved in peace processes. A small percentage (3.6%) in TMWUA said that the participation was not successful while in NWRUA it was at 14.38%. The difference between the two associations is because Rwanda has developed strong mechanisms and frameworks for the protection of women. The enforcement of laws and policies across the levels of governments has created a safe and secure environment

for women to actively engage in water conflict resolution processes. These results correspond with those of King (2024) who found out that Rwanda is considered a model case of women's inclusion as it has established structures for women's involvement and has implemented progressive gender policies. Kenya has also undertaken the same measures for women protection; however, the enforcement of these laws is relatively low or non-existent. The findings corroborate with those of Berry and Kamuru (2021) who ascertain that Kenya has failed to fully implement its gender quota.

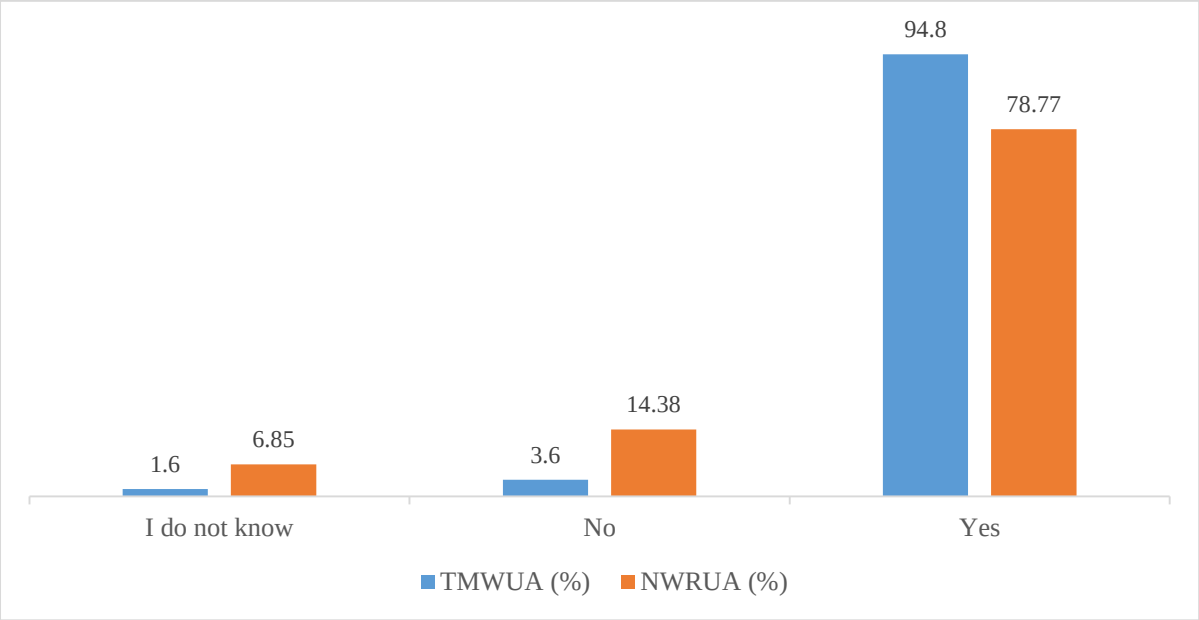

Figure 16: Comparative analysis of the success of women's participation in conflict resolution TMWUA and NWRUA

4.4.6 Factors hindering women in successful water conflict resolution

Results from Figure 17 show the major hindrances that women faced in water conflict resolution processes in both associations. The main hindrance in TMWUA was house chores and domestic duties (44.51%) while in NWRUA it was significantly lower at 24.04%. This suggests that societal expectations regarding women's household duties still hold deep in Rwanda as compared to Kenya. This also limits time the women allocate to participate in water conflict resolution processes. One respondent expressed their frustration,

'I am always busy with chores at the farm and at home. By the time I am done, the meetings are over and I am too tired to attend' (Respondent 3, TMWUA, 2024).

Wambu (2017) ascertains that women frequently encounter significant opportunity costs for participation due to their domestic duties. Similarly, a study conducted by Gasirabo

et al. (2019) established that while men were out of their households in the morning in search of work, women were left behind to carry out household duties including searching for water.

On the other hand, the main barrier the women to participate in water conflict resolution processes in NWRUA was lack of funds (48.08%) while in TMWUA it was at 11.11%. The women said that there were limited funding opportunities and income generating activities that they could exploit in order to engage effectively in water activities. Financial constraints limit women's participation and hinder women's participation in communal initiatives due to family financial responsibilities. One respondent quoted,

'I get very little money from my business which I use for household expenses. I have none to spare. I would rather use the money for home purposes than participate in other activities' (Respondent 4, NWRUA, 2024).

The results are in line with the findings of Loise (2016) who found that that lack of financial resources impedes women's active participation in conflict resolution processes. Moderate proportions (25.6% in TMWUA and 20.19% in NWRUA) of the respondents said they lacked support from their husbands. This indicates that is a common barrier in both countries primarily as husbands are final decision makers within the households. The husbands considered the participation of their wives in community water activities as secondary or of no importance. The husbands prevented their wives from participating in communal water activities. This study is supported by the study of Musa (2020) who observed that women face resistance from their husbands. Further, Wambu (2017) ascertain that very few women participate in skills training because of social resistance from men.

The influence of traditional practices as a barrier was significantly low with TMWUA at 13.02% and NWRUA at 14.42%. Some women said that they were not allowed to speak before groups of men, they were judged when they aired their views and that most of the times men were the final decision makers in conflict resolution processes. Men continue to dominate in the economic, political and social structures of power. The results concur with Eaton *et al*. (2021) who established that when it comes village-level meetings, the opinions of men especially elderly men, are deemed more valuable. When it came to government support, respondents from both countries indicated that they did not receive capacity development in terms of training to solve water conflicts and funding to support women groups. This was represented by 9.62% in TMWUA and 11.45% in NWRUA.

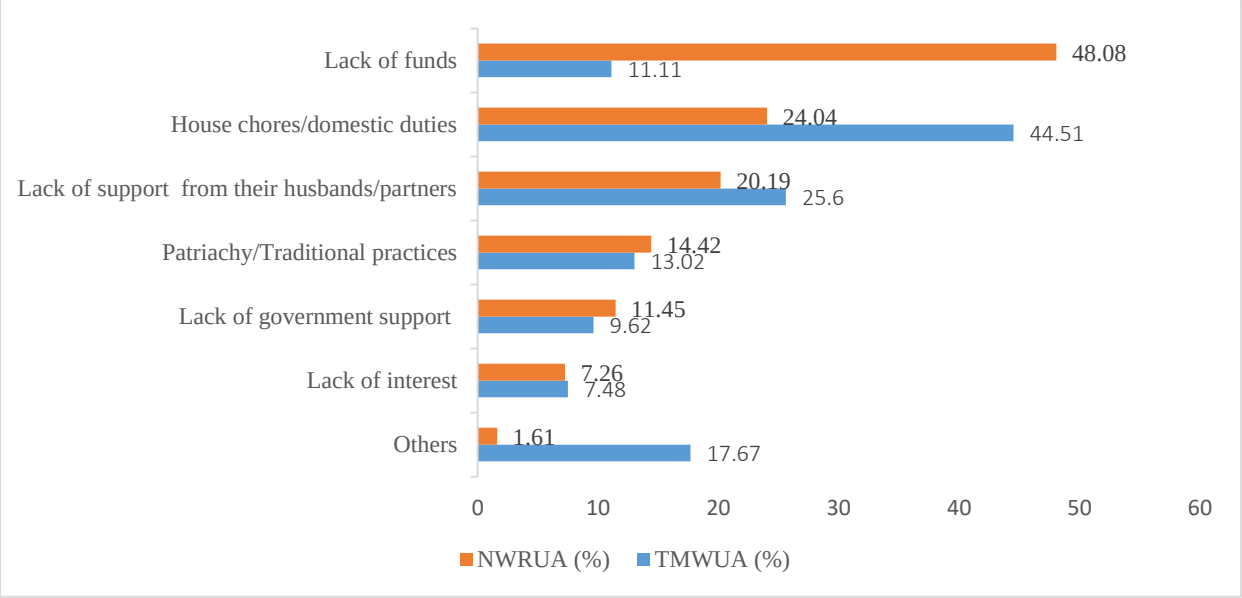

Figure 17: Factors hindering women in successful water conflict resolution in TMWUA and NWRUA

4.5 Effectiveness of water regulations in promoting women's access to water and its use

In this subsection the focus was on whether existing frameworks were implemented in ways that promote women's access to and use of water resources. The level of effectiveness was measured against compliance with WRUA laws, enforcement of penalties for lawbreakers, the extent of women's involvement in wetland management, the clarity of rules governing water use and the regularity of WRUA meetings. These indicators were guided by the OECD Water Governance Indicator Framework 2015. These categories provide insight into how well regulatory mechanisms function in practice and the degree to which they create an enabling environment for women's participation in water governance. As shown in Table 14 while both countries have established mechanisms through WRUAs, TMWUA generally demonstrates stronger compliance, enforcement, and women's involvement than NWRUA. This highlights the differences in the effectiveness of regulatory implementation between the two countries.

Table 14: Summary of the effectiveness of water regulations in promoting women's access to water and its use

Category	Response	NWRUA count	NWRUA %	TMWUA count	TMWUA %
All follow WRUA laws	Always	70	46.98%	192	74.71%
	Never	5	3.36%	2	0.78%
	Sometimes	74	49.66%	63	24.51%
	Total	149	100.00%	257	100.00%
Law breakers punished	Always	51	34.23%	185	71.98%
	Never	16	10.74%	2	0.78%
	Sometimes	82	55.03%	70	27.24%
	Total	149	100.00%	257	100.00%
Women are involved in wetland management	Always	54	36.24%	171	66.54%
	Never	16	10.74%	3	1.17%
	Sometimes	79	53.02%	83	32.30%
	Total	149	100.00%	257	100.00%
Rules are clear	Always	76	51.01%	201	78.21%
	Never	5	3.36%	4	1.56%
	Sometimes	68	45.64%	52	20.23%
	Total	149	100.00%	257	100.00%
WRUA organizes meetings	Always	106	74.65%	198	77.65%
	Never	6	4.23%	6	2.35%
	Sometimes	30	21.13%	51	20.00%
	Total	142	100.00%	255	100.00%

4.5.1 Challenges facing TMWUA and NWRUA

Analysing the challenges facing the WRUAs helps to identify gaps and weakness and areas where water governance can be improved. Based on the findings presented in Figure 18, the main challenge facing both WRUAs is lack of funding with TMWUA at 47.9% and NWRUA 44.8%. Both TMWUA and NWRUA reported that they receive little or no direct financial support and had to look for funding mechanisms or through donors. Stoa (2014) observed that Rwanda has inadequate financial capacity to support the development of its water sector and heavily relies on donor funding. Key informants interviewed stated that TMWUA

had received financial support from The Rural Sector Support Project (RSSP) between 2012 and 2018. However, TMWUA has not received any additional support since then.

In Kenya, insufficient financial resources have affected the management of water resources. It is hard to conduct thorough water resources planning and operations because river gauging stations are inoperable. One key informant commented,

'NWRUA has only received government support on two separate occasions; first, was in 2007, when the Water Sector Trust Fund (WSTF) provided funding for community sensitization and mobilization, and second during 2009-2010 through Lake Victoria Environmental Management Project (LVEMP II) for tree planting along River. Nyando. Since then, we have not received any financial aid from the government' (Chairman, NWRUA, 2024).

This finding is in line with that of Chepyegon and Kamiya (2018) who found out that in Kenya the assessment of water resources has deteriorated over time because of limited budgetary allocations and safeguarding of water catchments has been affected.

In NWRUA, conflicting interests among members was high at 33.7% as compared to TMWUA at 14.7%. Members felt that there was unfairness and favouritism when water judgment and penalties were being delivered. According to Narayanaan (2014) some WUAs in Eastern Province in Rwanda operate in a bureaucratic manner. There was inadequate and destruction of infrastructure with TMWUA at 13.8% and NWRUA at 24.2%. For NWRUA, the high rate of destruction of water infrastructure was attributed to theft of parts which rendered the infrastructure ineffective. This affected water projects, water supply and water distribution patters. In NWRUA most of the infrastructural projects that had been established by the state failed mainly because of vandalism and high operation maintenance costs. These findings are congruent with those of Van Koppen (2017) who established that when WRUAs are handed over infrastructural projects by the government they are unable to meet the operational and maintenance costs of the water projects. This affects the overall functioning and performance of the WRUAs. In contrast however, Theobald and El-Sayed (2019) observe that people in Rwanda work together through *Umuganda* to repair damaged infrastructure without waiting for the government intervention.

The other challenge was poor committee leadership with TMWUA at 18.84% and NWRUA at 12.8%. Respondents from both countries attributed this to inability of the WRUA committees to solve existing water issues, political interference and intra-conflicts. Other (17%) challenges that were facing TMWUA were lack of social trust, lack of transparency and accountability and distrust in the committee leadership. These finding are in line with Khandker *et al.* (2020) who reveals that the main issues affecting WUAs were development issues,

infrastructural challenges and misuse of resources by authorities. Legal issues (5%) that affected NWRUA were mainly its weak enforcement ability.

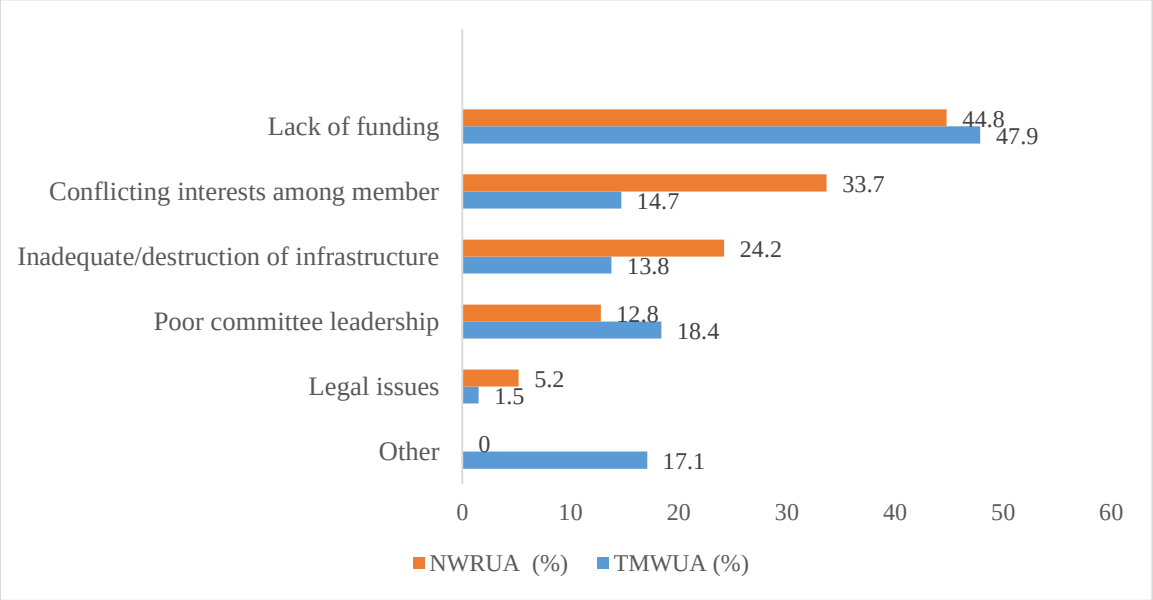

Figure 18: Challenges facing TMWUA and NWRUA

4.5.2 Reasons for joining the water associations

Majority of the respondents joined the WRUAs mainly to improve water management. This was represented by 50.81% from TMWUA and 68.92% from NWRUA. This means that the women are cognizant of the role of WRUA in water management and grassroots water governance. The need to secure water access rights inspired 23.39% of the women from TMWUA and 13.51% of the women from NWRUA to join the WRUAs. The women acknowledged the significance WRUA played in ensuring that registered members had access to equitable water distribution. Others indicated that their motivation for joining was to solve water conflicts that they were facing with TMWUA at 9.27% and NWRUA at 4.05%. This implies that the women believed in the capacity of their WRUAs to solve conflicts. The study findings reflect those of Wangombe (2013) who affirms that water associations' management have been able to solve conflicts through their influence in the community. Other reasons for joining was through invitation, peer pressure and desire to participate in decision making with TMWUA at 12.90%.

4.5.3 Perceptions on the overall functioning of TMWUA and NWRUA

The overall performance and functionality of institutions can be used to indicate their effectiveness. In TMWUA, majority of the respondents (75.4%) indicated that all members of TMWUA followed the rules that had been put into place while in NWRUA 46.8% of members indicated the same. This implies that the level of compliance to the rules and adherence to

existing laws set by TMWUA is higher compared to that of NWRUA. Lesrima (2019) argues that adherence to set water laws and policies reduces water conflicts. This is also reflected in the way both the WRUAs punish their members. In TMWUA, 73.0% of the respondents said that law breakers were always punished while in NWRUA it was only at 34.0%. The huge disparity between the two associations is that the level of policy enforcement within TWM is higher compared to NWRUA. One respondent from TMWUA commented,

'When one breaks the laws, they are punished immediately and heavily' (Respondent 4, TMWUA, 2024).

In NWRUA, enforcement was low and there was laxity when it came to apprehending law breakers. One respondent said,

'Here nobody seems to follow the rules. People ignore the rules as nothing happens to the law breakers' (Respondent 5, NWRUA, 2024).

The results are in line with studies by Owuor *et al.* (2012) who found out that weak enforcement of wetland policies has impacted the ecological integrity of Nyando Wetland. Enforcement mechanisms to hold people accountable influences the willingness of women to participate in WRUA activities.

When asked if the government is involved in management, 68.5% of the respondents in TMWUA indicated that they have seen their government involved in wetland management while in NWRUA it was as 36.2%. This shows that the level of government involvement in wetland management in TMWUA was higher as compared to that of NWRUA government. In TMWUA, the rules set are clear and effective at 77.4% while in NWRUA it was at 51.1%. The notable difference is attributed to the fact that members of TMWUA had clear understanding of the rules and regulations that were in place. In NWRUA, the women reported that the rules and ambiguous and could not be easily comprehended. The clarity of water rules influences women's level of engagement and their ability to influence water decisions of water. According to Ngirazie *et al.* (2015) the success of water associations at global scales in attributed to effective monitoring of both the water resource and its users, penalties for noncompliance, availability of low-cost local dispute mechanisms, rules governing water use that are adapted to local conditions, member participation in development of rules within the associations and a culture of transparency and accountability.

Respondents from both countries indicated that their associations had been organizing regular meetings with TMWUA at 77.0% and NWRUA at 74.5%. It is during such meetings that members of TMWUA and NWRUA were able to discuss arising issues its members. The frequency of the meetings was dependent on the needs of the members and the association's

Constitution. According to Munyua and Mbugua (2019) the number of meetings organized by WRUA vary but at least the meetings are done once per year where they discuss any matters arising. In both associations however, the women expressed their dissatisfaction with the financial mechanisms form their governments. For TMWUA, only 19.8% of the women had seen TMWUA receive financial support from their government while for NWRUA it was 14.2%. This shows that the funding mechanisms that both governments had put into place to support community-based water organizations were very low. The availability of financial resources and funding opportunities directly affect women who mainly rely on community water projects. Wafula (2015) recommends that allocating budgetary resources promotes women's equality and empowers them to participate in decision making at all levels.

One the major responsibilities of water associations in both countries as local level institutions is to promote environmental conservation through trainings. Respondents from both WRUAs acknowledged that the trainings that they had received on wetland conservation was important with TMWUA supporting this at 63.7% and NWRUA at 63.1%. A study by Wangombe (2013) established that trainings on water conservation, modern irrigation techniques and water management are important. Findings show that the rate of women involvement in law making processes was high with TMWUA at 77.8% and NWRUA 66%. This is because in both countries there exists a representation mechanism that allows for women to be involved in decision making process. The GoR has established the quota system for women to be allocated leadership positions while GoK has the two thirds gender rule. Rwanda has the Environmental and Climate Change Policy (2019) which incorporates gender in its values in order to increase inclusivity. In Kenya, the Water Act (2016) and Water Sector Strategic Plan provide for the inclusion of at least 30% of female leadership in water committees. The quotas system transcends down to community water governance and to some extent corresponds to legitimate decision-making power. The necessity of women participating in water law-making processes ensures gender sensitive outcomes and promotes water governance equality at local scales. The results concur with Yerian *et al*. (2014) who affirms that increased involvement of women in water governance enhances environmental sustainability and reduces conflicts through improved resource stewardship.

4.5.4 Role of TMWUA and NWRUA in conflict resolution

Both WRUAs provided platforms for conflict resolution mainly through dialogue facilitation. Warring and disagreeing parties were brought together mainly through *Umuganda* and *Mijikumi*. This was represented by 90.7% in TMWUA and 87.2% in NWRUA. For complex cases, legal intervention was undertaken with violators facing the judicial system with

TMWUA at 6.9% and NWRUA at 7.8%. Other ways in which WRUA was involved was through conflict prevention and promoting collaboration amongst members. These findings reflect those of Obando *et al.* (2018) who established that Bwathonaro WRUA in Kenya has been able to solve conflicts arising from water stress, illegal water abstractions and over-abstractions through negotiations and mediations.

4.5.5 Benefits since joining TMWUA and NWRUA

In Figure 19, the benefits of joining WRUAs are displayed. Highlighting the benefits of joining the WRUAs shows the abilities and the capacities of WRUAs to execute their responsibilities as mandated by national and local water management policies. In TMWUA, the most perceived benefit of joining the WUA was the need for improved water access (17.9%). Members benefited through increased water distribution of water into their farms. Through increased water access, members were able to increase their in-farm productivity which translated to increased income (16.4%). Members also benefited through enhanced water management (16.4%), water conflict resolution (11.8%) and better water infrastructure (11.3%). These findings reflect with the results of Theobald and El-Sayed (2019) who outlines the main function of WUAs in Eastern Rwanda were conflict resolution, infrastructural maintenance, collection of water fees and water allocation among water users. King (2024) ascertains that the establishment of water infrastructure in Rwanda had saved women's time and impacted them positively. Other benefits (12.3%) included access to market facilities and free fruit and tree seedlings.

For NWRUA, the greatest benefit that members acquired by joining the WRUA was enhanced water management practices (19.3%) and this involved free trainings on sustainable water use and soil conservation techniques. There was improved water access at 16.8% which involved trainings on pollution management so that local water channels remained clean and safe for use. Nyando WRUA provided a platform for members solve conflicts arising from water use (12.2%) and increase their income (16.5%). Other reasons (3.6%) were mainly to get free bamboo seedlings which the members used to plant for resale. These findings reflect those of Khandker *et al.,* (2020) who established that women from Eastern India reported that their participation in WUA had benefited them through increase in knowledge of water management, increased participation and improved water management.

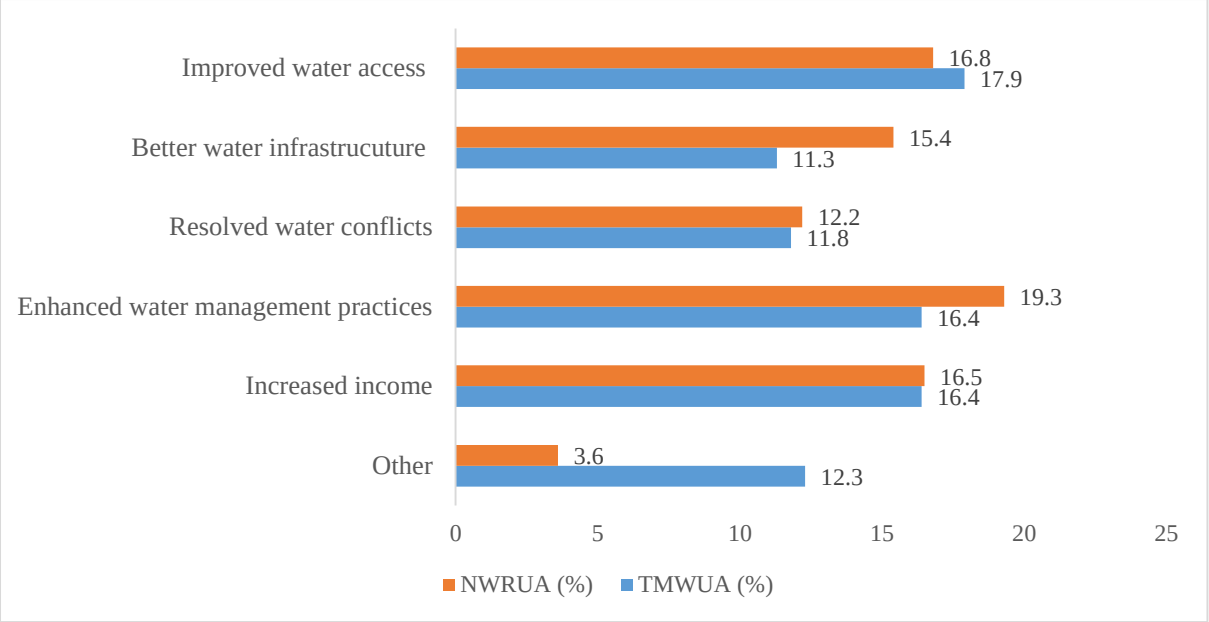

Figure 19: Benefits since joining TMWUA and NWRUA

4.5.6 Enforcement mechanisms for law breakers

Findings from Table 15 shows the different enforcement mechanisms that have been established by the WRUAs. Enforcement mechanisms that have been put in place by WRUA ensure that there is compliance amongst the members and those who fail to adhere to the policies face consequences. Fines were a common measure taken by both WRUAs. The fines involved paying monetary penalties. This was indicated by 52.8% in TMWUA and 24.8% in NWRUA. One respondent from TMWUA commented,

'When someone fails to clean their portion of the canal or diverts water in the canals, they are fined' (Respondent 5, TMWUA, 2024).

Another from NWRUA said, *'We are fined when we fail delay to pay to pay our monthly contributions to our WRUA' (Respondent 6, NWRUA, 2024).*

In NWRUA, taking legal action against offenders was higher at 43.3% as compared to TMWUA 1.6%. For example, in NWRUA those who failed to get water permits from Nyando WRUA for drilling boreholes were apprehended by WRA. According to Narayanaan (2014), the use water permits helps to prevent pollution, water logging formation and over exploitation of water resources. On rare occasions did both associations revoked membership of those who failed the laws. This was indicated by 1.2% in TMWUA and 4.3% in NWRUA. Another enforcement measure involved suspension of water rights, either permanently or temporarily with TMWUA 8.9% and NWRUA 3.5%. Warnings were another form of disciplinary action taken against non-compliance. It was done through word of mouth or formal writing and was represented by 35.5% in TMWUA and 24.1% in NWRUA. Findings from this study echoes

those of Musyima (2014) who established that strict enforcement of rules by WRUAs is considered a measure of its performance.

Table 15: Enforcement mechanisms for law breakers

		Frequencies (%)	
		TMWUA	NWRUA
Action against law breakers	Fines	52.8	24.8
	Legal Action	1.6	43.3
	Suspension from WRUA	1.2	4.3
	Suspension of water rights	8.9	3.5
	Warnings	35.5	24.1

4.5.7 Challenges facing wetlands before establishment of the water associations

Assessing the pre-existing challenges that both wetlands faced before the establishment of water associations serves as a basis for understanding the past needs, trends and historical context of the wetland ecosystems. This helps in predicting the future demands that will arise from wetland use. It also serves as a basis for understanding the performance of the WRUAs. Figure 18 shows the common challenges that faced the wetlands before the establishment of the WRUA in Mukunguli and Nyando. From the Figure 20, the main preceding challenges in both TMWUA (13.36%) and NWRUA (26.09%) was water scarcity especially during the long dry seasons. The limited availability and supply of water led to unequal distribution of water resources with TMWUA being affected at 12.82% and NWRUA at 21.24%. According to a study by Kerubo *et al.* (2023) in some East African countries, decisions regarding scheduling of water on irrigated farms are made without prioritizing the needs of women.

Pollution in Mukunguli Wetland was at 11.87% while in Nyando Wetland it was 21.68%. The pollution rate in Kenya was higher because of industrial pollution along R. Nyando. Floods were also a challenge facing both wetlands with Mukunguli Wetland at 10.36% and Nyando Wetland at 18.01%. Nyando Wetland in Kenya falls within the Nyando Floodplain and is prone to enormous flooding every year. Before establishment of the WRUA there were no water infrastructural projects to minimize the impacts of floods. This was represented by 8.85% in Mukunguli and 12.93% in Nyando. Respondents from Mukunguli reported that there were many intra-farmers conflicts (8.85%) and encroachment into the wetlands (6.14%).

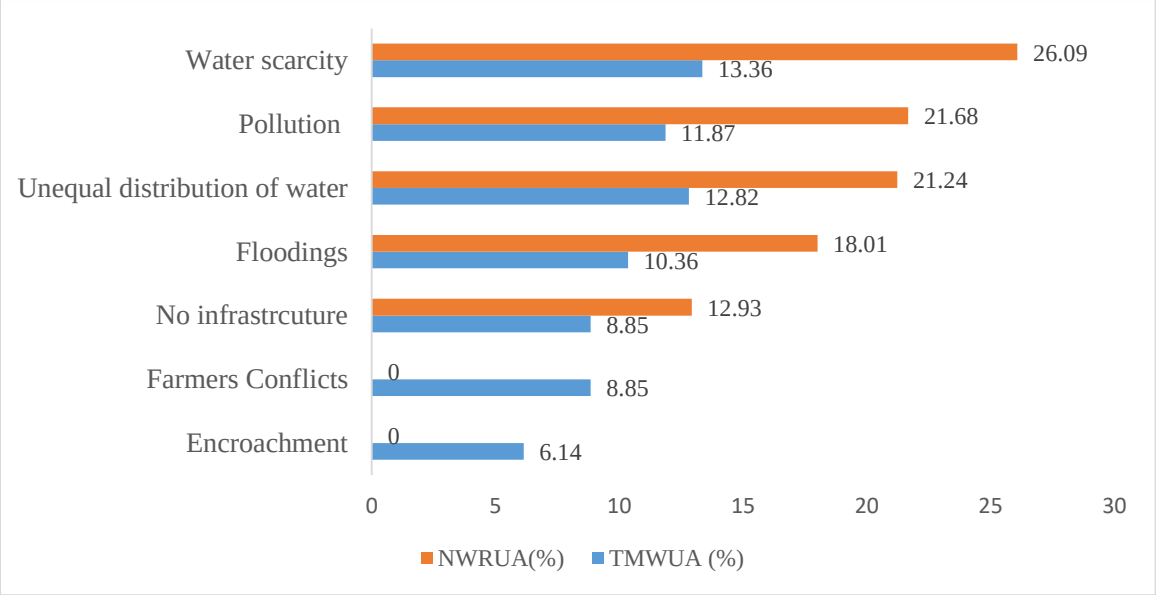

Figure 20: Challenges facing wetlands before establishment of WRUA

4.5.8 Suggested solutions to address challenges facing TMWUA and NWRUA

Study outcomes presented in Figure 21 show the main strategies to curb challenges that WRUAs face. For both TMWUA (22.3%) and NWRUA (28.1%) one of the major ways to solve the challenges that the WRUAs were facing was through enhanced infrastructural development. In their study Mbyukansenga (2022) states that continuous maintenance of infrastructure ensures that there is equal water distribution thus minimizing the likelihood of conflicts. There is need for increased and sustained funding streams from TMWUA (19.3%) and NWRUA (27.7%) to ensure that the WRUAs supports their daily operations and their projects. According to Ogada *et al.* (2017) when local initiatives are supported, costs are minimized and there is knowledge and information sharing. For TMWUA (11.5%) and NWRUA (23%) improved communication amongst members would reduce the incidences of intra-conflicts. Training for committee members in TMWUA (28.8%) and NWRUA (14.2%) would help enhance transparency and accountability. Key informants from TMWUA acknowledged that board members had received training and mentoring from RSSP but they still needed more capacity building. To help solve complex and entrenched conflicts both TMWUA (10%) and NWRUA (7%) would benefit by seeking legal support. These findings reflect those of Liambila (2017) who recommends that for local water associations to grow in their governance capacity there needs to be financial transparency, information management, member financial contribution, mobilization and diversification of funds, consistent communication of output and outcomes, proper organizational skills and establishing of inter-linkages with government and other stakeholders.

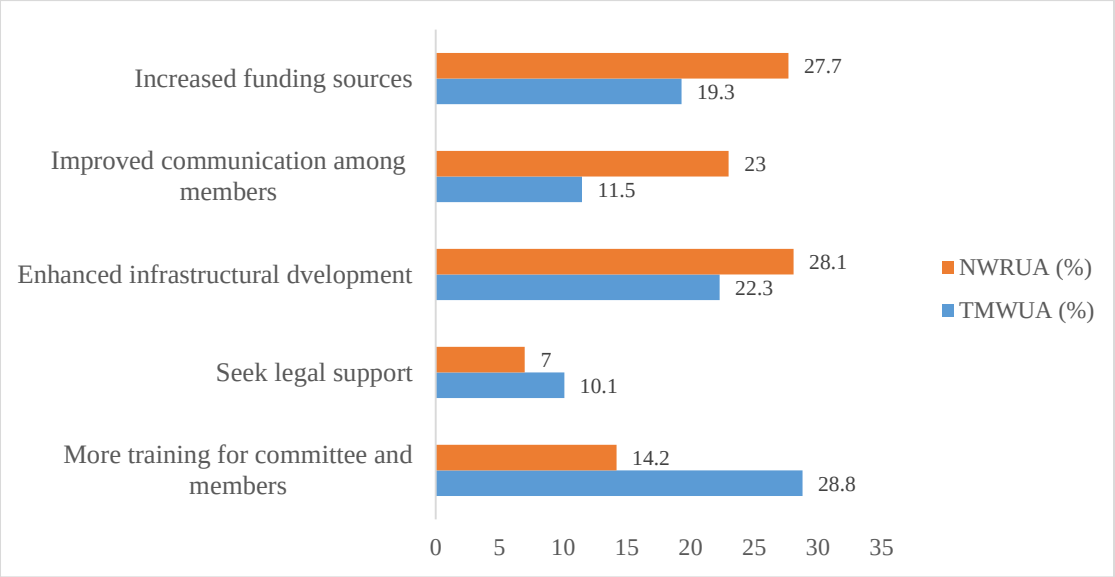

Figure 21: Approaches to challenges facing TMWUA and NWRUA

4.5.9 Chi-Square tests showing the existing relationship between rule clarity and the effectiveness of the enforcement efforts

Results from Table 16 show Chi-Square Tests showing the existing relationship between rule clarity and the effectiveness of the enforcement efforts. For TMWUA, there was no significant relationship between rule clarity and reporting of law breakers by members. This is because the p-value 0.690 was greater that alpha value 0.05. This implies that the clarity and effectiveness of the set water laws did not in any way influence the reporting of law breakers in TMWUA. For NWRUA, the p-value 0.083 is greater than alpha value 0.05. This means that in NWRUA there was no statistical significant relationship between the clarity and the effectiveness of water laws and the reporting of law breakers. Kareithi (2016) ascertains that without clarity of legislation, confusions and conflicts arise threatening the participation of water users.

Table 16: Chi-Square Tests showing the relationship between the rule clarity and reporting of law breakers

	Value		Df		Asymptotic (2-sided)	Significance
	TMWUA	NWRUA	TMWUA	NWRUA	TMWUA	NWRUA
Pearson chi-square	.742	4.978	2	2	.690	.083
Likelihood ratio	.967	5.193	2	2	.617	.075
N of valid cases	248	141				

4.5.10 Chi- Square tests showing the existing relationship between wetland trainings and rule clarity

Chi-square tests between the trainings on wetlands importance and the clarity and effectiveness of the rules set by local authorities revealed positive and significant associations in both WRUAs. This is as shown in Table 17. For TMWUA, the p-value 0.000 is less than alpha value 0.05. This means that the trainings organized by TMWUA had an impact by enhancing the perception and understanding of the laws. These findings reflect those of Theobald and El-Sayed (2019) who indicated that farmers in Rwanda received regular trainings from the Rwanda Agricultural Board through the agricultural officers on water use, water efficiency, seed selection and post harvesting technologies which enhanced their knowledge and skills on the management of the wetland. These regular trainings helped to increase their understanding of established laws and policies. For NWRUA, the p-value 0.037 was less than alpha 0.05. This shows that the regular trainings that had been organized by NWRUA had an impact in strengthening the knowledge of water laws. This means that the women were able to gain deeper understanding and insights of the water laws during the trainings thus making the water laws clear and effective and encouraging their participation. Findings reflect those of Wangombe (2013) who established that WRUAs provides trainings to their members on water policy frameworks and good governance with an aim of minimizing conflicts.

Table 17: Chi-Square Tests showing relationship between wetland trainings and rule clarity

	Value		df		Asymptotic significance (2-sided)	
	TMWUA	NWRUA	TMWUA	NWRUA	TMWUA	NWRUA
Pearson chi-square	86.545[a]	10.232	4	4	.000	.037
Likelihood ratio	86.248	8.088	4	4	.000	.088
Linear-by-linear association	79.001	1.976	1	1	.000	.160
N of valid cases	248	141				

CHAPTER FIVE
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

This study sought to evaluate the influence of water governance and socio-cultural factors on women's participation in water management decisions and conflict resolution in Rwanda and in Kenya. The focus was on the roles played by Tuyiteho Mukunguli Water Users Association (TMWUA) in Rwanda and Nyando Water Resource Users Association (NWRUA) in Kenya. Findings show that while there is undeniable progress in the application of IWRM framework as a tool for assessing water governance, there still exists gaps that minimize the efficacy of the framework. TMWUA was in the positive lead in the application of IWRM framework. NWRUA has also undertaken significant strides despite facing structural and institutional challenges. The comparison between the two countries reveal that frameworks on paper are not sufficient unless they practically implemented on the ground and at community level.

This research study examined the impacts of socio-cultural factors on women's participation in decision-making and conflict resolution processes in Rwanda and Kenya. Results show that for both TMWUA and NWRUA, the participation of women in decision making and conflict resolution processes was acknowledged. This study revealed that there were still some deeply ingrained cultural factors that hindered women's effective participation which are created by patriarchal social environment. These include men being final decision makers, women to be quiet and laid back and harsh criticism of outspoken women. These directly affects how women participate in local leadership of water governance. The gender implications of these socio-cultural practices is that there will be marginalization and underrepresentation further exacerbating gender inequalities.

There were still a mixture of challenges and successes that reduced the effectiveness of water regulations in both countries. Reforms such as Rwanda's National Policy for Water Resources Management and Kenya's Water Act 2016 have strong provisions gender inclusion and this has laid an important foundation for inclusive water governance. The study highlighted that the major challenges were insufficient funding, weak institutional capacity, poor committee leadership, intra conflicts and lack of transparency and accountability. These challenges weaken the overall functionality and legitimacy of water associations.

5.2 Recommendations

i. Successful implementation of IWRM framework requires an all-inclusive approach that promotes peaceful water resource conflict resolution. Thus, there is need for training women to be conflict negotiators and mediators within their communities and incentivize their active participation in water activities.

ii. There is need for promoting culturally appropriate ways to involve women in water management, rather than merely increasing the percentage of women on water committees. This includes working closely with traditional governance structures and advocating for women positions in these structures. There is need for investing in women-led water solutions and empowering women economically to benefit from existing water projects rather than them taking up leadership positions. Adaptive governance of complex systems should consider local customs and values to resonate with the people residing in the area. This enables better decision making.

iii. There is need for strengthening the institutional and financial capacity of water associations to implement water laws and address water conflicts. The WRUAs need to be self-reliant and have income generating activities such as tree nurseries, fish farming and poultry in order to sustain their daily operations.

5.3 Suggestions for further research

The following recommended areas of study would help in enriching in understanding the role of women in water resource conflict resolution:

i. A study on the gendered dimensions of water resource management in rural and urban settings.

ii. A research study in on the effectiveness of existing water policies in addressing gender disparities in water governance.

iii. A study on the long-term effects of women's involvement in water governance.

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APPENDICES

Appendix A: Questionnaire

My name is Zipporah Nyokabi Mureithi. I am an MSc student at Egerton University. I am carrying out research on the role of women in water conflict resolution in Rwanda and Kenya. I am kindly requesting that you spare some time to fill out this questionnaire. Information that you will provide will be treated with the utmost confidentiality and will be used for research purposes only. If you have any questions about this study, please feel free to contact the following: **Zipporah Mureithi - 0713320901**

Questionnaire Number	**Date**	**Interviewer Name**

Section A: Efficacy of IWRM Framework

1. Please tick the word that best describes your choice.

	Strongly agree	Somewhat agree	Don't know	Somewhat disagree	Strongly disagree
I know my water rights					
Different NGOs/ groups closely work together to manage water resources					
Women are actively involved in water committees/groups					
Water inspectors come to check					

on water resources					
Mechanisms to solve water-related disputes have been successful					

2. Do you get information on floods and drought? If yes, how do you get this information?
    a) Yes, through media: Phone, Radio, TV, Internet
    b) Yes, through community meetings and announcements
    c) Direct weather observation
    d) No, I do not receive such information
3. What happens to those who pollute the wetland?
    a) They are arrested and fined
    b) Nothing happens to them
    c) I do not know

Section B: Impacts of Socio-Cultural Factors on Women's Participation

4. Please tick the word that best describes your choice.

Age	18 to 30	31 to 40	41 to 50	51 to 60	61 and above
Marital Status	Married			Single	
Employment Status	Employed			Unemployed	
Education Level	Primary 1-4	Secondary		Tertiary	No formal Education

5. Please tick the word that best describes your choice

	Strongly agree	Somewhat agree	Don't know	Somewhat disagree	Strongly disagree
Cultural beliefs practices hinder women's participation in decision making and peace processes					

Traditional practices have been successful in solving water conflicts					
Women who are firm are judged					
Men do not respect women in leadership positions					
Women's views are respected					

6. What type of water use conflicts are in this area?

a) conflicts over unequal water distribution
b) conflicts over illegal water withdrawals
c) conflicts over destruction of water infrastructure/pipes
d) unequal division of labour when cleaning canals
e) conflicts between WRUA members themselves
f) flooding
g) water protests
h) I'm not aware of any conflicts

7. Has the participation of women in water resource conflict resolution been successful?

a) Yes
b) No
c) I do not know

9. What is hindering women to be successful in water conflict resolution?

a) Lack of funds
b) Lack of support from their partners/husbands
c) Patriarchy/ traditional practices
d) Lack of government support
e) House chores/domestic duties
f) Lack of interest
g) Others, please specify

Section C: Effectiveness of Water Regulations

10. To what extent do you agree with the following (tick one)

	Always	Sometimes	Never

Everyone follows WRUA laws in this area			
Those who break water laws are punished			
Government involves women in management of the wetland			
Rules set by local authorities are clear and efficient			
WRUA organizes meetings			
WRUA conducts regular water inspection in the farm			
The government provides WRUA with financial support			
The community is taught/trained on the importance of the wetland			
Women are involved in making of water laws and policies			
Water institutions in this area closely work together			

11. What issues were you facing when using the wetland before the WRUA was established?

a) Water scarcity
b) Unequal distribution of water
c) Pollution
d) Encroachment
e) No infrastructure
f) Farmer's conflicts
g) No infrastructure
h) Flooding

12. Why did you join?

a) To secure water access rights
b) To improve water management
c) To participate in decision making
d) To resolve water conflicts
e) Other (please specify) _____

13. How have you benefited since joining the WRUA?

a) Improved water access
b) Better water infrastructure
c) Enhanced water management practices
d) Resolved conflicts
e) Increased income
f) Other (please specify) _____

16. What happens to those who break the water laws set by the WRUA?

a) Improved water access
b) Better water infrastructure
c) Enhanced water management practices
d) Resolved conflicts
e) Increased income
f) Other (please specify) _____

17. Do you report those who break the water laws?

a) Yes
b) No

19. How does WRUA get involved in solving water conflicts?

a) Legal intervention
b) Dialogue facilitation
c) Other (please specify) _____

20. What are some of the challenges facing the WRUA?
    a) Lack of funding
    b) Conflicting interests among members
    c) Inadequate/destruction of infrastructure
    d) Legal issues
    e) Poor committee leadership
    f) Other (please specify) _____
21. How can these challenges be solved?
    a) Increase funding sources
    b) Improve communication among members
    c) Enhance infrastructure development
    d) Seek legal support
    e) More training for committee and members

Appendix B: Key informants interview schedule

Org:	**Date:**

1. When this WRUA established and what was is the leadership structure?
2. How was the wetland managed before the WRUA was established?
3. What is the role of the WRUA and what projects are currently on going?
4. How are women involved in WRUA activities?
5. What kind of support does WRUA give to its members?
6. What kind of support does this WRUA get from the government and other stakeholders such as NGOs?

7. How does this WRUA enforce its laws and policies?
8. What are some of the challenges facing the WRUA?
9. What can be done to solve these challenges?

Appendix C: Reliability Results

Scale	**Cronbach Alpha**	**Items**
Efficacy of IWRM and TBNRM Frameworks	0.714	6
Socio-Cultural Factors	0.842	6
Effectiveness of Institutional and Legal water policy frameworks	0.849	10
Average (All Scale)	**0.80167**	**22**

As indicated in the table, all the three variables have reliability above the necessary threshold of 0.6.

Appendix D: Egerton University ethical clearance

EGERTON UNIVERSITY
TEL: (051) 2217808
FAX: 051-2217942
P. O. BOX 536
EGERTON

EGERTON UNIVERSITY INSTITUTIONAL SCIENTIFIC AND ETHICS REVIEW COMMITTEE

EU/RE/DIR/009
Approval No. EUISERC/APP/315/2024 ***22nd March 2024***

Zipporah Nyokabi Mureithi,
P.O. Box 536-20115
Egerton,
Njoro
Telephone: +254713320901
E-mail: nyokabimureithi@gmail.com

Dear Zipporah,
RE: ETHICAL APPROVAL: ROLE OF WOMEN IN TRANSBOUNDARY WATER RESOURCE CONFLICT RESOLUTION IN THE NILE BASIN: A COMPARATIVE STUDY BETWEEN RWANDA AND KENYA.

This is to inform you that the ***Egerton University Institutional Scientific and Ethics Review Committee*** has reviewed and approved your above research proposal. Your application approval number is ***EUISERC/APP/315/2024.*** The approval period is ***22nd March 2024 – 23rd March, 2025***

This approval is subject to compliance with the following requirements;

i. Only approved documents including (informed consents, study instruments, MTA) will be used.
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by ***Egerton University Institutional Scientific and Ethics Review Committee***.
iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to ***Egerton University Institutional Scientific and Ethics Review Committee*** within 72 hours of notification
iv. Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to ***Egerton University Institutional Scientific and Ethics Review Committee*** within 72 hours.

v. Clearance for Material Transfer of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to ***Egerton University Institutional Scientific and Ethics Review Committee***.

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://oris.nacosti.go.ke and also obtain other clearances needed.

Yours sincerely.

EGERTON UNIVERSITY RESEARCH ETHICS Date. 22/03/2024

Prof. Raphael M. Ngure
CHAIRMAN, EGERTON UNIVERSITY INSTITUTIONAL SCIENTIFIC AND ETHICS REVIEW CTTEE
RMN/BK/

Appendix E: NACOSTI research license

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **464275**

Date of Issue: **24/January/2024**

RESEARCH LICENSE

This is to Certify that Miss.. Zipporah Nyokabi Mureithi of Egerton University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Kisumu on the topic: Role of Women in Transboundary Water Resource Conflict Resolution in the Nile Basin: A Comparative Study Between Rwanda and Kenya. for the period ending : 24/January/2025.

License No: **NACOSTI/P/24/32572**

464275

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

See overleaf for conditions

Appendix F: Rwanda research approval

REPUBLIC OF RWANDA

NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Kigali, 16th August, 2023
N°: NCST/482/423/2023

Ms. Zipporah Nyokabi MUREITHI
Passport Nº: AK0474767

Dear Ms. Zipporah,

RE: Approval to Conduct Research in Rwanda

I am pleased to inform you that your request to conduct research in Rwanda entitled: **"Role of Women in Transboundary Water Resource Conflict Resolution in the Nile Basin: A Comparative Study Between Rwanda and Kenya"**, has been approved under research permit **No: NCST/482/423/2023**.

This permission only covers research activities specifically related to the provided research project title, and project proposal submitted to the National Council for Science and Technology (NCST) for the period from **16th August 2023 to 16th August 2024**.

The research will be carried out under the affiliation of the **University of Rwanda, Centre for Geographic Information System and Remote Sensing (UR-CGIS)** under the supervision of **Dr. Ernest UWAYEZU (+250783022510)**, Senior Lecturer, and will take place in the Eastern and Southern provinces.

As a requirement, you will be **required to prepare a power point presentation of your results, and present at NCST Stakeholders Scientific Conference and submit both the progress and final reports** after completion of your research activities to the NCST, UR-CGIS, and Governors of Eastern and Southern Provinces.

I wish you success in your research.

Digitally signed by NCST(Executive Secretary)
Date: 2023.08.16 16:33:24 +02'00'

Dr. Eugene MUTIMURA
Executive Secretary

CC:

- Hon. Governor of Eastern Province
- Hon. Governor of Southern Province
- Principal, University of Rwanda, College of Science and Technology
- Dr. Ernest UWAYEZU, Supervisor of the study

Grand Pension Plaza Building, 13th Floor, P.O. Box 2285 Kigali-Rwanda,
E-Mail: info@ncst.gov.rw Web Site: www.ncst.gov.rw

Appendix G: Publication

Open Access Research Journal of
Science and Technology
Journals home page: https://oarjst.com/
ISSN: 2782-9960 (Online)

OARJ OPEN ACCESS RESEARCH JOURNALS

(RESEARCH ARTICLE)

Check for updates

Socio-cultural impacts on women's participation in water decision making and conflict resolution processes in Rwanda and Kenya

Zipporah Nyokabi Mureithi [1,*], Margaret Ngeci Githiri [1] and Ernest Uwayezu [2]

[1] *Department of Natural Resources, Faculty of Environment and Resources Development, Egerton University, P.O. BOX 536-20115, Egerton, Kenya.*
[2] *College of Science and Technology, School of Architecture and Built Environment, University of Rwanda, P.O BOX: 3900 Kigali-Rwanda.*

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Abstract

Women's position in the society gives them crucial knowledge for water decision making and management of related conflicts. However, their contribution to governance of water resources is constrained by systemic inequalities and normative beliefs on their roles and responsibilities. This study examined the impacts of socio-cultural factors on women's participation in water decision making and conflict resolution process in Rwanda and Kenya. The focus was Tuyiteho Mukunguli Water User Association in Rwanda (TMWUA) and Nyando Water Resource Users Association (NWRUA) in Kenya. The study adopted a cross-sectional research design and targeted 250 women form TMWUA and 140 women from NWRUA with an aim of highlighting the different socio-cultural contexts in local water governance. Proportionate stratified sampling was used and primary data were collected using structured questionnaires and key informant interviews. Descriptive statistics and Chi-Square Tests were applied for quantitative data analysis. This study revealed that there were still some deeply ingrained socio cultural factors hindering women's effective participation, with 26.9% of the women from TMWUA and 17.1% from NWUA who strongly agree that existing cultural barriers influence their engagements in decision making and conflict resolution processes. The study recommends that there is a need for promoting culturally appropriate ways to involve women in water management and working with traditional governance structures and advocating for women positions in these structures. This can enhance the sustainability of water conflict resolution outcomes.

Keywords: Water; Women; Socio-Cultural; Conflicts; Participation; Governance