



Assessment of Conflicts in Water Resources Management of *Tobora Sub-catchment* in Mara River Basin, Tanzania

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Abstract

Water resources are essential for both human livelihood and environmental services. Demand for resources has led to increasing water conflicts because of how water is managed and governed. Many developing countries like Tanzania experience conflicts based on competing water uses. This paper examines conflicts on various competing water uses in the Tobora Sub-catchment of the Mara River Basin in Tanzania. It analyses factors that contribute to water conflicts among water users. It further highlights conflict resolution and mitigation measures that the basin can adopt for proper water management. The study used explanatory and descriptive research design using mixed methods approaches. Different types of data were collected using focused group discussions, household interviews and key informants' interviews. Most of the respondents mentioned water conflicts to be mainly caused by land scarcity associated with population growth and increased competing water uses among various water users. Additionally, conflicts were linked to politics whereby politicians allowed water users to conduct economic activities 60m within water sources, which contradicts the water policy. Conflicts between farmers and herders were more evident due to competing water uses for irrigation and livestock keeping. Water conflicts were resolved through by-laws and laws adherence, mediation, resource use guidelines, public awareness campaigns, land use plans to demarcate farming and grazing land, legal land ownership rights and customary laws.

Keywords: Water conflicts, Water uses, Water resources management, Tobora Sub-catchment

Citation: Masesa B.M et al., (2024).
Assessment of Conflicts in Water
Resources Management of *Tobora Sub-
catchment* in Mara River Basin,
Tanzania, *JWEMPO*, 1(1).

Received: 13 June 2022
Accepted: 23 January 2024
Published: 27 January 2024

1.0 Introduction

Water is a vital and infinite resource (CNA., 2017). About 1.8 billion people will be living in areas of absolute water scarcity, and two-thirds of the world population could be under water stress by 2025 (United Nations, 2017). Water resources are gradually becoming a source of conflict globally because of physical water scarcity, climate change, poor economic management, and development practices (Mason & Blank, 2013; Rodríguez-Labajos & Martínez-Alier, 2015). Water scarcity has been increasingly linked to conflicts over a decade by water policy debates internationally as a conflict among countries sharing water resources and at the national level as conflict over access to and water use between different users and sectors (Ntilicha et al., 2012; Ravnborg, 2004). The lack of water users and stakeholders' involvement in water resource management has contributed to many different water use conflicts (United Republic of Tanzania (URT), 2015). Population growth in water stress countries has raised uncertainties of extensive water conflicts that are violent for an extended period (Cousin et al., 2019). Conflicts related to water arise locally, nationally and globally (Rodríguez-Labajos & Martínez-Alier, 2015; Shankleman, 2006). Water-related conflicts arise at different geographic scales, but the interactions of these conflicts with political, environmental, cultural, and socio-economic factors define whether a violent conflict will result (Kramer, 2004). Conflicts over water happening at a certain level can escalate to different levels (Mason et al., 2009). Water management and allocation conflicts in various contexts of the river basin occur between geographical units within the basin and between water users and water use sectors (Bandaragoda, 2000). Bijani et al. (2020) indicate that controllable and uncontrollable factors cause water conflicts. Controllable factors are related to the current water resources management, while the uncontrollable factors are not controlled by humans and related to natural events which include water scarcity as well as droughts.

Water resources management in Tanzania has five main levels according to National Water Policy 2002 and Water Resources Management

Act No.11 of 2009 (United Republic of Tanzania (URT), 2019). The management levels include national, basin, catchment, district, and the community which is the lowest level that integrates water users. The Act outlines the powers and functions of the water boards, catchment committees and water user associations responsible for water resources management levels. All management levels play a huge role in water conflict resolution including the formation of by-laws for mediation of disputes among water users at the community level (United Republic of Tanzania (URT), 2019).

2.0 Literature Review

2.1 Conflicts Over Water Resources

Conflicts of water use in Tanzania are increasing in all water basins due to water scarcity and increasing water use for socio-economic activities (United Republic of Tanzania (URT), 2014). Water shortage or inadequate water does not contribute to conflicts but how water is managed and governed. Often, it is not the actual inadequate water that may lead to tensions but rather how water is governed and administered (Organization for Economic Cooperation and Development, 2005; Yoffe et al., 2003). Kabote & John (2017) in a study on water governance in Tanzania noted the increase of water conflicts which are caused by water scarcity, limited administrative capacity, poor policies, and by-laws. According to Munishi et al. (2008), conflicts and water use competition, particularly during the dry season are the major causes impeding efforts of catchments water conservation. The major causes of water related conflicts include water shortages, an increase in population, limited participation of the community in the management of water resources, and irregular water schedules for irrigation. Additionally, water use conflict are substantially influenced by socio-economic factors which include age, gender and farm size (Ntilicha et al., 2012).

Ntilicha et al. (2012) in a study of water use conflicts in Northern Tanzania identified conflicts between farmers and pastoralists, and among farmers as the most serious. On the other hand, conflicts of water between farmers and among immigrant pastoralists and farmers are more rampant (Kabote, & John, 2017). Mitalo (2005) asserted that different measures are

recognized to be used for water conflict resolution. Traditional water allocation and conservation practices used by indigenous people worked effectively. Conflicts arising from water-sharing practices are resolved through government institutions such as Basin Water Offices, Sub-catchment and Catchment Offices, and Water Users Associations (WUAs). The government introduced a centralized system through government institutions and traditional water-sharing practices were abandoned, however, the government system has not managed to resolve conflicts within the community. The National Water Policy 2002 holds that Water User Associations are responsible for mediation of disputes among users and between groups within their areas of control and implemented at all levels (basin, catchment, district and community) (United Republic of Tanzania (URT), 2002). The National Water Policy 2002 has been operational for nearly 18 years and many objective and strategic changes have occurred nationally and internationally including the implementation of the new development plans and the development of Sustainable Development Goals (SDGs 2015-2030). As a result of these changes it was agreed that the National Water Policy has to be reviewed in accordance with relevant legislations and policy review exercise is expected to be completed by the end of March 2020 (United Republic of Tanzania (URT), 2020).

2.2 Managing Water Conflicts

Water use conflicts in Tanzania are addressed through training on conflicts management and negotiation skills in Basin Water Boards (BWBs), Catchment Water Committees (CWCs) and Water User Associations (WUAs) (United Republic of Tanzania (URT), 2014). Msale & Magina (2009) used the participatory process to resolve water use conflicts in rural Tanzania. The joint agreement was reached through dialogues and compromise between two conflicting groups whereby a water schedule was established for domestic water users particularly women and livestock keepers. The study highlights that village elders involved in the conflict resolution process acted autonomously using traditional systems between competing water users since no legal or statutory law was used to settle conflicts. Therefore, by applying traditional conflict resolution systems conflicting groups, especially women, appreciated the process.

Mbonile (2005) suggests that conflict resolution should be designed to contest the type of water conflict that needs to be addressed. It includes community participation and training of the local communities to manage water resources better. Mbonile (2005) further asserts that water resources management has been an important part of each community's traditional laws and behavioural norms since the pre-colonial era in Tanzania. Traditional laws guaranteed water resources ownership for the local community rather than an individual. Breaching traditional water laws by washing at the water source reserved for domestic use was a serious offence, and the offenders were either beaten, fined, or *chased* out of the community; thus, these laws prevented the over-exploitation of water. Therefore, most modern mediations in water management should not be superimposed on traditional systems. Traditional water management systems should be preserved to solve some water conflicts because sustainable water management cannot be attained without community and stakeholders' participation. Traditional water allocation practice is one of conflicts resolution mechanisms used in various water basins. Additionally, Mbonile (2005) indicates that both formal and informal structures work in parallel to resolve water use conflicts and informal structures are much preferred by communities in managing water resources than formal structures. On the other hand, studies by Mbonile (2005), Msale & Magina (2009) discussed only traditional rules as water use conflict resolutions, but other conflict mitigation measures were not discussed hence this study sought to highlight other measures.

Generally, this study assessed water use conflicts in the Tobora Sub-catchment. The study particularly assessed the underlying causes of conflicts, stakeholders' interests and positions in water resources, existing types of water use conflicts, linkages between socio-economic factors and water use conflicts, impacts of water use conflicts and water use conflicts resolution and mitigation strategies over water use that are essential for sustainable water resources management in the study area.

3.0 Methodology

3.1 Study Area

The study was conducted in the *Tobora* Sub-catchment, located at the lower part of Mara River Basin in Serengeti District, Tanzania. *Tobora* Sub-

catchment was selected because it feeds into Mara River Basin, a transboundary river shared between Kenya and Tanzania with different anthropogenic activities that contribute to conflicts over water. Additionally, there is unprecedented water competition among different water users and sectors in the basin (WWF, 2017). *Tobora* Sub-catchment covers about 364.31km² and situated at the lower part of Mara River Basin, Tanzania. This part forms the Mara River downstream flowing from Ikorongo Game Reserve bordering Serengeti National Park and sharply meanders to the north. At the location where the river meanders into the southwestern direction again, the main channel is lost in different streams, including *Tobora* Sub-catchment that feeds the downstream Mara wetlands. These streams and wetlands continue for about 70 kilometres downstream. In this part of the basin, human and livestock densities are high and small-scale subsistence agriculture is the primary land use activity (East African Community, 2013). The district where the *Tobora* catchment lies covers an area of 10,373 km². Out of this more than 70% is under the protected area category; game reserves, national parks and wildlife management areas (Othman et al., 2014).

Mara River Basin Map

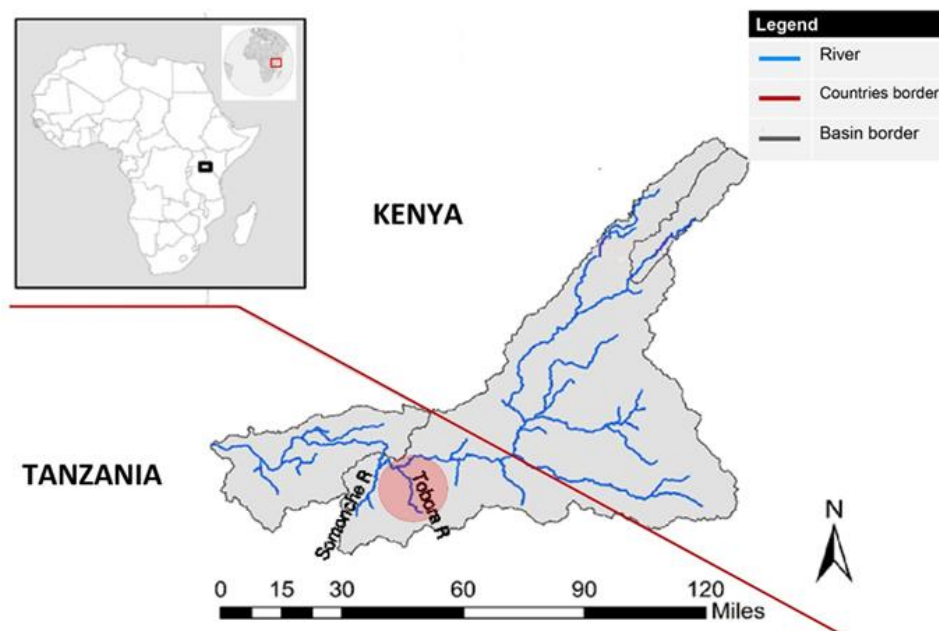


Figure 1. Map of *Tobora Sub-catchment* area

The study used explanatory and descriptive research design using mixed methods approaches. The mixed methods of data collection that were used include qualitative and quantitative methods. The qualitative methods used in data collection include key informants' interviews, household surveys, field observations or transect walks, and focused group discussions. Quantitative data was complemented by population, socio-economic data, land-use/cover changes, and environmental changes that contributed to water resource conflicts. This study preferred qualitative and quantitative methods for their potential to provide more complete, concrete, and nuanced answers to complex research questions. Additionally, to describe the factors influencing conflicts of water resources and its mitigation measures, variables that influence water resources management complement each other, particularly where data was not captured by a specific method.

3.2 Data Collection

The data was collected in March 2018, a process which commenced with Focus Group Discussions (FGDs) and Key Informant Interviews (KII). Key Informant Interviews (KII) were conducted in the first place at the Lake Victoria Basin Water Board (LVBWB) with officials in Mwanza City. These interviews were guided by a checklist whose questions probed into water management practices, particularly on participatory policy instruments with a focus on conflicts of water resources in the *Tobora Sub-catchment*. The same checklist was used to collect information from Key Informants from Water User Associations (WUAs) at the Sub-basin Level (Mugumu) as well as District officials at Serengeti District Council (SDC) from natural resources and community development departments. A total of nine key informants were interviewed at this stage.

Focus Group Discussions (FGDs) were conducted in three selected villages. Focused Group Discussions (FGDs) were conducted, two in each village, each with participants ranging from 4-12 participants for easy management of the group. As it was the case of Key Informant Interviews (KII), the checklist for Focus Group Discussions (FGDs) contained questions on water resources management practices particularly on participatory policy instruments with a focus on conflicts of water resources. The checklist probed on water resources utilisation, conflicts of water resource use and conflict mitigation measures adopted at community level in the study area. In addition to that, field observations/transect walks were used to triangulate the information provided by the methods used in the study area.

Household surveys were employed in the end, preceded by pretesting of the survey tool. The exercise commenced by sampling the subjects of the study. The study involved three (3) villages which were selected from two wards of Matare and Kisangula. In Matare ward, Matare and Kegonga villages were selected whereas in Kisangula ward, Kibeyo village was selected for the study. The villages were selected based on the various economic activities with competing water uses that may cause conflicts among the communities' proximity to the Tobora Sub-catchment. A combination of stratified random sampling and purposive sampling were used to select the household respondents involved in the study. Stratified random sampling was used to select villages and the study area according to the population size to represent the total population of the study area. The

total sample size was 86 households and were interviewed in each village as attached in Table 1. This sample size is equivalent to 10.7% of all households in the area. It accords to Kajembe, and Luoga, (1996) who argued that a sample size of 10% and above is recommendable to represent the study population.

Table 1. Sampled Respondents for Household Survey

Village Name	Sample Frame	Sample Size	Percentage (%)
Kibeyo	390	40	5.0
Kegonga	176	21	2.6
Matare	236	25	3.1
Total	802	86	10.7

Source: Field Survey, 2018

The questionnaire was employed to 10 households of which after completion were retained in the main sample. Information obtained at this stage helped in improving the questionnaire in terms of clarity. The main survey started in the aftermath and entailed face-to-face interviews with household heads, or any other member of age 20 years and above. Face to face interviews are particularly important as they allow interaction during interview sessions. The questions asked entailed household demographic characteristics (age, sex, education, occupation, and participation in water resource management etc.) to village-level information (natural resource endowments, access, utilisation and management among others).

3.3 Data Analysis

Data obtained in this study was analysed according to the types. Qualitative data was analysed based on the thematic content analysis framework whereby themes were categorized consistently with the objectives of this study. As themes emerged, similarities and differences were deduced to depict the extent of variation. Descriptive statistics were used to characterize the household demographic information as frequencies and percentages. Exploration of factors influencing water resources management was done using the Chi-square tests. All statistical treatments were done using Statistical Package and Service Solutions (SPSS) version 20 and the Microsoft Excel presented as tables and histograms.

4.0 Results and Discussions

4.1 Causes of Water Use Conflicts

Table 2 indicates that water conflicts were caused by various reasons whereby 52.2% of the respondents indicated land scarcity as the leading cause of conflicts due to population growth. LVBC, (2016) states that population density is high where land is fertile, particularly in lowland areas of the Mara River Basin, Tanzania. For instance, in the Serengeti region, population density is over 22 people per km². 15.7% showed politics compromised with water policy implementation in the management of water resources. This was clearly stated by Focused Group Discussions (FGDs) at Kibeyo village, who reported the following.

“We heard His Excellency, President of the United Republic of Tanzania, allowing a coffee farmer whose farm is located within 60m from the water source in Bukoba District, Kagera region to continue farming. This is a contradiction from what we know with regards to water resources utilization. Many villagers may conduct their activities against the Environmental Management Act (EMA), 2004, because His Excellency, President of the United Republic of Tanzania, allowed them to do so. This may bring problems to resource managers in monitoring the water resources utilization....”

Additionally, 11.2% of respondents mentioned corruption as one factor contributing to water resource use conflicts; however, there was no clear evidence of corruption occurrences. The results of the survey indicated the likelihood of corruption cases associated with transparency and water resources ownership. Corruption was linked to inadequate transparency in which water managers at the local level handled water resources ownership. Resources that include watering points and grazing areas with 9.7%, as indicated by the respondents, caused violent conflicts due to some of the community members' exclusion from sharing water, which is a shared resource.

On the other hand, study results indicated that 8.2% of the respondents stated that poverty contributed to water conflicts. This was due to a lack of basic needs and alternative livelihood activities beyond depending on natural resources. In addition to that, 3.0% of the respondents stated policies as the

least cause of conflicts since water users were farming within 60m of the river.

Table 2. Causes of Water Resource Use Conflicts

Causes of Water Resource Use Conflicts*	Frequency	Per cent
Poverty	11	8.2
Policies	4	3.0
Resources	13	9.7
Politics	21	15.7
Corruption	15	11.2
Land scarcity	70	52.2
Total	134	100

Source: Field Data, 13/03/2018 *Dichotomy group tabulated at value 1

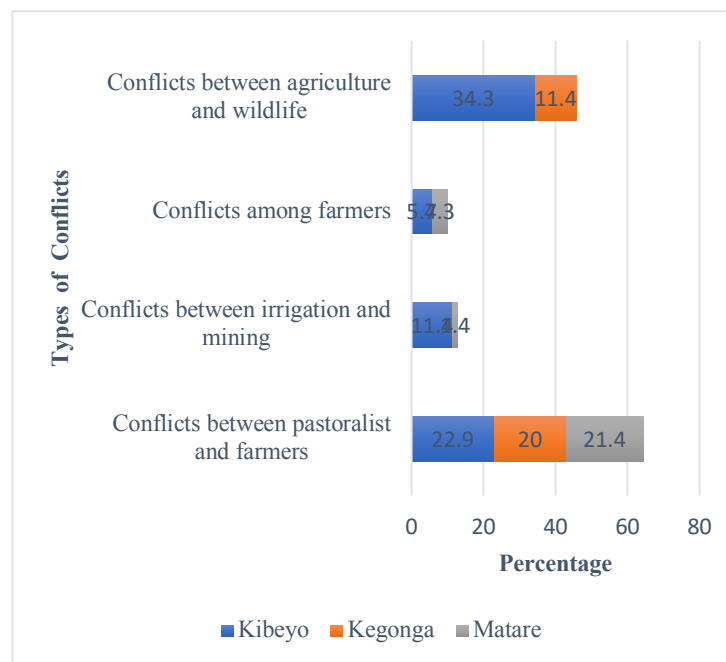
4.2 Types of Water Resource Use Conflicts

The common types of conflicts in this study involved herders/pastoralists and farmers, farmers and wildlife, mining, and irrigation (farmers), and farmers. Study results indicated that 64.3% of the conflicts were between farmers and herders caused by herders feeding livestock in peasants' farms and scrambling water for irrigation and watering livestock. Conflicts between herders and farmers were high in all three villages compared to other conflict types, whereby in Kibeyo, the results showed 22.9%, in Kegonga 20% and in Matare 21.4%. Survey results showed conflicts between farmers and herders as more distinct due to inherent consequences to human life and properties. United States Agency for International Development, (2019) highlights that village committees usually solve water use conflicts in Mara Basin, Tanzania; however, more complicated cases are referred to courts.

According to 45.7% of the respondents, conflicts between farmers and wildlife were mainly caused by wildlife feeding into villagers' farms with less intervention from Tanzania National Parks (TANAPA), thus food insecurity. Respondents in Kibeyo reported having many conflicts between farmers and wildlife with 34.3%, Matare with 11.4%, while Kegonga had no such incidences. Such conflicts were noted to cause displacement, loss of life and properties due to wildlife invasion. It is important to note that conflicts between farmers and herders were more violent and deadly, followed by conflicts between farmers and wildlife. This was due to the

presence of Serengeti National Park, whereby both animals and humans encroached on each other's habitat, causing conflicts over existing limited resources.

Mara region is rich in minerals; therefore, conflicts between miners and farmers over competition for water and environmental pollution were noted. About 12.9 % stated irrigation (farmers) and mining conflicts, particularly in villages bounded by mining activities. Study results indicated more conflicts in Kibeyo with 11.4% than in Matare with 1.4% and none in Kegonga village. Additionally, 10% of the respondents reported having conflicts between farmers caused by farm boundaries and excluding other farmers from utilizing water sources by fencing. Both Kibeyo and Matare had conflicts between farmers with 5.7% and 4.3%, respectively. This is shown in Figure 2.



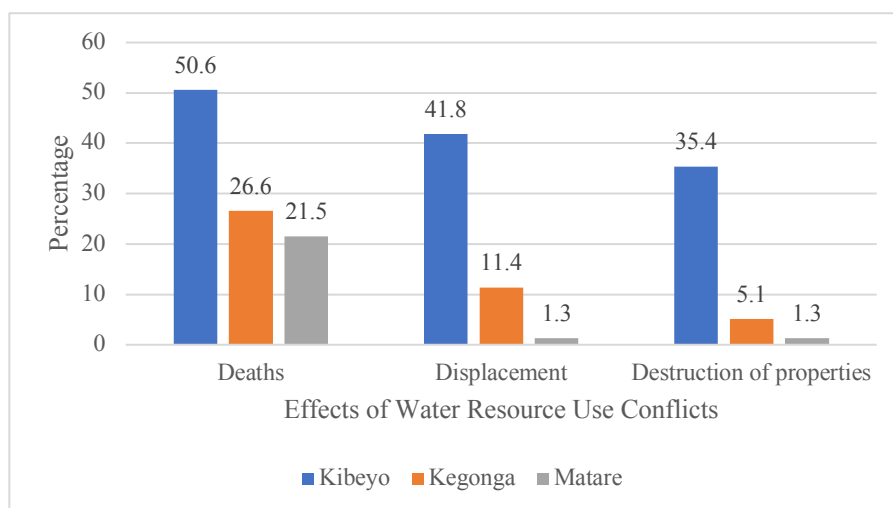
Source: Field Survey, 14/03/2018

Figure 2. Types of Water Resource Use Conflicts in the Study Area

4.3 Effects of Water Resource Use Conflicts in the Study Area

Many impacts were associated with water use conflicts in the study area, as shown in Figure 3. United States Agency for International Development,

(2019), states that land-use changes, particularly the expansion of land for other uses into wildlife corridors largely contribute to human and wildlife conflicts hence deaths and loss of properties. The results showed that water resource use conflicts caused the loss of human life and properties. 98.7% of the respondents stated that deaths are the main impact of conflicts between farmers and herders or livestock theft. Deaths caused by conflicts in Kibeyo were reported to be high at 50.6% compared to Kegonga at 26.6% and Matare at 21.5%. 54.4% indicated displacement as another impact caused by water use conflicts whereby households were demolished, forcing people to flee from their original homes. Kibeyo reported 41.8% water use conflicts while Kegonga had 11.4%, with Matare reporting the lowest conflicts with 1.3%. 41.8% of the respondents reported the loss of property as one of the impacts of water resource use conflicts in the study area. Destruction of properties was reported as water use conflicts with the lowest reported cases compared to deaths and displacement in the study area. Kibeyo reported 35.4% displacement cases while Kegonga reported 5.1% and Matare 1.3%.



Source: Field Survey, 14/03/2018

Figure 3. Effects of Water Use Conflicts in the Study Area.

4.4 Water Use Conflicts Resolution and Mitigation Strategies

The aim of Integrated Watershed Management (IWM) is to conserve functions of the watershed, enhance community participation and ownership through a participatory approach and implement custom-made water governance arrangements (Colloff et. al, 2019). Not much is known about community conflicts arising at the level of a watershed within national borders. In this regard, the local stakeholders' role is important in problem identification and following up on resolving conflicts in social, economic and political terms (Roder et. al, 2021).

Due to conflict occurrences in the study area, communities formulated mechanisms to mitigate them before happening and causing harm to the community members. The mechanisms are diverse and encompass various arbitrators covering the basin, district, village levels and traditional leaders. The respondents highlighted various conflicts mitigation measures as summarized in Table 3.

Table 3. Water Use Conflicts Resolution and Mitigation Strategies in the Study Area

Types of conflicts	vs.	Mitigation strategies	Intervening actors
Farmer herder conflicts		• Resource use guidelines • By-laws • Provide public education, particularly on the number of livestock proportional to land carrying capacity and resource availability. • Provide public education on the meaning and importance of environmental conservation while adhering to the laws without force. • Land use plans to demarcate between farming and grazing areas. • Provide formal land ownership rights such as the right of occupancy to farmers.	• Traditional leaders • Political leaders • District office in collaboration with village governments and other non-state actors • CBOs e.g., WUAs • Law enforcers e.g., Police

		• Court measures • Mediation and traditional law • Compensation	
Farmer	vs.	• By-laws • Court measures • Mediation	• Village governments • Law enforcers • Traditional leaders
farmer conflicts			
Human	vs.	• Expand the areas for community livelihoods in the area. • Use of by-laws	• TANAPA
wildlife			
conflicts			

Source: Field Survey, 14/03/2018

Table 3 above highlights different types of conflicts in the study area, mitigation strategies, and intervening actors. The study results showed common conflicts involving farmers and herders, farmers and farmers, and humans and wildlife.

Mitigation strategies for the farmer and herder/pastoralist conflicts involved resource use guidelines, by-laws, public education, particularly the number of livestock proportional to land carrying capacity and resource availability, public education on the meaning and importance of environmental conservation and adhering to laws without force, land use plans in demarcating farming and grazing areas, provide formal land ownership rights such as the right of occupancy to farmers, court measures, compensation, mediation and customary laws. Traditional leaders, political leaders, district offices in collaboration with village governments and other non-state actors, Community-Based Organizations such as Water Users Associations (WUAs), and law enforcers such as Police were intervening actors involved to ensure water conflict resolution.

Farmer-to-farmer conflicts involved by-laws, court measures and mediation as mitigation measures while village governments and law enforcers such as traditional leaders were involved in peaceful co-existence. On the other hand, using by-laws and expanding areas for community livelihoods in the study area were used as TANAPA was the actor involved in providing support to communities, particularly in human and wildlife conflicts.

Study results indicated that conflicts were mediated or resolved based on the status and severity of the harm the conflicts could cause or expected to cause. Conflicts that include farm demarcations, and water resources ownership, among others, were regarded as the first order due to being within the village governments' capacity to handle or resolve conflicts using traditional customs. Conflicts that involved criminal offences or demanded compensation, such as murder cases resulting from farmer-herder conflicts, were referred to as second-order conflicts. These are conflicts that village-level governments could not handle, thus handled by criminal procedure postulated under the law and compensation claims.

Additionally, compensation claims resulted from implementing the Environmental Management Act (EMA) 2004, whereby villagers who lived near the water sources before law enactment were evicted. Compensation was made before the eviction, depending on the value of invested assets in those areas. Compensation claims also meant the destruction of one's property, for example feeding livestock into other people's farms. Traditional systems were also used to handle compensation claims since they are highly respected and observed more than the formal law systems. According to Focus Group Discussion (FGD) conducted in Kibeyo village, conflicts resolution outcomes under the traditional system include malediction, fines, and exclusion from fellow community members. Water resources sharing instruments or equitable water are often emphasized.

The respondents also reported that diplomatic conflict resolution interventions were used by higher authorities such as the district, basin, and national levels for the second-order conflicts. The conflicts are often communicated by posted letters or telephones by the higher authorities to the local level and vice versa. If conflicts were due to the water use permit validity, the conditions over resource use are often assessed concerning conditions at the time of their issuance. Often, water resource use guidelines are provided by permits based on the resource condition. The provision of permits to water resource users usually stops when water resource availability is lesser.

5.0 Conclusion and Recommendations

The paper discussed the conflicts of water resource use and mitigation measures in water resources management in the Tobora Sub-catchment of Mara River Basin, Tanzania. Based on the study results, the paper concluded that land scarcity, politics, corruption, resources, poverty, and inadequate policy enforcement were significant causes of water use conflicts. Additionally, different types of conflicts associated with water use competition in the study area were evident. Conflicts between farmers and pastoralists/herders were indicated to be more violent and deadly, followed by conflicts between agriculture and wildlife due to the presence of Serengeti National Park. On the other hand, impacts associated with water resource use conflicts include displacement, and loss of life and properties. Consequently, widespread displacement of people caused by conflicts was indicated to be due to population growth, limited resources such as grazing land and watering holes for animals, according to the survey and discussions conducted. Destruction of properties was also associated with conflicts whereby some water users deprived others of using the water source within their vicinity by illegal fencing.

Water conflict mitigation measures were handled by governing structures which is Mara River Basin Water Board, Mugumu District government and the local leaders at Tobora Sub-catchment. Customary law systems were more preferred to solve water use conflicts in the study area than the formal law system. This calls for government concerted efforts to further formalize customary law systems, particularly in rural areas, for better water sources management.

The recommendations of water resource use conflicts in the study included the following:

- The government should strengthen the use and harmonization of customary laws with formal laws for conflicts resolution and better water management, the use of customary laws together with formal village by-laws for better ownership and management of water resources as an example.
- Provision of capacity development sessions for Water Users Associations to ensure proper water governance. This includes

providing training on the roles and responsibilities of the Water Users Associations and financial support to manage water project activities.

- Improvement of land use plans for better water management
- Community engagement, mobilization and sensitization in water resources management and conservation.
- Provision of livelihood activities for the basin inhabitants to reduce the reliance on natural resources.

Further areas of research include the following.

- The role of women in water uses conflicts management in the community because women are more involved in water management.
- The integration of customary and formal laws in managing water use conflicts in the community.

Acknowledgements: The authors would like to express their sincere gratitude to Dr Adegboyega Adeniran, Dr Patrick Ndaki, and Anselm Mwanjombe for their invaluable guidance and support throughout this research endeavour. Their profound insights and direction enabled the completion of this work.

Funding: This research did not receive any specific grant from funding agencies in the public, commercial or not-for-profit sectors

Conflict of Interest: Authors declare no conflict of interest.

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