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The importance of the Mara river and  
transboundary water management to users in  
Merenga, Tanzania

Master's thesis in Natural Resources Management  
Supervisor: Haakon Lein, Teklehaymanot Weldemichel  
May 2019





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# Abstract

This study examines the importance of the Mara river and other water resources to humans and wildlife in Merenga village in the Mara River Basin (MRB) of Tanzania, as well as how the ways in which local, national, and international authorities choose to manage water resources impact people's daily lives. The importance of the river is examined through historical, conceptual, and institutional lenses which position the study of water resources in the MRB in current discourses about water management. In doing so, the study examines the disconnect between local use and national and transboundary management that currently exists in the Tanzanian section of the MRB by examining differences that exist between household dependency on and perspectives of the river and the current management plans. The study finds that while the river is of the utmost importance to small communities that live along it, the dependency these communities have on this water resource has been overlooked by high-level managers. Furthermore there is a disconnect between local perceptions and transboundary management that has hampered the implementation of several management plans for the MRB. The study concludes that bridging the gaps that exist between dependency, perceptions and management is a key step toward the vitally necessary sustainable transboundary management of the MRB.



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A handwritten signature in cursive script that reads "Emily Jagers". The signature is written in black ink and is positioned in the lower right quadrant of the page.





# Table of Contents

List of Figures .....	ix
List of Tables .....	ix
List of Acronyms .....	x
1 Introduction .....	11
1.1 Purpose and Significance of the Study.....	11
1.2 Study Aims.....	12
1.3 Study Area.....	13
2 Water: International Discourse, Concepts, & Institutions for Management .....	18
2.1 History of International Discourse on Water Management .....	18
2.2 Water as an Economic Good.....	22
2.3 Water as a Human Right .....	25
2.4 Institutions in Management: Formal vs. Informal.....	28
2.5 Integrated Water Resource Management .....	31
2.6 Tanzanian Water Policies & Management.....	35
3 Methodology.....	42
3.1 Introduction .....	42
3.2 Methods in the Field.....	43
3.2.1 Informant Selection .....	43
3.2.2 Semi-Structured Interviews.....	45
3.2.3 Observation .....	46
3.3 Data Analysis .....	48
3.3.1 Transcription .....	48
3.3.2 Interview Content Analysis.....	49
3.4 Ethical Considerations.....	49
3.4.1 Personal Positioning.....	50
3.5 Study Limitations .....	51

4	User Dependence on the Mara River.....	53
4.1	Water Uses, Strategies, & Risks.....	53
4.1.1	Water Dependency & Uses .....	54
4.1.1.1	Wildlife Dependency on the Mara River .....	59
4.1.2	Water Strategies .....	61
4.1.3	Water Risks & Concerns .....	65
5	Local Perceptions .....	70
5.1	Water Level, Quality, & Availability.....	70
5.2	Climate Change .....	74
5.3	Mara River Management.....	79
5.3.1	Community Management Perspectives.....	79
5.3.2	Manager Perspectives.....	81
5.3.2.1	Mara Day: A path for management or more of the same failures.....	86
6	Discussion and Conclusion.....	89
6.1	Why is the Mara important?: Water as economic good or human right .....	89
6.2	What are the local perceptions and how are they influenced by institutions? .....	94
6.3	How do the importance of the river and perceptions interact with current management efforts? .....	97
	References.....	101
	Appendix 1: Participant List .....	109
	Appendix 2: Semi-Structured Interview Guides.....	111
	Appendix 3: Transboundary Agreement.....	120

## List of Figures

Figure 1. Map of Mara River Basin .....	14
Figure 2. Map of proposed dams in the Mara River Basin .....	15
Figure 3. Map of study area, Merenga village, Tanzania.....	17
Figure 4. Millennium Development Goals infographic .....	20
Figure 5. Sustainable Development Goals infographic.....	21
Figure 6. The principles behind and structural components of IWRM.....	32
Figure 7. National Water Policy objectives .....	37
Figure 8. Tanzania's Water Resources Management Act objectives .....	37
Figure 9. Tanzania's Water Supply and Sanitation Act objectives .....	37
Figure 10. Observation contextualized the interviews in a new way.....	47
Figure 11. The many uses of the Mara river .....	55
Figure 12. Maize grows in Merenga .....	56
Figure 13. Locally made bricks in Merenga .....	58
Figure 14. Waterfalls in the Mara river are possible sites for energy generation. ....	59
Figure 15. Wildebeest migrating between Serengeti National Park and Maasai-Mara .....	60
Figure 16. Boats are one method used to cross the Mara river in Merenga.....	66
Figure 17. A fishing basket used for catching fish from the Mara river. ....	68
Figure 18. A fisherman sits on rocks in the Mara river.....	68

## List of Tables

Table 1. The Four Dublin Principles .....	19
Table 2. Characteristics of water supply for human rights .....	27
Table 3. Design principles for long-enduring institutions.....	30

# List of Acronyms

ABS	AfricanBioServices
AMREF	Amref Health Africa (formerly African Medical and Research Foundation)
CPR	Common Pool Resource
EU	European Union
GLOWS	Global Water for Sustainability Program
IWRM	Integrated Water Resources Management
LVBC	Lake Victoria Basin Commission
MDG	Millennium Development Goal
MRB	Mara River Basin
NBI	Nile Basin Initiative
NCAA	Ngorongoro Conservation Area Authority
NELSAP	Nile Equatorial Lakes Subsidiary Action Program
NGO	Non-Governmental Organization
NTNU	The Norwegian University of Science and Technology
OHCHR	Office of the High Commissioner of Human Rights
SDG	Sustainable Development Goal
TANAPA	Tanzania National Parks
TAWIRI	Tanzania Wildlife Research Institute
UN	United Nations
UNICEF	United Nations Children’s Fund
WASH	Water, Sanitation and Hygiene
WHO	World Health Organization
WUA	Water User Association
WWAP	World Water Assessment Programme

# 1 Introduction

Water is an essential resource for all forms of life. For humans, access to fresh water is the foundation for food security and disease prevention, as well as social and economic development. For wildlife, water is both resource and habitat. Although fresh water is an important resource, only a small percentage of the world's water is considered fresh and an even smaller percentage is easily accessible and available for human and terrestrial wildlife use. Humans use water for a variety of purposes ranging from domestic uses, such as drinking, cooking, and cleaning, to economic uses, like farming, energy, and industry (WWAP, 2006). Water is also a building block for ecosystems, a limiting factor for the supporting, provisioning, and regulating ecosystem services provided by any given area (WWAP, 2006). In addition to being a resource that supports life and the functioning of the planet's ecosystems, the crucial role water plays in human life permeates many aspects of society. Human rights, gender issues, sanitation, health, energy, urbanization, sociological and economic development, food, climate change and many other areas of human life depend on or are influenced by water (Priscoli, 2004). Due to the large and important role that water plays in human life, there is a long history of humans attempting to manage water resources.

## 1.1 Purpose and Significance of the Study

This study examines the importance of water resources to humans and wildlife in Tanzania, as well as how the ways in which local, national, and international authorities choose to manage water resources impact people's daily lives. The study examines the Mara River Basin (MRB) located in Kenya and Tanzania, a transboundary watershed area that is an important freshwater resource for the people living within the basin, as well as the wildlife of the Maasai-Mara Serengeti Ecosystem. The MRB is of particular interest because it is shared between two countries with differing water management policies. Additionally, the dynamics between upstream and downstream users of the Mara river may be changing as multiple dam projects have been proposed in Kenya. This could greatly alter the availability of water for downstream users in Tanzania. Because of this, the Mara River and its water resources could benefit from a coordinated transboundary management effort.

This study seeks to explore the importance of the Mara River to communities that live along its banks and the lived experiences of the community members who depend on the river as their daily source of water. By doing so, the study also attempts to learn about the importance of the inclusion of household and community perspectives in the development and implementation of river and water management plans in the greater Mara River Basin and beyond. The study examines the disconnect between local use and national and transboundary management that currently exists in the Tanzanian section of the MRB by examining differences that exist between household perspectives of the river and the current management plans in place.

The fieldwork for this study was conducted in Merenga Village, Serengeti District, Tanzania. Located west of Serengeti National Park, the majority of research within this area focuses on the hydrology and ecology of the region in relation to the sustainability and management of the park. While some research on the demographics of Western Serengeti has been published (Shetler, 2007), qualitative research about the lived experiences of the residents and their interactions with the natural resources of the region is not abundant. This study presents novel household perspectives from water users living in Merenga village, Serengeti District, Tanzania.

## 1.2 Study Aims

This study explores the importance of the Mara river to downstream users in Merenga Village, Serengeti District, Tanzania. The importance of the river will be examined through historical, conceptual, and institutional lenses which position the study of the Mara in the current discourses about water management. Three research questions framed the data collection of the study and are as follows:

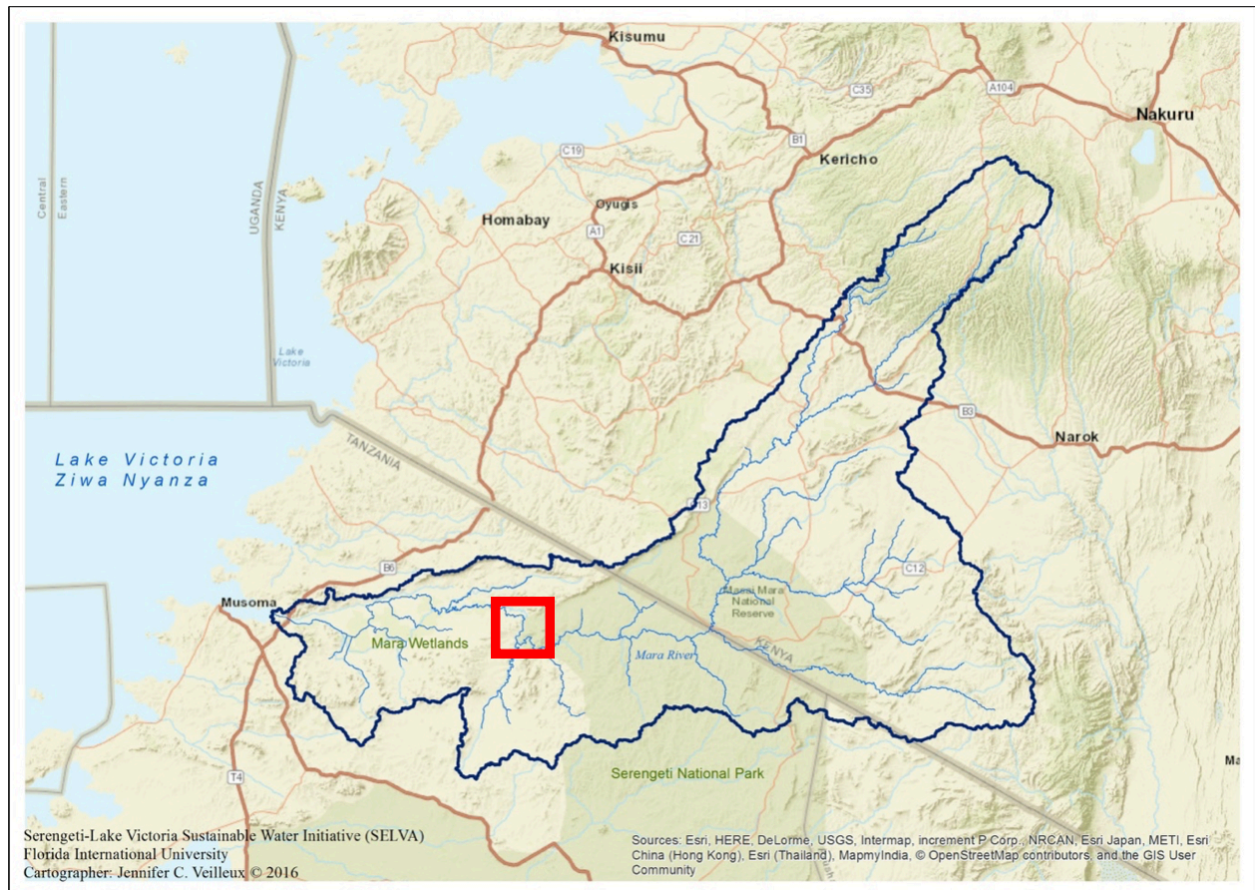
1. Why and how are the Mara River and other water resources important to local communities and wildlife in Tanzania?
2. What are the community members' and managers' perceptions of water, the environment, and the management of water resources?
3. How do the importance of and perceptions surrounding water resources incorporate and interact with national and transboundary management efforts?

The first question is aimed at assessing the community's dependence on, uses of, and strategies surrounding the use of the Mara river, which will be related to the debate over the concepts of water as an economic good or water as a basic human right. The second question

focuses on learning about the perceptions, held by community members and management officials, of the river, other sources of water, the environment, and how management is related to these resources. The ways in which these perceptions interact and influence the institutions within water management will be examined. The third question is meant to explore the connections between the dependency on and perceptions of the water resources in the MRB and the levels at which management exists in the MRB. It is also meant to examine whether or not the management plans in place at varying levels, both national and transboundary, incorporate or fail to include the local perceptions and dependency on the water resources of the MRB in Tanzania and what the results of this are.

### 1.3 Study Area

The transboundary MRB spans 13,750 km<sup>2</sup> and is located across the western part of the border between south western Kenya and north western Tanzania (WREM International Inc., 2008) (see figure 1). The MRB is a part of the Lake Victoria Basin which is a sub-basin of the Nile River Basin (Gereta, Wolanski, & Chiombola, 2013; Onyando, Agol, & Onyango, 2013). The MRB is an internationally important and shared fresh water resource for both Kenya and Tanzania. Within the basin, the Mara River stretches 395km, originating in the Mau Forest of Kenya and fed by many tributaries which drain water from the far reaches of the basin (Gereta et al., 2013). The Mara winds through the Maasai-Mara ecosystem in Kenya and into the Serengeti ecosystem in Tanzania, then feeds into the Mara Wetlands in Tanzania, and then drains into Lake Victoria, the world's second largest lake (Dessu, Melesse, Bhat, & McClain, 2014). The MRB supplies water for 1.1 million people and many species of wildlife in the Maasai Mara-Serengeti Ecosystem, as well as playing an important role in sustaining the natural, environmental services and systems of the region (Onyando et al., 2013; WREM International Inc., 2008). The basin is not evenly divided, area- or population-wise, between the two countries. Approximately 775,000 people live in the Kenyan section of the basin, while about 325,000 people live in the Tanzanian section (WREM International Inc., 2008). The population of the region is growing quickly and a majority of the people in the basin are engaged in small-scale agricultural and/or pastoral activities and relies on the Mara River to support their livelihoods (Dessu et al., 2014; WREM International Inc., 2008). In addition to the anthropogenic demands on the river basin, the world-famous Maasai Mara-Serengeti ecosystem depends on the MRB for its freshwater needs (WREM International Inc., 2008).



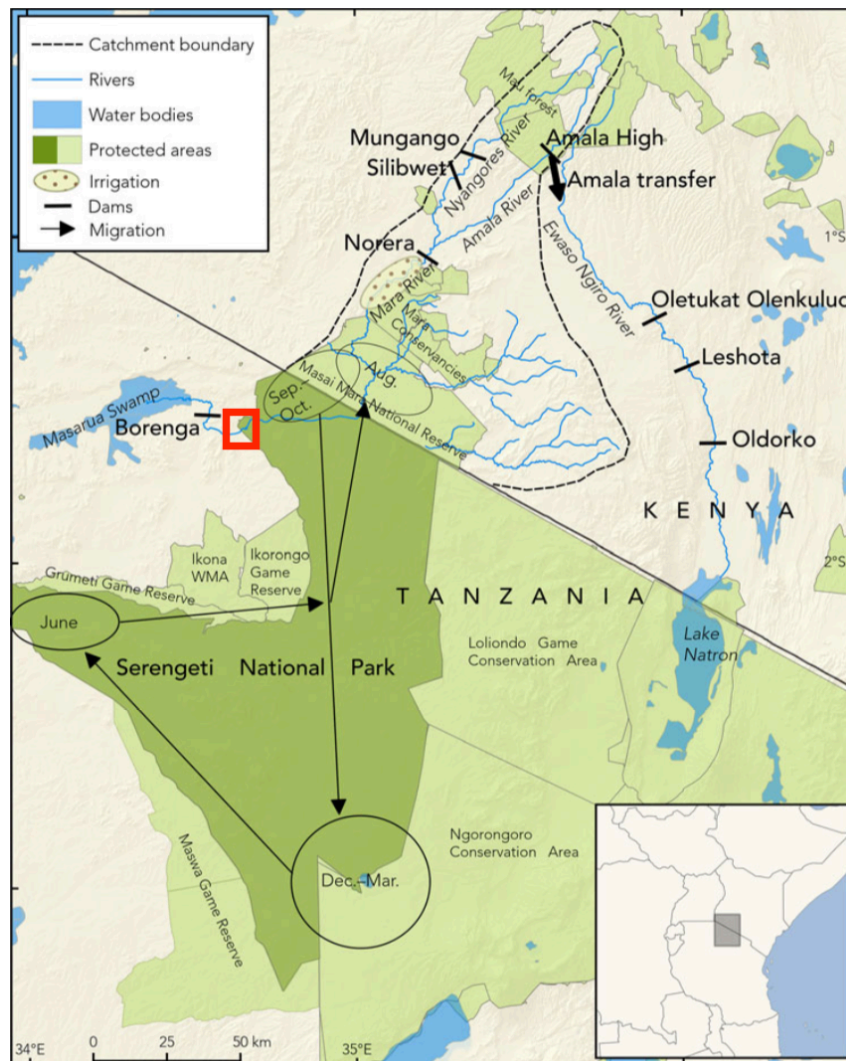
**Figure 1. Map of Mara River Basin with study area indicated by red box, adapted from (Veilleux, 2016).**

The MRB plays an essential role in sustaining the wildlife populations within the Maasai-Mara Serengeti Ecosystem (Dessu & Melesse, 2013b). It is the only perennial source of water in the north west reaches of Serengeti National Park and therefore plays a vital role in the survival of migratory species that travel between this Tanzanian protected area and the Maasai-Mara Game Reserve in Kenya (Dessu & Melesse, 2013a; Onyando et al., 2013). Species that depend on this river include ungulates such as wildebeest, elephants, hippopotamus, crocodile, a variety of fish species (Onyando et al., 2013).

The river faces a wide variety of challenges in supplying fresh water to all the life in the basin (Gereta et al., 2013; WREM International Inc., 2008). It has been reported that the river has experienced decreasing low flows in the dry season and increasing peak flows during the wet season (Mati, Mutie, Gadain, Home, & Mtalo, 2008). There has also been an increase in the variability of overall rainfall in the basin due to climate change (Dessu & Melesse, 2013a, 2013b; Mango, Melesse, McClain, Gann, & Setegn, 2011). The problems created by this increased variability are compounded by the fact that the demand for water to sustain livelihoods is increasing along with a quickly growing population (Hoffman, Melesse, & McClain, 2011). Given these demands, the MRB is an especially vulnerable freshwater



source and may benefit from more studies into how to manage such a vitally important resource.



**Figure 2. Map of proposed dams in the Mara River Basin with study area indicated by red box adapted from Mnaya, Mtahiko, and Wolanski (2017).**

Due to these increasing demands, seven dams have been proposed for the head waters of the MRB in Kenya and one dam has been proposed in Tanzania, (Mnaya et al., 2017; Nile Basin Initiative & Nile Equatorial Lakes Subsidiary Action Program, 2015) (see figure 2). The Kenya Water Resource Management Authority, in coordination with NELSAP, developed plans for water allocation in the Kenyan side of the transboundary MRB (Mnaya et al., 2017). These plans include the seven dams, of which the Norera dam will be constructed directly on the Mara river (Mnaya et al., 2017). Another, the Amala High dam and transfer, is planned to be constructed in the Mau forest and will divert water from the headwaters of the Mara into another river, Ewaso Ng'iro, where three more dams will be built for hydroelectricity generation (Mnaya et al., 2017). Finally another one or two dams will be built

within the Kenyan side of the basin on the Nyangores river, one of the rivers making up the headwaters of the Mara, specifically for irrigation purposes (Mnaya et al., 2017). The proposed dam in Tanzania would be positioned on the Mara river between Serengeti National Park and Lake Victoria, just east of the Mara wetlands (Mnaya et al., 2017).

The MRB and surrounding Mara region has bimodal rainfall, with two rainy seasons, one long, March to May, and one short, October to December (Dessu & Melesse, 2013a). The total annual rainfall varies greatly across the basin with more rain in the upper catchment in Kenya, ranging from 1,000 to 1,750 mm per year, than in the middle catchment, split between Kenya and Tanzania, and lower catchment in Tanzania, which have rainfall ranges from 900 to 1,000 mm and 300-850 mm respectively (Dessu & Melesse, 2013a). The variations in altitudes across the basin also contribute to the highly variable rainfall patterns that are experienced there (Dessu & Melesse, 2013a). An additional source of variation comes from the effects of climate change which are predicted to increase the variability in rainfall patterns, in turn making the peak and low flows of the Mara river more extreme (Dessu & Melesse, 2013b; Gereta et al., 2013).

The Mara River enters Tanzania and flows through the Mara Region, which is the north western-most region of Tanzania and contains seven districts. This study was conducted in Serengeti District, which is located in the north eastern part of the Mara Region and borders Tarime District and Kenya to the north and Serengeti National Park to the east (United Republic of Tanzania, 1998a). The Mara River flows through the north western corner of the park and creates a natural border between Serengeti and Tarime districts. Serengeti District has its administration in Mugumu and the district overall has a population of 249,420, of which about 91% lives in rural areas, with agricultural activities as the main source of income for 77.6% of its population (United Republic of Tanzania, 2016).

Merenga is one of the wards in Serengeti District located approximately 40km north of Mugumu (United Republic of Tanzania, 1998a). The Mara river divides Merengna village from Tarime District to the north and Serengeti National Park borders the village to the east (United Republic of Tanzania, 1998a). The village has 4,323 residents with 1,977 males and 2,346 females which live in 1,094 households in six sub villages (Zachayo, 2019). There are two primary schools, Merenga and Merenga B, and one healthcare center (Zachayo, 2019). The majority of the population in Merenga participates in agricultural activity, mainly crop growing and livestock keeping, for subsistence purposes and they rely on the Mara River to support their livelihoods (Dessu et al., 2014; WREM International Inc., 2008; Zachayo, 2019).

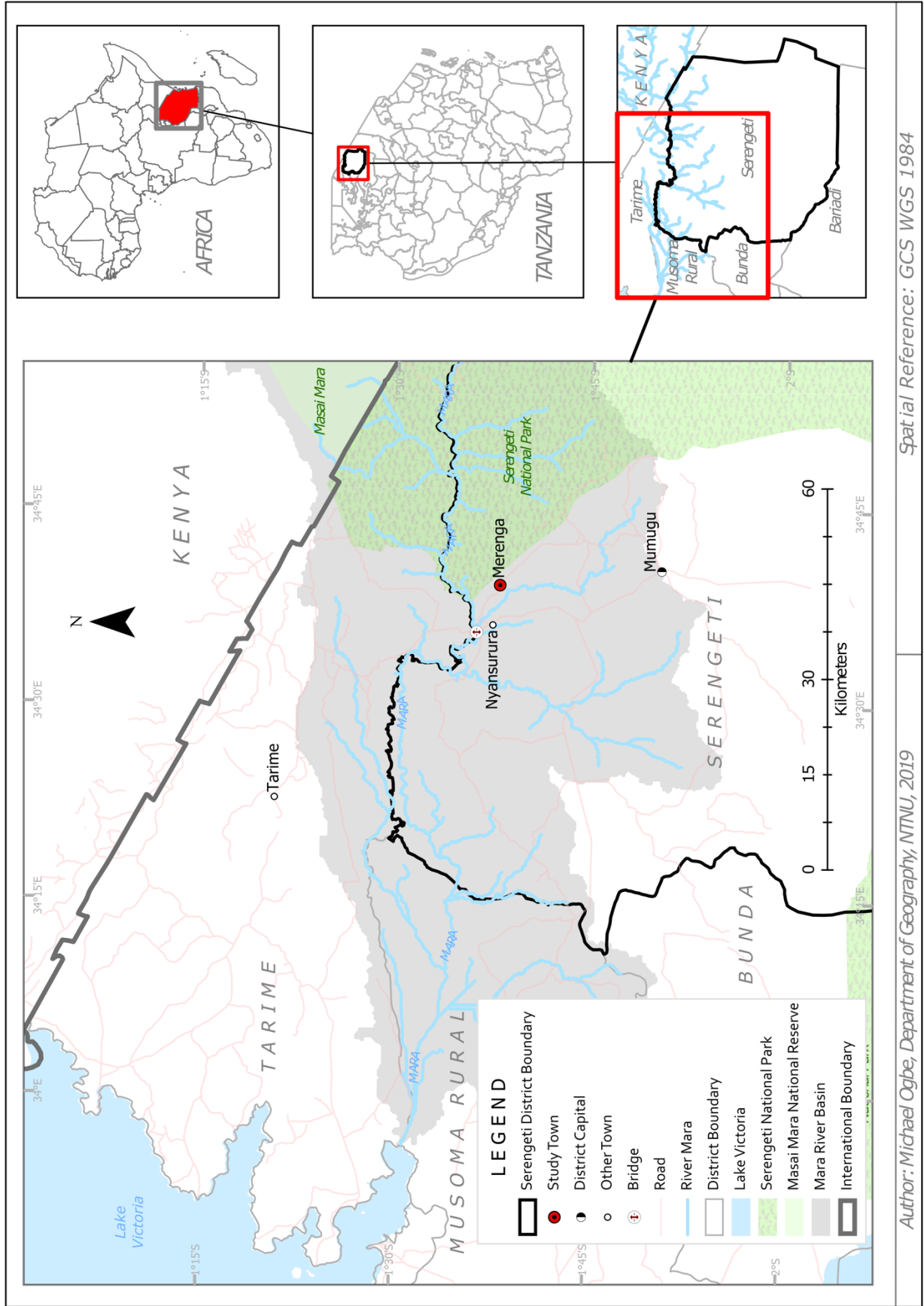


Figure 3. Map of study area, Merenga village, within Serengeti District, Tanzania (Ogbe, 2019).

## 2 Water: International Discourse, Concepts, & Institutions for Management

In this chapter the history of modern international water management plans and frameworks are outlined in order to demonstrate the influence international guidelines have on national policies. In the context of this study, water management is defined as “planned development, distribution and use of water resources” (Johansson, 1983, p. 138). The history of three internationally accepted frameworks that are concerned with water and its management and development are outlined in order to gain an understanding of the origins of current water management practices in Tanzania.

Following the historical outline of water discourse and management, there is a description of the ways in which the international community has treated water as an economic good and as a human right. This leads into a discussion of the types of formal and informal institutions that dictate the governance levels at which water management plans are performed. Integrated Water Resource Management is then presented as a foundation for the management framework in place that, in coordination with international treaties, influences how water is managed in Tanzania. The evolution of Tanzania’s water policies is described and reflects the complexities of creating plans that are successful in allowing for the continued and sustainable use of national water resources while also meeting the standards and principles set by international initiatives and entities.

### 2.1 History of International Discourse on Water Management

Over the past half-century there has been extensive work internationally to improve access to freshwater resources in rural and developing countries. This work has led to an ongoing evolution in the way in which water is treated, on the international scale, as an economic good, a development issue, and a human right. The introduction of water management discourse occurred in 1972 at the United Nations Conference on the Human environment, also known as the Stockholm Conference (Lein & Tagseth, 2009). It was further addressed at the first ever international water conference in Mar del Plata, Argentina in 1977 by the UN (United Nations, 2019). This conference was the first internationally coordinated

approach to Integrated Water Resource Management (IWRM) and was the beginning of decades of continuing work to provide access to safe, reliable, clean water to those who lack it (United Nations, 2019). The UN declared 1981-1990 the International Drinking Water Supply and Sanitation Decade, focusing attention on the importance of clean water and sanitation worldwide (United Nations, 2019). These early years of discourse and initiatives led into the International Conference on Water and the Environment in 1992 in Ireland, which resulted in the first internationally recognized principles for sound water management, known as the Dublin Principles (Lein & Tagseth, 2009). These principles recognized that water is becoming increasingly scarce due to water conflicts and overuse while focusing on water as an economic good (United Nations, 1992).

**Table 1. The Four Dublin Principles adapted from United Nations (1992).**

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ol style="list-style-type: none"><li>1. Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment.</li><li>2. Water development and management should be based on a participatory approach, involving users, planners and policy makers at all levels.</li><li>3. Women play a central part on the provision, management and safeguarding of water.</li><li>4. Water has an economic value in all its competing uses and should be recognized as an economic good.</li></ol> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

While the international community claims continued agreement on these principles as the foundation for the best practices within water management there has been much debate over how to move past the rhetoric and toward implementation of water management plans based on the principles (Lein & Tagseth, 2009). Additionally, there have been debates over the validity of the idea that water is an economic good and whether or not water is a basic human right. These debates and discussions about how water should be treated at the international level have resulted in various international treaties including the Millennium Development Goals (MDGs) and the Sustainable Development Goals (SDGs), both of which were developed by the United Nations and other international development partners. These sets of goals go beyond water management and focus on the broader development and sustainability of countries. However, within these goals, water management, and therefore the Dublin Principles, play a significant role. The MDGs and SDGs have played a very important and influential role in the ways in which water management has been discussed and implemented by international bodies like the UN as well as by individual nations.



Figure 4. Millennium Development Goals infographic (<https://www.un.org/millenniumgoals>).

The Millennium Development Goals (MDGs) were drawn from the United Nations Millennium Declaration, which is a resolution that the UN adopted during the Millennium Summit in September 2000 (UN General Assembly, 2000). These eight goals, set for the time period of 2000-2015, focus on development and increasing the global standard of living (Figure 4). More specifically, the MDGs concentrate on how wealthy countries can help developing countries reach more adequate levels of development and places the financial onus to reach these worldwide goals on developed nations. Throughout the document this responsibility of wealthier nations to aid developing nations is repeated. Another idea that is echoed throughout the declaration is the important role that water plays in achieving the goals set forth by the MDGs. In specific relation to water resources section IV focuses on “protecting our common environment,” which is reflected in Goal 7, “Ensure environmental sustainability,” in which the importance of the sustainable use of shared natural resources is emphasized (UN General Assembly, 2000). Despite the commitment to the MDGs by the international community, the MDGs had structural weaknesses that made it challenging for individual countries to meet the goals within the prescribed timeframe (Sachs, 2012). The failures caused by flaws within the MDGs provided the UN with inspiration to improve upon these goals in a new, more ambitious and holistic set of goals, the SDGs (Sachs, 2012; United Nations, 2015).



**Figure 5. Sustainable Development Goals infographic (<https://www.un.org/sustainabledevelopment>).**

The Sustainable Development Goals (SDGs) were established by the resolution entitled “Transforming Our World: The 2030 Agenda for Sustainable Development” and were intended to build off of and improve upon the MDGs. The SDGs, to be implemented and achieved from 2016-2030, go further than the MDGs by providing clear goals with adjustable action steps for individual countries to meet their national targets that correspond with those within the international initiative (United Nations, 2015). The SDGs are also intended to address a wider range of issues, with 17 international goals (Figure 5), more than twice as many goals than outlined by the MDGs, as well as 169 national level targets. This broader set of international goals shifts the focus to one more concerned with global sustainability while also promoting development. Additionally, the SDGs emphasize the responsibility of all countries to partake in reaching these ambitious goals through focusing on how individual countries can adjust their targets “guided by the global level ambition” while keeping in mind their development needs and national circumstances (United Nations, 2015).

The sentiment that every nation has the principal responsibility for its own development, both economic and social, and that national policies and strategies for development play a primary role in said development, is reiterated throughout the document (United Nations, 2015). This represents a significant shift from the MDGs, which were more focused on how wealthy countries should aid developing countries in their growth and progress (United Nations, 2015). The agenda emphasizes the importance of the involvement and participation of all countries, developed and developing alike, in achieving the goals and

targets set forth by the SDGs, as well as providing a framework for how progress and results should be tracked (United Nations, 2015).

In relation to this study, the SDGs provide a foundation for sustainable water use and management in Goal 6. Entitled “Clean Water and Sanitation,” goal 6, and each of its eight targets, was set forth to “ensure availability and sustainable management of water and sanitation for all” (United Nations, 2015). More specifically, targets 6.5 and 6.b are highly relevant to the aims of this study. Target 6.5 states “by 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate” (United Nations, 2015). Target 6.b resolves to “support and strengthen the participation of local communities in improving water and sanitation management” (United Nations, 2015). In addition to goal 6 and these specific targets, the importance of water and natural resources management is echoed throughout many of the goals outlined in the 2030 Agenda for Sustainable Development. The importance of water is mentioned in goals 3, 6, 11, 12, and 15 while the more general importance of natural resources, in which water is included, is referred to in goals 1, 5, and 15. This integrated focus on how water effects many sections of sustainability and development mirrors the evolution of how international bodies, like the UN, have adopted a more holistic view of how water should be managed through progressively more all-inclusive goals, from the Dublin Principles to the MDGs to the SDGs.

These three international publications represent and support the overarching and wide-reaching recognition of the importance of sound water management policies and practices for ensuring development and the sustainable use of this essential resource. However, throughout the period of international discourse on water management there has also been much debate on how water should be treated when moving from the theoretical rhetoric behind principles of water management into the applied and practiced policies that impact how water is accessed, used, disposed of and ultimately recycled within the water cycle. The arc of these debates moves from the principle that water is an economic good, set forth by the Dublin Principles, to seeing water as a human right and a key to achieving widespread development. The next two sections explore this spectrum of approaches and how international discourse has evolved through these debates.

## 2.2 Water as an Economic Good

Rogers, De Silva, and Bhatia (2002) argue that water has long been recognized as an economic good throughout Europe and the United States, where private companies that



supply water have taken root in various settings. However, the Dublin Principles brought the idea of water as an economic good to the international stage, by way of the UN, for the first time in 1992 (Bakker, 2007; Perry, Rock, & Seckler, 1997; Rogers et al., 2002; Savenije & Van Der Zaag, 2002). This idea has since been interpreted and developed in various of ways and through various schools of thought. By calling water an economic good in Principle 4 (Table 1), the leaders at the International Conference on Water and the Environment brought economic theory, that posits correct pricing of goods, both private and public, can lead to increased economic efficiency in the use or consumption of such goods, into international principles for how water management should be discussed and implemented (Rogers et al., 2002). Two differing views on how this idea has developed and should be implemented are discussed below.

One argument for considering water as an economic good stems from the idea that there are large inefficiencies in how water and water related services are priced and that taxes intended to pay for these goods are below the full and actual cost of obtaining and using the goods (Rogers et al., 2002). This trend of underpriced water and water services has led some professionals to call for the rise in water prices, which could fund the expansion of water infrastructure and services and lead to increased efficiency, equity and sustainability in the use and distribution of the resource (Rogers et al., 2002). While water pricing may be the simplest way to achieve the goals of efficiency, equity and sustainability within the water sector, Rogers et al. (2002, p. 1) acknowledge it may also be the “most difficult to implement politically.” This is because there are a variety of ways of increasing water prices, depending on the power structure, economic model, and water rights system within any given society and it is hard to predict which way will lead to increased efficiency, equity and sustainability with the least amount of resistance from and financial pain endured by users, especially the poor (Rogers et al., 2002). These researchers endorse the idea that “the choice of policy depends crucially upon the local political and social conditions” (Rogers et al., 2002, p. 16).

The World Bank echoes the sentiment of considering the social aspects of water as a resource but calls for a more holistic and sustainable approach to water resources management that treats “the resource as an economic as well as social good” (Lein & Tagseth, 2009; World Bank, 2004, p. 28). Savenije and Van Der Zaag (2002) support this and present a second school of thought on the concept of water as an economic good, arguing that water pricing should be used as an instrument for achieving financial sustainability not a tactic for water allocation. This line of argumentation within the debate about the validity of the idea of water

as an economic good posits that an approach to water management based strictly on economic pricing will fail because it does not take the unique characteristics of water as a resource and good into consideration. One such characteristic is that water cannot be divided up into clear kinds or types of water, as all water exists, in varying forms and positions, within the water cycle (Savenije & Van Der Zaag, 2002). Therefore the use of one form of water invariably impacts the availability of another form of water which in turn effects the whole cycle (Savenije & Van Der Zaag, 2002). Another characteristic that makes water unique as compared to other economic goods according to Savenije and Van Der Zaag (2002, p. 99) is the fact that there is no substitute for water on the market which means that the “only choice to be made is how to allocate it” and figuring out “the most efficient way of using it.” Water also differs from other goods in that it is temporally variable, dependent on climatic conditions and changes as well as on how humans, who are often in other countries or on different continents, have interfered with the climate (Savenije & Van Der Zaag, 2002).

Taking into consideration these key characteristics, water pricing is an important tool for increasing efficiency, equity and sustainability in the water sector that should support a more holistic and integrated approach, but should not be the only tool used because water is vitally different from other economic goods (Savenije & Van Der Zaag, 2002). Furthermore, Savenije and Van Der Zaag (2002) argue that seeing water as an economic good is not about finding the best price for water, it is about applying holistic reasoning to choices made about water management (Green, 2000). In order to achieve sound water management through the application of this type of reasoning, suitable and effective regulations are needed to guide the sectoral allocation of water (Savenije & Van Der Zaag, 2002). Within sectors, water markets and pricing may, in certain cases, allow for the efficient, equitable and sustainable allocation of this resource but should not be used as the predominant tool to dictate how water is managed (Savenije & Van Der Zaag, 2002).

These two schools of thought represent different perspectives on the same principle: water is an economic good. They propose different mechanisms for implementing sound water resource management. While there is still debate about the best approach for looking at the economic value of water and how to efficiently, equitably and sustainably allocate and use it, the real issues arise when applying this principle in real world situations. Running economic experiments to determine the best approach for managing water is unacceptable as it would greatly effect, possibly very negatively, and interfere with peoples’ livelihoods (Perry et al., 1997). The goal of minimizing the negative effects of water pricing supports an

opposing approach to how water should be viewed. It is embraced by a variety of stakeholders in the water management debate, ranging from environmentalists to public sector unions to indigenous peoples, all of whom argue that “water is life” and because of this water should be seen first and foremost as a human right and key to sustainable development (Bakker, 2007).

## 2.3 Water as a Human Right

Throughout the evolution of, and in response to the concept of water as an economic good, there has been a parallel development of the idea that water should be recognized by the international community as a human right. In the years since the Dublin Principles were adopted, it has become increasingly apparent that the importance of water permeates almost every aspect of human life and societal development. According to the UN, water is critical for energy generation, ecosystem functioning, socio-economic development and the very survival of life on earth and therefore a key component of sustainable development (United Nations, 2019). Despite the importance of water, water has not always been recognized as a human right and there are many challenges that society faces concerning water that have yet to be resolved. These challenges range from providing access to safely managed drinking water services to 2.1 billion people worldwide (WHO/UNICEF, 2017) to creating cooperative management frameworks for the two-thirds of the world’s transboundary rivers that currently lack them (WWAP, 2012). Additionally, the continued increase of international focus on climate change mitigation has highlighted the impacts of climate change on access to clean water and sanitation (WHO/UNICEF, 2017; WWAP, 2012). The importance of water for life and development combined with the continuing challenges society faces concerning water provide the base of reasoning for the argument that access to clean water should be seen as a universal human right at the international level.

Additionally, water’s wide-ranging impact on and importance to sustainable development has prompted opponents of viewing water strictly as an economic good to criticize the UN for focusing on the financial value of water rather than recognizing water as a necessity of life, especially within international initiatives like the MDGs (Garcés-Mascareñas, 2015). The water-as-right argumentation recognizes the necessity of water for life and human wellbeing as well as its embedded importance for development and food production (Avila-García, 2017). This perspective argues that the international effort to meet development goals combined with the essential need for reliable access to clean water necessitates the provision of aid and protection to vulnerable individuals, communities and

social groups (Avila-García, 2017). Furthermore, the vulnerability of these groups cannot be sufficiently addressed through a purely economic approach to water management focused on water pricing (Gleick, 2000; Marson & Savin, 2015; Savenije & Van Der Zaag, 2002). This idea was supported by the growing evidence that purely market based solutions for water management had so far failed to meet the MDGs relating to water and sanitation issues (Savenije & Van Der Zaag, 2002; UN General Assembly, 2010). This failure pushed the UN to initiate the ‘Water for Life’ International Decade for Action 2005-2015, which shifted the focus of water discourse to the importance of achieving universal access to drinking water and sanitation in a more integrated and holistic way.

The ‘Water for Life’ initiative declared that all nations have a collective responsibility in managing water resources responsibly and sustainably, an idea that would influence the ways in which the SDGs were established five years later (Balaji et al., 2012; WWAP, 2006). The campaign renewed the attention on the issue of water and led to the integration of the essential and unique nature of water as a resource into the way in which the international community views this resource. ‘Water for Life’ also led to the resolution for the human right to water and sanitation, adopted in July 2010 by the UN, which formally recognized the link between having reliable access to safe, clean water and sanitation and positive development outcomes (Sultana & Loftus, 2013; UN General Assembly, 2010). The human right to water in practice entitles all humans to have access to “sufficient, safe, acceptable, physically accessible and affordable water for personal and domestic use” (UN OHCHR, 2010). Within this definition, personal and domestic use is defined as water for drinking, personal and household hygiene, cooking, and washing clothes (UN OHCHR, 2010). Additionally, each of the adjectives describing the characteristics of water supply covered by the human right to clean water and sanitation has been defined in Table 2.

Two months after the ratification of this right the UN Human Rights Council solidified the legally binding aspects of this right with a second resolution, which added specific language about the human right to safe drinking water and made compliance with the human right to water and sanitation compulsory, even for countries who abstained from ratifying the first declaration (Sultana & Loftus, 2013; UN Human Rights Council, 2010). The recognition and reinforcement of the human right to water by the UN allowed for advancements in the international community’s ability to require individual countries to adopt measurable, concrete plans and actions that embed the right to water into national policies, new legislation, and development investments (Avila-García, 2017). Furthermore, the ‘Water

for Life’ campaign and the recognition of water as a human right through UN resolution directly influenced the approach to water and sanitation issues used in crafting the Sustainable Development Goals (SDGs).

**Table 2. Definitions of the characteristics of water supply as required by the human right to clean water and sanitation (UN OHCHR, 2010).**

Characteristic of water supply	Definition	Specific Requirements
Sufficient	Sufficient to cover basic human needs for personal and domestic use.	<ul style="list-style-type: none"> <li>• 50-100 liters per person per day covers most basic consumption and health needs.</li> <li>• 20-25 liters per person per day is absolute minimum required; this amount fails to cover all health and consumption needs. (WHO/UNICEF, 2017).</li> </ul>
Safe and Acceptable	Water supply must be free from threats to a person’s health including microbes, parasites, toxic chemicals and radiological substances.	<ul style="list-style-type: none"> <li>• Water must be of acceptable taste, color and odor to ensure people do not seek out polluted alternatives that may be more visually appealing.</li> <li>• Adequate sanitation systems are key mechanisms for protecting safe and acceptable water sources from contamination</li> </ul>
Physically Accessible	Water sources should be within safe and reasonable distance for all members of a population, with special consideration given for vulnerable groups including women, children, people with disabilities and the elderly.	<ul style="list-style-type: none"> <li>• Reasonable distance is defined as one that allows each person to collect sufficient water to cover personal and domestic uses.</li> <li>• Water sources should be within 1000 meters of a household and collection time should not be more than 30 minutes for access to the basic need of 20 liters per person per day. (WHO/UNICEF, 2017)</li> </ul>
Affordable	All direct and indirect costs for water and sanitation should not prevent anyone from accessing water services or enjoying other human rights including access to food, health, education and housing.	<ul style="list-style-type: none"> <li>• Cost recovery should not be a barrier to access, especially for the poor.</li> <li>• Suggested 3% of household income as possible benchmark. (WHO/UNICEF, 2017)</li> </ul>

While the right to water is now universally recognized this does not preclude the use of the tool of water pricing from water management. Sound water management strategies support water pricing as a tool to ensure equity, efficiency and sustainability in the work being done to achieve universal access to clean water (United Nations, 2015; WHO/UNICEF, 2017). The SDGs attempt to integrate the concept of water as an economic good and the tool of water pricing with the human right to water in order to strike a balance between the two

concepts that results in optimal management of this important resource. The next section explores the societal mechanisms which incorporate these concepts into the fabric of society.

## 2.4 Institutions in Management: Formal vs. Informal

The balance with which the international community implements the concepts of water as an economic resource and a human right in rhetoric and legislation influences the views of the concepts held by people at all levels of society. These societal views, rules and norms surrounding water, as well as the laws and regulations related to water set forth by governments, all come together to form the institutions that govern water use and management within a society (Ostrom, 1993). Institutions can be defined as “stable, valued, recurring patterns of behavior” that have an influence on society and its configuration (Huntington, 1968). Another definition of institutions is “integrated systems of rules that structure social interactions” (Hodgson, 2015). While the exact definition varies between economic scholars, it is agreed that institutions are the rules of the game of life, regulate access to resources, and range from laws and regulations set forth by governments to the cultural norms and societal rules that are unspoken and unofficial but understood by people within a society (Hodgson, 2015).

In order to address these broadly worded and numerous general definitions, scholars have categorized institutions into formal and informal groups. Formal institutions can be defined as any formally recognized policies, laws, acts, management plans, theories and organizations that are established and recognized by official entities such as governments (Sokile, Mwaruvanda, & Van Koppen, 2005). There is extensive literature about formal institutions, how they are constructed and how they change over time (Bromley, 1985; Davis & North, 1970; Hodgson, 2015; Huntington, 1968; Tool, 1977), as well as how new institutions should be constructed (Ostrom, 1990, 1993; Saleth & Dinar, 2004; Shah, Makin, & Sakthivadivel, 2001). Formal institutions play an important role in water management as they are the mechanisms through which water is governed by states, especially in the developed world (Shah et al., 2001; Sokile et al., 2005). The formal institutions concerned with water resources are wide ranging and include the laws, policies, enforcement mechanisms, non-governmental organizations and international treaties that define what sound water management looks like and how it should be performed. This study is itself informed by many formal institutions, such as the SDGs, the human right to water and sanitation, the concept of water as an economic good, and many more.

In contrast to formal institutions, informal institutions are less concrete and according to Sokile et al. (2005, p. 3) “have roots in the local communities and are embedded in and interwoven with the existing customs, traditions, norms, beliefs, folklores and tales.” Additionally, informal institutions are more malleable and evolve more slowly over time in response to changing situations at the local level (Ostrom, 1990; Saleth & Dinar, 2004; Sokile et al., 2005). Despite the difficulty in clearly defining what they are, the role that informal institutions in the developing world play is very important and cannot be over emphasized in governing water usage and management (Sokile et al., 2005). This is because at the local level of water management, informal institutions are highly respected and recognized as legitimate (Sokile et al., 2005). This deference for informal structures at the grassroots level often means that informal institutions are held in higher esteem than and prevail over formal ones within local water management (Sokile, Kashaigili, & Kadigi, 2003; Sokile et al., 2005; Sokile & Van Koppen, 2004). In order to adapt to this preference for the informal approach, many governments have worked to implement formalizing grassroots-based user organizations (Shah et al., 2001), such as the network of water users associations (WUAs) in Tanzania. Associations like WUAs are an attempt to bridge the gap between the formal and informal institutions that make up water management within Tanzanian society, by bringing together formal structure and informal rules and beliefs and allowing the two to interact and inform one another.

This interface between informal and formal institutions is defined by how they interact with each other and influence how each is formed and transformed by the others (Sokile et al., 2005). In fact, formal institutions can be seen as dependent on and derivative of informal ones in order to have stability and strength while informal institutions are interpretations and partial extensions of formal ones (Saleth & Dinar, 2004; Sokile et al., 2005). In the developing world, the interface between formal and informal institutions is especially important in water management because the ways in which the two interact dictate peoples’ ability to access clean water and sanitation (Sokile et al., 2005). In order to fully comprehend how a society is structured and how it functions, an understanding of all these institutions is needed, including the interface between the formal and informal and how they were formed and are changing (Ostrom, 1993; Sokile et al., 2005).

In her work to understand and outline how to construct strong institutions in situations influenced by the formal and the informal, the Nobel Prize winning political economist, Elinor Ostrom, outlined eight design principles for creating enduring shared resource

governance institutions (Table 3). The design principles were originally intended to be a framework for creating long-enduring irrigation institutions but have since been expanded to encompass all common pool resources (CPR), including all water resources (Ostrom, 1993, 1999). CPRs are defined within economic theory as any good derived from human-made or natural resources, which is non-excludable, rivalrous and faces the issues of overuse and congestion because it is subtractable (Ostrom, 1990). This means that the good's characteristics make it costly to exclude potential users from deriving benefits from it, the use of the good is competitive among users, and that one user's use of the good subtracts from others' ability to use the same good (Ostrom, 1990). These characteristics of CPRs influence the institutions that govern them, both formally and informally. Ostrom's work defines the characteristics of institutions capable of taking the facets of CPRs into consideration within the management of a resource like water.

**Table 3. Design principles for long-enduring institutions adapted from Ostrom (1993).**

#	Design Principle	Description
1	Clearly defined boundaries	The boundaries of the service area and the individuals or households with rights to use a shared resource from a service provider are clearly defined.
2	Proportional equivalence between benefits and costs	Rules specifying the amount of a shared resource that a user is allocated are related to local conditions and to rules requiring labor, materials, and/or money inputs.
3	Collective choice arrangements	Most individuals affected by operational rules are included in the group who can modify these rules.
4	Monitoring	Monitors, who actively audit physical conditions and user behavior, are accountable to the users and/or are users themselves.
5	Graduated sanctions	Users who violate operational rules are likely to receive graduated sanctions (depending on the seriousness and context of the offense) from other users, officials accountable to these users, or both.
6	Conflict resolution mechanisms	Users and their officials have rapid access to low-cost, local arenas to resolve conflict among users or between users and officials
7	Recognition of the rights to organize	Users have the right to devise their own institutions that are not challenged by external government authorities.
8	Nested enterprises	Appropriation, provision, monitoring, enforcement, conflict resolution and governance activities are organized in multiple layers of nested enterprises.



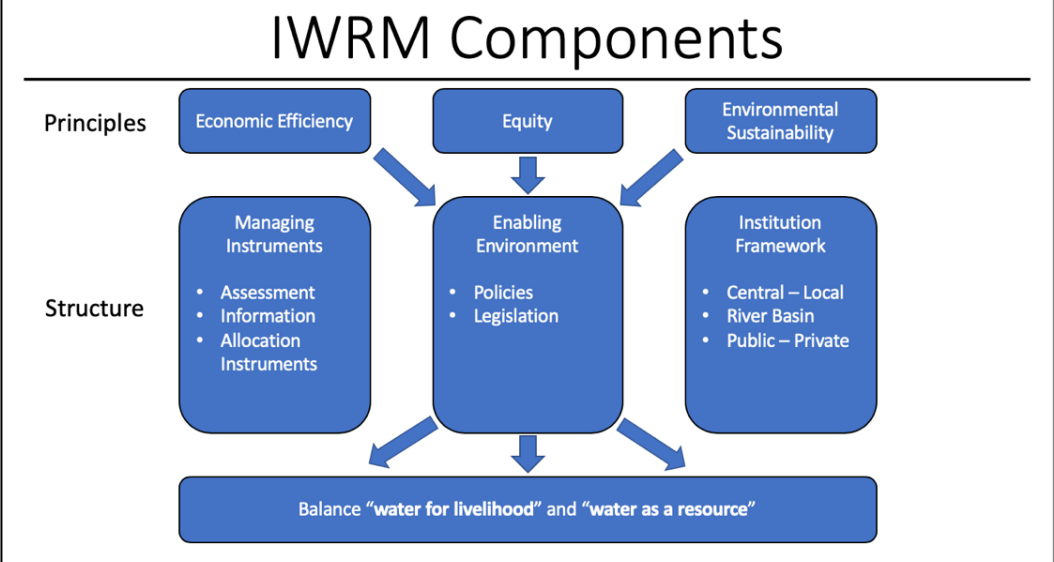
As suggested, institutions change over time and can be designed and redesigned to fit the evolving beliefs, needs, or wants within a society (Ostrom, 1999). Designing institutions is also a continuous process, which when looked at through the lens of water management is enhanced when all stakeholders are involved in the process (Ostrom, 1993) and institutions at all levels of society, from centralized to decentralized, are taken into consideration (Sokile et al., 2005). Centralized management is characterized by the utilization of formal institutions as a tool for managing resources from the national level (Masanyiwa, Niehof, & Termeer, 2015). Informal institutions are conversely linked to decentralized management principles which emphasize the dispersal of management responsibility to local level entities, such as village councils and water user groups like WUAs (Masanyiwa et al., 2015). Centralized and decentralized management can also interact, like formal and informal institutions do. However in order for them to influence one another there needs to be communication and coordination between the two.

In developing countries like Tanzania there is a gap between centralized, formal institutions and decentralized, informal institutions, which leads to ineffective water management (Shah et al., 2001). This deficiency of communication and coordination is exacerbated by a lack of an enabling environment, an institutional framework and management instruments, all of which are necessary for the formation of strong institutions for water management (Hassing, Ipsen, Clausen, Larsen, & Lindgaard-Jørgensen, 2009; Shah et al., 2001). There is a framework that has been constructed in order to instate sound water management policies and practices at all levels. The goal of this framework is to build the structures necessary for strong, integrated and enduring institutions that bring together formal and informal institutions and centralized and decentralized management into sound policies and plans. This framework is a process known as integrated water resources management.

## 2.5 Integrated Water Resource Management

Integrated water resource management (IWRM) is a concept that was developed throughout the history of the international water management discourse (Rahaman & Varis, 2005). IWRM attempts to bring together formal and informal governance institutions and centralized and decentralized forms of management in order to achieve a sustainable, multifaceted, and integrated approach to the complex issue of water resource management (Sokile et al., 2005). Since the UN Water Conference in 1977, IWRM has been developed, criticized, reworked, and edited in a multitude of ways. Today, the most widely accepted

definition of IWRM is “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, 2000). IWRM attempts to use common sense and clear language in order to convey and implement best practices based on efficiency, equity and sustainability within water management practices, as recommended by the Dublin Principles (Hassing et al., 2009). These principles provide the foundation for the three structural pillars of IWRM, which are an enabling environment, institutional framework, and management instruments, seen in Figure 6 (Hassing et al., 2009). As suggested by the figure, the overarching goal of IWRM is to achieve a balance between the concepts of water as a resource and water for livelihood (Hassing et al., 2009), or in the language used by this study, between water as an economic good and water as a right.



**Figure 6. The principles behind and structural components of IWRM adapted from (Hassing et al., 2009).**

Critics of the Global Water Partnership’s definition, like Biswas (2004), argue that the language within it is too broad and vague, and therefore not easily implemented in real life, at the operational level. Furthermore opponents posit that while conceptually attractive, implementing IWRM is practically impossible (Biswas, 2004, 2008). These critics contend that the impossibility of success of IWRM is due to little consensus surrounding which factors to include in the integration process, little to no success achieved through IWRM implementation thus far, and a lack of agreement about the parameters that should be used to assess and monitor success, or failure, of IWRM initiatives (Biswas, 2004, 2008).

Despite the IWRM's shortcomings, the merit of the concept is still considered admirable by supporters, who argue that implementation of the concept's principles is a process that takes time. Backers of IWRM acknowledge that full realization and implementation of the principles of IWRM within water resources management practices may take several decades (Hassing et al., 2009). However, supporters argue that a long implementation period does not negate the validity of pursuing the principles and goals of IWRM (Hassing et al., 2009). The support of and belief in IWRM by the international community is evidenced by the inclusion of components of IWRM in the Dublin Principles, the MDGs and the SDGs (UN General Assembly, 2000; United Nations, 1992, 2015). The ways in which IWRM has been interpreted and incorporated into these international agreements has progressed and changed subtly yet significantly, as the successes and failures of the earlier agreements, goals and action plans, as well as the strength and weaknesses of IWRM, were taken into consideration in the drafting of the more recent ones.

Coming a decade and a half after the inaugural water conference held at Mar de Plata, the Dublin Conference of 1992 formulated the principles that have become the foundation of the concept of IWRM (see Table 1). The conference further succeeded in highlighting the necessity of integrating water resource management and encouraging the active participation of all stakeholders, at all levels, and also brought the important role of women in water management to the attention of the international community (Rahaman & Varis, 2005). In spite of these successes in utilizing IWRM as a tool for promoting sound water management practices, the conference failed to create a clear roadmap for how the Dublin Principles, and the structure of IWRM, should be implemented in real life situations (Rahaman & Varis, 2005). The conference also lacked active and meaningful participation of the developing world's water professionals and decision makers and in general only brought together experts, rather than a wide range of stakeholders participating in intergovernmental meetings (Rahaman & Varis, 2005), both of which are now seen as important parts to putting IWRM into practice (Hassing et al., 2009).

The MDGs can be seen as a broad response to the critique that the Dublin Conference did not provide a framework for implementing IWRM in the real world. This set of eight easily understandable goals attempted to mobilize the world in order to achieve important and agreed upon social priorities worldwide, through the setting of timebound and measurable objectives (Sachs, 2012). An important precursor to the Millennium Declaration was the Second World Water Forum, held in the Hague in March 2000, which provided a foundation

of understanding of IWRM and water's social, cultural, and environmental values that were integrated into the MDGs (Rahaman & Varis, 2005). Overall, progress achieved by the MDGs was highly variable across countries, regions, and goals (Sachs, 2012). However the goals and the Second World Water Forum were successful in raising IWRM to international attention by highlighting the importance of its principles for the advancement of the world-wide political and development agenda (Rahaman & Varis, 2005; Sachs, 2012).

Most recently, the SDGs attempt to achieve the balance between the concepts of water as economic good and water as human right prescribed by IWRM by recognizing and taking into consideration the failures of the MDGs within the newer set of goals and targets (Sachs, 2012). The MDGs failed to take a truly integrated approach to water management, and to development in general, thus resulting in the failure to meet water-related, and other, goals within the MDG timeframe (Le Blanc, 2015; Sachs, 2012). While the MDGs were set mainly for poorer countries, using the aid of wealthy countries, to achieve higher levels of development, the SDGs attempt to rectify the MDGs failures by taking a holistic approach to the ways in which all countries should participate in the advancement toward sustainable development (Le Blanc, 2015; Sachs, 2012; United Nations, 2015).

In the context of water related goals and IWRM, the SDGs attempt to integrate the ways in which water influences and impacts various other goals within the agenda (Le Blanc, 2015; United Nations, 2015). In fact, Le Blanc (2015) describes how the type of integration prescribed by IWRM for water resource management can be seen throughout The 2030 Agenda for Sustainable Development, creating a network of intertwined, interrelated, and therefore inseparable goals and targets (Hassing et al., 2009). As a whole, the SDGs are a more integrated system of goals and targets than the MDGs and this overall integration may lead further to the integration of policy across sectors (Le Blanc, 2015). With the increasing international focus on integration across sectors, especially in relation to water related issues and IWRM, individual countries have started to adopt these principles into their own policies and legislation as well as working to create transboundary water resource management plans for water resources they share with their neighbors.

Transboundary water resource management plans are a key component to target 6.5 of the SDGs which promotes the use of IWRM in crafting such agreements (United Nations, 2015). As an increasing number of countries worldwide are experiencing higher levels of water stress, transboundary management becomes ever more important to implement

(Rahaman & Varis, 2005) and because of this there has been an international push to strengthen existing river basin commissions and to create ones where there currently are none (Sandford, 2017). One of the main challenges to creating effective joint river basin management plans is the lack of strong formal institutions that support cooperation between all the stakeholders within a given basin (Ostrom, 1999; Rahaman & Varis, 2005). However, if the international community and individual countries wish to achieve the implementation of successful transboundary water resource management this challenge must be overcome. Implementing the process of IWRM combined with Ostrom's institutional design principles is one approach to accomplish this goal. The ways in which Tanzania has incorporated these processes and principles into its water resource management plans and legislation, as well as the work that has been done by Tanzania and Kenya to create a transboundary management plan for the MRB will be examined in the next section.

## 2.6 Tanzanian Water Policies & Management

At the national level, The United Republic of Tanzania has a long history of developing management plans and institutions for the water resources within its borders. Over the past nearly 60 years since independence the government of Tanzania has struggled to find a balance between centralized, formal policies and control and decentralized, informal power structures to manage and improve water sources in Tanzania (Masanyiwa et al., 2015). These struggles are coupled with Tanzania's legal pluralism between national law and traditional rights, especially within water policies, which allows for various customary laws to be accepted as holding the same weight and legal standing as written law, according to the *Judicature and Application of Law Ordinance (No. 453) of 1961* (Lein & Tagseth, 2009; United Republic of Tanzania, 2004).

An example of this pluralism is observed in national water law, which states that water belongs to the state and any user that wants to abstract surface water, like that in rivers and streams, must have a water right, or license, obtained from a water officer (Lein & Tagseth, 2009). Existing alongside this formal law, customary and traditional rights allow established practitioners of traditional irrigation to have access to water, and this right is seen as a matter of inheritance or local custom (Lein & Tagseth, 2009). This combination of formal laws and informal rules, all with equal weight under the law, has created an inextricably intertwined web of formal and informal water policies and ministries that coexist uneasily in Tanzania (Lein & Tagseth, 2009; Sokile & Van Koppen, 2004). Some of the tension between the two

approaches comes from calls for water policy reform based on claims of a water crisis in the country (Lein & Tagseth, 2009) and the subsequent sense of urgency all forms of management feel to “get it right” when it comes to water (Sandford, 2017). This urge can be observed in the many amendments and changes to water policies over the past 50 years within the country.

Tanzania’s original formal water law was established by British colonial authorities in the 1923 (Lein & Tagseth, 2009). Since independence in 1961, many formal water-related policies have been adopted starting with the main *Water Utilization (Control and Regulation) Act, 1974 (No. 42)* and its subsequent amendments in 1981, 1994, 1996, and 1997 (United Republic of Tanzania, 1974, 1981, 1994, 1996, 1997). This policy and its amendments dictated water utilization, established water authorities and outlined regulations for fees associated with water right applications and volumetric water abstractions (Lein & Tagseth, 2009; United Republic of Tanzania, 1974, 1981, 1994, 1996, 1997). There were also policies and strategies in other sectors that incorporated water resources into their rhetoric and influenced the use and management of water in the country, including *Poverty Reduction Strategy Paper*, the *Development Vision 2025*, the *Policy Paper on Local Government Reform*, and *The Energy Policy of Tanzania* (Lein & Tagseth, 2009; United Republic of Tanzania, 1992, 1998b, 1999, 2000). As for ministries that deal with water there have been many including, but not limited to, the Ministry of Water, the Ministry of Water and Livestock Development, the Ministry of Water, Energy and Minerals, and the Ministry of Water and Irrigation (Lein & Tagseth, 2009). This web of overlapping policies and ministries with differing and sometimes contradicting objectives led to a lack of strong institutions, inadequate training in maintenance, inappropriate technologies, exclusion of customary laws, and low involvement of local community members in the process of establishing water infrastructure and management leading to overall weaknesses and sometimes failures in these systems (Masanyiwa et al., 2015; Priscoli, 2004).

In response to these difficulties the Tanzanian government has done extensive work since the turn of the century to repeal and restructure its water policy system. Currently, the Ministry of Water and Irrigation is the government entity responsible for managing water resources within Tanzania with its main policies being the *National Water Policy*, *The Water Resources Management Act*, and the *Water Supply and Sanitation Act* (United Republic of Tanzania, 2002, 2009a, 2009b). The objectives of these policies are outlined in figures 6, 7, and 8.

*National Water Policy, 2002 objectives:*

- To develop a comprehensive framework for sustainable development and management of the Nation's water resources, in which an effective legal and institutional framework for its implementation will be put in place;
- [To] ensure that beneficiaries participate fully in planning, construction, operation, maintenance and management of community based domestic water supply schemes;
- [To] address cross-sectoral interests in water, watershed management and integrated and participatory approaches for water resources planning, development and management;
- [To] lay a foundation for sustainable development and management of water resources in the changing roles of the Government from service provider to that of coordination, policy and guidelines formulation, and regulation.

**Figure 7. National Water Policy objectives adapted from United Republic of Tanzania (2002, p. 3).**

*The Water Resources Management Act, 2009 objectives:*

- To provide for institutional and legal framework for sustainable management and development of water resources;
- To outline principles for water resources management;
- To provide for the prevention and control of water pollution;  
To provide for participation of stakeholders and the general public in implementation of the National Water Policy, repeal of the Water Utilization (Control and Regulation) Act and to provide for related matters.

**Figure 8. Tanzania's Water Resources Management Act objectives adapted from United Republic of Tanzania (2009a, p. 359).**

*Water Supply and Sanitation Act, 2009 objectives:*

- To provide for sustainable management and adequate operation and transparent regulation of water supply and sanitation services with a view to give effect to the National Water Policy, 2002;
- To provide for the establishment of water supply and sanitation authorities as well as community owned water supply organizations;
- To provide for appointment of service providers, repeal of the Waterworks Act and to provide for related matters.

**Figure 9. Tanzania's Water Supply and Sanitation Act objectives adapted from United Republic of Tanzania (2009b, p. 429).**

These three policies are the current foundation of water policy in Tanzania and, as expressed in their objectives, they work conjointly to provide an enabling environment capable of building strong institutions for water management that incorporate the principles of IWRM into national water plans (United Republic of Tanzania, 2002, 2009a, 2009b). They replace all previous legislation from and amendments of the *Water Utilization (Control and Regulation) Act*, include rhetoric about the importance of local participation in all processes related to water planning, management, implementation, and operation, and accept informal, or customary law as carrying equal legal weight as formal water policies in Tanzania (United Republic of Tanzania, 2002, 2009a, 2009b).

Informal or customary laws have also played a substantial role in Tanzania's water resource management history. However, these informal institutions were not recognized by the government as equal to written law until the passage of the *Judicature and Application of Law Ordinance (No. 453) of 1961* (Lein & Tagseth, 2009; United Republic of Tanzania, 2004). The recent integration of traditional laws into *The Water Resources Management Act* (United Republic of Tanzania, 2009a) further strengthens their legitimacy within formal water policy. The act is representative of the ways in which Tanzanian ministries have worked to formally endorse customary laws and incorporate them into written law. This work can be seen as an effort to integrate formal and informal institutions in order to achieve better legislative and managerial outcomes and in doing so mirrors the process of IWRM.

Working to integrate informal and formal laws has resulted in the network of WUAs established by the government, which issue and monitor rights for abstraction and encourage participation in the process of IWRM by all water stakeholders (Sokile & Van Koppen, 2004). However, WUAs have many flaws and have been shown to favor formal laws in ways that increase inequity in water access, giving preference to local elites and making it harder for the poor to access the minimal water needed for day-to-day life (Sokile et al., 2003; Sokile et al., 2005; Sokile & Van Koppen, 2004). While these set-backs with WUA structuring and implementation have made the process of integration slower than desired, Tanzania has embraced the move toward mainstreaming IWRM principles by using them in its water basin management plans.

The government of Tanzania has worked to implement the principles of IWRM by establishing river basin-level management plans for both its national and transboundary river basins. Tanzania shares many trans-boundary resources with Kenya, and these two countries



recognize the valuable and mutually beneficial potential of having a framework for managing their shared resources. Kenya and Tanzania have been actively working on this issue and most recently, on 29 November 2018, the environmental ministers from the two countries signed a joint communiqué for the sustainable management of shared transboundary resources (2018). The bilateral talks described in the communiqué focused on crafting strategies for the sustainable management of transboundary resources, like transboundary river basins (Joint communiqué on sustainable trans-boundary resource management, 2018). The communiqué directly mentions the MRB as one such basin and outlines five steps to improve upon or replace existing bilateral initiatives, which both parties agreed have historically proved to be inadequate in slowing down, minimizing, and controlling the scale and speed at which their shared resources have been degraded (Joint communiqué on sustainable trans-boundary resource management, 2018). These steps include establishing ministerial-level transboundary committees for management and technical guidance, undertaking a fact-finding mission to determine the current status of shared resources and recommend interventions, and developing a shared management protocol and plan of implementation for management initiatives (Joint communiqué on sustainable trans-boundary resource management, 2018).

This plan is in line with SDG efforts to create effective basin-level river management plans for all transboundary rivers worldwide and represents Tanzania's and Kenya's willingness to support and jointly pursue this goal at the national level (United Nations, 2015). The plan is the most recent effort to achieve sound management of transboundary river basins like the MRB by the governments of Kenya and Tanzania. The agreement also validates and pushes forward the work that has been done by NGOs to establish a shared transboundary management plan for the MRB. Over the past two decades NGOs and international agencies, with funding from Norway, Sweden, and the United States, have worked to establish shared, basin-wide, and MRB-specific management plans for the development and prolonged sustainability of the MRB, its water resources and the encompassing ecosystem (Onyando et al., 2013). Included in these efforts is work to establish strong water management institutions and mainstream IWRM principles in those institutions and the plans they produce (Onyando et al., 2013).

There were four basin-wide projects conducted in the MRB between 2003-2014, one by World Wildlife Fund (WWF), one by Nile Basin Initiative (NBI) Nile Equatorial Lakes Subsidiary Action Programme (NELSAP), and two by Global Water for Sustainability Programme (GLOWS). WWF's project, *Mara River Basin Management Initiative, Kenya and*

*Tanzania*, had the overarching goal of ensuring adequate quality and quantity of water supplied by the Mara River to maintain sustainable ecosystem functioning and basic human needs (Onyando et al., 2013). The *Mara River Basin Transboundary Integrated Water Resources Management and Development Project, Kenya and Tanzania*, was conducted by NBI NELSAP and had the goal of using IWRM principles to establish a sustainable framework for the shared management of the MRB's water resources and to prepare for sustainable development investments to improve the standard of living and environmental protection in the basin (Onyando et al., 2013).

GLOWS conducted two concurrent projects concerning the MRB. The first was the *Integrated Management of Coastal and Freshwater Systems – Mara River Basin*, which was focused on increasing the social, environmental and economic benefits derived from healthy aquatic ecosystems and sustainable water resources management (Onyando et al., 2013) The second was the *Transboundary Water for Biodiversity in the Mara River Basin (TWB-MRB), Kenya and Tanzania*, which concentrated on implementing coordinated and participatory projects aimed at improving water resource management that reduce and take special consideration of the threats to biodiversity in the MRB and surrounding ecosystem (Onyando et al., 2013). While the four projects' goals vary slightly, all four take an IWRM approach to the management of the MRB, incorporating Ostrom's design principles in order to establish the necessary institutions needed to manage and address the specific challenges and transboundary characteristics of the MRB.

Since these projects began a variety of conflicts between Kenyan and Tanzanian participants have arisen. These conflicts are centered around the economic value of water in Kenya versus the value of sustaining life and ecosystems with water in Tanzania and how these conflicting values interplay with the proposed dam projects in both countries. As recently as May 4, 2019 there have been clashes between Kenya and Tanzania over plans to build seven dams in the upper catchments of the MRB in Kenya and one dam in the lower catchment of the basin in Tanzania, just before the Mara flood plains (Muchira, 2019). While the proposed dam projects in Kenya would likely alleviate some of the pressure on freshwater demands in southern Kenya, they would also most likely lead to major reductions in the amount and availability of downstream freshwater resources for users in Tanzania and for the Serengeti ecosystem (Gereta et al., 2013). The report by Gereta et al. (2013) funded by Tanzania National Parks and the Frankfurt Zoological Society argues that this, combined with other water flow disrupting projects in Kenya, may lead to the complete drying of the Mara

River during the dry season and severe droughts. This outcome would greatly impact both the people and the wildlife of northern Tanzania who depend on the river. Mnaya et al. (2017) argue that if these dams are built they will require 115-185% of annual flows in drought years, leaving nothing for the minimum environmental flows required to maintain a flowing water source. This means that during drought years the Mara will dry completely.

In this most recent confrontation between the two countries over the dams, Tanzania has called for the halt of the construction of the Norera dam in Kenya and the Borenga dam in Tanzania (Muchira, 2019). These are the two dams in the eight-dam proposal that would be constructed directly on the Mara river (see Figure 1). While Tanzanian officials claim to be in negotiations with Kenyan counterparts to shelve the projects, according to Muchira (2019), Kenya has asserted that they will continue with the construction of all the dams and accuses Tanzania of dishonesty, as the projects were to be implemented with the support of NBI which has worked to create a shared, integrated transboundary water resource management plan for the entire MRB. While the debate continues, the two contested dams are still in the planning and financing phase and construction has not started on either (Muchira, 2019).

These dams were planned under the guidance of the NBI NELSAP Transboundary IWRM and development project for the MRB and would bring considerable development investments into Kenya and result in multiple new hydroelectric power generation stations which could greatly benefit Kenya economically and developmentally (Nile Basin Initiative & Nile Equatorial Lakes Subsidiary Action Program, 2015). Opponents of the plans argue that they only take into consideration the economic value and allocation of water resources in the Kenyan side of the basin while ignoring the need to meet minimum environmental flows in order to maintain the river, especially during the dry season and prolonged droughts (Gereta et al., 2013; McClain et al., 2014; Mnaya et al., 2017). Furthermore, opponents assert that the dam proposals fail to recognize the human right to water in the Tanzanian side of the basin and do not consider the ecological and humanitarian ramifications of such expansive infrastructure in a fragile ecosystem (Gereta et al., 2013; McClain et al., 2014; Mnaya et al., 2017; Muchira, 2019).

## 3 Methodology

### 3.1 Introduction

This study was conducted in Merenga Village between September and October 2018. The phenomenon under study is international water resources management and qualitative methods were used to explore the importance of the Mara River and other water resources to communities of this region. As Roulston (2014) explains qualitative methods allow the researcher to learn about the lived experiences, motivations, perceptions, opinions, and beliefs of their subjects in a manner more in-depth than quantitative methods (Flick, 2014). Therefore, qualitative methods are suited to this study because I am researching the perceptions and lived experiences of Merenga village, a community that depend on the Mara with questions about why and how the Mara and its management at varying levels affect such communities. I am pursuing these questions because previous studies in the region are focused on the hydrology of the MRB and the effects of this on the world-famous Mara-Serengeti ecosystem and wildlife. This study attempts to explore the human side of the MRB and its management through the lived experiences of its residents.

This study was conducted under AfricanBioServices (ABS), which is an an EU-funded African-European network of scientists and researchers working on the project “Linking Biodiversity, Ecosystem Functions and Services in the Serengeti-Mara Region, East Africa: Drivers of Change, Causalities and Sustainable Management Strategies” (AfricanBioServices, 2017). This connection provided the funding needed to conduct the necessary fieldwork in Tanzania as well as the connections with organizations in Tanzania, like TAWIRI, TANAPA, and NCAA that proved vital to its successful completion. It is important to note that this study was highly dependent on the issue of access to informants. Access refers to this researcher’s ability to work in the proposed study area and with the proposed key informants (Crang & Cook, 2007; Hay, 2016). Being associated with AfricanBioServices gave me access to the study area and some of the key informants or ‘gatekeepers’ that were crucial in making introductions and setting up interviews with other informants (Crang & Cook, 2007). These connections included contact with Dr. Janemary Ntalwila of TAWIRI, who helped the research group I was a part of get our research permits

and set up connections in the field for my research, and Noel Alfred of TAWIRI, who drove our group of researchers during our fieldwork. The key connection provided by Dr. Ntalwila for the fieldwork I conducted was with the ABS and TAWIRI's Serengeti District community coordinator, Jeremia Zachayo, who was assigned to help me in the field. Jeremia's work for this study was essential, as he introduced me to community leaders in Merenga, helped to organize community members willing to answer my questions, and was the translator for all of my interviews with community members. Jeremia also arranged two meetings with key informants in Mugumu, the administrative seat of Serengeti District and provided me with contact information for a third key informant.

## 3.2 Methods in the Field

In this section I will describe the methods used in the field to gather data. First, the methods used to select informants are described. Then I talk about how I used the qualitative data gathering methods of semi-structured interviews and direct observation to gather information pertaining to my research questions. After this I explain the data analysis methods used to make sense of the interviews I conducted in the field. Finally, I discuss the limitations of my methods and study.

In the field, 15 community members living in Merenga were interviewed, 11 males and 4 females, as well as 3 key informants who are professionals in the fields of wildlife management, ecology and water engineering. The informants from Merenga and the key informants from Serengeti District and Serengeti National Park were integral in establishing an understanding of the lived experiences and perceptions of the people from Merenga with connection to the Mara river, as well as in learning how the government's current water policies affect the lives of these people and the management of the MRB.

### 3.2.1 Informant Selection

Informant selection of villagers was done through purposive opportunistic, criterion and convenience sampling. Purposive sampling is the purposeful selection of a particular group for study based on specific characteristics they possess and was used for the informant selection within this study (Hay, 2016). Included in this type of sampling are opportunistic, criterion and convenience sampling. Opportunistic sampling is the "impromptu decision to involve cases or participants in a study on the basis of leads uncovered during fieldwork" (Hay, 2016, p. 449). Criterion sampling was used in the selection of key informants as it is the

selection of participants that meet certain criterion (Hay, 2016), in this case managers who work on management issues within the MRB. Convenience sampling involves selecting participants on the basis of access, and while not always reliable for good data, produced interesting and relevant data for this study (Hay, 2016).

On the first day of fieldwork in Merenga, Jeremia introduced me and the study objectives to a village council leader in Merenga who gave me permission to interview community members. The village leader assigned a young man from the village to facilitate the introductions between myself and the village members I would interview. Jeremia, the facilitator and I walked from household to household seeking out willing participants. At each household we came upon the facilitator would introduce Jeremia and Jeremia in turn would introduce me and my project to the people in their homes. In this way the facilitator acted as a gatekeeper who provided the necessary connection with informants that allowed for the formation of trust between the informant, Jeremia and me. After each introduction Jeremia would then ask if the head of household or another adult living in the household would be willing to answer my questions. In this way respondents opted-in to participating in the study.

On the second day of fieldwork in Merenga we met with another village council leader who informed us that there was a village assembly going on between to the town well and a school building. I was told I would conduct the interviews in the school during the morning. The village councilor and Jeremia spoke to the assembly and introduced me and the objectives of my study to the assembled villagers and then asked willing volunteers to speak with me. The village councilor facilitated the connection between myself and the interviewees and acted as a liaison, bringing each new informant to sit with and be interviewed by me in the school. In the afternoon we moved location and sat outside the village council's administrative building. Here, people who had heard about my project earlier in the day but could not stay to be interviewed came to meet with me. Each of the informants on this second day of fieldwork volunteered to be interviewed. All of the interviews on both days in the field were only recorded with the express permission of each interviewee.

Two of the three key informants were selected through pre-established relationships that Jeremia had and through which was able to recruit his contacts to answer my questions. The first of these was John Lendoyan, the Head Game Officer of Serengeti District who is Jeremia's boss. Jeremia acted as the connection between me and Mr. Lendoyan, scheduling a meeting time for me to interview him. The second key informant was Dickson Kamazima, a

water engineer working in Serengeti District. He is a personal contact of Jeremia who agreed to be interviewed. Unfortunately the recordings of our interviews were unusable due to malfunctioning equipment but notes from our conversation helped me to build an understanding of water resource development in the region. The last key informant was Emilian Kihwele, Head TANAPA Ecologist for Serengeti National Park. Dr. Ntalwila provided me with his contact information introduced me to him via email. Mr. Kihwele and I met for an interview in Arusha in early October 2018, during my last week in Tanzania.

### 3.2.2 Semi-Structured Interviews

Interview methods were the main source of data for this study and were used to gain an understanding lived experiences and perspectives of people living and working in the MRB. This involved audio recordings of the interviewees who agreed to be recorded and interview notes taken during all of the interviews. Additionally, the process included using semi-structured interview guides to interview key informants who were management officials with knowledge of water resources and the institutions that manage them, as well as community leaders who depend on the water resources in their village and participate in the local village council. Community members who rely on the Mara and other water resources were interviewed about their dependency on and perceptions of the water resources they use as well as their perspectives of water management as it currently is performed in the village. The management officials interviewed were asked about the positions they hold, the work they do and their perceptions of the MRB and its management.

The interviews I conducted with the community members and the key informants were done using a semi-structured style in which I developed interview guides for each type of informant I planned on interviewing. These guides can be seen in Appendix 2. Semi-structured interviews follow an interview guide, which is a list of questions, but do not rigidly adhere to those questions (Hay, 2016). They allow for follow-up and exploration of topics that may arise throughout the interview that are not necessarily included in the original set of questions (Hay, 2016). This type of interview allows the researcher to gain a more in-depth perspective and understanding of the informants' views (Hay, 2016). In relation to this study, the semi-structured approach gave me the freedom to adjust the wording of the questions so that they could be more easily translated to my Kiswahili speaking informants.

Each interview with community members in Merenga began with an introduction by Jeremia, the translator. He would introduce the informant and me and then give the informant

a short description of the study I was conducting. This description was developed throughout the interviews as Jeremia became more familiar with the questions I asked and the conversations I had with the informants, through his translations, about my motivations to study the topics we discussed. After this introduction I asked the informant if I could record our conversation. Thirteen of the fifteen community members I interviewed agreed to be recorded, as well as all three of the management officials. In addition to recording the interviews, I took notes of what was said and my general impression of each interview. I began with basic questions about the informants' age, amount of time they have lived in Merenga, whether or not they held any leadership position within the community, and their main source of income. For the management officials I asked about their work experience that led up their current position and about the responsibilities that their positions entail. Once I had gathered this introductory information I interviewed the informants about a wide range of topics including the ways in which they depend upon and use the Mara, their perspectives on different factors effecting the river, and their views on how the river is cared for by their community, Tanzania, and Kenya. Each interview ended with me saying "Those are all the questions I have for you; do you have any questions for me?" This allowed the participants and I to engage with each other further and to close the interview in a congenial way.

These interviews allowed me to gain an on-the-ground perspective of the uses and perceptions held by the people who are dependent on the Mara river as their main freshwater resource as well as the perspective of management officials whose work is concerned with or impacted by the management of the MRB (Crang & Cook, 2007).

### 3.2.3 Observation

Observation is a qualitative research method that involves the purposeful watching of events and happenings occurring in the world (Hay, 2016). It is the result of active choice rather than just exposure, due to the fact that what we see and how we see it is influenced by what we choose to focus our attention on (Hay, 2016). Observation is used to complement, contextualize and count data gathered through other methods (Hay, 2016), and in the case of this study was used to complement and contextualize the data from the interviews that were conducted.

Complementary data is additional evidence that describes the other more structured forms of data collection, such as interviews, and can be collected before, during and after these other methods are performed (Hay, 2016). At the end of each day I journaled about my



impressions and feelings about the experiences I had had throughout the day. These field notes and interview impressions are types of complementary observational data that were used to build a better picture of the place and people I interviewed, especially after leaving the field and during the analysis of the data. Contextualization is the use of such methods as the “go-along” interview so that the researcher can gain first-hand, direct experiences and observations that can enrich the other data gathered. Contextualization was used in this study, especially when I went to the Mara on several occasions at various locations along the river as a way to gain a better understanding of the different dependencies on, uses and perceptions of the river.



**Figure 10. The group of people assisting in the field on my second day of field work went to see the waterfalls of the Mara in Merenga which contextualized the interviews in a new way.**

One method used to record the observations I made in the field was field notes and impressions taken throughout the day and journal entries at the end of each day. Another recording method of my observations was through photographic evidence. Some of these photographs are featured throughout this document as a way to immerse the reader in the place in which the field work for the study was conducted and display the phenomena discussed in the interviews. The photographs are intended to help contextualize and complement the data from the interviews for the reader.

## 3.3 Data Analysis

The goal of the analysis of the data gained in the field was to look at the data more critically and carefully in order to reconfigure the data and expose new themes and patterns that may have been missed in earlier scans of the results (Cragg & Cook, 2007). The analysis endeavors to be credible, transferable, dependable and confirmable so that it may be viewed as a thorough and authoritative critical review of the current standing of international water resources management policies in Tanzania in regards to both government and community based perspectives (Baxter & Eyles, 1997; Cragg & Cook, 2007). In order to achieve these goals, a variety of analysis methods were used. These methods included transcription of interviews, development of search words and thematic codes for text analysis, and sorting through vast amounts of data and reconfiguring it into themes and patterns in order to give outsiders a realistic view of the experiences of the researcher and the researched (Cragg & Cook, 2007; Hay, 2016)

### 3.3.1 Transcription

The process of transcription was used in order to facilitate analysis of the data contained within the recordings (Hay, 2016). Transcription is the essential process of converting the vast data sets that are recorded interviews to text (Hay, 2016). I transcribed the interviews from the field work conducted by hand, no specialized transcription software was used other than iTunes for listening to the recordings and Microsoft Word to write up the transcriptions. The process involved playing several second of a recording and typing what was said, word-for-word, rewinding and replaying the section if necessary until the words were recorded properly. If there were any words I could not understand, I made note of this in the transcription. I also made note of the tone of voice of the respondent while they were answering and how this was either conveyed through the translator's translation or if the translation seemed to be a shortened version of what was said. Anytime I picked up on words in Kiswahili that I know I also made note of this. Each person speaking was identified by initials throughout the transcripts. After having listened to each interview a second time and transcribing it, I also journaled a second general impression of the interview to compare this second impression to the journal entries of my first impressions.

### 3.3.2 Interview Content Analysis

Once all of the interviews were transcribed, the data were compiled into a single, master document. From this document conducted manifest and latent content analysis by creating a series of new documents that were organized in various ways to bring different aspects of the data to light. I analyzed the data for both the surface content, such as specific words that were repeatedly used by multiple informants, and for latent content, such as recurrent underlying themes discussed by multiple informants (Hay, 2016).

One such document was organized by question, with each individual's answer to similar questions asked next to one another so that I could analyze the similarities and difference between answers and compare them to other factors like age and gender. Another document was created by using the search function within Microsoft Word to search the master document for key words and extracting the sections of interview that included those key words and the context within which they were talked about. The key words I used in these searches were level, quality, population, climate, trees, education and management, along with the various variations of these words that could be found throughout the interview transcriptions. This type of topic grouping proved to be very useful in extracting shared and conflicting ideas, opinions and perceptions among the respondents.

These groupings were also supplemented by thematic topics that were not necessarily discernable by a single key word or phrase. These thematic areas include water uses, water strategies, and risks and concerns associated with water. These themes were searched for using a wider range of related search words and related sections of transcription were compiled similarly to how the key word searches were compiled. These themes and topics were used as the foundational structure that I have built my results and discussion on. All of the topic and thematic groups are presented in chapters 4 and 5 and a discussion of how they relate to the discourses, concepts and institutions is presented in chapter 6.

## 3.4 Ethical Considerations

All research is political, because power relations and knowledge issues impact all research (Crang & Cook, 2007). Researching government processes and policies and the people affected by them exposes this study to a variety of ethical concerns to be considered. First, unequal power relations between myself, the researcher, and the informants were important to keep in mind before, during and after conducting field research. Cook (2009) and

Johnson (1992) point out that in research where powerful elites are being interviewed, researchers may seem to be a threat because they are able to expose these people's lives to examination and judgment by others (Crang & Cook, 2007). At the same time, powerful elites also tend to have the power to block a researcher's access to the desired research subjects or areas or prohibit what researchers can say through restrictive contracts (Bradshaw, 2001; Cassell, 1988; Crang & Cook, 2007). Another power relation to consider is that of the researcher with community members being interviewed. It was important to me to think about whether or not the communities of the Tanzanian side of the MRB would benefit from or be hindered by the research I conducted (Crang & Cook, 2007). It is my intention to give the informants' perspectives on the issues at hand within the study a voice.

Due to the research including governmental policy and community perspectives on the effectiveness of that policy, anonymity is essential, and all names of informants from Merenga have been changed in the presentation of the data to ensure that informants do not experience retribution for their responses (Crang & Cook, 2007). In addition to confidentiality, informant selection was based on voluntary participation and permission for recording the interview was obtained at the beginning of each interview (Crang & Cook, 2007). The consideration of the impact this study on the lives of the informants has been consistently recalled throughout the entire research and project process (Crang & Cook, 2007).

Lastly the impact of needing a translator for a majority of the informant interviews must be considered. This project is connected to the work NTNU is already conducting in this region in coordination with ABS. Through this connection I had assistance in creating connections to the informants who participated and was provided a translator, as I do not speak Kiswahili fluently. While English is used as the official language in governmental proceedings, many of the informants did not speak English so the interviews were conducted in Kiswahili and translated to English by the translator during the interview. This leads to concerns of meaning having been 'lost in translation' or transcription (Crang & Cook, 2007). Additionally, the translator was a management official and the effect of his perspective on the data must also be acknowledged.

### 3.4.1 Personal Positioning

Another important aspect to reflect upon when considering the factors that have shaped the data in this study is my positionality as a white, American female in her mid-

twenties doing research through a European university that has an established research project in the study area (Crang & Cook, 2007). As Clifford and Marcus (1986) argue, qualitative research is informed by the life experiences of all the people who participate in it. My personal experiences and personality have undoubtedly affected the outcome of the research and the interpretation of the data I gathered. The same is true of the life experiences of the informants I spoke to in Tanzania. Subjectivity is unavoidable in qualitative research (Crang & Cook, 2007), a fact that is especially true in the case of this study, as the goal of it is to gain a better understanding of the lived experiences and perceptions of people who live and work in the Mara River Basin. In doing so do, I am taking the subjective experiences of the informants and interpreting them through my own subjective lenses which will have an unavoidable effect on the portrayal of the results, discussion and conclusion. I have attempted to keep my positioning in mind throughout the study and to present the perspectives of the informants truthfully.

### 3.5 Study Limitations

This study was subject to a variety of limitations. The first limitation experienced was the amount of time it took to get a research permit to be able to start my fieldwork. The work needed to get all the necessary paperwork in order and processed took an additional two weeks spent in Arusha from the time I arrived in Tanzania. This meant that I had only four weeks instead of the planned six weeks to interview informants and gather the necessary data.

Another limitation came in the form of transportation. My fieldwork was conducted concurrently with three other students' research. However, I was the only student conducting research in Merenga, which is a very rural village that is difficult to reach. The other students research was based in Serengeti National Park and Ngorongoro Conservation area. During our fieldwork the four of us shared a car and driver, Noel Alfred, provided by TAWIRI. This meant that I was beholden to the research schedules of the other studies being done. This limitation and the fact that Merenga is difficult to reach resulted in two days of fieldwork in Merenga, conducting community member interviews and two days of fieldwork in Mugumu, conducting key informant interviews. I was also able to schedule and conduct another key informant interview after having returned to Arusha with the other students. Due to this limited amount of time in the field I was not able to conduct follow up interviews with informants I had already spoken to. I also was not able to organize focus discussions which

could have greatly enhanced and enriched my understanding of the lived experiences and perceptions of people living in Merenga.

Another limitation was that I was unable to speak directly with any officials from the Water Ministry. While the wildlife managers I spoke to had very interesting and important insights into the management of the MRB, I believe my study is lacking a first-hand perspective of how water management is performed by the central government. The water engineer that I spoke with had a very limited amount of time to spare and unfortunately the parts of the recordings of this interview were not clear enough to discern what was said and there was also a mistake made when stopping and starting the voice recorder when the participant received a telephone call that he did not want recorded. The notes taken from this interview were used as supporting information to corroborate what the other informants reported, however much of the data that would have been on the recordings is lost.

Despite these limitations I have worked to convey the data gathered in a clear and concise way that truthfully represents the lived experiences and perceptions of the Mara river, other water resources and their management held by community members from Merenga and managers working with the MRB.

## 4 User Dependence on the Mara River

This chapter focuses on the ways in which people in Merenga depend on the river. First, the chapter describes the ways in which informants depend on and use the water collected from the Mara River, as well as how wildlife depends on the river. The chapter then goes on to describe strategies informants have developed in order to get enough water to meet their needs throughout the seasons and climatic changes. This leads into a discussion of the risks and concerns associated with the river and how these have affected community members.

### 4.1 Water Uses, Strategies, & Risks

Water from the Mara River plays an essential role in sustaining life in Merenga village. All community members depend on and gather water from the river for a variety of uses. Community members described the river as dependable compared to the smaller rivers of the area. Samuel, a village council member who has lived in Merenga for 30 years, said this dependability is a major advantage stating, “it’s a big river and... it’s reliable for supplying water for domestic [purposes] and... livestock.” Samuel went on to explain that “even if all the sub-rivers dry, they are sure that they have an area to depend on for domestic and livestock water supply,” which can occur during the dry seasons or when there is a drought. The sentiment of the river’s reliability, even during droughts, was confirmed by David, a carpenter and farmer, who said that “even if the river is dry, all the places cannot be dry so there are some points which have water.”

While the reliability of the river was mentioned often, when asked what the risks and benefits of the river are for them, the majority of community members interviewed emphasized the benefits they derive from the river. These benefits range from the increased productivity of the land in close proximity to the river as pointed out by David, “if you compare here it is green... that is not the same [for people who] live far away from the river,” to the idea that “water is life,” which Barbara, a middle-aged woman who is a native to Merenga, emphasized. Luke, another native farmer who has lived in Merenga for 35 years, described the Mara as, “the main source, the only place” for his family and other community members to get the water they need each day. In addition to the benefits derived from the river, community members described the strategies they had developed for collecting the

water needed on a day to day basis. These strategies take into consideration not only the benefits, but also the risks associated with the river. While there is an emphasis on the benefits of living near the river, the risks are also an important factor in determining who uses the river and how it is accessed.

#### 4.1.1 Water Dependency & Uses

The benefit and use of water from the river that was mentioned first and most often by all the informants was for domestic purposes. Domestic uses, as described by informants and defined within this study, range from tasks performed in homes that require water, like cooking, drinking and cleaning, to other uses that are performed closer to the actual river including laundry, sanitation and personal hygiene, including bathing, urinating and defecating. One informant, Katherine, a young woman who depends on agriculture as her main source of income, described the importance of water to her and her family by saying that “water is everything, but most important [for] eating and drinking and other domestic issues, so there is no way you can escape” the need for water. When I asked Katherine’s neighbor, Barbara, why water is important to her, she responded “actually, water is life. So, [I] depend on water in everything, drinking, domestic issues, yes.” One of the youngest informants, Coulter, who works as a mason’s assistant, described the importance of water to him succinctly, “drinking, [I’m] thirsty, and domestic issues, yeah.” In addition to depending on the river for water, David pointed out the convenience of the river because “it’s a very close distance so it helps [us] to have water for domestic purposes,” among other uses and benefits.

Another type of water use mentioned by all respondents is one that provides economic gain such as irrigating crops, watering livestock, fishing, or brick making. These water uses, which occur outside the household are referred to as economic uses within this study. Every person interviewed stated that their main source of income is agriculture, with many people also keeping livestock. Most of the farming activity is subsistence farming, with very little of the crops grown being sold. When asked about the importance of water from the river to his life and livelihood Coulter described it as his “number one priority.” However, Barbara pointed out that, “in the past there used to be a lot of rain, but nowadays, no. Even, it is unpredictable. Sometimes it rain this month, sometimes it does not.” Due to changing patterns and reduced overall rainfall, more people are depending on the river as a source of water for agricultural purposes. Luke depends on the river water for multiple uses and emphasized that



“around here, this is the main source of water... where livestock go to get water for their survival.”



**Figure 11. The many uses of the Mara river; livestock watering, laundry (right foreground on rock in river), bathing (right near shore in river).**

In addition to taking his cattle to the river for drinking, Luke also “fetch[es] water in the river” that he brings to “a seedling area for the tobacco.” He describes this as “doing irrigation by using [my] head to fetch water.” Samuel confirmed this practice, stating, “[some farmers] use the river for irrigation purposes... so their farms, they have good conditions because they have the river.” Paul, an older man, approximately 60-70 years old, who was born in Merenga, also asserted that his main priorities concerning water included livestock and irrigation. “So, number one...livestock, they get water, domestic uses [are] another issue, and third, sometimes [I] use the local irrigation, that I take water using my bucket, from the river, to make sure my plants survive.” This type of rudimentary irrigation is a coping mechanism for when rainfall does not provide enough water to grow crops.

Building on the idea of increasing irrigation within the village, David argues that “if the government were serious” about protecting the river from people over using the water resource, and preventing people from planting crops too close to the river’s banks, then they should “construct maybe an irrigation scheme... to make sure that people at least, who live

close to the river, are benefiting... which will give them... food security.” The need for government assistance with an irrigation scheme was echoed by Daniel, who is on the Merenga village council and is the leader of the sub-village Nyamieri. He explained that there is a pump, run by a generator, that he uses for pumping water from the river for irrigation purposes. Running this pump is too expensive to use it for all of his crops though, which is why having assistance from the government would allow him to irrigate more of his crops. By being able to depend on irrigation, Daniel believes he would have a sense of security when it comes to his ability to produce enough food for his family.



**Figure 12. Maize grows with the help of rain and water brought from the Mara river in buckets.**

Another farming activity that is dependent on the Mara is the ability to keep livestock. As referenced, the river is an important resource for the survival of livestock, which in turn provide stability for the farmers who keep them. During droughts, if crops fail, livestock can be sold, which provides farmers with a safety net of money they need to purchase food at the market. Samuel describes “one big advantage [is] that it’s a big river and... it’s reliable for supplying of water for... livestock. [We] are sure that [we] have an area to depend on for... livestock.” However, he also worries that in the future “maybe [the river] will not be enough... the level is going down.” Added to this worry, as described by Esther, who is a native farmer in Merenga and has been living there for 30 years, is a connection between the

decreasing rainfall, the increasing dependency on the river and a decrease in the quality of the river as a water resource within the community of Merenga village:

There [are] changes in terms of amount of rainfall because at the beginning there was enough and reliable rainfall, but nowadays the rain is not enough... [We're] not having enough rainfall, so [we] depend on one source of water, which is the River Mara. So, there is a lot of stakeholders when it comes to sharing of water. From wild animals, livestock, so everyone depend on that source. So, by that situation the water not be in a good way to use actually.

Because of these concerns, some respondents talked about efforts to limit the number of livestock people keep. Katherine put it in clear terms “you should have as minimum livestock as possible to survive.” While livestock provide a certain amount of security during prolonged drought for those who own them, community members have also diversified how they make money to buy food when their crops fail. Such strategies include fishing and brick making, which are also dependent on the Mara for their viability and success.

Brick making was described by Samuel as an important alternative to farming for younger men to make some extra money for their families. He indicated that this activity provides households with another source of income that helps to safeguard food security.

People have adapted some other activities, for example the youths nowadays it seems that they are not competent when it come to the issue of farming. So, they have groups, and these groups they are making the bricks. So, they produce bricks and they exchange the money they get with food, so that their family can survive because they are youth but they have families which depend on them.

According to Samuel, the production of bricks by these youth groups occurs near the river, as “it serves as an area available where they produce [bricks] for buildings... because there is water there they can make the local bricks.” This work is done especially during the dry season or prolonged droughts, due to the fact that people are not as busy with other farming activities and the lower water levels in the river make the suitable brick-making soil easily accessible. When “it is a dry time or a drought period... everyone should gather, those who are able, to the river so that they can produce the bricks... And this is also a development issue” because the bricks produced are used to build the community. Examples of buildings in the community constructed with the local bricks are the schoolhouse in which the interview with Samuel was conducted and many of the households visited (figure 5).



**Figure 13. Locally made bricks are used to build some homes and other structures in Merenga.**

There are villagers who also see potential for development of the river as a resource beyond the ways in which it is currently utilized. David identified “another advantage... [the river] has some important areas especially some waterfalls which can be used to produce electricity, as well as being used as a site of tourism.” The area is very close to Serengeti National Park, therefore there is a large wildlife population that also relies on the river in this area. David believes that there are certain spots along the river that could be developed as wildlife viewing points for tourists who want to see wildebeest, hippopotamus, crocodiles and other wildlife. David also brought up the issue of the wildlife’s dependence on the Mara and commented that during periods of prolonged drought, not only do communities suffer, but biodiversity is also threatened. “Due to this... dropping of the level of the water, as well as sometimes the river dries it effects biodiversity especially species which are found inside the river which depends on water for their survival.” The negative effects of drought on wildlife populations in turn threatens the overall health of the ecosystem of the area and the long-term sustainability of the Mara River Basin and region.



**Figure 14. Waterfalls in the Mara river are possible sites for energy generation.**

#### **4.1.1.1 Wildlife Dependency on the Mara River**

Wildlife managers are also concerned about the overall future and sustainability of the Mara River because, in addition to the anthropocentric dependencies and uses of the river, wildlife populations also rely on the waters of the Mara. John Lendoyan has been Serengeti

District's head Game Officer for 10 years and oversees natural resource issues as related to wildlife in the district. As a wildlife manager he has concerns about the Mara because "we know that the Mara river is of great importance in Serengeti ecosystems [and] as a wildlife officer I see the very great importance of the Mara river." Serengeti district is "what we regard now as the home for wildlife [and] the Mara river provides water, provides for the migration of wildebeest and is making the ecosystem healthy." Emilian Kihwele, who has worked for TANAPA for 17 years, the most recent eight of which he has served as Serengeti National Park's head ecologist, echoed these concerns and explained that "hydrologically, the park is divided into four sub-basins, the Mara River Basin drains the northern parts of the park." He described how "of all the four basins, it is only the Mara river which is permanent" and therefore the wildlife in the area rely upon it heavily during the dry season and prolonged droughts, when other sources have dried. He went on to say,

Mara River to me is like a life-line for the park. When you are talking of Serengeti you talk of the migration, that big number of animals, near to 2 million if you include the Thompson's gazelles, the zebra and the wildebeest. Wildebeest and zebra move during the dry season in search of water and pasture. So during the dry season they are all in the northern part [of the park] and getting water from the Mara river and having their dry season pasture.

Mr. Lendoyan also described how the ecosystem is home to a great variety of wildlife like "the elephants.... they make a cycle from Serengeti National Park, they go through their corridors to Mto [river] Mara and they go back again to the protected area."



**Figure 15. Wildebeest migrating between Serengeti National Park and Maasai-Mara must cross the Mara river to find pasture during the dry season.**

However, both managers expressed a concern about the decline of the river's ability to meet the needs of the wildlife that depend on it. Mr. Kihwele described "the change in terms of water level is on the decline." He added that "this is not new, this has been observed since the late 90s, we started observing the change in 1996/98." He attributes this pressure to human populations in all parts of the basin but spoke mainly about pressures created by Kenyan users.

There are serious concerns on the head waters in the Mau catchment forest where there has been a lot of degradation in terms of forest destruction and the catchment has been inhabited by people. People do cut the trees there. At the same time as you move from the head waters towards Serengeti, the river passes through Narok and Bomet counties (Kenya), where there is a lot of construction for irrigated agriculture. In addition, there is a big concern on land use changes within the basin, which is also contributing to a decline in the floor level and changing the quality of the water.

Mr. Lendoyan echoed these concerns adding that the pressures in Tanzania include changes to the land cover along the banks of the river in order to expand farming. Mr. Lendoyan explained that "the communities are doing farming on the river banks, along the banks of the river." He then pointed out that "this goes against the law, but the implementation of the law seems to be a problem." He went on to describe how this practice leads to the "destruction of the environment by clearing the river banks when they cultivate them." Mr. Lendoyan reported that clearing the riverbanks has also created a ripple of effects for the river such as "soil erosions near the river, you find the expansion of the river banks because of those activities, also the depths of the river [change due to] siltation." Additionally, the actual farming practices along the riverbanks can lead to debris from farming activities, like plant waste and animal waste used as fertilizer, being washed into the river. Mr. Lendoyan also mentioned that communities "are fishing and sometimes they use illegal chemicals in the water so this also causes the destruction of the environment" According to both managers, all of these anthropogenic pressures negatively impact the health of the river, the greater Serengeti ecosystem surrounding the river and therefore the wildlife dependent on the ecosystem and the river.

#### 4.1.2 Water Strategies

As water plays such a central role to people's lives, many strategies have been adopted in order to ensure that people can get the water they need. Samuel described the importance of such strategies by saying that "water is life. So, without water, [we] would not be able to survive." In our discussion about villagers' strategies for using water, Samuel reported people

will use “firewood” and “the mechanism of... boiling water” in order to purify the water they collect. Another strategy Samuel described is to filter water, “for example you take your clothes, then you have your dish [that] you put water [in],” or tools “which we buy at the market, do you know the one we use in the tea?” I asked if this meant a strainer to which Samuel responded “yeah, there’s large ones which can also be used to [filter water].” In addition to filtering and boiling water collected directly from the river, some users have found ways to supplement the water gathered from the river.

Barbara has a rainwater collection system set up on the roofs of her household. “This house you see... [I] collect water from here... if it rain[s], no problem... [I] don’t need to bother to go to the river.” In this way Barbara is able to decrease the amount of time she spends collecting water. It allows her to passively collect water while it rains, which then can be stored and used in the future when there is a prolonged drought or the water from the river is of bad quality and insufficient for providing for the household’s needs. The benefits of this system also extended beyond Barbara’s immediate household. She described helping others, giving neighbors and family members, who live in other households, water from her storage tank during droughts or when there is too much pollution in the river and filtering the water is not enough to make it suitable for use and consumption. “[My] relatives... come here when it’s raining and collect rainwater,” and take it “home to their home,” which is a “strategy of making sure that they get enough water.” Katherine confirmed this saying she “go[es] to other people’s houses for collection of [rain]water.” She often relies on her neighbors in this way “during the rainy season... for drinking [water] especially.” Barbara explains that when using the river water “if it rains, then there are some complications, but if it doesn’t rain then everything’s okay.” When asked what kind of complications she responded, “here we mean that the water [in the river] becomes a little bit polluted... it collects some...stuff from different areas, then moves them downstream.” Stuff refers to debris from vegetation, wildlife, livestock, and humans as well as silt that has eroded from the river banks. Both Katherine and Barbara agree that “rainwater is very useful for drinking,” stating that it’s “very clean” in comparison with water from the river, especially during the rainy season.

However, rainwater harvesting systems are exceptional, and not everyone in the village has easy access to someone willing to share this resource with them. Additionally, Barbara reported that “in the past there used to be a lot of rain, but nowadays, no... [rain] is unpredictable,” and this sentiment was echoed by informants such as:



Luke, “A long time ago there used to be a lot of rain compared to nowadays.”

David, “When [I] was a kid [I] used to take the umbrella every day to go to hunt... but nowadays can go for a couple of days without seeing even a drop of rain.”

And Samuel, “In previous time we have enough rain, compared to [now].”

In order to adapt to this increasing unpredictability of rainfall, another strategy for supplementing the water retrieved from the Mara is collecting water from the well that was constructed in the center of Merenga Village by AMREF Health Africa, referred to as AMREF by informants in this study. Thomas, a farmer who has lived in Merenga for 28 years, reported this well was constructed this year and it provides clean, reliable water to the villagers who use it. According to Luke, the well is part of an AMREF initiative known as Rain Project, the goal of which is to implement Water, Sanitation and Hygiene (WASH) programs in rural Tanzania. While the well is a valuable resource for the community members who live close by to the village center, many people live too far away from the well to experience any real benefit from it.

One such villager is Luke, a farmer whose land is further away from the town center than from the Mara. He thinks the well is helpful for others in the village but “it’s not useful here... for people who are very close to the river.” In fact, he feels he has not benefited from the well at all because of the far distance between his household and the well. Additionally, most of the informants did not mention using the well regularly as a source of water, if at all. This lack of references suggests that the benefits of the well do not reach past the households located near the village center and the well itself.

Another result of the well’s small impact is that the time-consuming activity of fetching water from the river still predominates in most peoples’ lives. While fetching water is necessary for conducting daily household chores and activities, it can also be viewed as a task that takes up time that could be otherwise be spent in productive ways, especially when households are far away from the river. Additionally, the gendered responsibility of water fetching for domestic uses within the home became apparent through discussions about this activity. Phillip, an older farmer who has lived in the village for over 20 years and is friends with Barbara and her husband, indicated that water for domestic purposes is the responsibility of women while water for livestock purposes was the responsibility of men. The women interviewed described fetching water from the river and then transporting it back to the household. Barbara and I discussed how often she goes to the river to get water. “At least

three times a day,” after “[my] kids have gone to school.” She went on to talk about how after she “goes three times... then [I am] tired because it is a distance.”

Another community member, Mary, who participates in agricultural activities as well as running a tea business out of her household, lives far away from the river and reported “it takes around two hours, to go and return” when collecting water from the river. Barbara sympathizes with households like Mary’s that are farther away from the river and recognizes that “those who are far away, they have problems especially in walking to the Mara River, fetching water, going back home.” In addition to the number of trips and how long each trip takes, women also described how the location along the river where they fetch water often changes due to a variety of factors, including current water level and quality, which are affected by droughts, flooding and pollution. In talking to Mary about this topic she explained that “when it’s full, then people shall discuss that ‘it’s full now, where are we going to fetch water?’” The knowledge of where to fetch and the availability of water from the river is “a big, very big concern because no alternative, in close area, for getting water” for Barbara and her fellow water users.

Some villagers use techniques of construction to ensure the community outside the center of the village also have access to the water they need on a daily basis. One such technique is to dig small, handmade wells in order to collect and store rainwater. David describes this as one of the traditional strategies and says that “this is a strategy to cope so that you can have some water to use at home... you take out the sands, you have some holes and these holes have to supply water to a home so this is a strategy, like an adaptation.” Another practice is the building of dams along the river to divert river water as well as collect rainwater for livestock. Barbara spoke about how “these dams which are constructed” are made “so that [we] can store water, especially the rain water.” She went on to describe how “people discuss about ‘don’t go with your livestock there,’ or ‘do this because we have constructed [the dam] for the purpose of [water for livestock].” Thomas confirmed the use of dams for water collection and added, “We have no conflict in our area because we have... one well which has good infrastructure... and again we have a dam, which have also a place where livestock can drink water so there is no conflict.” This is an important strategy to prevent not only conflict, but also waterborne illnesses in the community because it ensures a separate supply of water for livestock from that which is used for domestic purposes.

A final practical strategy for water that is used by respondents is virtual water storage. Food security and water availability are closely linked, as the availability of water for farming purposes greatly impacts the productivity of crops and the health of livestock. The concept of virtual water storage is a nexus between food security and water availability. It is the concept that during particularly productive periods villagers will create a stock of crops that can be stored long-term, which in a way stores the water used to grow those crops. Samuel described the practice as “people, when they have a chance, good chance to farm, they farm so that they can have a stock when the situation is not good or when the climate has changed a lot.” Barbara depends on this strategy when providing food security for her family. She is greatly concerned by what she has observed as decreasing rainfall throughout the year saying the biggest “problem is food shortage.” Her response to this problem is to “cultivate a large area so in such a case that... there is no rain [we] can survive still using the same food which [we] have harvested until the situation” improves. “By keeping, by having a lot... a stock of food” Barbara ensures that her family is “supplied during... a challenge like drought.” As suggested, this strategy provides a safety-net for when water conditions change in an unfavorable way and impact villagers’ ability to grow enough of the crops they depend on for subsistence.

### 4.1.3 Water Risks & Concerns

While there are many benefits derived from the Mara, there are also risks associated with using the river. The Mara River stands between Merenga and Tarime, which is the closest town where trade occurs. Many villagers in Merenga regularly travel to Tarime because it is a center for business and the market. However, villagers in Merenga do not have a safe way to cross the river within their village. There is a bridge in Nyansurura (Figure 3), which is the next village to the west of Merenga, but as David stated, “the bridge is far away from this side,” too far away for most of Merenga’s residents to access easily and quickly, and therefore it is inconvenient for them to use.

The main methods used for crossing the river are to wade or swim across or to be ferried across in a boat. However, the area where people cross is a dangerous area according to David, and these methods pose risks. One major risk assumed by users who cross the river is drowning. Samuel described the dangers of crossing the Mara,

There is a big risk especially for those people who want to go to Tarime. You know this is Serengeti but we have the nearby district Tarime. When you cross the river you are in Tarime, so in most cases it is seen that they face death while trying to reach to

Tarime sometimes. So at least... fifty people per year are taken by water because there is no bridge.

When the water is high and the river swells, the currents can be very fast, sweeping people away who are trying to cross. Samuel described another risk of death while wading through the river. “There are crocodiles, and actually, they are dangerous, they kill people.” This was echoed by Luke who talked about “the deaths which happen sometimes to some people... deaths in the river... there are crocodiles, which actually, [are] dangerous to people’s life.” These issues also impact farmers with livestock, as these animals are taken to the river for drinking and are also susceptible to being swept away by strong currents and as Samuel put it, “livestock are killed by crocodile.” David also reported a general wariness around the safety of the river. “It’s dangerous sometimes it doesn’t matter whether it is full or if it is not full, someone could die... if they are too close to the river, anytime.” He described being frightened by the dangers of the river and “advising... family members ‘don’t go there.’” However, if people need or wish to go to Tarime, their options are to either assume the risks that come with trying to get across the river in Merenga or take time away from other pursuits to walk to the bridge in Nyansurura.



**Figure 16. Boats are one method used to cross the Mara river in Merenga.**

Another concern associated with the river is maintaining the quality of water from the Mara. These concerns are reflected in interviewees’ views on the use of the river as a place

for urination and open defecation, as well as the illegal use of poisons for the purpose of fishing. These polluting practices were acknowledged by a few of the interviewees and are a concern to them because they threaten the quality of the water for other uses. David described the river as “the place where people take baths, so those are their bathrooms, we have bathrooms there although not constructed, but you can go to the river, this is what you do, you go to the river.” He further explained that,

People are not trained this is an area where we take water for domestic purposes, so some people even leave their materials there. When they are going to take a shower, yeah, some people use the area as a toilet, so this reduce the quality of water.

In discussions about unwritten social rules that govern how villagers use the river, Coulter and I discussed how “dumping your products,” (which, like “leaving their materials,” was clearly a euphemism for urinating and defecating, as indicated by hand gestures and what I interpreted as shy, awkward tones of voice can uncomfortable laughter) is viewed as violating the rules surrounding the protection of the river.

Using poisons for fishing is also a violation of the rules in place for protecting the quality of the river. However, this practice seems to be happening in Merenga. While the respondents did not mention who was using this strategy, multiple people mentioned that it does happen and that doing so is not allowed. Coulter explained that “if someone is using poison to kill fish... then you’re polluting the water so you are supposed to be liable, [for] what you have done.” Esther mentioned the use of chemicals for fishing when she described how she can tell the water quality has changed over her lifetime.

[In] previous time, was okay, but nowadays there is a change, there is a change in terms of quality... There is this poisonous or harmful, I mean harmful chemicals, which [are used for] fishing strategies. So, it’s also effected the quality of water.

James also talked about this practice and how it not only effects water quality but also the health of everyone relying on the river. “[I’m] talking about the poisonous chemical used for fishing, illegal fishing activities, so this is one of the problems, which... has affected [my] life because if you are drinking the water which have been poisoned then you have consequences... [like] getting sick, diseases, yes, sure.” James added that “they are trying to filter [the water], but it’s not easy to make sure that [it is] good 100 percent.” Coulter explained that if caught violating the rules against the use of chemicals and defecation in the river, the violator can be taken to “a village office so that [they] can answer about what they think that is the wrong issues [that] have been done in the water,” which, Samuel explained, can lead to a possible punishment, such as a fine.



**Figure 17.** A fishing basket made of palm fronds and rope helps local fishermen to catch fish as they swim in the Mara river.



**Figure 18.** A fisherman sits on rocks in the Mara river, waiting to catch something on his line.

In addition to humans using the river in these ways, the large number of livestock and wildlife that use the river as a water source also contribute fecal matter to, and in some cases a general decrease in the quality of, the water. Esther expressed her concern about how wildebeest that drown in the river while drinking from, or trying to cross, the river effect the water quality. “There is a lot of wildebeest which have been taken by water. So, even if you go [to the river], you see that it’s a very big challenge for [us] to have safe and clean water... for domestic uses.” The availability of safe clean water, that is protected from fecal and other types of contamination, is foundational to preventing outbreaks of waterborne illnesses and promoting overall health in the village. Additionally, the community member’s dependency on the river means that they come into contact with this resource on a daily basis, which influences their perceptions of the river and the environment in which they live. These perceptions will be examined in the next chapter.

## 5 Local Perceptions

This chapter explores the perceptions of the river held by the informants from Merenga and the management officials who were interviewed. Their thoughts on the level, quality, and availability of water from the river are presented first, as well as how these indicators have changed or remained constant over their lifetimes. Then the perceptions of climate change and how the interviewees see the ways in which climate change has impacted the river, the area, and their lives are portrayed. This leads into the interviewees' thoughts on the importance of education about, and local participation in management. The final sections of the chapter examine the perceptions that villagers and managers have on the current strategy for water management and the ways in which to improve management in the future.

### 5.1 Water Level, Quality, & Availability

The perceptions of changes to the river were mixed across informants, including the impression of how the level has varied or remained constant over time. Each informant living in Merenga was asked “have you noticed any changes in the amount or quality of the water in the river over your lifetime?” and then asked to elaborate on the changes or consistencies they have observed. Many of the community members interviewed reported that the water level in the river has decreased over their lifetimes, while others report that the level has remained constant. Esther conveyed that “the level has gone down, because of maybe prolonged drought.” James voiced the same opinion saying, “the level has gone down, according to [my] experience... because of the drought.” David reported that “[the river] was full once upon a time but now it [is] going down and down.” He went on to explain further,

The main problem which [we] experience here is sometimes of the level of water is going down... sometimes it dries and so it becomes a problem for [us] so [we] have to go somewhere to search for water maybe somewhere at [another] point of the river... because this area, as you can see, it seems to be dry... [but] there are some points where there [are] remnants of some water.

Luke echoed this statement. “[We] are worrying about the water level, [we] pray to God that the water should continue to flow.” However, he is not as worried about the river drying.



If it's not the rainy season, [the river] is in the middle level, so [I] don't see that the water fluctuate[s] a lot here... If maybe there is rain or anything which can make the level of water to go up, it go[es] up then, but it never dries.

Samuel, however, is very "worried actually about the situation because when you compare the previous time and nowadays the water level has changed a lot," and he went on to explain that he has seen a decrease in the level overtime due to changing rain patterns. "So, in terms of level in previous time we had enough rain, compared to nowadays, so the level [of the river] has gone down for sure." He added to this explanation by saying that "[we] are not certain, when it's going to rain so this also contribute[s] to... the level of water in the Mara river." He also attributes the decreasing level of water in the river to prolonged droughts and an increasing number of people and livestock using the river and is worried "that maybe it will not be enough" for future use.

Katherine, on the other hand, has not noticed an overall decrease in the level of water in the river during her lifetime. She did however explain that there are seasonal variations in the level of water in the river that fluctuate with the amount of rain in any given season.

There is no significant changes in terms of level of water, but what happen, it depend on the season. From April to October or September there is a lot of water, but the other time, the water... go to the lower level.

She went on to say that the factors that affect the level of water in the river are "rain and the droughts," which aligns with Samuel's report that rain patterns and amounts influence the river level. Katherine's statement that there are seasonal variations to the level of water in the river is corroborated by Coulter and Paul. Coulter described that "sometimes it happens that there is lower level of water and sometimes happen that the water is full." Paul explained that the seasonal changes are influenced by rainfall patterns, saying, "the water keep changing according to the season. If it is drought then the level of water goes down, but when it comes to the rain [season], if there is rainfall, then there is an increase of level of water." While informants have differing opinions on whether the overall level of the water has been decreasing over time or staying consistent, there was a general consensus that the water level varies with the seasons and greatly impacts daily life.

One of the ways in which the seasonal variability of the water level affects the villagers' ability to use the water from the river relates to how levels impact quality. The variations in the water levels are not an isolated issue because they directly impact the quality of the water in the river. Mary reported this connection saying that when she and other women discuss fetching water "the main concern is on the level first, the one which bring

issue of quality.” Katherine explained that “when there is a lot of water [in the river], because of rain, the water become[s] polluted, but when the water is at its lower level, then everything is good,” and the water can be used for “domestic uses.” Coulter also confirmed this by describing “when [the river] is full it is complicated as usual, not easy to use.” Barbara explained that the changes and complications that arise when the river is high are related to various types of debris, such as plant and animal waste from agriculture and wildlife, being swept downstream and polluting the water. Katherine echoed this statement saying, “when it rains there is like a flooding of water... the water become polluted in such a case that it is not so palatable for drinking.” Mary also spoke about complications but focused on “when the water is at the high level, in most cases, [we] don’t go [to the Mara] to fetch water. [We] rely on the nearby streams here as [our] main source of water. But when it’s low, no problem,” then they can go to the Mara for water.

While high levels of water can cause problems concerning quality, Esther reported that low levels can also have an effect on the water quality. She explained that “when it is too dry you found that the water taste has changed, become like salt, a salty taste.” Coulter also contended that there are also issues when the water level is very low and went on to describe the complications he has experienced in this situation.

When the water has gone down to the level of maybe drying there are some... algae, so [I] tend to go with maybe a tree or something else to make sure that [I] can make the area clean so that [I] can have some water for domestic purposes.

While describing this strategy, Coulter motioned with his arm indicating the tree, or branch he mentioned is used to sweep away the algae on the surface of the water. This strategy to improve water that is available supports Mary’s claim that, “quality is a main concern,” when fetching water from the river. Another issue of change that relates to the river quality was discussed by James, who explained that “sometimes seems that you have different colors of water around the river... In such a case that it sometimes seems that it’s red, sometimes white... so the colors of water keep changing sometimes.” He related these changes to not knowing how upstream communities in Kenya actually use the river. “We are not sure how they use, what they use water for... [I’m] not sure, what are these guys doing.” The effects of activities on the Mara in Kenya were also discussed by David who related that he has heard gossip about projects along the river in Kenya:

According to the gossiping it seems that there are some activities which are going on at the Kenya side which make the level of water to go down... This gossip is about that in Kenya they have constructed a certain dam, which is very big actually, and they

diverted a stream tied to the dam, so... they have taken water from Mara River so, have reduced the pressure of water... [I'm] not sure, whether this river will survive for twenty years to come or even if it [will be] there, [I'm] doubting it will be the same as it is today, because the way that it is being changed.

Rumors like these and the lack of knowledge about how the river is used upstream, combined with the experience of decreasing water levels, are a source of uncertainty about the future availability of water from the Mara.

Another source of uncertainty around the river is its ability to support a growing population in the village. In asking the informants about the sources of population increase, it became apparent that births are seen as the main source. David explained that,

Immigration is not too high, I mean... it is not increasing the population, but what increase the population here is actually... people are giving birth to babies, so people are increasing and increasing because of that reproduction.

This statement was supported by Mary who indicated that “the population is increasing, and the reason is birth,” and Coulter who said the population is “increasing and the main reason due to birth.” Samuel also discussed population increase extensively and when I asked what the source of the increase is, he immediately responded “births.” According to Samuel the effects of population increase are reflected in the changing quality of water.

In previous time it was better because there was few people and actually the quality of water was good. [We] used even to drink water without... using firewood to [boil and] purify [the water] but nowadays it is not possible. The reason behind that, it's an issue of population growth.

David is also concerned with how the apparent population growth in the village could impact the availability of water from the river in the future. He focused on how protecting the river now should be a priority in order to ensure the sustainability of the river moving forward. “It's very critical to sure up, shape up the river because of the population increase.” He went on to explain that when he was younger there were not as many people living in the village “but now [I] have several kids and you see that there are houses everywhere so the population is increasing,” and the community has continued using the river, “so it might affect the river by having population growth.”

When I asked if the river will be able to support a growing population into the future the interviewees' expressed a variety of opinions. Coulter was “not sure there is [an] answer” because the level of the water fluctuates “so [I'm] not sure whether there [will] be enough water to support the population in the future.” Barbara expressed that she thinks it will depend on rain, “if there is rain, even if the population grow, no problem, but if there is no rain, that's

challenging.” Mary believes that the increase in the number of people could cause issues and reported that “there might be some problem maybe in the future, due to population increase.” James approached the question from a different angle, saying that he is “worried that maybe, in the future there will be not enough water for people to use because of especially prolonged drought which is going on.” Samuel worries that a combination of these factors will affect the availability of water from the river, “[I’m] worrying that maybe it will not be enough, because of livestock, people yeah, and the drought, and the level is going down.” Samuel also links population growth with changes in the climate. “Population growth might be... the big reason of climate change as people are growing in number and they have different demands.” The changing level, quality and availability of water from the Mara will greatly impact the future of the river, and the ability of the growing number of villagers from Merenga to depend on it.

## 5.2 Climate Change

Another factor that may influence the ability of the river to support Merenga’s growing population and its water needs is changes to the climate of the region. Informants’ related that the shifting rainfall patterns are an issue that impacts water availability from the river. Unpredictable rainfall patterns are said to contribute to the variation in levels, quality, and future availability of water from the Mara, according to informants. When asked how climate change has impacted them personally, respondents invariably talked about the impacts of changing rainfall patterns, decreasing amounts of rain, and the negative impacts this has had on their ability to produce enough food for their families.

One of the results of changing rainfall patterns is prolonged droughts, which have become more common according to many community members. They report experiencing significant decreases in the amount of rainfall each year, as well as rains coming later in the year and lasting for shorter periods of time. Coulter spoke about how he and his neighbors begin to worry when droughts occur because “even if it rains, it [only] rains a little bit” which leads him to question and think, “when is the rain going to *rain*?” This question weighs on his mind “because you know, people depend on rain.” Samuel added to this idea by explaining that previously,

[We] were sure about the time when it’s going to rain. Maybe April and March we have heavy rainfall and sometime floods, also December. But nowadays you can find that April and March, it is a drought period.

Informants like Mary connected this changing predictability and reliability of rainfall patterns, and the experience of more “prolonged drought” periods in the village as “an issue of climate change.” David also made this association and related it to the wider environment of the area. He reported that due to decreasing rainfall,

The environment has changed, the conditions which used to be more attractive of the environment which were here formally are not here, because as you can see it is dry... Even the streams... which actually bring the water to the Mara River have also been affected by climate change.

The effects of decreasing rainfall and shifting patterns are felt not only by the people in Merenga, but also by the livestock farmers keep.

David spoke about how livestock are greatly impacted by the shifting and decreasing rain in the region and also described the ripple effects caused by these changes.

Food is scarce nowadays because of the climate change, even for the livestock. It is very difficult for them to get pasture... that’s why there is an issue of illegal grazing in the National Park, which automatically raises to conflict between the park rangers, or the conservationists, with the people in the community.

In addition to conflict with park officials concerning illegal grazing, the changes in climate have also created challenges for the wildlife that live in the region.

One of the biggest challenges humans face in Merenga associated with shifting rainfall patterns and climate change is maintaining food security. Many interviewees reported that if there is a prolonged drought, it ruins their crops. Coulter explained that when it has not rained enough, “especially when... [I] plant the maize, after a few days the drought is prolonged, then nothing is yielded from the farm.” David also complained that “the climate is not good” and this has affected his harvest. He explained that in his opinion the effects of decreased crop yields due to climate change are wide reaching. First, he spoke about how “you need to have enough to eat, so that you can cultivate well,” but, “man power... is down because the food is not enough for [us].” He then talked about how the oxen used for cultivation are affected by food scarcity because there is a decrease in the availability of pasture land.

Here, [we] use ox, you know... to pull things for agriculture... [but] because they don’t have enough pasture it’s difficult... You can spend a lot of time going here and there with the oxen... [and] at the end of the day you have no good results compared to the previous time when... [there] used to be enough pasture.

Finally, according to David, the cattle used for dairy are also impacted by decreased pasture, which in turn effects the milk they produce. When there is not enough pasture for cattle. “[the] milk for our watoto (children)... [is] automatically effected,” because there is not as

much protein in it. So, David believes that “even the issue of filling milk” is impacted by the changing climate.

Samuel also believes that the effects of climate change are wide reaching but explained the impacts more broadly, saying that “[we] are not certain when it’s going to rain” which in turn impacts agriculture and as Samuel described it, “when agriculture is effected, development issues [are] also effected... especially [when] we are talking about the food security.” Samuel reported that climate change has had a major impact on his ability to provide food security for family. He described that “during the previous time [we] were using the food for other purposes, like selling at the market and running family issues, [and] for development issues.” However, due to decreasing crop yields caused by less rain “it seems that there is not enough... food to feed [our families]” so “people are starving, and development issues are going down.” Barbara confirmed this saying that for her the “problem is food shortage” caused by the unpredictable and unreliable rainfall. Climate change has had multiple, interrelated and wide-ranging effects on families in Merenga which has created difficulties with which community members have had to cope.

Mary spoke about the difficulties that arise when there is not enough rain and what she does to deal with these issues. “Climate change, especially with the prolonged drought... effects some issues like food security [for] individuals and the household.” She and her family “have to look for alternative to get food,” when there are prolonged periods with no rainfall. When this happens, she reported needing “to purchase [food] from somewhere, someone else.” Esther also reported needing an alternative place to get food when she cannot produce enough for her family, so she “depend[s] on the market to have an alternative food” source. She explained that “nowadays, if you plant and you are lucky, you will harvest, but if you are not lucky” and there “is a drought then you will get nothing.” She also went on to describe that the

Quantity and size of the products from the farm has changed. In previous time [we] used to get a lot of food from a small place but nowadays you need a big chamber to make sure that you can have something to [take] home.

Another technique that farmers have adopted is incorporating new varieties of crops that are more drought resistant than others. Coulter is one such farmer who said that “due to climate change [I] have adapted, some... new varieties of foods. For example, watermelon... and tomato.” He explained that these new varieties of crops are important because “there is a disease effecting maize here,” in addition to being more suited to the changing climate. As

described in the water strategies section, virtual water storage in the form of crop stocks and cattle used as a way to store money for food when crops fail, are two other coping mechanisms that are used by farmers.

While community members see climate change as impacting their lives, they report not knowing how they could deal with this as individuals. Informants from Merenga reported their village had no plans to help mitigate climate change in their community. When I asked if the community or government has taken any initiative to help mitigate the effects of climate change for villagers Coulter responded, “not yet.” David agreed when asked the same question saying, “no one cares, for sure.” He believes that “it’s an issue that it should be dealt with [by] the higher-level authority so [I’m talking] about the district, maybe the region, or the state.” When I asked what could be done in the village to protect the river from climate change and its impacts a few interviewees mentioned that increasing the number of trees in the area, and specifically along the river banks, might help.

David explained that while there has not been an initiative in Merenga, in the “area around the next village,” through which the Mara flows, “there was an attempt to plant trees... they have a schedule for planting trees so that they can save the river.” Samuel, a member of the village council who has participated in the discussions about plans for tree planting near the river in Merenga, explained that in Merenga there is a problem with people cutting down trees “some cut trees to make charcoal, some cut trees for constructions.” Samuel believes this “is effecting the level of rain because you know that the rain comes when there is availability of trees.” As a member of the village council and the “formal environment committee,” Samuel has participated in discussions about how to stop people cutting down trees that are close to the river and in “dealing with actually seeing who is cutting the trees.” From this experience he believes there needs to be “more afforestation” in Merenga because

If the community can take initiative in planting trees close to the river then [we] will be sure that even if the river dries in some areas, [we] can [have] water for a long time because trees conserve the amount of water.

Samuel justifies these actions as “strategies of making sure that people do not cut trees near to the river... to make sure that the river can survive.” Other community members like Thomas, Paul, and David echoed Samuel’s association of trees with “the process of making rain, evaporation.” While trees actually use water, the perception of the importance of trees in the water cycle and in protecting the river was mentioned by these respondents and was said to be

a topic of discussion and concern within the village government. This misconception of the role of trees represents a gap in the education of community members, from villagers to village council members, about environmental concepts, climate change, and possible ways of dealing with problems that occur because of these issues.

This gap in education has not gone unnoticed by villagers and many of the respondents spoke about the importance of increasing education and general awareness around these issues within the village. David articulated this idea in detail and believes that villagers need to be educated about these issues at a young age because if “people were well educated since they were kids, then we [could] expect that maybe the river would be sustainable in the future because they [would] understand the importance of having the river.” However, he went on to explain that “currently, especially for the adults, [who] are actually the real users of the river, they have no education about that.” This leads to “people continuing to use the river as they see fit,” without knowledge about how certain activities may affect the river now and in the future. Esther agreed with the idea that education is an important component of any plan to protect the river from climate change and believes that the village council should assume the responsibility of teaching the community about these issues. However, when asked if any effort such as this exists she expressed uncertainty about how this could be accomplished in Merenga. “I have not seen anything like that in my lifetime and I was born here... I’m actually not sure what can be done.”

Samuel, on the other hand, contends that such information is already distributed to the community through the village assembly. He explained that “there is something known here as village assembly where all other members of the village are supposed to gather together so that [we] can make decisions,” and disseminate important information to the villagers. Samuel posits the village assembly would be a good forum to teach village members about the issues of protecting the river and climate change. David agrees with using the village assembly as a forum for education. He said that by doing so the managers of the river can involve the villagers “in that way” and “get ideas from the people who are living around the river and improve [the] plan.” David also believes that the education of children about these issues

Should be coming from the government because... the schools, that’s automatically the government you know... Curriculum should be developed in such a way that it impacts the kids, the environmental conservation issues... because the river itself will not survive alone, you need some intervention... it’s very important, so something should be done to make sure that the river is surviving.



John and Thomas echoed this idea and conveyed that the ideas of promoting tree planting along the river and stopping cultivation within a certain distance from the riverbanks are two methods the village council is currently working to instate in the village. Paul believes that one of the best ways to accomplish the goal of educating the village about things they can do to protect the river is for village council members to lead by example and be “role models of how to conserve.” This notion is in line with John, Thomas and David’s shared belief that education is a way for the government and local people to come together, share knowledge, and work together in their efforts to protect and manage the river.

## 5.3 Mara River Management

Community members conveyed that the management of the river and other water resources is important to them and in this section the informants’ perceptions of the current management of water and the Mara River within the community are examined. First, the varying opinions on current management structures are discussed. Then community members’ ideas about how management should be constructed and performed in the village are examined. This leads into a discussion about the possibility of a shared management plan between Tanzania and Kenya for the MRB. Finally, opinions on the strengths and weaknesses of one such shared initiative, Mara Day, are shared to show the similarities and differences between the perceptions held by community members in Merenga and that of managers working in the MRB.

### 5.3.1 Community Management Perspectives

Within Merenga, the river plays a central role in each person’s daily life. However, when asked about how the river is managed to protect it for continued use many informants, including David, Katherine, and Mary, agreed that there is no formal management. David responded to the question by saying, “In this area? No... but some area around the next village... there was an attempt to plant trees.” Katherine confirmed this but said that “it’s a good idea to have a structure” or organization to help manage the river. Mary agreed with the concept of a river management plan saying, “it’s important that [we] have a plan to manage the river.” While these informants described a lack of management, several other interviewees spoke about management initiatives that do exist in Merenga. Barbara and Luke separately described what is known as the Rain Project, an initiative led by AMREF to build wells in rural communities. Luke described the process of getting community approval for the project

There was community involvement because the project, after having the idea, they had a meeting with the villagers. [AMREF] told [us] about the intention of building wells and the community accepted it. Then they started to build those wells.

Barbara's perception of the project is "that is an initiative in which the government worked with other partners" in order to ensure that people have enough water and as a way to reduce the pressure from human use on the river. Barbara also described an informal rule that helps to keep the well in the village in good working condition.

If there is a problem [with the well], then someone takes the responsibility to make sure that that water remain for [the village]. For example, the users who are going there can be given an assignment... to clean this area until it return or it is restored so that we can continue to fetch water in this area.

Another form of management in Merenga is the environment committee within the village council. Samuel, a member of the village council, described one of the responsibilities of the village council is to create "strategies of making sure people do not cut trees near to the river... to make sure that the river can survive." These strategies are carried out by the environment committee, which is "a formal committee... in the village focusing on the issue of the Mara [and] dealing with actually seeing who is cutting the trees" as well as other activities that impact the environment and the river, as described by Samuel. He also said that the committee is formally recognized "in the village and it is known up to the district level." Additionally, as described in section 4.1.3, informal water rules set by the village council dictate how the water should be used and provide a procedure for how to report misusers to the village council. The consequence of breaking these rules set by the village council according to James, David, and Samuel include being fined or told that you are no longer allowed to fetch water from the source you contaminated. However, James indicated that "these rules are for the wells... but I'm not sure about [rules for] the Mara." A final form of possible management structure in place in Merenga was described by James, who told me

In villages in Tanzania we have sub villages. So, we should bring people, different people from [different] sub villages... together and [we] can come with ideas [about] how everyone is going to protect the river.

Although answers varied about whether or not formal institutions for water management exist within the village, there was consensus among the respondents that having a formal structure would be helpful in the village's ability to manage and protect the river and its water resources.

When asked about how such a management institution should be structured, Katherine said it would be best if this structure involved the community, while Barbara worried that

people would not recognize its authority if it was run by a grassroots group of villagers. According to Barbara, “it [would be] good if it would be initiated by the district or the central government because... if it is run by the villagers” people will question the authority of such an organization and “they may attempt to ignore you [because] there’s no authority, but if it is an [outside] authority” the villagers will respect it more. David brought up an important aspect of management by saying that a formal structure and plan for water management is a good idea but that it is important to remember “that we are various users with various interests.” He expressed the importance of “making sure that various groups with various interests can access water,” such as domestic water users and “the pastoralists [who] use [water] and need maybe a dam to make sure that their cattle or goats or livestock have access to water.” He stresses that such a management group and plan should have the goal of using the Mara “in a good way which would not harm the water and ecosystem.” Samuel and David said the best way to achieve a sustainable plan is to focus on educating the villagers about the importance of managing the river, kids and adults alike.

When asked what the best type of management would be moving forward, the informants were divided. Some believe a cooperative plan for all users in Kenya and Tanzania would be best. Samuel argued that “because the river starts in Kenya then there is a demand of shared plan so that each actor would be involved” in the management of the Mara. James thought a shared plan would help the two countries unite, and that both the central government and small communities like Merenga should be involved in the process. Esther offered a more measured answer saying tentatively, “if they can cooperate, it is a good idea because even if we have a good strategy here, because the source of water is from Kenya, they can pollute the water and we would have poor quality water in Tanzania.” She went on to consider the possibility that a shared plan might not appeal to both governments and “if they are not interested in that, then they should make the wells in the villages so that the villagers can have alternative” water sources to the river. While the villagers had a positive, albeit tentative, outlook on possible shared management initiative, the managers who were interviewed were more skeptical of making this idealized plan a reality.

### 5.3.2 Manager Perspectives

The managers I spoke to agree with the villagers’ ideas that management of the MRB is very important and described the intricacies of constructing and implementing successful

and enduring management in the region. Serengeti Head Ecologist, Emilian Kihwele expressed his ideas on what makes for bad versus good management:

Bad water management is making decisions in isolation. People in the upper catchment sitting on their side making their decisions and the people downstream sitting on their own and making their decisions. What is good for people along the catchment basin is to come together, develop an integrated water utilization plan, then implement.

He also spoke about what sound management of the MRB means to him. “The concept of management as far as water [from the Mara] is concerned is about a serious decision to forego economic development and some livelihoods.” He stressed that a sound management plan for the MRB will entail “a serious decision for people because we need to take out the people who are in the Mau catchment forest.” In addition to restoring the Mau forest, the location of the headwaters of the Mara, and limiting human activities within this catchment area, Mr. Kihwele contends that “we have to come up with a water budget, how much should be allowed to be abstracted and not abstracting everything [the river] has [in order] to maintain a reasonable flow for biodiversity.” This includes the principle that “people should not be allowed to abstract any water in excess of the river flow, something which is not being practiced.” This idea is highly relevant to the plans in place in both Kenya and Tanzania to build dams along the Mara river.

These plans consist of seven dams in Kenya and one in Tanzania, which Mr. Lendoyan, head game officer for the Wildlife Management Office in Serengeti District said, “will consume some water from the river.” Emilian Kihwele expanded on this, reporting that,

For the one in Tanzania, it is of less concern because it is on the lower catchment. [But] those seven [dams] on the upper catchment in Kenya would require nearly between one-hundred and fifteen to one-hundred and eighty-five percent of the existing flows, which implies during the dry season [there will be] nothing there to meet the demand of those dams.

This statement is supported by many studies focused on the changing hydrology within the MRB (Gereta et al., 2013; Hoffman et al., 2011; Mati et al., 2008; Mnaya et al., 2017; Mutie, Mati, Home, Gadain, & Gathenya, 2006). Mr. Kihwele is worried about these proposals because “if those dams are going to be implemented there is a high chance for the river to dry out which will end the days of Serengeti.” Mr. Lendoyan echoed these concerns and added to them saying the dams “will impact the wildlife because you have the hippopotamus, a lot of them in the river, you have the crocodiles, and also the crossing of the wildebeest and the zebras.” Mr. Kihwele explained that because of the importance of the actions in Kenya for the

survival of the Serengeti ecosystem “it’s a transboundary issue between two partner states, Tanzania and Kenya, and the only solution to solve it is a political arrangement.” An agreement between the two countries would be the best way to protect the ecosystem, however Mr. Kihwele is doubtful that this is possible.

While the importance of having sound management of the entire basin is clear, Mr. Kihwele also expressed great skepticism in Kenya’s and Tanzania’s ability to cooperate at a higher governmental level due to national interests and the stark differences in the ways in which the governments function in the two countries. “I’m highly negative on the collaborations because when it comes to the national interest, I don’t think Kenya will be in any position to forego their economic developments to safeguard the Serengeti or for the benefit of Tanzania, I don’t think it is possible.” He went on to approach the topic from the Tanzanian perspective as well saying,

I don’t believe in a shared [plan] because I as a Tanzanian, we have our own interests, national interests, we have our own priorities. We have different laws from Kenya, we have different policies from Kenya and those are the instruments to be used [for shared management] so if you depend on an integrated or joint management plan you will end up failing.

He supported this argumentation with the example that “in Tanzania we encourage early burning but Kenya doesn’t practice early burning,” which references controlled burns of vegetation as a form of managing ecosystems. Another example of the differences in policies is that “in Tanzania we don’t practice shoot on sight, while Kenya, they have the law you shoot the poacher on sight.” Due to these very different policy approaches Mr. Kihwele contends that the two countries “cannot have the same management plan because [they] have different laws, different policies and regulations,” and these differences may prove to be irreconcilable when it comes to creating a shared policy and plan for management in the MRB.

Despite his cynicism Mr. Kihwele admits that “there has been some initiative on managing Mara River Basin [featuring] a collaborative initiative between Tanzania and Kenya.” He has participated in two attempts to create a shared management plan. “From 2004 to 2012 there was a project by the name of Transboundary Water for Biodiversity and Human Health.” He went on to say, “that project yielded a lot of documents, it produced environmental flows assessment report on the Kenyan sides, the biodiversity strategic plan, the strategic environmental assessment for the basin, so there is a lot of documents.” But he argues that “the documents are there but they are not implemented.” When asked why this

was the case he had an introspective answer, having been a participant in creating those documents. “What is lacking is the political will because you need to bring all the key players to come and to argue to implement what is in [the documents].” Despite the lack of implementation of this first plan there has since been a subsequent plan. “From 2012 to last year (2017) we came up with the new project by the name of PREPARED and currently they are coming with their different projects.” This project is in the planning phase and Mr. Kihwele is skeptical about its advancement past this stage. “Theoretically, it is okay, we are meeting we are discussing, coming up with plans, but practically nothing is really happening on the ground.” While he is not optimistic about the ability of creating a shared management plan he emphasized the need for a political agreement between the two countries.

He argues in order to accomplish sustainable management of the MRB “we need a political arrangement between Tanzania and Kenya and at that level you need a higher household [than scientists] to sit and discuss, to deliberate about it and direct what it will look like.” He contends that when it comes to making the changes necessary to protect the basin,

It’s a matter of decision, if Kenya decided today they would be successful. It’s not a matter of [Tanzania] convincing [them], it’s a matter of reality. We know that the Mara river originates from the Mau catchment, which is entirely within Kenya. We need to restrict any human activities within the forest and that’s for Kenya [to do]. It’s known, it’s clear. What we need to convince them of is to make sure that they reduce the current abstraction of water from the Mara. The water abstraction should be determined by the available water after minimum flow assessment.

He hopes that “Kenya understands their position as they are on the upper catchment of the MRB.” Mr. Kihwele soberly points out that Kenya yields substantial power over the fate of the Mara and therefore “they need to do everything possible to make sure the Mara is there.”

When asked about Tanzania’s laws and responsibilities for managing their portion of the MRB and other water resources he said that he holds Tanzania to the same standards that he holds Kenya to, but that in the case of the MRB Tanzania is at a disadvantage. However, he sees the same issue of the lack of political will for implementing policies in Tanzania as he sees at the international level between Tanzania and Kenya. “When it comes to some decisions, particularly in Africa, the politicians will look at the people specifically the majority poor [and] sometimes they just close their eyes as if they are not seeing anything.” This inability to act has formed a gap between policy making and implementation. In reference to the Water Resources Management Act of 2009 he reiterated that,

If you go to that act [it is] talking of integrated water resource development and management plan, [it] encourages you to bring all the key stakeholders, you assess what their demands are how much is available and how you could share it sustainably. The document is sufficient the only problem is the political ground.

He argues that this act “is the guiding principle in Tanzania so whoever is involved by any means with water he has to make sure that he complies with the requirement of the Act.” So while the document is sufficient for guiding users how water resources are to be treated, the act fails to initiate government action beyond upholding the law.

Mr. Kihwele and I discussed the potential of WUAs as a way forward in effectively managing water resources in Tanzania. He explained that “the Water Users Associations have been developed by the projects within the Mara River Basin.” In fact, the plan discussed earlier, “the Transboundary Water Management for Biodiversity and Human Health is the one that established the WUAs in Kenya and now in Tanzania.” When asked how well the WUAs are doing within their functions he was optimistic about their potential but also realistic about the challenges they face.

Yes, I would say they are functional sixty percent, because I know we have two main water users associations in Tanzania, the Tabora and the Tagithe and... when you go outside the protected areas the land is owned by villages so you need to [interact] with the village governments, so somehow they are doing their best at least.

We then discussed how these WUAs and TANAPA could work together to manage the MRB but again he was not enthusiastic about collaborating.

Why can't they develop their own management plan for Tagithe [catchment] and implement? Why can't they develop their own management plan for Tabora catchment and implement? Why should they wait for TANAPA to invite them into the TANAPA management plan?

He believes that even if TANAPA tried to create a shared plan with the WUAs, the villagers in the WUAs would not actually participate in the planning or help with the implementation because they would not feel ownership of it. Mr. Kihwele supports each stakeholder group coming up with their own plan under the guiding principle of the law.

John Lendoyan also spoke about community involvement from his perspective as the head game officer of the wildlife management office in Serengeti District. He echoed Mr. Kihwele's argument that community involvement and multiple stakeholder involvement does not always work. As the wildlife manager of the district “we bring the stakeholders together sometimes and we discuss issues, but it has never been very involving.” Mr. Lendoyan posits that the various stakeholders are fragmented and that past attempts to achieve shared

initiatives have not been successful. An example Mr. Lendoyan gave of an attempt to initiate community participation is the district led “plan of planting 1.5 million trees each year, which is a government objective.” This initiative is meant to combat the effects of climate change and he explained that “we’re always planting trees each year because there is an evaluation, but the problem is how it is performing.” He goes on to explain that “the problem is that many plants are not surviving [because of] the consuming of the plants through charcoal burnings, it is a big problem here in Serengeti.” So while community members participate in planting the trees they also then cut down mature trees in order to get the charcoal required for their daily energy needs.

John Lendoyan said that attempts like this one can have other negative effects on the district’s relationship with communities. He explains that,

In this office we say that we have the role to communicate all the benefits [of conservation] to all the communities to try to influence a positive attitude [within] the communities for conservation. But if we are not doing it the right way... then it is hindering our communication to the communities. So at the end of the day the objective of influencing the positive attitude, we are not achieving it.

However, Mr. Lendoyan still takes an optimistic perspective on the possibility of involving the community in management plans saying, “if we could set up and have everything we do together, nicely, and put our action plans together we could [work] together.” He stresses that communication between officials and communities, in both directions is key to the success of any such plan “because if they do not communicate then the negative attitude of the communities will still be there.” Currently, there is an initiative that encourages direct communication between daily users of the Mara river and high-level officials in order to achieve long-term transboundary cooperation in managing the MRB known as Mara Day.

#### **5.3.2.1 Mara Day: A path for management or more of the same failures**

Mara Day was initiated September 15, 2012 in Kenya, and has been celebrated every year since (Lake Victoria Basin Commission, 2018). Both managers described the objective of Mara Day as a way of bringing attention to the importance of the Mara to the users and governments in both Kenya and Tanzania. Mr. Kihwele explained that “the main objective is creating awareness, empowering people to participate on the sustainable use and management of water resources and biodiversity within the basin.” Initially funded by USAID, the celebrations are now almost entirely funded by the LVBC, which is committed to involving communities in the process of managing the MRB (Lake Victoria Basin Commission, 2018).



John Lendoyan added that the LVBC “headquarters is based in Kisumu, sometimes they come with some projects which involve Kenya and Tanzania.” Emilian Kihwele mentioned more specifically that “the Lake Victoria Basin Commission, which is under East Africa Community, is the entity which was responsible for Mara Day” and the Transboundary Water for Biodiversity and Human Health project we had discussed. Mr. Kihwele explained that the responsibility of hosting the event is “alternated, for instance this year (2018) it was in Kenya, last year it was in Tanzania and next year it will be in Tanzania.” This allows more stakeholders from both countries to participate.

Both managers expressed that Mara Day has many strengths and one that Mr. Kihwele emphasized is that stakeholder involvement in the Mara Day Celebrations is very important. “So we have certain efforts where we have a lot of stakeholders taken in from the primary school, to secondary school, from local communities to governmental institutions who come together to exchange ideas and knowledge on what to do so that we can safeguard the Mara basin.” Mr. Lendoyan contends that another of the celebration’s strengths is “the strength of bringing people together, giving the people opportunity to discuss, to raise their concerns but also to point fingers at those who might be causing the negative effects on the sustainability of the river” in a public forum that has the capacity to enact change. Mr. Kihwele attributes the forum’s capacity to enact change to the fact that,

We invite a big people from the government institutions to be the guest of honor. For instance when it was in Tanzania in 2015 the vice president was the guest of honor. In 2017 the prime minister was the guest of honor, so you can imagine it’s easier for those people to make a decision for the country.

The Mara Day Celebrations give these politicians the opportunity to interact directly with water users and key stakeholders in a way that is not usually possible. Mr. Lendoyan explained more specifically that “the stakeholders meetings bring the strengths of sharing and [creating] the way forward together on [water] issues... and the formulation of action plans,” involving both high-level politicians and everyday water users.

Mr. Kihwele believes that the celebrations attract these politicians “because there are some scientists who do some presentations, there are a lot of exhibitions so they see those too, they understand and then they [can] make some [informed] decisions.” Mr. Kihwele also contends that the approach of Mara Day each year encourages governments to take action.

For instance, before this year’s commemoration in Kenya, two weeks before it, the government of Kenya evicted people from the Mau forest simply because we were

heading toward the Mara Day, and people in Tanzania will come, and if they see that there are people [in the Mau forest] we are going to be blamed.

However, Mr. Kihwele also sees the negative side of such delayed action. “Nowadays people will just sit doing other things waiting for September,” which means that “people won’t [have] a day to day responsibility.” He contends that a year-round perspective is necessary because the Mara River is a life-line to all living things in the region but sees that currently, “people just do other things from January to August and then in September they are busy with the Mara Day, which is not enough.” Mr. Lendoyan agrees and added that there is also an issue when it comes to funding the entities that will carry out the plans created and commitments made at Mara Day. “Now investment needs to be there, because what I see now with the water associations, is they have the action plans but no implementation of them.”

In trying to address this issue Mr. Kihwele approached the organization now responsible for organizing the Mara Day Celebrations, the LVBC, and said “you have developed good documents, can’t you find a way so that these documents are implemented?” He was discouraged by their response which was, “no, this is not our duty, our duty is just to develop policies.” According to Mr. Kihwele, this may be a result of the fact that LVBC only has four to five staff members and do not have the capacity to enforce implementation, another piece of evidence of the lack of proper funding. Both managers see that this most recent attempt at cooperative and shared management for the MRB suffers from the same fate as other management attempts: Plenty of good documents, agreements, and commitments, but a lack of implementation and action. Mr. Lendoyan described this predicament concisely, “Mara Day was a very good idea to try to bring attention to both countries... but I think its operating more politically than professionally.”

## 6 Discussion and Conclusion

In this section I discuss the results of the study within the context of the discourse, conceptual, and institutional framework provided in chapter 2. The results of this study endeavor to answer the research questions which are as follows:

1. Why and how are the Mara River and other water resources important to local communities and wildlife in Tanzania?
2. What are the community members' and managers' perceptions of water, the environment, and the management of water resources?
3. How do the importance of and perceptions surrounding water resources incorporate and interact with national and transboundary management efforts?

In analyzing how the discourses, concepts and institutional framework apply to each of the research questions there were three trends that began to emerge from the data. The first trend is the influence of the concepts of water as an economic good and water as a human right and how this interacts with the dependency of community members and wildlife on the Mara river. A second trend is the ways in which formal and informal institutions are formed by and influence the perceptions of water, the environment, and they ways in which management are performed. The last trend that emerged from the data was the evidence of gaps in political will, funding, education and implementation that have effects on the management of the river and on the people living and working in the MRB.

### 6.1 Why is the Mara important?: Water as economic good or human right

The Mara river is vitally important to the people and wildlife living within the MRB. In interviewing community members, the importance of the Mara river to villagers living in Merenga became abundantly clear. The river is the only reliable source of water for the whole community and all its members' needs. Community members emphasized that "water is life," and that the Mara is "the main source, the only place" for the people of Merenga to get the water they need to sustain themselves and their families. The Mara river is used for multiple purposes ranging from domestic uses such as drinking, cooking, washing clothes, and bathing

to economic activities such as farming, watering livestock, fishing and brick making. The water from the Mara river is a resource that is used by every community member, every day.

In interviewing the wildlife managers who work in the area and reading many studies conducted in the region (Gereta et al., 2013; Majule, 2010; McClain et al., 2014; Mnaya et al., 2017) the importance of the Mara as a resource for sustaining the greater Mara-Serengeti ecosystem and all the wildlife for which the region is famous also became apparent. As John Lendoyan said, “Mara river provides water, provides for the migration of wildebeest and is making the ecosystem healthy.” Emilian Kihwele reiterated this, saying “Mara River to me is like a life-line for the park,” and for the entire MRB.

A third important use of the river is as a means of economic development. This third use presents the opportunity for potential economic and developmental growth through proposed dam projects in Kenya and Tanzania. One of the development plans put forth by Nile Equatorial Lakes Subsidiary Action Program (NELSAP), an international funding program under the Nile Basin Initiative (NBI), outlines the construction of eight dams that would affect the MRB, seven of which are in Kenya and one of which is in Tanzania. The local dependency on the river combined with the proposed projects for the Mara bring attention to the tension between the basic needs met by the river in Tanzania and the possible economic benefits derived from the river by users in Kenya.

The debate between water as an economic good or water as a human right plays a central role within this tension. The result of the tension between the two uses of the Mara is ongoing conflict between the Kenya and Tanzania. As recently at May 4, 2019 reports of the two countries clashing over the proposed dams have been covered by news outlets in East Africa (Muchira, 2019). On the Kenyan side of the argument, the ideas that the dams were proposed by NELSAP, an international recognized development fund, and that Tanzania originally agreed to the plan set forth, is the basis for their push to move forward with the plans to build the dams. Additionally, many economists and scholars argue that treating water as an economic good and creating appropriate water pricing schemes can be used as tool to achieve more equitable and sustainable water supply by controlling water demands (Rogers et al., 2002; Savenije & Van Der Zaag, 2002). However, as water pricing currently functions in most developing countries the poor are forced to pay a higher percentage of their income in order to access the water they need on a daily basis when water utilities do not meet their needs and they are forced to purchase more expensive water from vendors (Rogers et al.,

2002). Additionally, the plan for the dams in Kenya do not take into consideration the impacts they will have the ability of people and wildlife to access water from the river in the lower catchment area in Tanzania, especially during the dry season (Gereta et al., 2013; Mnaya et al., 2017)

On the Tanzanian side of the conflict, politicians and scientists alike have raised the alarm about the possible harmful impacts the dams in the upper catchment of the MRB, located entirely within Kenya, would have on the people and the wildlife living in the lower catchment, located entirely within Tanzania. Therefore, Tanzanian government officials are calling for the plans to be halted and discarded. As head ecologist of Serengeti National Park, Emilian Kihwele put it, “those seven [dams] on the upper catchment in Kenya would require between one-hundred and fifteen to one-hundred and eighty-five percent of the existing flows, which implies during the dry season [there will be] nothing there to meet the demand of those dams.” This data comes from a paper by Mnaya et al. (2017) which supports Tanzania’s claims that constructing the proposed dams, including the one in Tanzania, will have far too many negative impacts on the people of the MRB, the wildlife population, and the entire ecosystem to make them acceptable. As users that depend on the Mara are already reporting, the river sometimes dries almost completely, even without any dams built in the upper catchment. Models show that based on minimum environmental flows needed, the river water resources would be completely exhausted by the dams in Kenya during the dry season and droughts, meaning that the river will dry out completely in the lower catchment area greatly impacting humans and wildlife in the region (Gereta et al., 2013; McClain et al., 2014).

Because of the political border within the debate over the dams, the issue is highly polarized between Kenya and Tanzania. While attempts have been made in the past to create a shared management plan for the MRB, the fact that the water level in the river continues to decline is evidence that these plans have not been successful and that the needs for an effective agreement is urgent. Kenya sees the vast potential of tapping into the economic value of the MRB. By building the dams, Kenya hopes to increase the efficiency with which the Mara as a resource is used. An increase in efficiency of use of the river is seen as absolutely necessary due to the changes that the basin is experiencing caused by a shift in the regional climate. Proponents of the dams argue that the lack of water storage facilities is a major issue in Kenya which will only get worse with the effects of climate change (Metobwa, Mourad, & Ribbe, 2018). Kenya has the distinct advantage as the upstream country in the situation and what they choose to do will directly impact users not only in Kenya, but also in

Tanzania. However the current focus on the Kenyan side of the basin is on increasing the efficient use of the Mara in order to increase development in the basin and provide sufficient water and energy for the citizens of Kenya (Metobwa et al., 2018). This one-sided focus turns a blind eye to the importance of the river to downstream users in Tanzania.

Within this debated the role of formal institutions is very important. These include the international agreements that exist concerning water management. For example, the SDGs call for the guarantee of the availability and sustainable management of water resources for all as well as the use of IWRM at all levels, including transboundary agreements for river basins that are shared between two or more countries (United Nations, 2015). This set of goals and the targets pertaining to water management can be seen as a guiding institution for the ideal management outcomes in the MRB that are desired by high level, international authorities. As emphasized in this set of international goals, it is every individual country's responsibility to manage their resources responsibly and in a manner that does not preclude others from reaching their development potential as indicated by the global level ambition of these goals (United Nations, 2015). Additionally, as the name of the goals state, any development achieved by participating nations moving forward should be sustainable, which it can be argued means that it does not negatively impact others, now or in the future.

While the goals set in the SDGs are meant to inspire nations toward sustainable practices they are not binding. However, the declaration of the human right to clean water and sanitation is binding, as the Human Rights Council ratified the declaration as one of the international human rights laws in September, 2010 (UN Human Rights Council, 2010). The right to water means that all humans have the right to "sufficient, safe, acceptable, physically accessible, and affordable water for personal and domestic use" (UN OHCHR, 2010). This is important in relation to the MRB because the informants from Merenga were adamant that the Mara is their only reliable source of water. However, the damming of the Mara in the upper catchment is predicted to reduce the flow of the river to unsustainable levels (Mnaya et al., 2017) that would prevent users from obtaining the absolute minimum of 20-25 liters per person per day (WHO/UNICEF, 2017).

Added to the overstretched supply of water are the impacts of climate change which are already being seen in the village, as informants report experiencing an overall decrease in the amount of rainfall as well as decreasing levels and quality of water in the river and confirmed by multiple studies in the basin (Dessu & Melesse, 2013a, 2013b; Mango et al.,

2011). The threat of the river drying completely during the dry seasons and droughts is a real possibility, especially if the proposed dams are constructed. Due to these facts, the MRB needs to have protection under international law as it provides the absolute minimum requirement of water, 20-25 liters per person per day, to hundreds of thousands of people in the lower catchment (WHO/UNICEF, 2017; WREM International Inc., 2008). This would also irreversibly impact wildlife populations in the Mara-Serengeti ecosystem, which aside from having inherent and cultural value, also contribute significantly to both countries' economies through tourism (Gereta et al., 2013; Majule, 2010; Mnaya et al., 2017). Due to all of these compounding factors, Tanzania is demanding that the plan for dams in the MRB should be halted.

While Kenya the right to pursue economic development, the international agreements maintain that development that further suppresses another group is not beneficial. Additionally, the human right to water and sanitation precludes development that strips others of this right. Tanzanian Mara river users are, however, at the mercy of the actions of the Kenyan government and users. The adoption of a binding international political agreement is recognized as needed by local users and managers in Tanzania. Mr. Kihwele expressed his hope that “Kenya understands their position as they are on the upper catchment of the MRB.” He believes that because of their position of power they have the responsibility “to do everything possible to make sure the Mara is there.” The necessity of cooperation between the two countries is needed if a mutually acceptable and sustainable management plan is to be reached.

A tentative first step toward such an agreement was made when the ministers from equivalent environmental ministries in Kenya and Tanzania met for bilateral talks in November 2018. These talks produced a joint communiqué on the need for transboundary cooperation in relation to all shared natural resources, with special mention of the MRB as a specific and important example (Joint communiqué on sustainable trans-boundary resource management, 2018) (see appendix 1). The communiqué is the first step toward creating a binding transboundary agreement to sustainably manage the MRB. As the Mara is both an economic opportunity and a provider of human rights, the two concepts are inextricably linked. However the concepts do not necessarily work against one another. As Savenije and Van Der Zaag (2002) argue, treating water as an economic good can be used as a tool to ensure all people are able to access the water they have a right to. The trick is in finding the balance of treating water as an economic good under the overarching principle that water is a

basic human right, with special consideration given to the importance of the river to users in communities like Merenga who depend on it for their right to water.

## 6.2 What are the local perceptions and how are they influenced by institutions?

Institutions play an important role in water management because they are the societal views, rules, norms, laws and regulations that work together to govern water use and management within a society (Ostrom, 1993). In this way, institutions, both formal and informal, greatly influence and are formed by peoples' perspectives at all levels of society. This section explores how the structure and influence of institutions are expressed through the perceptions of the people living in Merenga and working in the MRB.

At the local level many institutions have a significant impact on people's perceptions. In Merenga, having access to water is people's "number one priority," and as all life and livelihoods depend on water to function, "there is no way you can escape" the need for water. Due to this dependence on water, people in Merenga have formed various perceptions of the water they have access to, how climate change that is affecting their water sources, and the management techniques used to conserve and protect their water sources. These perceptions are influenced by a variety of institutions. Most community members' perceptions of the water level of the Mara is that it has decreased over the past several decades, an assertion which has been confirmed by multiple studies (Dessu & Melesse, 2013a; Hoffman et al., 2011; Mati et al., 2008; Mutie et al., 2006). This worries many community members who "pray to God that the water should continue to flow," because while they are not sure of the future of the river, they have trust that water is from God and that God will provide for them. Some community members believe that it is not within their power to control resources from God, such as water. In this way, trust in the institution of religion has influenced people's perceptions of the longevity and sustainability of the river.

Just as people's beliefs shape their perceptions of the resources in Merenga, the village council also plays an important role in shaping their behavior, especially concerning water. As was expressed by the respondents, there are certain village bylaws and unspoken social rules that dictate appropriate and inappropriate uses of the river and other water sources in the village. Here a blend of formal and informal institutions seem to function cohesively together, working to support and enforce the other. The village council is the body responsible for



enforcing these rules as the governing institution of Merenga. Participants from Merenga reported that these rules can range from unspoken social rules, like not allowing open defecation close to the river, to official bylaws that make it illegal to use chemicals for fishing purposes. This blended institutional framework is a complicated web of official and unofficial rules guiding the appropriate uses of water in Merenga. The practices of open defecation and using chemical for fishing are seen as inappropriate by the community of Merenga and the village council. This collective agreement over practices that are not allowed is an institution informed by the village council and by the people living within Merenga. It is understood that if you participate in these practices “then you’re polluting the water so you are supposed to be liable, [for] what you have done.” This water-use institution is enforced by the village council, but with help from the community. Community members are asked to report any incidences of wrong doing “so that [they] can answer about what they think that is wrong [that] has been done in the water.” The behaviors and water uses deemed inappropriate by community-based perceptions are in turn governed and enforced by the institution of the village council. Together institutions and perceptions of what is right and what is wrong are the foundation off of which the society in Merenga is built.

The way in which participants perceive climate change can also be seen as an influential institution within the community because it impacts people’s farming behaviors. Climate change was talked about within the context of the amounts and shifting patterns of rainfall during the interviews. When I asked about climate change, respondents replied in similar ways, such as, “in the past there used to be a lot of rain, but nowadays, no.” Furthermore several respondents agreed that rainfall is becoming more unpredictable which influences their ability to farm successfully. These perceptions have influenced the institutions that manage water resources in the village. One example of this influence is the rule set by the village council to prevent people from cutting down trees close to the river. This rule ensures that the river banks are protected from erosion, however there is a misunderstanding over this rule. Many respondents believe that trees help to create rain and are a way of increasing rainfall in the area. While this is not true, it seems to be an institutional belief that has influenced people’s behavior by discouraging them from cultivating on the riverbanks. In this instance the perception at play is based on a false belief, but has resulted in a positive behavioral, and institutional, outcome in terms of protecting the river.

Perceptions and institutions also interact at societal levels above the community, however local level perceptions do not have as much influence over the institutions that are step up to guide them from higher levels. This was evident when speaking with both the community members and the managers about the formal institutions that govern water policy and transboundary cooperation at the national and international levels. In relation to how climate change is affecting Merenga it was expressed that “no one cares, for sure” but that this type of issue “should be dealt with [by] the higher-level authority,” which refers to the district or regional government. The perception that higher level authorities are responsible for dealing with issues like climate change was echoed by other respondents as well. At the same time, a distrust in governing bodies was also expressed and issues of corruption when it comes to distributing funds from higher level government funding to the appropriate places has been an issue in Merenga. This distrust in institutions that are supposed to provide support and structure is a hinderance to the integration of local perceptions into national and international institutions.

Perceptions also influence the transboundary management of the MRB. Respondents from Merenga expressed a range of opinions about how the river should be managed between Kenya and Tanzania. Some expressed wanting the countries to come to a shared plan, saying it would help to unite the two under a common cause and that a shared plan would be best because both parties would be able to voice their concerns and participate. Other participants were more hesitant, stating that they are not sure if it is possible for the two countries to work together in this way. The managers who were interviewed expressed cynicism in a shared plan because Kenya and Tanzania have very different governments with laws and policies that are hard to reconcile. Despite these perceptions of hesitancy, institutions have formed around the MRB that support and augment the building of management institutions that are aimed at sustainably managing the water resources in the basin. These include the joint communiqué, the various NGO plans for managing the MRB and the annual Mara Day celebration.

All of these institutions could work to shift the perceptions of people who believe that a transboundary management plan is not possible. However, in order to accomplish this, real action needs to be taken in implementing the ideas such as IWRM and WUAs. Action is needed due to the current perception that transboundary institutions are functioning at a political level but not at a professional one. In order to move past this gap in implementation the institutional design principles set forth by Ostrom (1993) need to be applied more rigorously to the transboundary management plans. Specifically, more work to improve the

level of collective choice agreements included in the building of such institutions needs to be done so that community members like those in Merenga are involved in the process of transboundary management.

### 6.3 How do the importance of the river and perceptions interact with current management efforts?

The importance and perceptions of the water resources in the MRB inform the efforts to manage these resources in a variety of ways. International efforts have been focused on creating the necessary frameworks to use IWRM as the process for creating successful transboundary management. The SDGs, the declaration of the human right to water, the joint communiqué on sustainable trans-boundary resources management, the multiple transboundary management planning attempts and Mara Day are efforts that lay the groundwork for an enabling environment which is essential to achieve IWRM in the MRB. However, in moving from planning phases into implementation there has been gaps in political will, funding, and education. In order to act on or change the plans in place, the importance and perceptions of the MRB's water resources need to be at the forefront of implementation in order to fill these gaps.

The importance of the basin to humans and wildlife is reflected in the many efforts to manage the basin at various levels and through various institutions. The local importance of water and the fact that community members in Merenga believe that “water is life” is mirrored in the Tanzanian Water Resource Management Act which states that “safe drinking water is a basic human right” (United Republic of Tanzania, 2009a, p. 364). This is further supported at the international level by the declaration of the human rights to clean water and sanitation (UN General Assembly, 2010; UN Human Rights Council, 2010). The recognition of the importance of water at these three levels, local, national and international, is an important building block for the establishment of IWRM in the MRB and is one that must be continuously recalled throughout the planning and management processes.

How past management efforts have proceeded, their success and failures, stops and starts are influenced by the perceptions of water, environment, and management within the MRB and the importance of the water resources in the basin to various users. One way in which management has been influenced by perception is displayed in the perception of holding users accountable for misdeeds relating to water use and management. This

interaction between management and perceptions can be seen at multiple levels. At the local level, the village council is responsible for ensuring that people who pollute water sources are held accountable through warnings and fines. The community held perceptions that the village council holds authority in water-related issues imbues this institution with the power to govern water resources. The power held by the village council in turn influences the perceptions of climate change in the community of Merenga. This is displayed in the village council's decision to prohibit the clearing of trees from and cultivation of the riverbanks having influenced how village members relate to the effects of climate change.

At the national level, Tanzanian water policy calls for the establishment of WUAs to enable a decentralized form of water management that allows for local institutions to be incorporated into water policies that work for users of a water source and comply with national level water management policies. This type of institutional structure, that incorporates an integrated bottom-up approach with support and guidance from the top, is an attempt to bridge the gap that exists between local and national level management, allowing for effective enforcement of water policy and accountability for misuse. However, the community members interviewed did not have any perceptions on this type of institution because they were not aware that it exists. The managers working within this type of structure perceive flaws in this management institution because they see there is a lack of local participation, perhaps caused by the local lack of knowledge of its existence. This lack of interaction between local perceptions and national management represents a gap in implementation that has prevented the adoption of effective institutions for water management at the grassroots level.

At the international level, transboundary management efforts are perceived both positively and negatively. Efforts such as the four management plans for the MRB produced by various NGOs are perceived as good faith efforts to construct a mutually beneficial plan for the water resources. Each of these plans is an attempt to create IWRM institutions that are capable of managing shared water resources sustainably while also holding violators of those institutions accountable. As voiced by the managers interviewed, these initiatives have produced many documents that lay the groundwork for implementing the process of IWRM. However, as is demonstrated by the current clashes over one of these management initiatives, the ability of these newly formed institutions to negotiate disputes has not yet been established. Perceptions of deception and mistrust between Kenya and Tanzania, as voiced by

community members and managers alike, have played a central role in these disputes as well as the debate over whether water should be seen as an economic good or as a human right.

Together the importance and perceptions of the management of the MRB has resulted in at least four efforts to create a shared plan for Kenya and Tanzania within the basin. However, these factors have also led to conflicts between the two countries who rely on the water in the basin as an economic good and as a resource for meeting basic human rights. It is evident through all of these efforts and conflicts that the MRB is a valuable river basin for the people who live and work within it, and therefore work to manage it will continue. In moving forward with the management of the MRB there are key pieces of water management discourse that should be recalled, that may have been lost sight of throughout the long process of creating a mutually beneficial management plan for the basin.

The principles and structure of IWRM are an important framework for analyzing the dependency on and the perceptions of the Mara river as well as how the basin is currently being managed. Past management attempts have worked to ensure that the principles of IWRM (economic efficiency, equity and environmental sustainability) are achieved by providing the necessary structure needed to achieve these principles. This structure includes the pillars of an enabling environment, an institutional framework and managing instruments. As expressed by managers, past management projects have produced a lot of documents including environmental flows assessments for the river, a biodiversity strategic plan, and a strategic environmental assessment for the basin. These documents provide a baseline enabling environment for the sound management of the MRB. However, the other two pillars of structural IWRM are lacking. The institutional framework needed to maintain and enforce the management of the MRB is unable to move forward due to conflicts between Kenya and Tanzania. These conflicts have played a part in preventing the establishment of strong central to local, transboundary river basin and public to private connections that allow for management actions to be taken. The conflicts have also impacted the previously agreed upon managing instruments, such as the plan to construct dams in the basin, which are now contested and the two sides are at an impasse.

According to managers these conflicts and immobility can be reduced to a lack of political will, funding, education, and implementation efforts. One manager contends that management of the MRB has come down to the countries making the decision to put their differences aside and working to protect and manage the MRB. However, he added that this

would not be enough because in past projects “theoretically, it is okay, we are meeting we are discussing, coming up with plans, but practically nothing is really happening on the ground.” How then, do Kenya and Tanzania move past negotiations and joint communiqués, in which they agree that something needs to be done, to real action steps that implement the plans they agree upon? The challenge in moving forward will be in determining what motivates high-level authorities to act and using those motivating factors to find a balance between water as an economic good and water as a human right.

This study is an effort to explore the importance of the MRB to users and examine the local perceptions that interact with how management is performed in the basin. By incorporating the importance of the river to users and the local perceptions of the resources within the MRB, this study attempts to create a sense of urgency for the policy makers and politicians responsible for taking action and pushing for implementation. At this point, management efforts are “operating more politically than professionally,” but truly integrated water resources management plans take time to be successful. While the MRB may not have the time necessary to wait out the stops and starts of the process of IWRM implementation before the impacts of climate change and lack of management further degrade the basin, that does not mean that Kenya and Tanzania should stop trying. As expressed by a Merenga community member, “there is no way you can escape” the need for water, and there is no way to escape the need for a transboundary agreement to sustain the MRB for all of its users.

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# Appendix 1: Participant List

## Key Informants:

- Emilian Kihwele – Head TANAPA ecologist for Serengeti National Park
  - 8 years in current position; 17 years for TANAPA
- Dickson Kamazima – District water engineer
  - 1 year in current position; 5 years working as water engineer
- John Lendoyan – Head game officer for Serengeti District
  - 10 years in current position

## Community Participants: All names are pseudonyms

- Barbara – 40-50 years old
  - Main source of income: agriculture
- Coulter – mid 20s
  - Main source of income: agriculture
  - Mason's assistant
- Daniel – 32 years old
  - Main source of income: agriculture
  - **Village council member**
- David – 40-50 years old
  - Main source of income: agriculture
  - Handyman/carpenter
- Esther – 30 years old
  - Main source of income: agriculture
- James – 30-40 years old
  - Main source of income: agriculture
- John – 57 years old
  - Main source of income: agriculture
- Katherine – mid 20s
  - Main source of income: agriculture
- Luke – 35 years old
  - Main source of income: agriculture

- Mary – 29 years old
  - Main source of income: agriculture
  - Run tea café business
- Paul – 60-70 years old
  - Main source of income: agriculture
- Samuel – 30 years old
  - Main source of income: agriculture
  - **Village council member**
- Thomas – 28 years old
  - Main source of income: agriculture



# Appendix 2: Semi-Structured Interview Guides

## Community Member Interview Guide

### 1. General Info

- 1.1. How long have you lived in this area?
- 1.2. What are your main sources of income?
- 1.3. What are your main concerns about the Mara River Basin?
- 1.4. Are you affected by these problems?
  - 1.4.1. If yes, in what ways?
- 1.5. What do you see as your key role(s) in these issues?
  - 1.5.1. Why?
- 1.6. What are your priorities (concerning water)?
- 1.7. In what ways have past management planning projects collaborated with you/your group/organization in the Mara River Basin?
  - 1.7.1. If so, which projects?
- 1.8. What were your expectations of these past projects?
- 1.9. Have the projects met your expectations/priorities?
  - 1.9.1. How have they met or failed to meet your expectations and priorities?
- 1.10. What are the main strengths and weaknesses of past management planning projects?
- 1.11. What is meant by managing and plans?
  - 1.11.1. What does management mean to you?
  - 1.11.2. What makes good management or bad management?

### 2. Water (Use, Importance, Changes, Concerns) & Climate Change

- 2.1. Why is water important to you?
- 2.2. What role does the river play in your daily life?
  - 2.2.1. What do you depend on the river for?
- 2.3. Have you noticed any changes in the amount or quality of water available from the river over your lifetime?
  - 2.3.1. How has it changed?
  - 2.3.2. How did/do you cope with these changes?
  - 2.3.3. How have other sources of water changed?
- 2.4. How have changes to the water levels impacted your life?
  - 2.4.1. In years there were water shortages why were there shortages and how did you cope?
- 2.5. What changes have you made in your life to deal with fluctuations in the water availability?
- 2.6. Where do you get the water you use from on a daily basis?
  - 2.6.1. Do you use water from different sources for different purposes?
    - 2.6.1.1. Where do you get drinking water from?
    - 2.6.1.2. What other sources do you use and what are their uses?
- 2.7. What problems do you face if water is not available?
- 2.8. Is the availability of water from the river a concern for you? Why or why not?
  - 2.8.1. Who do you talk to the most about your concerns over water issues?

- 2.8.2. Who uses the most water in your household?
- 2.9. What is climate change?
  - 2.9.1. How did you learn about climate change?
  - 2.9.2. Have you experienced the effects of climate change?
  - 2.9.3. How has climate change impacted you?
  - 2.9.4. What have you done to adapt to climate change?
  - 2.9.5. Who is responsible for stopping climate change?

### **3. Planning and Management**

- 3.1. Do you think the levels of water are due to natural processes or human management of the water, or something else?
  - 3.1.1. Do you feel that your voice is considered and heard concerning your water needs?
  - 3.1.2. How are your needs addressed through management schemes?
- 3.2. Have you participated in discussions and plans concerning managing the Mara River? How?
  - 3.2.1. What role did you play?
  - 3.2.2. What are your main concerns for managing the river?
  - 3.2.3. Have your concerns been addressed? How?
  - 3.2.4. What issues have not been addressed? How would you like them to be addressed?
  - 3.2.5. Do you feel that your concerns were heard during the discussion and planning phases of the management schemes? Explain...
- 3.3. Do you think there needs to be a shared plan for managing the river between Tanzania and Kenya?
  - 3.3.1. Is water management good for or harmful to your ability to access water?
  - 3.3.2. Who should manage the water and implement plans for the river?
- 3.4. What was achieved by the discussions and plans?
  - 3.4.1. What are the plans for managing the river?
    - 3.4.1.1. What do you think about these plans?
  - 3.4.2. How have you and your community participated in these plans?
  - 3.4.3. How have you participated in these plans?
  - 3.4.4. What issues are still a problem concerning the river since the plans were enacted?
  - 3.4.5. Have you seen any physical changes to the river since the plans were discussed or implemented?
  - 3.4.6. How has community involvement in managing water changed over your lifetime?
- 3.5. Have the management schemes helped you cope with water shortages? How?
  - 3.5.1. Do you feel well informed about all the issues concerning the river?
  - 3.5.2. Has information concerning the importance of managing and the management of the river been distributed to you and your community?
    - 3.5.2.1. How?
    - 3.5.2.2. Has this information help you in any way? How?
- 3.6. What are the structures in place?
  - 3.6.1. Are you a member of water users association?
    - 3.6.1.1. Is it a formal or informal group?
  - 3.6.2. How do you participate in the group?
  - 3.6.3. How has the group changed the way you access and use water?
  - 3.6.4. Do you feel that your voice as a water user is heard by the group?

3.6.4.1. In what ways, how?

#### **4. NGO & Consultant participation**

- 4.1. Did (NGO name) help your community adapt to changes occurring to the Mara?  
How?
- 4.2. How was your community involved in participating in the work done by (NGO name)?
- 4.3. Does money play a large role in how NGOs or the government make plans?
  - 4.3.1. How does this effect the plans made by the government or NGOs?

#### **5. Conflicts between Tanzanian Stakeholders**

##### *5.1. Industry*

- 5.1.1. Is industry using too much water from the Mara?
- 5.1.2. How did/does the pollution from the North Mara Gold Mine affect you?
- 5.1.3. How did your water use change after the pollution occurred?

##### *5.2. Social Contracts*

- 5.2.1. Are there any unwritten social rules concerning water usage?
  - 5.2.1.1. How are these rules enforced?
  - 5.2.1.2. Who makes these rules?
  - 5.2.1.3. How do these rules influence your behavior?
  - 5.2.1.4. What are the consequences of breaking these social rules?
  - 5.2.1.5. How do you become a member of a water user association/group?
  - 5.2.1.6. What gives you the right to use water from the river?
  - 5.2.1.7. What obligations do you have as a member of a water user association?
  - 5.2.1.8. Are there formal local by-laws on paper concerning the river and water?
    - 5.2.1.8.1. Can I have a copy of these?

##### *5.3. Land Use*

- 5.3.1. How has the land changed over your lifetime?
- 5.3.2. How has the way people use the land changed over time?
- 5.3.3. How have farming practices changed over your lifetime?
- 5.3.4. Have your crop yields changed over your lifetime? How?
- 5.3.5. Has changing your farming practices increased crop yields?
- 5.3.6. How have changing farming practices affected water resources in your community?

##### *5.4. Immigration to Western Serengeti*

- 5.4.1. Has there been an increase or decrease in the number of people using the water sources you rely on?
- 5.4.2. How has this increase impacted you?

#### **6. Conflicts with Kenyan Stakeholders**

- 6.1. How do you think the use of water at the source of the river in Kenya affects the water in the Mara River in Tanzania?
- 6.2. Do you believe the use of the river in Kenya has affected your ability to access enough and good enough quality of water from the Mara? Why?
- 6.3. Are you willing to invest financially in order to ensure the sustainable use of water by upstream users? (payments for ecosystem services, PES)
  - 6.3.1. Are PES already being used?
  - 6.3.2. If so, who is paying them and to whom?

## **Wildlife Manager/Park Official Interview Guide**

### **1. General Info**

- 1.1. How long have you worked as a wildlife manager/park official/etc.?
- 1.2. As a park official, what are your priorities?
- 1.3. What are your main concerns about the Mara River Basin?
- 1.4. Are you affected by these problems?
  - 1.4.1. If yes, in what ways?
- 1.5. What do you see as your key role(s) in these issues?
  - 1.5.1. Why?
- 1.6. What are your priorities (concerning water)?
- 1.7. In what ways have past management planning projects collaborated with you/your group/organization in the Mara River Basin?
  - 1.7.1. If so, which projects?
- 1.8. What were your expectations of these past projects?
- 1.9. Have the projects met your expectations/priorities?
  - 1.9.1. How have they met or failed to meet your expectations and priorities?
- 1.10. What are the main strengths and weaknesses of past management planning projects?
- 1.11. What is meant by managing and plans?
  - 1.11.1. What does management mean to you?
  - 1.11.2. What makes good management or bad management?
- 1.12. Who is responsible for managing and monitoring water sources in the park?

### **2. Water (Use, Importance, Changes, Concerns) & Climate Change**

- 2.1. Why is the Mara River important to the Serengeti Ecosystem and the greater Maasai-Mara Serengeti Ecosystem?
  - 2.1.1. Which species depend on it?
  - 2.1.2. How do different species depend on it?
  - 2.1.3. What would happen to the ecosystem and wildlife if the river were dammed near its source in the Mau Forest, Kenya?
- 2.2. How has Mara River changed over the time you have worked in the park?
  - 2.2.1. What are the consequences of these changes?
  - 2.2.2. What has been done to adapt to these changes?
- 2.3. Are there other issues the Mara River is facing currently? What are they?
  - 2.3.1. How have these issues impacted the park?
- 2.4. Have the effects of climate change been observed in the park?
  - 2.4.1. What are the impacts of climate change within the park?
  - 2.4.2. What has been done to adapt to these impacts?
  - 2.4.3. Who is responsible for stopping climate change?
  - 2.4.4. Has climate change been taken into account within the management plans for the park and its water sources?
    - 2.4.4.1. How has this been done?

### **3. Planning and Management**

- 3.1. Does the park have a management plan for Mara River (other water sources in the park)?

- 3.1.1. What is the management plan for Mara River?
- 3.1.2. What is involved in managing water sources in the park?
- 3.1.3. Is this management plan coordinated for the entire Maasai-Mara Serengeti Ecosystem?
  - 3.1.3.1. How?
  - 3.1.3.2. Why?
- 3.1.4. How is the plan implemented on the ground, on a day-to-day basis?
- 3.1.5. Can I have a copy of the management plan?
- 3.2. Do you think management schemes in place address the needs of different stakeholders who use the Mara River?
  - 3.2.1. Who are the stakeholders?
  - 3.2.2. How are their needs addressed in the management plans?
- 3.3. Do you think there needs to be a shared plan for managing the river between Tanzania and Kenya?
  - 3.3.1. Have there been past plans or are there future plans to create such a management scheme?
  - 3.3.2. Have past plans been implemented?
  - 3.3.3. Were they successful or not? How?
  - 3.3.4. Who should be in charge of managing the water and implementing plans for the river within an international plan?
- 3.4. Have you participated in discussions and plans concerning managing the Mara River?
  - 3.4.1. What role did you play?
  - 3.4.2. Which organizations were involved in the work?
  - 3.4.3. Who funded the work? NGOs
  - 3.4.4. Has the management strategy been put into action within the park?
  - 3.4.5. Currently, what are your main concerns for managing the river?
  - 3.4.6. Were your concerns heard and addressed within these discussions/plans? How?
  - 3.4.7. What issues have not been addressed?
    - 3.4.7.1. How would you like them to be addressed?
  - 3.4.8. What was achieved by the discussions and plans?
  - 3.4.9. What do you think about the plans for managing the river?
  - 3.4.10. What issues are still a problem concerning the river and its management?
  - 3.4.11. Have you seen any physical changes to the river since the plans were discussed or implemented?

#### **4. NGO & Consultant Participation**

- 4.1. Where does funding for water management come from within the park?
- 4.2. Do NGOs or consultants help the park adapt to changes occurring to the Mara River and other water sources?
  - 4.2.1. Which NGOs/consultants and how do they help?
- 4.3. What was the impact of past NGO/consultant's participation in managing water sources in the park, specifically the Mara River?
- 4.4. Did the NGO/consultant help park managers to address concerns about water and the Mara River?
  - 4.4.1. How did they succeed or fail to do so?
- 4.5. Does money play a large role in how the park makes plans?
  - 4.5.1. Did the source of funding influence the overall project to manage the Mara River?

- 4.5.2. How does funding from outside NGOs/consultants shape (water management) plans within the park?

## **5. Conflicts Between Tanzanian Stakeholders**

### *5.1. Social Contracts*

- 5.1.1. Are there any unwritten social rules concerning water usage between local communities to the west of the park's borders and the park?
  - 5.1.1.1. Who makes these rules?
  - 5.1.1.2. How do these rules influence your management of the Mara River?
  - 5.1.1.3. What are the consequences of breaking these social rules?
  - 5.1.1.4. How are these rules enforced?
  - 5.1.1.5. Are there formal local by-laws on paper concerning the river and water?
    - 5.1.1.5.1. Can I have a copy of these?

### *5.2. Land Use*

- 5.2.1. How has the land surrounding the park changed over your time at the park?
- 5.2.2. How has the way people use the land changed over time?
- 5.2.3. How have farming practices changed?
- 5.2.4. How have the changes to land use and farming practices effected the park?
  - 5.2.4.1. Ecologically?
  - 5.2.4.2. Management-wise?

### *5.3. Immigration*

- 5.3.1. Has there been an increase or decrease in the number of people using the water sources that flow through the park?
- 5.3.2. Has there been an increase or decrease in the number of wildlife using the water sources that flow through the park?
- 5.3.3. How has this increase/decrease impacted the park and its water sources?

## **6. Conflicts with Kenyan Stakeholders**

- 6.1. How do you think the use of water at the source of the river in Kenya affects the water in the river in the park and in Tanzania in general?
- 6.2. Do you believe the use of the river in Kenya has affected the ability of wildlife in the park to access enough and good enough quality of water from the Mara? Why?
- 6.3. Is the park willing to invest financially in order to ensure the sustainable use of water by upstream users? (payments for ecosystem services, PES)
  - 6.3.1. How much should be invested and by whom?
- 6.4. What level of accountability exists between Maasai-Mara National Reserve and Serengeti National Park in concern with the management of the Mara River?
  - 6.4.1. What are the mechanisms in place to enforce this accountability?
  - 6.4.2. Are these mechanisms used and is accountability enforced at the grass-root level?
- 6.5. Do you believe there should be more or less coordination between the parks concerning the management of the Mara River?
  - 6.5.1. In what ways?
  - 6.5.2. How?
  - 6.5.3. Why?

## **Community Management Official Interview Guide**

### **1. General Info**

- 1.1. What position do you hold in relation to environment or water?
- 1.2. How long have you held this position?
- 1.3. What are your responsibilities within your position?
- 1.4. As a (insert position), what are your priorities concerning water?
- 1.5. What are your main concerns about the Mara River Basin?
- 1.6. Are you affected by these problems?
  - 1.6.1. If yes, in what ways?
- 1.7. What do you see as your key role(s) in these issues?
  - 1.7.1. Why?
- 1.8. In what ways have past management planning projects collaborated with you/your group/organization in the Mara River Basin?
  - 1.8.1. If so, which projects have you collaborated with?
- 1.9. What were your expectations of these past projects?
  - 1.9.1. Have the projects met your expectations/priorities?
  - 1.9.2. How have they met or failed to meet your expectations and priorities?
- 1.10. What are the main strengths and weaknesses of past management projects?
- 1.11. What does management mean to you?
- 1.12. What makes good management or bad management?

### **2. Water (Use, Importance, Changes, Concerns) & Climate Change**

- 2.1. How is the Mara River important to you (and your job)?
- 2.2. Have there been any changes to the Mara River over your lifetime? What are these changes?
  - 2.2.1. Why have they occurred?
  - 2.2.2. What have you done to adapt to these changes?
  - 2.2.3. What are the impacts of these changes on you and your community?
- 2.3. What is Climate Change?
  - 2.3.1. As a (insert position), do you teach others about climate change?
  - 2.3.2. Have you and your community experienced the effects of climate change?
  - 2.3.3. How has climate change impacted you and your community?
  - 2.3.4. What have you and your community done to adapt to climate change?
  - 2.3.5. Who is responsible for stopping climate change?
- 2.4. Is the availability of water from the river a concern for you and your community?
  - 2.4.1. Why or why not?
  - 2.4.2. Who do you talk to the most about your concerns over water issues?
  - 2.4.3. Who uses the most water in your community? What is it used for?
- 2.5. Do you feel that your opinion about water management is taken seriously?
  - 2.5.1. By local people?
  - 2.5.2. By national and international leaders?
- 2.6. How has your opinion impacted management plans?

### **3. Planning and Management**

- 3.1. Do you think management schemes in place address the needs of different stakeholders who use the Mara River?

- 3.1.1. Who are the stakeholders?
- 3.1.2. How are their needs addressed in the management plans?
- 3.2. Do you think there needs to be a shared plan for managing the river between Tanzania and Kenya?
  - 3.2.1. Have there been past plans or are there future plans to create such a management scheme?
  - 3.2.2. Have past plans been implemented?
  - 3.2.3. Were they successful or not? How?
  - 3.2.4. Who should be in charge of managing the water and implementing plans for the river within an international plan?
- 3.3. Have you participated in discussions and plans concerning managing the Mara River?
  - 3.3.1. What role did you play?
  - 3.3.2. Currently, what are your main concerns for managing the river?
  - 3.3.3. Were your concerns heard and addressed within these discussions/plans? How?
  - 3.3.4. What issues have not been addressed?
    - 3.3.4.1. How would you like them to be addressed?
- 3.4. What was achieved by the discussions and plans?
  - 3.4.1. What are the current plans for managing the river?
    - 3.4.1.1. What do you think about the plans for managing the river?
  - 3.4.2. How have you and your community participated in these plans?
  - 3.4.3. Have you seen any physical changes to the river since the plans were discussed or implemented?
- 3.5. How has community involvement in managing water changed over your lifetime?
- 3.6. Have the management schemes helped communities cope with water shortages? How?
- 3.7. What are the structures in place to manage water at the community level?
  - 3.7.1. At the regional level?
  - 3.7.2. At the national level?
  - 3.7.3. At the international level?
  - 3.7.4. Are you a member of WUA?
    - 3.7.4.1. How do you participate in the WUA?
    - 3.7.4.2. How has the WUA changed the way you access and use water?
    - 3.7.4.3. Do you feel that your voice as a water user is heard by the WUA? In what ways, how?

#### **4. NGO & Consultant Participation**

- 4.1. Where does funding for water management come from in your community?
- 4.2. Did NGOs or consultants help your community adapt to changes occurring to the Mara River?
  - 4.2.1. Which NGOs/consultants and how did it help?
- 4.3. How was your community involved in participating in the work done by (NGO name)?
- 4.4. What was the impact of the NGO/consultant's participation in managing the Mara River?
- 4.5. Did the NGO/consultant help to address your and your community's concerns about water and the Mara River?
  - 4.5.1. How did they succeed or fail to do so?



- 4.6. Does money play a large role in how NGOs/consultants or the government make plans?
  - 4.6.1. How does this effect the plans made by the government or NGOs?
  - 4.6.2. Did the source of funding influence the overall project to manage the Mara River?
- 4.7. Do NGOs/consultants have an overall positive or negative effect on water management and the Mara River?

## **5. Conflicts Between Tanzanian Stakeholders**

### *5.1. Industry*

- 5.1.1. Is industry using too much water from the Mara
- 5.1.2. How did/does the pollution from the North Mara Gold Mine affect you?
- 5.1.3. How did your water use change after the pollution occurred?

### *5.2. Social Contracts*

- 5.2.1. Are there any unwritten social rules concerning water usage?
  - 5.2.1.1. Who makes these rules?
  - 5.2.1.2. How do these rules influence your management of the Mara River?
  - 5.2.1.3. What are the consequences of breaking these social rules?
  - 5.2.1.4. How are these rules enforced?
  - 5.2.1.5. How do you become a member of a water user association/group?
  - 5.2.1.6. What gives you the right to use water from the river?
  - 5.2.1.7. What obligations do members of a water user association have?
  - 5.2.1.8. Are there formal local by-laws on paper concerning the river and water?
    - 5.2.1.8.1. Can I have a copy of these?

### *5.3. Land Use*

- 5.3.1. How has the land changed over your lifetime?
- 5.3.2. How has the way people use the land changed over time?
- 5.3.3. How have farming practices changed over your lifetime?
- 5.3.4. Have crop yields changed over your lifetime? How?
- 5.3.5. How have changing farming practices effected water resources in your community?

### *5.4. Immigration*

- 5.4.1. Has there been an increase or decrease in the number of people using the water sources you rely on?
- 5.4.2. How has this increase/decrease impacted the river and its management?

## **6. Conflicts with Kenyan Stakeholders**

- 6.1. How do you think the use of water at the source of the river in Kenya affects the water in the river in Tanzania?
- 6.2. Do you believe the use of the river in Kenya has affected the ability of your community to access enough and good enough quality of water from the Mara? Why?
- 6.3. Is your community willing to invest financially in order to ensure the sustainable use of water by upstream users? (payments for ecosystem services, PES)
  - 6.3.1. How much should be invested and by whom?

## Appendix 3: Transboundary Agreement

### JOINT COMMUNIQUÉ ON SUSTAINABLE TRANS-BOUNDARY RESOURCE MANAGEMENT BETWEEN THE REPUBLIC OF KENYA AND THE UNITED REPUBLIC OF TANZANIA

The Cabinet Secretary Ministry of Environment and Forestry of the Republic of Kenya Keriako Tobiko, CBS, SC and the Minister for State for Union and Environment in the Office of the Vice President of the United Republic of Tanzania, Hon. January Y. Makamba (MP.), held bilateral talks today, 29<sup>th</sup> November 2018.

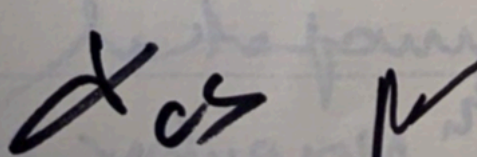
In a cordial and friendly environment, the two Ministers lauded the strong historical and bilateral ties that exist between the two neighbourly countries. The talks also covered a range of issues in the context of sustainable environmental conservation including the success of the just concluded Sustainable Blue Economy Conference.

With regard to trans-boundary natural resources, the Ministers exchanged views on the need to develop strategies that would enhance their management. While agreeing on the intricate links in the ecosystems that traverse the two countries and the threats facing them, the meeting took note that so far Kenya and Tanzania have signed several MOUs concerning the management of trans-boundary resources which include; the lakes, wetlands and rivers, water catchment areas and flora and fauna. The meeting underlined the sustainable management of the Mara River Basin, Lake Jipe, Lake Chala and Lake Natron ecosystems. The two Ministers recognized the immense contribution of these resources to their national economies and hence underscored the importance for close collaboration in their management.

The two Ministers recalled previous and existing bilateral initiatives to manage trans-boundary resources and agreed that they have proved inadequate to stem the speed and scale of environmental degradation of these resources.

In this regard, the Ministers agreed to;

- i. Establish a Joint Sectoral Committee at the Ministerial level to coordinate conservation and management initiatives of the trans-boundary resources.



- ii. Establish a Joint Sectoral Team of Experts to provide technical guidance in the management of the trans-boundary resources.
- iii. Undertake a fact -finding mission at the Ministerial level to ascertain the current status of the trans-boundary resources and recommend requisite interventions.
- iv. Develop a consolidated and comprehensive protocol on the management of all the trans-boundary resources.
- v. Develop a resource mobilization plan that will support the implementation of the trans-boundary resource management.

The two Ministers committed to fully support the implementation of this Communiqué.

**Keriako Tobiko, CBS, CS**  
Cabinet Secretary  
Ministry of Environment and Forestry  
Republic of Kenya

Signature-----

Date-----

*[Handwritten Signature]*  
**29<sup>th</sup> November, 2018**

**Hon. January Y. Makamba (MP)**  
Minister for State for Union and Environment in the Office of the  
Vice President of the United Republic of Tanzania

Signature-----

Date-----

*[Handwritten Signature]*  
**29<sup>th</sup> November, 2018**

Emily Bly Rogers

"Actually, water is life!"