







ABSTRACT

Contemporary arguments hold that increased resource scarcity in arid and semi-arid regions in Africa will be the cause of many conflicts in the near future. Water scarcity especially is increasingly being linked to global warming, with scientists, academics, and governments from around the globe issuing dire warnings on the aftermath of climate change as they seek to battle this latest 'threat to humanity' through various policy interventions. The study site of Maji Moto, Kenya, is experiencing increasing and prolonged droughts as well as increasing water scarcity and water-related conflicts during these dry spells. This study will use a political ecology framework to qualitatively assess the local institutional structures to determine how access to water resources is governed at the study site, and to what extent these socio-political institutions and their embedded power relations contribute to disputes and conflicts at the community level, and whether or not climate change plays a definitive role in the water-related conflicts. Pre-colonial control and management of water was governed by customary law where water governance was closely linked to communal land rights. During colonial times the British dismantled these traditional institutions and centralized resource management and control by imposing a governance system based on individual land rights. The Maasai were moved into Native Reserves where institutionally life continued to be governed by customary law. As such, the British created the conditions for a pluralistic system of land and water governance. Today the pastoralist Maasai institution faces many challenges as the traditional administrative institutions of village elders and age-sets where decisions are based on consensus and reciprocity are slowly replaced by new institutions based on democratic principles and statutory law. The demand for change is not always exogenous and can come from within as well as economic, political, and environmental factors such as population pressure, land tenure, multiple droughts, and trading in a market economy require specific types of institutions to meet these new conditions. As traditional and statutory laws collide, contradictory interests question the legitimacy of the authority of the various institutions, leading to new forms of cooperation and conflict. This study demonstrates that it takes more than a change in the weather to elicit the increased water-related conflicts apparent at the study site and that climate change interventions must be based on the contents and effects of institutions rather than on just their form.



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List of abbreviations

ASAL Arid and Semi-Arid Lands

CoCooN Conflict and Cooperation over Natural Resources in Developing

Countries Programme 2009

FAO Food and Agriculture Organization of the United Nations

GR Group Ranch

GWP Global Water Partners

ILEPA Indigenous Livelihoods Enhancement Partners (ILEPA is the Maa

word for 'Rise up' or 'Rise')

IO International Organization

IPCC International Panel on Climate Change

IWRM Integrated Water Resource Management

MM Maji Moto

NCCAP Kenya National Climate Change Action Plan 2013-2017

NDEAP Narok District Environmental Action Plan 2009-2013

NRM Natural Resource Management

NWO Nederlands Instituut voor Wetenschappelijk Onderzoek (Netherlands

Institute for Scientific Research)

PRSP Poverty Reduction Strategy Paper

UNDP GEF-SPG United Nations Development Programme Global Environment Facility

- Small Grants Programme

UNFCCC United Nations Framework Convention on Climate Change

UNU-EHS United Nations University Institute for Environment and Human

Security

WHO World Health Organization

WMC Water Management Committee of Maji Moto Irrigation Scheme

WRMA Water Resourse Management Authority

WSP Water Service Provider



Glossary of Terms

Enkare Nairowua Hot water (Maa)

Hotel Local term for a place where one can get food and drink

Maji Moto Hot water (kiSwahili)

Manyatta Traditional home built of sticks, cow dung, and mud, with thatched

roof

Matatu Mode of transportation typically in a small 6 seater bus or by

motorbike

Mobati Improved manyatta made of iron sheeting

Moran Age-set where the young men become warriors

Mzungu Derogatory term for a white person

Oligata Clan or lineage

Olosho Territorial section

Olporror Age-set

Orinka orok Black sceptre given to age-set leaders at initiation

Shamba 'Garden' where vegetables, wheat etc. are planted; agricultural plot



1 INTRODUCTION

Contemporary arguments posit that increased resource scarcity in arid and semi-arid regions in Africa will be the cause of many conflicts in the near future. Indeed, resource scarcity, especially water scarcity, is increasingly being linked to global warming. Scientists, academics and governments from around the world are issuing dire warnings on the aftermath of climate change as they battle this latest 'threat to humanity' through capacity building exercises, participatory engagements, climate change funding, international conventions, and policymaking. The Kenyan rangelands are no strangers to a changing climate, water scarcity, and water related conflicts. This study has been carried out with the purpose of researching the causes of water related conflicts in the Kenyan rangelands, more specifically in a community that lives within a ten kilometre radius of the last remaining permanent water source in the Maji Moto Group Ranch.

The literature supporting the relationship between resource scarcity, climate change, and conflict is vast and growing, as are the narratives that are emerging from this theme. Thomas F. Homer-Dixon, renown scholar on the links between environmental stress and violence in poor countries has been especially influential in this area in which he posits that "Climate change will help produce the kind of military challenges that are difficult for today's conventional forces to handle: insurgencies, genocide, guerrilla attacks, gang warfare and global terrorism" (Homer-Dixon 2007, as cited in Floyd 2008, pg. 61). His main thesis holds that global warming, combined with population growth will lead to increasing resource scarcity and unequal resource distribution which in turn will lead to droughts and desertification which will further deplete already scarce resources such as arable land and water, thereby leading to violent conflict as people struggle for survival (Homer-Dixon 1994, pg. 40).

Whilst Homer-Dixon's resource scarcity narrative and environmental security thesis have been very influential within academic circles and with policy makers, other scholars in political ecology (Raleigh 2010, pg. 72; Bryant 1998, pg. 80, Johnston 2003, pg. 76; Floyd 2008, pg. 55) argue that other factors might play a more central role to resource related conflicts such as the economics of the locality and its socio-political structures, and praise the merits of applying a political ecology framework to assess power relations and conflicts inherent in such structures. Power in this context refers to the relational effects relative to one's location



advantage, access to other material resources, psychological strength, or social status (Piccione and Razin 2009 as cited in Komakech et al 2012, pg. 115). Although environmental changes are occurring at the study site and might contribute to water related conflicts, this study will go behind the scenes to investigate the structural links between this environmental change and the politics of the area utilizing a political ecology framework to assess the reasons for the prevailing conflicts.

1.1 The Politics of Water

To understand the link between climate change and the politics of water one must retrace when and how water made its entrance into the climate change discourse. Although a lengthy discussion of the political history of the water-climate change nexus falls outside the scope of this thesis, suffice it to say that the Dublin principles to come out of the 1992 International Conference on Water and the Environment held in Dublin, Ireland, may be considered an important catalyst for the global politics of the climate change and water discourse (Bakker 2007, pp. 430; Sambu and Tarhule 2013, pg. 788). These principles inform the Integrated Water Resources Management (IWRM) paradigm which became the dominant framework for international water policymaking by newly emerging global players in the water domain such as the 1996 World Water Council established by the World Bank and the United Nations and other international multi-stakeholder platforms (Conca 2006, pp. 6; Bakker 2007, pp. 431) and thus by extension, their development partners. An in-depth review of this paradigm will be provided in chapter three of this paper.

1.2 The Study Site

NWO and the Ministry of Foreign Affairs of The Netherlands initiated the CoCooN programme in 2009. With a view to the political agenda of international players and the Kenya government with regard to the politics of water mentioned above, I undertook my research as part of the joint collaborative research project between ILEPA of Kenya and Utrecht University which runs the CoCooN project. The project's aim is to focus on increasing inclusiveness, participation, and conflict-sensitivity of climate change interventions directed at farmers and pastoralists, and on the ways to prevent conflicts and/or contribute to conflict resolution. Following in this vein, my research topic entails an assessment of conditions, catalysts, and triggers in a Maasai community in Maji Moto, Kenya, that lead to conflict over shared



resources in general, with a view to water security in particular within the context of climate change.

1.3 Problem Statement

This study focuses on water resource related conflicts in a Maasai community in the arid rangelands of Maji Moto, Narok South, Kenya. I shall investigate what the causes are of these conflicts by assessing the socio-political institutions and governance structures of the water resources. I shall seek to assess how access to water resources is governed in the villages at the study site and how these institutions and their embedded power relations contribute to disputes and conflicts at the community level, and whether or not climate change has any bearing on the decisions taken at the community level regarding the governance of water resources.

1.4 Research Objectives and Research Questions

When assessing water-scarcity related conflicts it is important to build political factors into definitions of environmental scarcity and "clearly disentangle the physical sources of the grievance or conflict from its political, economic, and social determinants" which is "key to reaching a more robust conclusion concerning the effects of environmental trends" (Dessler 1999 as cited in Tamas 2003, pp. 5). This separation of the physical from the subjective is key to reaching a better understanding of the links between climate, water, and conflict.

Based on the problem statement above my main objective is to research and establish the causes of water related conflicts between local water users and local water providers in the marginalized community of Maji Moto in Kenya. I am particularly interested as to how each user's unique situation affects water use and non-cooperation with others. In order to assess what the case may be in the Maji Moto case study, the research questions were derived from the conceptual framework which is elaborated upon in chapter two. Based on the research objective my research questions are as follows:



Central Research Question

How do water resource scarcity and socio-political factors influence water related conflicts in the arid rangelands of Maji Moto, Kenya?

Sub-Questions:

- 1. Which water conflict histories can be identified in Maji Moto and what is their dynamic?
- 2. Who are the major actors involved in the water conflicts and what motivates their behaviour?
- 3. Which internal and external factors could explain the origin and evolution of conflicts within the Maji Moto community with regard to water?
- 4. Which policy options with regard to prevention, mitigation, and early warning of water conflict can be derived from the Maji Moto case study?

1.5 Motivations and Relevancy

The link between climate change, water scarcity, and conflict is a key theme in development studies, peace and conflict research, and the public forums. The 'resource scarcity narrative', 'environmental security thesis' and 'climate change discourse', although dominant concepts when explaining the relationship between water and conflicts, are under scrutiny (Raleigh and Kniveton, 2012, pg. 5; Raleigh 2010, pg. 69; Symons 2014, pg. 272) as policy makers, think-tanks, and the media assume the simplistic cause and effect scenario that climate change causes water scarcity which in turn triggers conflict and causes insecurity (Kloos et al. 2013, pg. 32).

One school of thought is that climate change will lead to conflicts, both violent and non-violent, in a number of regions of the world (Swart 1996, Sacks 2005, Homer-Dixon 2007, Stern 2007, as cited in Raleigh and Kniveton 2012, pp. 51) due to resource scarcity. Ngigi (2009, pp. 1) asserts that economic growth and food security in Sub-Saharan Africa is threatened by climate change and that by 2020 an estimated 50-250 million Africans will face increased water stress. A second school of thought stresses that the environmental scarcity



thesis and climate change are not sufficient to explain water scarcity and the resulting conflicts, that various non-environmental factors contribute to water conflicts, and that resource scarcity is not an absolute scarcity, "but a relative construct that has more to do with resource distribution and mechanisms of access and control" (Homer-Dixon 1994, pg. 9; Johnston, 2003, pg. 74).

Since "water and its availability and quality will be the main pressures on, and issues for, societies and the environment under climate change" (Bates et. al 2008, pp. 7), the UNU-EHS concurs with the second school of thought and finds that value-based approaches to climate change vulnerability have emerged that acknowledge that climate change could be perceived or valued differently by individuals, groups, societies and governments which subsequently leads to differences in the levels of vulnerability and adaptive capacity of these stakeholders (O'Brien and Wolf 2010 as cited in Kloos et al. 2013, pg. 34). Along these lines, governments recognize that water "is at the core of sustainable development as it is closely linked to a number of key global challenges" and that water is key to managing risks such as famine, migration, epidemics, inequalities and political instability which have a direct impact on meeting the post-2015 development goals of poverty eradication, overcoming inequalities, realizing human rights and boosting sustainable economic development (UN-Water 2014, pg. 7). The UNFCCC to be held in Paris, France in December 2015, or 'Paris 2015' as it is commonly referred to, is set to play a key role, albeit indirectly, in helping governments to attain a globally sustainable water goal of curbing extreme weather patterns that appear to be a contributing factor to water related conflicts in ASAL's (UNFCCC 2015; UNEP Climate Action).

Since the literature on the ASAL's of the world, including Kenya, are viewed as areas with resource scarcity-driven conflicts, I find it relevant to research water resource related conflicts in at my study site. Much of the existing research focuses on armed and violent conflict at the national and international level. However, less research is available for disputes or low-intensity conflicts at the micro-level around scarce water resources mainly because of a lack of data at this level even though this type of water related conflict is far more frequent and might also be prompted by extreme events such as droughts and floods (Gleditsch et al., 2004; Ohlsson 1995, 1999a and 1999b, Ohlsson and Turton 1999, Ravenborg 2004, Swedish Water



House 2005, Carius et al., 2004, Thomasson 2006, Turton 2004, Swatuk and Wirkus 2009 as cited in Kloos et al. 2013, pg. 34). As a consequence of this knowledge gap I find my research topic relevant for ongoing debates within the academic arena and public spheres because of the contemporary interest in climate change related themes. Moreover, it is interesting to study water security in a Kenyan ASAL such as Maji Moto with its high poverty rate, as the government has yet again aligned its water distribution and governance structures to international donor requirements which might have a counter-productive effect on the post-2015 sustainable development goal of poverty eradication at the household level.

1.6 Structure of the Thesis

I shall present my research through conceptual, theoretical, contextual and methodological frameworks whereupon I shall proceed to present an analysis, discussion, and conclusion of my findings, and conclude with possible recommendations. This thesis consists of seven chapters. Chapter one provides an Introduction, chapter two highlights the Conceptual and Theoretical background whilst chapter three provides some Contextual background. Chapter four discusses the Methodology used whilst Chapter five outlines the Findings and Analysis. Chapter six provides a Discussion of the findings and Chapter seven provides the Conclusion and Recommendation for academics and policymakers. The letters A, D, and N followed by a number indicated in brackets are the respondents' interview reference codes for privacy purposes.



2 Conceptual and Theoretical Background

This section provides an introduction to certain concepts and theories related to and referenced in my discussion of the water-climate-conflict nexus. To gain an understanding of how these concepts and theories influence not only global and national policy making but affect marginalized communities, a brief overview of the various narratives and discourses leading to the construction of these concepts and theories is in order. Finally, I will provide the theoretical background for this study. I have chosen to assess the research objective using the political ecology approach.

2.1 Narratives and Discourses of the Water- Climate Change-Security Nexus

A narrative is broadly defined as 'the telling of a story', i.e. to make something known or to convey information (Berger 1997 and Lacy 2000 as cited in Wiles et al 2005, pg. 90), in other words, a narrative presents information as a sequence of connected events, and has some kind of thematic coherence (Labov 1972 as cited in Wiles et al 2005, pg. 90). If a narrative is told often enough, it becomes discourse or general knowledge, often stated as fact. Discourses are more general in their contents than narratives and are referred to as knowledge regimes: "it is the articulation of knowledge and power, of statements and visibilities, of the visible and the expressible. Discourse is the process through which social reality inevitably comes into being" (Escobar 1996, pg. 326). According to Foucault, this knowledge is taken for granted and ultimately becomes 'truth' but he challenges how something can be considered as truth just because someone declares it to be so (as cited in Cresswell 2009, pg. 211). The danger with discourses according to Foucault, is that the deployment of this 'knowledge' and the circulation of these 'truths' involve the exercise of power (Huxley 2009, pg. 256) and that this 'truth' is constructed and simply might not exist in other times and places. But these 'truths' shape perceptions, concepts are 'constructed', and a dominant narrative is born and forms the basis of public beliefs and policy (Orindi and Huggins 2005, pg. 33-9). Orindi and Huggins also note that although these concepts are shaped through research referencing local actors, these actors are completely excluded from the process (2005, pg. 33-9).

In linking the above descriptions of narrative and discourse to the water-climateconflict theme and tying it to the most recent wave of hegemonic policy interests, one cannot



fail to note that this discourse is increasingly discussed in apocalyptic terms, becoming a 'disaster' or 'crisis' discourse, whereby climate change will no doubt lead to 'water wars', 'water crises', 'violence', and is a 'universal emergency' (Symons 2014, pg. 272; Burchi 2005, pg. 32-1; Meinzen-Dick and Nkonya 2005, pg. 8-1; Daniels and Endfield 2009, pg. 215) with U.S. President Barack Obama's recent speech on his clean power plan 'in the fight against global climate change' proclaiming that 'climate change is one of the key challenges of our lifetime' and that there is a 'connection between this critical issue and the health of our families' (Obama, August 3, 2015).

According to the literature (Symons 2014, pg. 272) there are two main reasons for using populist language in the marketing of the notions of climate change and water security. The first reason is to invoke fear by using dramatic images and to mobilize otherwise opposing groups to show solidarity for the cause. The second reason is that by using terminology such as 'universally accepted' and 'greatest challenge facing humanity this century' the climate change 'disaster' discourse becomes accepted uncritically at the international, national, and regional levels and mainstreamed into policy making. The result is that international agendas are satisfied and pathways are created for climate change funding to be secured by the developing nations (Symons 2014, pg. 270, 272). This observation is key as it sheds light on who the key actors are in the water-climate-conflict debate, which theories or ideologies influence their decisions, what their ultimate objectives are, and whether or not these objectives coincide with the needs of those at whom their resulting policies are directed, these being rural communities as is the case in this research study.

2.2 The Water Security Concept

The concept of water security is one of these discourses and made its entrance into public and academic debates in the 1990's when it was variously linked to military, food, and environmental security. At the turn of the century the Global Water Partnership expanded on this concept to include access and affordability of water, human needs, and ecological health, and over the past decade this concept has informed both policy and academia and is considered an emerging paradigm by certain scholars (GWP March 25, 2010; Cook and Bakker 2011, pg. 94,100; Burchi 2005, pg. 32-1).



Within the context of human needs and for the purposes of this paper the concepts of property rights, institutional design and governance structures, and water scarcity and their relationship to conflict will be outlined. These concepts must be understood in pluralistic terms since all over the world but especially in the African and the Kenyan contexts, customary and statutory institutions and governance structures co-exist and sometimes overlap (GOK, Constitution 2010, ch. 10, part 1, 159 sub c, ch. 5, 60 sub g, 67 sub f). Although this is not the venue for an exhaustive discussion of these concepts, it is important to link these concepts together in support of this thesis' empirical and discussion sections.

2.2.1 Institutions and governance structures: property rights, legal pluralism, and legitimacy

Kenya's water governance structures date back to the colonial water reforms of the late 19th century. Pre-colonial control and management of water was governed by customary or indigenous laws where water governance was closely linked to communal land rights (Sambu and Tarhule 2013, pg. 782; Orindi and Huggins 2005, pg. 33-4). During colonial times however, the British dismantled these traditional institutions and centralized resource management and control with the central government by imposing a governance system based on individual land rights (Lelo et al. 2005, pg. 14-6). The Maasai were moved into Native Reserves where institutionally, life continued to be governed by customary law (Sambu and Tarhule 2013, pg. 783; Komakech 2012, pg. 120). As such, the British created the conditions for a pluralistic system of land and water governance.

Today, this disconnect between Western-inspired and indigenous resource governance and institutional structures is cause for both confusion and conflict in many parts of the world including in developed nations - as opposing forces struggle to ascertain which of these property rights systems have legitimacy as opposed to legality (LeMeur et al 2006, pg. 15). Property rights are defined as "the claims, entitlements and related obligations among people regarding the use and disposition of a scarce resource" (Furubotn and Pejovic 1972, as cited in Meinzen-Dick and Nkonya 2005, pg. 8-2). In the African context where historically land and water were shared communally based on the customs and practices accepted by the members of a certain group and where land and water was for everyone, the concept of property rights can be ambiguous. This is especially true in the Kenyan Maasai context where "water is given by God" and is "free for all", and as such is considered to be a free, open access resource



that no one individual or group can own outright and where no specific rights are assigned to anyone (Lelo et al. 2005, pg. 14-5; Orindi & Huggins 2005, pg. 33-4; Meinzen-Dick and Nkonya 2005, pg. 8-5). Thus in the African context, property rights can be separated into statutory and customary rights. This distinction is highly relevant because statutory law is the body of law laid down in the acts of legislature whilst customary law are laws and rules based on long-standing practice, not codified in written form, as is typically the case in rural areas such as study area, but are nevertheless considered legitimate (Burchi 2005, pg. 32-4). The discrepancy between statutory and customary water rights is important to this case study because they themselves can in fact act as a catalyst for conflict (Mwangi 2010, pg. 718) for instance when foreign commercial water users fence off their properties thereby eliminating customary water access pathways used by the locals. At the same time formalized water access rights can contribute to increased corruption as the more well connected users manipulate registration to serve their own interests (Bruns 2007, as cited in Komakech et al. 2012, pg. 115). As the Kenyan state reforms its land and water laws toward the more integrated IWRM approach which is based on Western legal premises without sufficient regard for customary laws, confusion and social tensions ensue (Burchi 2005, pg. 32-1; Meinzen-Dick and Nkonya 2005, pg. 8-8).

This legal pluralism "refers to a situation characterized by the co-existence of multiple normative systems all experiencing validity" (Mumma 2005, pg. 5-5). According to scholars (Mumma 2005, pg. 5-12; Lelo et al. 2005, pg. 14-1; Komakech et al. 2012, pg. 123), Kenya's current water laws modelled on the IWRM approach fail to recognize the country's pluralistic legal framework and take into account the customary laws. Adding to the confusion of the legitimacy of water rights, government mistrust, and subsequent water conflicts, is the fact that Kenya's new constitution and land laws *do* make express provisions for customary laws and traditional institutions (Mumma 2005, pg. 5-7; GOK Constitution 2010, pg. 64).

It thus becomes necessary to define what institutions are and how they operate. North (1989, pg. 1321) defines them as a set of "rules, enforcement characteristics of the rules, and norms of behaviour that structure repeated human interaction" whilst governance is defined as the "exercise of legitimate authority within a local group through endogenously evolved sets of rules whilst government has the formal exercise of control through law and coercion over a



community" (Mearns 1996, as cited in Fratkin 1997, pg. 239). As Kenya's state institutions and governance structures evolve, so do those of the Maasai. The complexity of the matter is that pluralism exists not only between statutory and customary laws but within customary law itself (Meinzen-Dick and Nkonya 2005, pg. 8-3; Mwangi and Dohrn 2007, pg. 245); as the different clans and sub-tribes in different locations evolve at different stages, so do their governing institutions. These changes in local institutions are not always exogenous and the demand for change can come from within as well (Mwangi 2007, pg. 897; Fratkin 1997, pg. 244; Ensminger 1990, pg. 663; Mwangi and Dohrn 2007, pg. 245) as economic and political factors require specific types of institutions to meet these new conditions.

This is also the case at the Maji Moto study site where property rights have evolved from a communal land rights and livestock as a store of wealth, to the group ranch system and ultimately to land privatization and a monetarized economy. Moreover, the statutory authority of group ranch officials and state appointed administrative chiefs (GOK 2012, Land (Group Respresentatives) Act; GOK, 2012, Chief's Act 2012) co-exist with the traditional institutions of age-sets, clans, and village elders (Ensminger 1990, pg. 663; Orindi and Huggins 2005, pg. 33-5). In Maji Moto, some water resources are governed by these traditional or customary institutions whilst others are governed by what I shall call 'hybrid institutions' for lack of a better word which are institutions that integrate formal/statutory, informal/customary and social systems in order to meet the needs of multiple users. As such, the concept of legitimacy is still at the centre of the water rights struggle in Kenya today as different types of water laws overlap and influence each other whilst they are not all equally powerful.

2.2.3 Water resource scarcity

The final concept within the water security concept is that of water scarcity. Water scarcity is typically characterized as an environmental problem. Water scarcity falls in the realm of environmental scarcity which according to Homer-Dixon (1994, pg. 8) is caused by three things: resource depletion and degradation, population growth, and unequal social distribution of resources. Other scholars link water scarcity to climate change as it could alter water availability (Anglia 2014, pg. 4; Burke et al. 2009, Hsiang et al. 2011, UNEP 2011 as cited in Kloos et al. 2013, pg. 24). The literature furthermore posits that water resource scarcity can be either absolute or relative as water resource scarcity is not limited only by absolute



physical limits of a water source, but also depends on how the user is affected by the political economy of water in the area (Homer-Dixon 1994, pg. 9; Johnston, 2003, pg. 74; Collier 2000 as cited in Kloos et al 2013, pg. 24).

2.3 Environmental Security Thesis

In the academic sphere environmental security is defined as the relationship between security concerns such as armed conflict and the natural environment. Environmental security is a post-Cold War concept that evolved and gained prominence after a shift in the United States' strategic geography away from areas of ideological interest to areas with vast reserves of oil and natural gas where an interruption in the supply hereof could threaten the economic interests, and thus the national security, of the United States (Klare 2001, pg. 49; Floyd 2008, pg. 51; Dalby 2002, pg. 98; Homer-Dixon 1991, pg. 79). The rest of the world soon joined the race for energy supplies leading to conflicts in much of Africa and Southeast. These events have produced a new geography of conflict in which resource flows determine the boundaries rather than political or ideological pursuits (Klare 2002, pg. 52). As environmental problems began to gain relevance in political discourse in the 1970's and with it a number of suggestions on how to consider their security implications (Falk 1971, Brown 1977 as cited in Trombetta 2008, pg. 587), it was not until the 1980's when global environmental problems such as global warming and depletion of the ozone layer arose that the debate on environmental security gained momentum, and the phrase environmental security entered into international debates (Trombetta 2008, pg. 587).

The environmental security literature has given much attention to the idea that environmental issues including but not limited to deforestation, land degradation, and soil erosion will lead to environmental scarcities which might lead to (violent) conflict. The Toronto Group under leadership of Thomas Homer-Dixon argues that simple scarcity as a result of environmental change and population growth is only part of a much more complex situation in which social factors such as elite capture, population displacement, or economic decline, intersect with natural phenomena such as scarcity of cropland and river water and thus lead to conflict (Dalby 2002, pg. 96; Floyd 2008, pg. 54; Barnett 2000, pg. 281). However, rival environmental conflict theses have emerged whereby 1) conflict is considered to be more likely linked to the disruptions of modernity, 2) conflict is not caused by resource scarcity but



by resource abundance, 3) conflicts emerge because of relations of access, control, and struggle over resources, and 4) conflicts emerge because of vulnerabilities of populations to changing environments as in the case of climate change (Floyd 2008, pg. 56; Dalby 2002, pg. 97; Trombetta 2008, pg. 592).

In the context of Kenya in particular, the literature indicates that the country's environmental problems include environmental degradation, water scarcity, and climate change (GOK 2013, NCCAP 2013-2017, pg. 4; Sida 2014, pg. ii). In Narok county water quantity levels in rivers are declining and water quality is deterioration due to a variety of factors including but not limited to water catchment destruction, increased human settlement on river banks, population growth, and pollution (GOK, NDEAP 2009-2013, pg. 20). Many of the factors noted by both the NCCAP and the NDEAP were also observed in the Maji Moto study area which is situated in Narok County, key amongst them being environmental degradation, pollution, and changing weather patterns. Kenya appears to be making great strides toward attaining environmental security by mainstreaming the environment and conservation thereof in the new constitution (GOK 2010, Constitution, articles 42, 69, 70) and calling for a participatory environmental management approach through devolution of natural resource management duties to county governments, by enacting various new pieces of legislation, and re-structuring existing or establishing new institutions and partnerships (GOK 2009, NDEAP 2009-2013, pg. 11; Parry et al 2012, pg. 54; UNDP March 2013, pg. 15), critics maintain that there is much still to be done as the country's policy framework and institutional arrangements are either fragmented or absent, whilst climate change disaster risk management efforts remain largely focused on reactive, short-term emergency or relief responses (Parry et al 2012, pg. 5, 56). Closely related to environmental security is the concept of climate change which is outlined in the following section.

2.4 Climate Change as a cause for conflict

According to the IPCC (2001, pg. 368 as cited in Kloos et al 2013, pg. 32; IPCC 2012, pg. 557), climate change refers "to a statistically significant variation in either the mean state of the climate or in its variability persisting for an extended period (typically decades or longer). Climate change may be due to natural internal processes or external forcings, or to persistent anthropogenic changes in the composition of the atmosphere or in land use".



Research by some scholars has indicated that climate change might spark communal and crossborder conflicts due to resource scarcity which historically has been seen as the main driver for conflict (Swart 1996, Sachs 2005, Homer-Dixon 2007, Stern 2007 as cited in Raleigh and Kniveton 2012, pg. 51). Other scholars posit that there appears to be consensus amongst academics, policy makers, NGO's, and the general public that climate change can be considered a threat multiplier for existing tensions rather than the actual cause of conflict itself since besides climatic factors other factors such as poverty, weak institutions, mistrust, inequalities, and lack of information and basic infrastructure may also contribute to conflict (Kloos et al 2013, pg. 7; Homer-Dixon 1994, pg. 7; Raleigh and Kniveton 2012, pg. 62; Anglia 2014, pg. 10). "A growing body of empirical evidence suggests that communities do not face climate and the resulting environmental changes in isolation but rather in conjunction with socio-economic and political risks" (Stark, Terasawa and Ejigu 2011, Mercy Corps 2012, Schilling et al. 2013, Vivekananda et al. 2014 as cited in Vivekenanda et al 2014, pg. 7) and as such the fragility/stability, vulnerability/resilience and human (in)security factors must be assessed in order to analyse the pathways between climate change and conflict if policy initiatives are to be successful in their aim to achieve peaceful and sustainable development.

According to Kenya's NCCAP 2013-2017, "there is scientific evidence that the frequency of droughts, floods, and other extreme climate events has increased in recent years" (GOK, 2013, pg. 4). Based on this evidence and guided by the global debate on climate change, Kenya's government is in the process of mainstreaming climate change into all development related policies (GOK, NCCRS 2010, pg. 3; GOK, NCCAP 2013-2017, pg. 2; Floyd 2008, pg. 62) and is trying to better understand the relationship between the vulnerability of communities to the impacts of climate change and conflict (Mitchell and Tanner 2006, pg. 5; World Bank 2011, Gleditsch 2012, Scheffran et al. 2012a, USAID 2012 as cited in Vivekananda et al. 2014, pg. 488), as this impacts the people's adaptive capacity (Kloos et al 2013, pg. 32; Mitchell and Tanner 2006, pg. 5; Kasperson et al., 2000 as cited in UNDP, 2005, p. 250). Failure to adapt could thus lead to a decrease in human security increasing the propensity for conflict. "Human security can be said to have two main aspects. It means, first, safety from such chronic threats as hunger, disease and repressions. And second, it means protection from sudden and hurtful disruptions in the patterns of daily life – whether in homes, in jobs or in communities. Such



threats can exist at all levels of national income and development" (UNDP 1994 pg. 23, as cited in Kloos et al. 2013, pg. 35) whilst the stability-fragility binary relates to (un)willingness or (in)capability of the state "of assuring basic security, maintaining rule of law and justice, or providing basic services and economic opportunities for their citizens" (GSDRC 2014, OECD 2008 as cited in Vivekananda et al 2014, pg. 489). In conclusion, climate change as an amplifier of hydro-climatic hazards such as the droughts in Kenya and at the study site affects environmental resources such as water, and can lead to an increase in human insecurity and subsequently to conflict.

2.5 The Concept of Water – Related Conflict

This paper seeks to assess whether the concepts outlined in the previous sections might be an underlying cause for water related conflicts in the study area. In order to assess this possibility the term 'conflict' requires some degree of nuancing. must be put into context. The term 'conflict' requires a certain degree of nuancing. Different groups of people, from development institutions to local communities, apply a different understanding of the term which generally tends to imply a negative event and thus must be put into context (LeMeur et al 2006, pg. 17; Warner and Jones 1998, pg. 2). Consequently the term 'conflict' tends to translate to 'war' 'tension' and 'armed violence' in the security and development literature, an event to be resolved for the sake of social relations and economic development, whilst it tends to be expressed or perceived as a 'game' 'dispute', 'debate', 'argument', or '(non-violent) fight' by local communities, a phenomenon that needs to be 'calmed down' to 'keep the peace' and where 'consensus' is sought by mobilizing specific sets of social relations to seek the objective of peace (LeMeur et al 2006, pg. 15; Komakech et al 2012, pg. 115). Another important concept is that conflicts can be viewed as a "normal mode of communication between various actors" and that there is no reason to 'pathologise' conflicts in general, or in Africa in particular, as they can lead to positive changes and innovation (LeMeur et al 2006, pg. 17, 20; Warner and Jones 1998, pg. 2).

Conflict in dryland Kenya and other Sub-Saharan nations typically invokes the Western image of 'violent conflict' which tends to be a common theme in the bulk of academic literature, the most common being between conflicts between the 'modern' agriculturalists and 'backward' pastoralists (Cleaver 2002, pg. 12), whilst other narratives portray rifle-toting



'ethnic' or 'tribal' 'militants' in trans-boundary water wars. The term 'conflict' in the context of this research however is to be interpreted as a 'non-physical quarrel'. This assessment of conflict over natural resources at the community level should not be seen as less significant or unnecessary: low-level disputes have a habit of turning into tensions which can ultimately escalate to more serious fighting or violent conflict if ignored or if well-intended but misguided NRM policies are implemented (Turner 2004, pg. 885; LeMeur et al 2006, pg. 20).

In conclusion, these diverse theoretical concepts propose a very different set of causes of water related conflicts. External advisors should therefore critically review the localised historical, cultural, socio-political, economic and ecological factors of the argument or conflict, as conflict resolution or prevention should be based on social and cultural norms and moral principles (LeMeur 2006, pg.19) rather than on a hurried diagnosis of resource mismanagement and institutional failure where the diagnosis is generally not guided by village history but by common pool resources theory (Bromley 1992, Hardin 1991, Oakerson 1992, Ostrom 1990 as cited in Turner 1999, pg. 649).

2.6 Political Ecology

This study is informed by the political ecology framework as "political ecology examines the political dynamics surrounding material and discursive struggles over the environment in third world countries. The role of unequal power relations in constituting a politicized environment is a central theme. Particular attention is given to the ways in which conflict over access to environmental resources is linked to systems of political and economic control first elaborated during the colonial era" (Bryant 1998, pg. 79). Political ecology has evolved significantly since the 1970's in response to the apolitical nature of nature of environmental research which was the dominant discourse at the time, and continued to evolve and gain prominence by the end of the 1980's as the environmental literature and policies failed to provide solutions to the various environmental problems. Although an extensive historical background of political ecology falls outside the scope of this research, I present a brief outline of the key developments of this framework.

Critique of earlier environmental literature manifested itself over the years as academics pointed to the lack of attention to social diversity and power in the human-environment relations (Fabinyi et al. 2014, n.p.; Kloos et al 2013, pg. 39) and political ecology stepped in



so to speak to fill this gap. Scholars sought to assess the relationship between knowledge and power to mediate political-ecological outcomes; more recent political ecology draws heavily on the work of Foucault by highlighting the ways in which representations, narratives, and discourses shape human-environment relations (Fabinyi et al. 2014, n.p.). Whereas environmental scholars and policy makers focus on the social and physical aspects of environmental change, political ecologists seek to put politics first in order to understand the historical interactions of humans with their environment and how this might be linked to an increase in environmental degradation and conflict.

In the Kenyan context, the intervention of the British influences how the élite, the poor, and the marginalized interact with their environment today, as well as the associated power relations present in this relationship which might cause political instability or more localized conflicts. It is these unequal power relations that are linked to land resource conflicts, and by extension, to water resource conflicts that political ecologists seek to understand (Cutter 1996, Peet and Watts 1996, Watts and Bohle 1998, Peluso and Watts 2001, as cited in Raleigh 2010, pg. 72). According to Raleigh (2010, pg. 72), case studies have shown that conflict is rarely about land or water scarcity but is more a result of other tensions within and between social groups. The cause of these tensions are varied, ranging from patrimonial politics, government exclusion, political irrelevancy, low government capacity, and marginalization. According to the literature, the Maasai of Kenya are a prime example of a people dealing with all of these issues. As an ethic minority they are especially affected by national patrimonial institutions and are poorly represented in government, which in turn leads to poor access to power (LeMeur et al 2006, pg. 21; Mwangi 2007, pg. 896; Hughes n.d., pg. 4). The literature contends that those living in marginal lands or with nomadic or pastoral livelihoods carry low political weight (Raleigh 2010, pg. 74). These marginal lands are either absent of government rule or fail to accept the state's legitimacy, and as such are effectively not incorporated in the state as government capacity is often insufficient to rule all of its territories, resulting in a stateless society (Ensminger 1990, pg. 662). This in turn weakens the ability of the state to provide basic social services including water and sanitation services. This political exclusion creates economic inequalities which are evident in many African pastoral communities as social

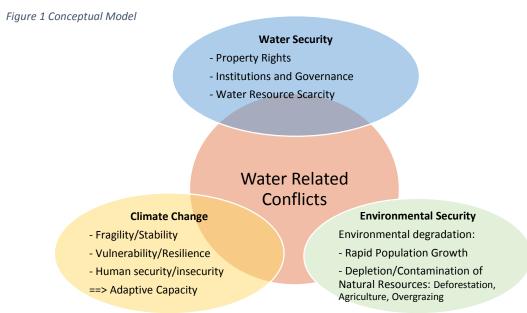


services, physical infrastructure, and political representation are below average in remote, low population density communities such as the Maji Moto study site.

Narrowing the focus of the previous paragraphs to the context of this research, the political ecology of water "focuses on access and regulation of water by looking at power over access and use of resources" (Kloos et al. 2013, pg. 34). Scholars argue that societal changes in the socio-economic and political spheres bring about winners and losers when it comes to inequity in the distribution of costs and benefits of water resources, and that these uneven power relations and injustices are fundamental drivers of vulnerability and insecurity which may lead to conflict (Homer-Dixon 1994, pg. 10; Castro 2004, Kallis 2009 as cited in Kloos et al. 2013, pg. 34; Anglia 2014, pg. 6). It is the focus of this paper to qualitatively assess this hypothesis in the Maji Moto case study.

2.7 Conceptual Framework

This section outlines the relationship of the key concepts discussed in the previous sections which may act as a catalyst for or be the actual cause of water related conflicts. This conceptual framework guides the analysis of the manner in which water security, environmental security, climate change, and conflict interact and serves as the basis for answering the four sub-questions of this study.





3 Contextual Background

This chapter provides some contextual background to this study. The first section outlines the geography and ecology of Kenya and of the research area. Section two outlines the political administration of Kenya's land and water regimes. Section three outlines Maasai culture whilst section four outlines the water management and distribution institutions at the study site and their governance structures.

3.1 Geography and Topography

Kenya is located along the equator in Southern Africa and experiences extreme variations in climate due to its various landforms, particularly the rangelands of the Rift Valley

Source: www.unep.org



Figure 2 Map of Kenya

where the research area of Maji Moto is located. Kenya has a land area of 580,728 square kilometres of which approximately 85% is classified as arid and semi-arid land (ASAL) and it is classified as a water scarce country with only 15% of its available water resources developed (AfDB 2014, pg. 7). The country's per capita water availability of 792 m3 falls below the scarcity threshold (FAO 2008, as cited in UNEP n.d.). Kenya's 2009 census

showed that the country had a total population of 39 million people, with 67.7% of the population living in rural areas with the ASAL's supporting almost 30% of the total population and 70% of the livestock production (GOK NCCAP 2013-2017, pg. 3). Scientific evidence shows that the frequency of droughts and other extreme climate events have increased in recent years (GOK NCCAP 2013-2017, pg. 4) with mean annual temperatures having increased by 1.0 degrees Celsius since 1960, an average rate of 0.21 degrees Celsius per decade (McSweeney et al. 2009 as cited in Parry et al. 2012, pg. 2). Major droughts occurred in 1991–



1992, 1995–1997, 1998–2001, 2004–2006, 2009, 2010-2011 (GOK 2006, SEI 2009 as cited in Parry et al.; GOK DOP pg. 7) and in 2013-1Q2015.

The research site is located in Maji Moto group ranch, Narok South, Osupuko division, Maji Moto location, Southern Kenya at 1° 20′ 0″ South, 35° 43′ 0″ East at an elevation of approximately 1.500 metres above sea level. Maji Moto is mainly characterized by a dry and dusty savannah landscape that comprises a total land area of 120,607.63 acres which equates to 492.10 square kilometres. Please refer to appendix 6 for an overview of the excerpt from the Narok County Land Registry and appendix 3 for an overview of the Maji Moto sub-division.

3.2 Institutions: land use systems, water regimes

Patterns of land use have changed in Kenya's ASAL's over time from mostly nomadic pastoralism, to sedentary pastoral and agro-pastoralism, or to pure cultivation (Muriuki et al. 2005 as cited in Nyariki et al. 2009, pg. 163) and with these land use changes come changes to water rights and accessibility. The following sections will provide a brief overview of the various land use systems and water regimes in Kenya over time. The research area's land use systems and subsequent water security issues are also the result of these various processes dating back to colonial times (Hughes 2013, pg. 2).

3.2.1 Kenya's Land Use Systems

3.2.1.1 A history of Kenya's livestock production systems: Grazing Schemes and Group Ranches Pre-colonial and colonial times

In pre-colonial times land in Kenya was mostly communally owned and governed by customary law. Under this system Maasai pastoralists had travelled with their cattle over vast territories in search of pasture and water (Campbell et al 2000, pg. 337; Ng'ethe 1992, n.p.), and each individual had the right to use the land in a manner acceptable to the community who owned the land. All land was commons where resources were shared by territorial section, *Olosho, Olgilata,* and *Olporror* and as such land was not owned to the exclusion of anyone else and total individual autonomy in land matters was an unknown concept in those days. (Juma and Ojwang 1996, Galaty 1981, as cited in Riamit 2013, pg.16, 30; Hughes 2013, pg. 1; Fratkin 1997, pg. 243).

The arrival of the British in 1895 brought huge changes to the Maasai way of life as the colonial administration formed two reserves in which the Maasai were resettled through the



1904 and 1911 Maasai Treaties. Economic and political structures evolved and thirty years later traditional Maasailand was now White Highlands (Grandin n.d., pg. 10; Hughes 2013, pg. 2; Londsdale & Berman 1979, pg. 17) as Maasai lands, considered as 'waste', 'unoccupied', and 'damaging to the environnment' (Mwangi 2007, Rutten 1992, Wrong 2009 as cited in Riamit 2015, pg. 35) were annexed to accommodate the White Settlers and British policy sought to 'sedentarize' the nomadic pastoralists to bring colonial law and order into their lands and encourage the people to cultivate (Hughes 2013, pg. 2).

These colonial laws and policies set the stage of the general direction of transformation of land and water rights and the associated institutions in Maasailand. As outlined in chapter two, it is imperative to understand the history of the evolution of property rights and how access to water resources is affected, as it becomes increasingly difficult over time to deviate from established institutions (Mwangi 2007 as cited in Riamit 2013, pg. 38). Various development policies were promoted under colonial rule including the creation of cultivation programmes, wild life conservation areas, and alternative livestock production systems organized through various grazing schemes (Campbell et al. 2000, pg. 337). These programs effectively restricted the Maasai pastoralists' control and access to water and grazing areas by instituting livestock quota's through the sale of surplus stock and strict enforcement of cross boundary livestock movement (Ng'ethe 1992, n.p.). Grazing programs failed as pastoralists refused to sell their surplus stock and left the grazing scheme to continue their transhumant livelihood in search of pasture and water according to their traditional ways as dictated by climatic patterns.

Post-colonial times

Similar policies continued after independence and the rangelands continued to be held as trust lands by the state until the group ranch system was launched in 1968 with the support of USAID and the World Bank. The Land (Group Representatives) Act 1968 was enacted which enabled land to be demarcated into group ranches (Serneels et al. 2001, pg. 68). A group ranch is a livestock production system whereby a group of people jointly own freehold title to land, maintain agreed stocking levels, and herd their livestock collectively whilst owning their herds individually (Kenya Ministry of Agriculture, 1968, as cited in Ng'ethe 1992, n.p.). It was a new approach to pastoral development aimed at transforming the nomadic subsistence production system into a sedentary, commercially oriented system, to bring health services and



education to the Maasai and to integrating pastoralists into the national economy (Fratkin et al. 2005, pg. 7; Fratkin et al 2006, pg. 2). This concept is a major departure from the Maasai sociopolitical institutions and livestock management strategies as it sought to exclude ranch members' livestock access to other ranches and to allocate grazing quotas to limit livestock numbers to the carrying capacity of the ranches (Galaty 1981, 1994; Rutten 1992; Mwangi 2007a, 2007b as cited in Hughes 2013, pg. 6; Mwangi 2007, pg. 894; Serneels et al 2001, pg. 68). A democratically elected group ranch committee was to manage all local administrative affairs which were traditionally decided and/or executed by groups belonging to a certain ageset, clan, or councils of elders on the basis of consensus (Grandin n.d., pg. 4). This system was not successful either as droughts forced the Maasai to leave the group ranch in search of pastures and water, and soon elite members of Maasai group ranches started securing large individual holdings within the group ranch structures (Mwangi 2007, pg. 890; Mwangi 2010, 717; Hughes 2013, pg. 7). Furthermore, the group ranch policy entailed a defined livestock quota system through periodic destocking which was not implemented by the Maasai, resulting in increased herd numbers and overgrazing. Other challenges ensued: grazing herds in areas reserved for dry season grazing, inviting family to graze on group ranch lands without permission from the group ranch committee, setting wild fires, and failure to pay member contributions towards the financing of group projects such as water provision and schools, and most of these acts are contrary to the group ranch charter (Mwangi 2007, pg. 904). By the end of the programme in 1979, 159 group ranches had been carved out in the previously open rangelands of Maasailand (Mwangi 2007, pg. 889; Mwangi 2010, pg. 719; Ng'ethe 1992, n.p).

3.2.1.2 Fencing the group ranch: land privatization and sub-division of land assets

By the end of the 1980's, group ranch members started to call for subdivision into individual, titled parcels as a way of protecting their interests (Galaty 1994 pg. 191, as cited in Hughes 2013 pg. 7; Mwangi 2007, pg. 896; Serneels et al., pg. 68; Ng'ethe 1992, n.p) against elite capture, outsiders, and further government appropriation for wildlife conservation, whilst group ranch committees encouraged privatization in order to divest themselves of the responsibilities of managing the group ranch (Mwangi 2007, pg. 905). Other advantages of titled subdivision perceived by the Maasai included new income opportunities such as leasing their lands for pasture or cultivation, cultivation, selling land, and destocking of individual



herds to the carrying capacity of one's property thus eliminating or reducing the need to migrate during droughts (Mwangi 2007, pg. 905). However, there also proved to be challenges with regard to sub-division. These included sedentarization, further subdivision of land into smaller and smaller plots to meet inheritance purposes which ultimately leads to unproductive use of land, the sale of land to outsiders and becoming landless in the process, the keeping of smaller livestock numbers (Mwangi 2007, pg. 892), and new land use systems such as cultivation.

This process of subdivision in Maji Moto started in 1999 and continues to this day. The process had its own set of challenges, including but not limited to compromised and self-interested group ranch committees who, empowered by the Land (Group Representatives) Act Cap 28 to conduct transactions on behalf of the group ranch members, allegedly misused member's title payments for their own benefit thereby not being able to pay the land surveyors to sub-divide (Riamit 2013, pg. 79, D30), assigned parcels in an indiscriminate fashion whereby some persons are allotted rocky or hillside parcels where it is virtually impossible to construct homes or house livestock (N1). Others were allotted parcels and even though having paid their titling fee were not given their title, or, upon failure to pay their title fee within a certain timeframe, lost their land to a third party without their consent (D29, D30, N1, N2).

3.2.2 A history of Kenya's Water Regimes

Colonial rule also heavily influenced Kenya's water governance structures and took away the Maasai's control and accessibility to water. Post-independence water governance structures and institutions sought to 'right the wrongs of colonialism' and set about promoting and funding 'self-help' or Harambee water projects which entailed small community projects in rural areas where 80% of the Kenyan population lived at the time (Sambu and Tarhule 2013, pg. 784; Lelo et al. 2005, pg. 14-7) under the philosophy of African Socialism during what became known as the International Hydrological Decade of 1965 to 1974 which sought fund water programs in developing countries with the objective to strengthen global scientific knowledge of water resources. This program evolved as international agenda's evolved and the International Drinking Water Supply and Sanitation Decade of 1981-1990, or 'Water Decade', utilized SAP's as a mechanism to enforce the neo-liberal agenda in Kenya's water sector (Sambu and Tarhule 2013, pg. 785), and by the year 2000 yet another round of institutional and governance reforms took place to accommodate the IO's latest objective of sustainable



development and poverty reduction as per the MDGs, and SAPs were replaced by PRSP's (Sambu and Tarhule 2013, pg. 787).

In the past, community water projects were approved and implemented under direct project delivery by the Ministry of Water. Due to capacity and funding constraints the government decentralized the water sector in 1997 through a process of 'handing over'. Under this policy NGO's and community groups funded and maintained control and ownership over water management and distribution processes of their water projects (Mumma 2005 as cited in Spaling et al. 2014, pg. 804). These projects proved unsustainable in future years and the new Water Act 2002 informed by the IWRM approach was enacted in 2004. For an overview of the new institutional water structure please refer to appendix 14. The IWRM model is defined as "a process which promotes the coordinated development and management of water, land and related resources in order to maximize resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems" (GWP, 2009 as cited in Sambu and Tarhule 2013, pg. 788; GWP 2000, as cited in Saravanan et al. 2009, pg. 76; UNDESA, n.d.) and has become the accepted alternative to the sector-by-sector, top-down management style that has dominated in the past (GWP 2010) and the backbone of the United Nation's 2005-2015 International Decade for Action 'Water for Life'. In summary, IWRM is professed to be a more holistic and integrated water management approach with the ultimate goal of sustainable development which is sought to be accomplished through, amongst others, the use of water charges as an 'economic tool'. These water charges aim to "support vulnerable groups and influence their water saving and efficient use behaviors by providing incentives to manage demand, cost recovery and readiness of individual users to pay for extra water management services" (GWP 2010).

Various African countries in the region including Tanzania and Uganda (Komakech et al. 2012, pg. 119; Orindi and Huggins 2005, pg. 33-1) have reformed their water management sectors to comply with the latest neo-liberal IWRM doctrine through decentralization and liberalization with the aim of improving efficient water delivery systems – and to be eligible to received IO funding. The IWRM approach also became the mechanism on which Kenya based its sustainable water policy which is anchored in the water act (Water Act no. 8, 2002, art. 15.3). This IWRM concept whilst calling for greater participation of stakeholders and



decentralization of water management and water delivery services, also calls for all people, including the poor or marginalized – which includes the community of Maji Moto - to make some financial contribution as water is considered to be an economic good (Black 1998 as cited in Sambu and Tarhule 2013, pg. 788; GWP 2012; Orindi and Huggins 2005, pg. 33-8). This is a major departure from the previous water management system where rural communities were pretty much left to their own accord. Similarly to the water acts of the previously mentioned African countries, a key criticism of Kenya's water act is that it fails to recognize that Kenya in fact functions under a pluralistic legal structure where the state's statutory laws do not typically align with customary laws practiced in rural areas even though customary rights to water access play a significant role (Mumma 2005, pg. 5-5; Orindi and Huggins 2005, pg. 33-1; Lelo et al. 2005, pg. 14-1; Burchi 2005, pg. 32-1; Komakech et al. 2012, pg. 116). According to the critics this 'integrative approach' cannot be achieved as water resource management is a political process of contestation and negotiation and as such power dynamics are involved, and question the definition and approach of the IWRM by the GWP as the basis of this approach rests on the core principle of Habermasian communicative rationality. This principle maintains that individuals are rational beings, all stakeholders are easily identifiable, social relations and identities are stable, all participants possess equal and perfect knowledge and the skills to negotiate their power differentials with honesty and integrity, and will thus reach consensus and cooperation rather than take actions in pursuit of their own goals (Saravanan et al. 2009, pg. 77, 81). This approach furthermore assumes that all power lies with government and that to foster communicative rationality amongst actors, existing institutional structures need to be changed to accommodate a more open style of governance. This approach is much too simplistic for the Kenyan context as will become clear shortly.

3.2.3 Sedentarization: the end of pastoralism?

The practice of pastoralism is a food production system where human populations live on the products of their livestock in ASAL's or areas of scarce resources, has been around for centuries, and continues today in the ASAL's of Africa, the Middle East, Central Asia, Mongolia, highland Tibet, the Andes, Scandinavia and Siberia (Fratkin 1997, pg. 235); Kloos et al. 2013, pg. 43). International organizations, national governments, NGO, and various religious and conservation groups in Africa and in Kenya in particular, have long sought to



sedentarize pastoralists as a way of controlling and taxing them, to stem the flow of cross-border migrations, and to deliver food and social services and to put an end to their nomadic lifestyles which were considered as 'primitive' and 'irrational' (Dyson-Hudson 1991, Galaty 1999, Kituyi 1990, Fratkin 1997, Hogg 1982, Hogg 1986, as cited in Fratkin et al 2005, pg. 8; Sun 2009, pg. 2). Whilst the literature discusses the positive and negative socio-economic consequences of sedentarization an in-depth discussion hereof fall outside the scope of this paper. With a view to the objective of this paper it is of greater significance to outline the contribution of sedentarization to the evolution of institutions at the study site.

Whereas sedentarization of the Maasai in Kenya has been involuntary due to various development policy interventions mentioned in the previous section, many of Kenya's Maasai, including those at the study site, today are settling down at a rapid rate and diversifying their livelihoods as pure pastoralism for many has become either untenable or otherwise unattractive. They seek to settle down in urban centers or small towns and take up paid labor in the



Photo 1 Homestead with Improved Manyatta's, Mokondani village, MM, February 2015.

transportation, hospitality, and retail sectors or start cultivation or small businesses in their rural villages as they gain individual title to land (Fratkin 1997, pg. 246; Fratkin et al. 2006, pg. 7; Coast 2002, pg. 15). Besides the previously mentioned development interventions, other changes included a lack of mobility and flexibility, displaced local authority over range and water use, decreased effectiveness of sanctions, and manipulation and corruption by wealthy and elite members of the community (Little 1987a, Brokensha and Little 1988, Schlee 1990 as cited in Fratkin 1997, pg. 252; Grandin n.d., pg. 9; Homewood et al. 2009, pg. 339). According to Fratkin (1997, pg. 252) and Nkurumwa (2010, pg. 1634), Maasai pastoralists are experiencing difficult times in the twenty-first century as their ability to maintain their subsistence livestock economies becomes increasingly challenging. Respondents in the study area concur that pastoralism as an institution is coming to an end as the population increases, droughts increase, water becomes more scarce, individual parcels become smaller and smaller, children are being educated, the commons are fenced in, and traditional institutions are weakened and market institutions force them to change (Ensminger 1990, pg. 672).



3.3 Ecology and Livelihoods in Maji Moto

Maji Moto group ranch has a population of approximately 10.000 inhabitants (Riamit 2013, pg. 27; Appendix 4) of which the Maji Moto research site has a population of approximately 6.000 (D30). The population of the group ranch is spread out over the rangelands and people and livestock live in very isolated locations and under harsh environmental conditions. The main water source in the group ranch is the Maji Moto Hot Spring or *Enkare Nairowua* which runs through the village of Mokondani at the research site. Although there are various villages in Maji Moto, only the villages of Mokondani, Inchaishi, Iltalala, and Kikurukurr are included in this research as they are roughly situated within a 10 kilometre radius of the group ranch's last remaining permanent water source, the Maji Moto Hot Springs. Please refer to appendix 8 for an artist's rendering of the location. Temperatures at the study location



Photo 2 Livestock decimated by the drought, MM, March 2015

fluctuate according to altitude with average temperatures of 20 to 22 degrees Celsius in the



Photo 3 Dispensary, Mokondani Village, MM, with recently placed solar panels by government. May 2015.

rangelands. Country wide droughts are negatively impacting Maji Moto as well with the latest drought having lasted three years from 2012-2Q2015 whereby livestock keepers have lost up to an estimated 60-70% of their livestock.

The study site is predominantly settled by the Purko Maasai pastoralists. There are very few non-Maasai living at the study location except a few who

come to work the agricultural plots or take up employment at the schools or in the kiosks at the Maji Moto market. Maji Moto is a predominantly pastoralist community followed by subsistence irrigation agriculture and small business enterprise such as *matatu* drivers, cell phone charging stations, cattle trading, and *hotels* in the market centre. Some residents who either have no more livestock or too few livestock take on paid labour as crop workers, cattle herders, water collectors and kiosk assistants. There are two public primary schools at the study



site, one in Inchaishi and one in Mokondani, one public girls' secondary school in Mokondani, and one privately sponsored academy in Mokondani. A small dispensary or rural health office is also located in Mokondani, attended by one health worker and an assistant. There are no doctors or hospitals in the area, with the nearest full- service public clinic in Narok Town just over an hour's drive from Mokondani. There are no paved roads, electricity, piped water,



Photo 4 Irrigation scheme and dams, Mokondani Village, MM, June 2015

garbage collection, or sanitary facilities at the study site. Most homesteads or *manyatta's* are still made in of sticks, mud, cow dung and thatched roofs in the traditional manner, with some homes showing improvements such as roofs of corrugated iron. A very limited number of the more modern houses are constructed completely of corrugated iron known as *mobati* or of natural brick and sport glass windows. There are very few pit latrines in the villages and open defecation is still

common.

3.4 Water resources at the study site

3.4.1 History of demarcation of agricultural plots in the Maji Moto irrigation scheme

Agricultural cultivation, locally referred to as 'farming' commenced in the early 1970's when two Kikuyu outsiders migrated to Mokondani village and started small irrigation plots or 'gardens' (D4, D17, D22, D24, D26, N3, N4). As droughts intensified during the late 1990's and early 2000's, the Maasai suffered losses of up to 60% of their livestock and started to take up farming as a coping strategy (N3, N4, N5, D6). Over the years farming increased due to the an abundance of water and the urbanization of Mokondani as schools, a dispensary, and a market place were built and the Maasai began to lead a more sedentary life (D17, D21, D28). During the 1970's through the mid-1990's, Maji Moto was still communal land but a few members of the elite noting the success of the Kikuyu simply picked a small plot of land of perhaps ¼ acre near the stream and called it their own (N3, N4, D26, D28). By the mid 1990's



the number of people settling around the hot spring and its stream increased and conflicts over plot boundaries started which led the fourth group ranch committee to commence the formal demarcation of the agricultural plots in 1997 (D5, D17, D28, D24). Demarcation encouraged



Photo 6 Upper and Lower Dam, Mokondani Village, MM. May 2015.

more people to commence farming and by the year 2000 an estimated 100 plots were being farmed. The distribution of the irrigation plots was determined by the fourth group ranch committee and a powerful local county councilman who demarcated and allocated the plots to 'certain families' that were already living in the area along the hot spring. Group

ranch members of other villages complained of their exclusion and were allotted some parcels as well (D23, D28).

3.4.2 The irrigation scheme

The irrigation scheme in Mokondani is a gravity-fed smallholder canal irrigation scheme with earthen furrows. Please refer to Photo 4 for a visual of the irrigation scheme with the two dams in the foreground and the scheme laid out in the background. Water for the irrigation scheme is harvested from the Maji Moto hot spring catchment area. This water is collected and stored in two dams, the big dam or lower dam due to its Big Dam, March 2015



Photo 5 Main Furrow,

location downstream and the small dam or upper dam due to its location upstream. As can be noted from Photo 6 the dams are located one below the other and clearly indicates how the dams obtained their respective names. The small dam is situated at a higher elevation than the big dam and serves not only the upper part of the gravity-fed irrigation scheme but it is also designed in such a way that during heavy rains, any overflow from the small upper dam will be channelled to the big lower dam (Anekeya n.d. pg. 2).

The irrigation scheme, like the rest of the group ranch, is laid out in a grid system and consists of 217 irrigation plots of 2 acres each (N3, N4, N6, D17, D21, D23; Appendices 1 and 2). Please refer to Annex I for the official blueprint of the irrigation scheme as surveyed by the Narok Provincial Survey Records Office. The irrigation scheme is divided into three irrigation



blocks which are served by four secondary furrows named the *Olemeitaya*, the *Olormuateini*, the *Olesecondary* and the *Ololdukai*. On paper, these four secondary furrows are meant to serve 217 irrigation parcels or the equivalent of 834 acres. In actuality between 105 - 190 parcels (N3, N5, N6) are farmed due to the droughts and insufficient water. No drip-irrigation or other irrigation technology is used in the scheme and irrigation water may only be used by operational farms; no irrigation water may be used to water the plots for fodder for livestock (N3, D1, D12). Generator pumps are used by well-off farmers to pump water from the dams to speed up the irrigation process. The irrigation scheme is an informal scheme managed by a local water management committee and is not registered with any government water authority nor are any water abstraction or maintenance fees are paid by the farmers. In the case that furrows, canals, valves, or piping require maintenance or repairs, those farming at the time are asked to contribute whatever they can afford to.

3.4.3 Some background information on the Dams

A few small dams have been constructed in Mokondani over time. Most were the initiatives of powerful chiefs who needed to water their large herd of cattle or of the missionaries who sought to help the community. Over time these dams silted up due to lack of



Photo 7 Main valve Big Dam. Generator pipe and furrow next to it.

maintenance. (D17, N1, N5, N7). In the mid-1990's, a local politician and influential chief who owned hundreds of cattle and was up for re-election initiated the construction of what is today known as the lower or big dam with a capacity of 5.229 cubic metres with technical and funding assistance from the county government. (N5, D5, D21, D28, Anekeya n.d. pg. 1). This new big dam

however was never really completed and the water from this dam could not reach the upper farms since the location of this dam was lower than most farms (D22, D26, D28, D30, Anekeyah n.d, pg. 1). Due to lack of maintenance and a sense of community ownership the



dam fell into disuse. By the year 2000 the population and livestock increased due to the urbanization of Mokondani and demand for water increased exponentially. Once again a powerful local politician campaigning for office and owner of hundreds of cattle initiated the rehabilitation of the big dam with the assistance of the relevant government authorities (D3, D4, D5, D6, D12, D15, D29, N8, MMGR 2002) and with financing from the group ranch coffers (N8). The project entailed an expansion of the big dam to 21.000 cubic metres, the



Photo 8 Big Dam, Mokondani Village, MM, March 2015.

addition of a second outlet in the big dam, and the rehabilitation of the small dam to 7.500 cubic metres (Anekeyah n.d., pg. 1). In the end only the big dam was expanded but there were design errors (MMGR 2002, D6, D3, D4, D5, D12, D15). By the end of 2002, the younger generation of farmers and a local CBO recognized the great need for water (D6, D29) and facilitated what turned out to be a five year process of constructing or rehabilitating

water supply interventions. This 'MM Community Water Project' was executed with the cooperation and participation of the Maji Moto community and in partnership with UNDP GEF-SPG. The project entailed the rehabilitation of amongst others the wind mill and both dams (D29). The project was finally completed in 2007 (N8, MMGR 2007) with USD 19.934 or the equivalent of Ksh. 1.2 million in partial funding from UNDP-SGP (MMGR 2007, pg. 2;

UNDP SGP) with the remainder of USD 4,000 or the equivalent of Ksh. 400.000 from the group ranch coffers (D30). Although the dams are utilized by both pastoralists and farmers, no user or maintenance fees are paid by either stakeholder. In the case that the valves or dam walls require fixing or maintaining, the farmers who are cultivating at that time, pool together funds to make the repairs.

3.4.4 The Maji Moto Windmill pumping station

In the early 1970's a German missionary had put in a small gravity fed underground water tank with a very small windmill to service the mission station and the pastor's and missionaries' residences (N7, D17,



Photo 9 Spring Inlet to Big Dam, Mokondani Village, MM, March 2015.



D29). This water intervention was handed over in 1991 to PAC missionary who came to Maji Moto under the umbrella organization of PAG. The missionary established a dispensary and the primary school and put in the large windmill with funding from PAG. Over the years the secondary girls' school and the private academy, Enkiteng Lepa, were constructed and also connected to the windmill (N7, N8, D15, D17, D29, D30). This wind mill was handed over to the Maji Moto community in the late 1990's when the last missionary left (D15, D29). After the missionary handover in the late 1990's, the windmill broke down for almost 13 years until it was rehabilitated under the previously mentioned five-year water project. Anyone can be connected to the wind mill pumping station provided they can afford to purchase and lay the necessary piping down to their homes (D12, D15, D17, N5, N7). Today the wind mill serves approximately 600 people by pumping water to the previously mentioned institutions as well as to the homes of a few elite members of the community (D15). The wind mill pumping station is not actively operated or managed by either a formal or an informal water committee. Water distribution to the institutions and private homes is managed unofficially by the Girls' Secondary School which is the largest stakeholder. Water distribution is dependent on two things: the wind factor and whether or not the windmill is operational or temporarily out of service due to breakages. When the wind mill breaks down, the secondary school places a generator at the source in the hot spring and pumps water directly to the secondary school approximately 2-3 kilometres away. Other stakeholders are free to use a generator provided they can afford to purchase or lease one. There are various sources in the hot spring but only source has been designated to be used by the windmill and its stakeholders. In the case that the windmill breaks down all stakeholders are required to donate funds for repairs. There is no fixed formula to determine a stakeholder's share in the repair costs. Everyone is expected to contribute in a somewhat equitable fashion depending on the size of their water demands and what they can afford to contribute. If a stakeholder does not contribute, water will not be distributed to that stakeholder. The windmill has not been serviced since 2007 other than some minor maintenance and no monthly water user or maintenance fees are paid to maintain and operate the windmill.



3.4.5 The Hot Spring and the water point

The Hot Spring is the last remaining permanent natural water resource in Maji Moto. Until the construction of the dam in 1996 the hot spring used to be approximately 7-10 kilometres in length before disappearing underground (D6, N9). Today it is a mere two kilometres long, ankle deep, and easy to step across. The water point is physically situated in the hot spring itself village, MM, April 2015. and approximately 500 - 700 women collect



Photo 11 Salt Lick and Laundry at Hot Spring, Mokondani Village, MM. April 2015.

water there each day. Please refer to Photo 10 for a visual representation of the water point. Today, an estimated 300 bathers use the hot spring every day whereas 10 - 15 years ago there were not more than 10 bathers per day (D29, D30, N8). Up to 2005, the area around the hot spring was very bushy and was home to a variety of animal species including snakes, leopard, cheetah, and even lion (D6, D12, D17, D28, D29, D30, D29,N2, N7, N9). Ten years later, by



Photo 10 Water Point, Mokondani Village, MM. March 2015.

2015, the riparian areas and hot spring itself are heavily degraded as can be seen in photo Photo 15 most vegetation has disappeared, tree roots are exposed, all animals have disappeared and there is much pollution and soil runoff in the spring, whilst some of the sources in the spring have silted up (D6, D12, D17, D27, D28, D30, N1, N2, N7, N9, N10, N11, N12). There is not and never has been a hot spring or natural resource management committee for the Maji Moto Hot Spring

(D6, D22, D23, D28, D29, D30, N2, N4, N8, N12). Over the years, some attempts were made by the more elite residents to protect the source by planting tree saplings, putting up fencing around the trees and the source, and placing garbage cans. Each has effort failed as pastoralists would tear down the fencing to graze their cattle in the lush green space and steal the wooden poles to construct their *manyatta's* or cattle pens. Garbage cans were removed by the



pastoralists, cut in half, and used as doors for the goat pens. After a few attempts, one elite resident finally managed to fence off the source and plant medicinal and other indigenous trees to protect the source and for cultural heritage purposes. This small area around the source is today a dense tropical forest patrolled by 2 or 3 local Maasai rangers who are paid to do the job. Other than this small project the remainder of the spring and riparian areas remain unmanaged. Lifestyles, the natural environment, and the climate were different up to 10-15 years ago with few people and cattle living in the area.



Chapter 4 Methodology

This section presents the methodology chosen to investigate the problem of water scarcity and related conflicts at the research site. First, the overall research approach and design is presented followed by the methods of data collection and data analysis performed. Finally ethical considerations and limitations of both the research itself and of the research methods are outlined.

4.1 Research Approach and Design

I used a qualitative design framework to inform my research to ensure that the research would follow a 'logical structure of inquiry' and that the evidence collected would enable me to answer my research question as unambiguously as possible and ensure an acceptable degree of internal validity (Vaus 2001, pg. 9). This approach was judged to be the best fit for my research design since this approach seeks to 'focus on the human experience' and seeks to 'understand the social world, recognising this world for its richness in context, detail and experience' (Mason 2002, Bailey 2007, Denzin and Lincoln 2011 as cited in Stewart-Withers et al. 2014, pg. 59) and 'to explore a social phenomenon' (Stewart-Withers et al. 2014, pg. 60) which would best lead to answering the research questions. This research takes the form of an exploratory case study strategy of inquiry as it seeks to answer a 'how' question (Laws et al. pg. 344, 346) and study a conflict event which occurs in a bounded context (Miles and Huberman 1994 as cited in Baxter and Jack 2008, pg. 545) that has no single set of outcomes (Yin 2003, as cited in Baxter and Jack, 2008, pg. 548). Operationalization of the conceptual framework led to the research questions included in appendix 12. Sixty-six (66) residents were interviewed of which 43% female and 57% male. Additionally, three (3) exploratory interviews were held with a male pure pastoralist, a female widowed small business owner and former farmer, and a male agro-pastoralist and small business owner. Please refer to appendix 13 for a brief overview of the respondents' characteristics. The duration of most interviews was between 30 and 45 minutes, with FGD's and interviews with key informants taking between 1-1.5 hours and taking on the form of an informal unstructured chat.



4.1.1 Operationalization

According to the literature, researchers must define and clarify concepts which requires developing nominal or conceptual definitions and operational definitions in order to apply indicators to them so that they become measurable (Vaus 2001, pg. 24; Russel 2011, pg. 30). Operationalizing the different concepts is key to determining the validity of my findings as different definitions will provide different findings which could result in erroneous conclusions. Please refer to appendix 12 for an overview of the interview guide.

4.1.3 Reliability and Validity

In order to meet certain criteria for a rigorous research so that it to be acceptable or valid to modern social science 'rather than being just an anecdote' (Dingwall 1992, as cited in Rapley 2013, pg. 52) and transferrable from one context to another depending upon the degree of 'fit' between the contexts (Guba, 1981, as cited in Rapley 2013, pg. 52) the sampling was structured to focus on processes, behaviours, intentions and motivations, and interactions whilst ensuring proper application of the research by using qualitative research methods that best suited the context in which the research took place (Sumner and Tribe 2008, pg. 99). To ensure the quality of my research, as much exposure as possible to the conflict event under study was gained by staying in the village for at least four consecutive days every week and holding informal chats with the residents to build rapport. Continuous self-reflection and triangulation were used as a tool to corroborate the research findings and add credibility as a way to contribute to the validity of my analysis and conclusions (Sumner and Tribe 2008, pg. 108).

4.2 Data Collection Methods and Fieldwork

Field work for this study was carried out from February 14, 2015 thru May 28, 2015. This research project required various kinds of logistical support, including travel, research assistance, and interpretation services which were duly provided by both the study guide/translator and the host NGO. The study used qualitative methods for this research as their flexibility was better suited to the research context and objective. Sixty-nine (69) informant interviews were held which included three exploratory (3) interviews, and 2 focus group discussions (FGD) with a total of 6 water management committee members and 14 women to understand in detail the perceptions of water scarcity and conflict in the area. Three exploratory



interviews were conducted with community members including a pure pastoralist (male), divorced female farmer, and an agro-pastoralist/small business owner (male) in order to identify emerging themes and potential problems with interpretation issues. This allowed for a fine-tuning of the questions for the semi-structured interviews prior to the intensive data collection. Respondents of the FGD and key informant interviews were purposively selected based on four criteria: 1) gender 2) practice agricultural farming, pastoralism (or a combination of both), or other livelihood 3) knowledge on climatic conditions of the area and 4) subdivision/village location. The reason for choosing the two FGD's is because the 'Bead Ladies' are the largest women's empowerment group in Maji Moto and their views from a women's perspective on water collection and conflict at the water point was key, whilst the water management committee was needed to confirm the institutional structure of the irrigation scheme as well as to obtain their side of the story on the alleged corrupt practice of favouritism. Furthermore, some observation was carried out as an observer-participant (Jackson 1983, pg. 41; Atkinson and Hammersly n.d., pg. 248) as I was hosted by a local family and participated to a certain extent in the lives of the residents. Site visits and transect walks were done, and some mapping of the water points and irrigation scheme in the form of sketches was done with assistance from informants. Photography, filming, and taking field notes are also some of the research tools used in during this research. Finally, much of the research was based on secondary resources. As the methods employed have both strengths and weaknesses, triangulation strategies were applied to reduce potential biases of the data collected including but not limited to posing different questions on the same topic and referring to responses received by other respondents during the interviews after the respondent has answered a question as a way of probing.

4.3 Sampling Procedures

Purposeful, convenience, and snowball sampling was used to choose respondents. According to Overton and Van Diermen (2014, pg. 45), these types of sampling are best used in development research where there is often a lack of documentation and thus difficult to know the precise population and when research takes place in a rural setting where informants are spread out over often large distances as is the case at my study location. The characteristics of the respondents are quite heterogeneous. Sixty-six (66) respondents were interviewed of which



28 women and 38 male. Please refer to appendix 13 for an overview of the livelihoods of the persons included in the sample. Children or elderly males were excluded from this sample as were government officials. The younger children and young adults typically attended boarding school and remained there during my stay at the village. The elderly men were excluded since those whom we were able to access often tended to be under the influence of alcohol whilst others simply had no interest to participate in the research. Government officials were excluded at permission was not granted by the host organization to contact government officials. With a view to the time and logistical constraints, the focus was on interviewing those actors that did meet the selection criteria mentioned in the previous section of this chapter. However, sampling an equal number of each type of actor was not possible for a few reasons. First, farmers or agro-pastoralists were not always available at their plots and many plots were not being farmed because of the drought. Also, most farmers were also livestock keepers, whilst pastoralists did not partake in agricultural farming. In the local context a 'farmer' is typically a sedentary agropastoralist. Pure pastoralists were most difficult to get hold of as they spend much time travelling with their animals, and thus purposeful choices had to be made to speak to informants based on their availability.

4.4 Semi-structured interviews

As I sought to research people's perceptions of certain events, semi-structured interviews were most appropriate for this study. Semi-structured interviews allow respondents to speak freely and provide additional information than a structured interview as they "are a verbal exchange where the interviewer tries to elicit information from another person by asking questions based on a list of pre-determined questions yet allowing participants to talk about issues that they feel are important" (Longhurst 2010, pg. 103) where the questions are 'open ended but follow a general script and cover a list of topics' (Russell 2011, pg. 156). The interviews often took place with family members or neighbours around. Sometimes I would turn the interview into a semi-formal group interview depending on who was in attendance. I do not believe this type of interviewing biased the answers obtained. To the contrary the responses were independent and thoughtful and often very different thereby leading to greater



insights of theme under discussion. Triangulation was used by asking the same questions of the different actors in the sample.

4.5 Secondary resources

Secondary resources were reviewed to complement my fieldwork as much of the research is based on historical, socio-political, and theoretical information. A limited amount of data regarding the study site and of the water interventions at the study site was available as this mostly pastoralist society does not have a fixed address or office and not much worth is given to the written word. The host organization was able to supply some hard copy information which included emails between local project leaders and international organizations, letters from politicians, project proposals from local environmental agencies, various other correspondence, and group ranch and community project minutes. Another reason for reviewing academic journals, country papers and locally available documentation was to fill the gaps in my own collected data, to support my findings and discussion, and to draw more holistic conclusions.

4.6 Limitations encountered during research

This section serves to outline certain key limitations encountered during the research process which could bias the data collection and therefore the findings and analysis.

4.6.1 Time and logistics

Effectively the research period covered three and a half months. It is possible that there might be errors in the data since there are limitations on which activities one can carry out and how much research is possible during such a short period of time in a rural setting of this nature. For instance, the possibility for consistent triangulation or cross checking of data was limited due mainly to the great distances between the homesteads and the villages of the study site, but also due to the limited availability of people in this predominantly pastoral community. A longer stay might have been more conducive to more in-depth research as well as better structuring of the research process itself. Nevertheless, considering the quality of the data collected i.e. the number of similar responses obtained by independent respondents of this relatively small sample size, leads me to believe that my research objective was carried out sufficiently.



4.6.2 Language challenges

With regard to the research process itself, the first couple of interviews, regardless of whether they were held in Maa or in English were rather difficult. Besides the obvious difficulties with translation from Maa into English and potential loss of key bits of information, grammatical and interpretive differences of the English language were common at first between myself and the interpreter/guide. However, once I got used to the meanings of words he used to describe certain things and started using his expressions and choice of words, and he got used to my language style, we were both able to communicate very well with each other. Engaging with the tactic of probing and triangulation within the interview itself, I was able to obtain coherent and reliable responses to the questions even though often, the respondents and I reached a meeting of the minds in a round-about way. One example of this is the use of the word 'conflict'. Whilst in western culture 'conflict' can be both violent and non-violent disputes, the use of the word 'conflict' in this context carried a very heavy negative connotation which did not get resolved. When I asked 'are there conflicts between farmers and livestock keepers because farmers use a generator to pump water from the dam?' the answer was, to my initial astonishment, always 'no'. By switching to the word 'argument' or 'quarrel', suddenly all respondents answered 'yes' to the same question.

4.6.3 Conflict of Interest

I am aware of a potential conflict of interest in my research study. In this case it relates to the fact that the host organization is first and foremost a Maasai organization concerned with the plight of indigenous peoples. The founders, directors, and social workers of the host organization are themselves Purko Maasai from Maji Moto and have farming and livestock interests at the study site. The host organization has also contributed in one way or another to the water projects in Maji Moto and people at the study site either know them or know of them. On the other hand, Utrecht University is the research partner of the host organization as well as my research advisor. As such, I am 'caught in the middle' so to speak. I trust however that flagrant bias in the research process was mitigated by remaining transparent and non-judgemental and maintaining a certain degree of diplomacy without compromising the research objective.



4.6.4 Interviewing Elites

I sought to interview eleven people considered by the guide/interpreter and host organization to be elites¹ or key respondents. Of these potential respondents, I had difficulty in reaching three of them. In a manner I am very familiar with from my own Caribbean background, these three potential informants agreed to give an interview and subsequently proceeded to give us the run-around. In the end I did not meet with the area chief or the former county councillor but an official of the host organization 'phoned ahead' to the third key informant to help establish my legitimacy, reduce any perceived threat and to show respect for this person's status within the elite network and according to custom which according to Scheyvens et al. (2014, pg. 203) is an important way of achieving access and gaining the cooperation of the potential respondent. This resulted in a successful three hour chat which included visiting the various community projects he was involved with which turned out to be most beneficial to this case study.

4.6.5 Positionality and reflexivity

The literature mentions that there are a variety of techniques that can help strengthen the rigour of qualitative research two of which are positionality and reflexivity (Barbour 2001, pg. 1115). From personal cultural experience I knew that my gender, language, ethnicity, age, and life experiences could influence the way I experienced the host culture, but I also knew that the reverse was true. In practical terms, these factors did not hinder me from interviewing any of the sub-sets of the population at the study site, nor from posing any of the research questions. Continuous reflexion was used during data collection and analysis which lead to the discovery of emerging patterns or new themes which allowed for a re-focussing of the interviews and the chance of collection more rigorous data (Glaser and Strauss 1967 as cited in Priest et al. 2002, pg. 31; Barbour 2001, pg. 1116).

4.6.6 Possibility of sampling-errors

There is always the possibility that the data collected might contain errors due to the limitations discussed in this chapter, not least when it comes to language and translation. Furthermore, one must consider the potential bias of the guide/interpreter in his choice of

¹ Elites in the Maji Moto context refers to people who are either political leaders, educated, or wealthy.



respondent selection during the sampling stage. Additional bias in the sample could come from the fact that government officials including the area chief and male elders were not included in the sample for one or more reasons as mentioned previously. In order to mitigate the risk of analytical, historical, or other bias due to exclusion of the government which I consider to be a key actor in this research but was not able to interview, I have attempted not to provide judgements or conclusive remarks regarding the government. I have had to rely on secondary sources as well which might also contain certain errors or omissions when it comes to historical or statistical data or might be incomplete as records of group ranch meetings, water committee meetings, project documentation and so forth are not kept in one location or are not written down. I do not have an indication that these factors are of influence on this research, but they must be taken into consideration.

4.7 Data analysis

I have drawn on the conceptual and theoretical frameworks as outlined in chapter two to analyze the collected data, and have used a few select quotes that I deemed representative of the respondents' perceptions obtained during the data collection stage, whilst utilizing other quotes to highlight distinct opinions. During this stage in the research process I collected, categorized and coded all of the data generated through fieldwork using NVivo software and interpreted and contextualized the data for analysis and discussion.

4.8 Ethical considerations

The literature suggests that fieldwork in 'developing countries' or with 'marginalized' people can raise various ethical issues including power relations between the researcher and the respondents when it comes to knowledge generation, ownership, and exploitation (Banks and Scheyvens 2014, pg. 160; Stewart-Withers et al. 2014, pg. 62). Along this vein, researchers are often accused of having a predatory relationship with the people involved in the study, moreover when those being studied are 'relatively powerless', 'poor people of low status', or 'ethnic minorities' (Jackson 1983, pg. 42). Regardless of the bias that might be inherent in the italicized terms themselves, as these terms in and of themselves are a construct of a perceived reality by those who coined these terms, my point of departure is always one of humility and politeness when introduced to people whom I do not know. Whilst one or two respondents initially showed mild hostility toward me and accused me of 'coming to see how we poor stupid



people live' and 'you rich *mzungu* come here and take and take for your own benefit but never help us in any way', I found that by explaining that not all *mzungu* are rich and that I came from a place similar to Maji Moto which got more and more developed because of research, would lead to surprise and cooperation on the part of the respondent. Otherwise, I never sensed a feeling of unease between the respondents and myself. To the contrary, I was clearly the 'Other' in this setting where I was paid no special respect or looked up to simply because of I was 'Western', and more often than not I was the object of good natured jokes at my expense or sometimes even outright ridicule.

However, in keeping with Western prescribed ethical norms and standards for social science research, I will point out that I explained to the respondents in detail what the aim of the research was, what it will be used for, and who will have access to it and that they need not answer any question if they did not want to. Their privacy was guaranteed and they were free to decide when to stop the interview. Permission was always sought from the respondents for the use of the audio-recorder, their name, and photo's in any setting including publication.



5 Findings and Analysis

This section presents the findings and through analysis draws out key aspects of water scarcity, power relations, and institutional design that contribute to the persistence of conflict at the study site. The chapter draws heavily on the semi-structured interviews and focus group discussions and presents my findings based on the objectives and research questions of this study and an analysis of what I have determined to be the cause for water related conflicts at the study site.

5.1 Main findings: a review of the water related conflicts

Careful assessment of the theoretical concepts purported to cause conflict in the water-climate-conflict debate has led me to determine that the conflicts at the study site are rooted in the inefficiencies of the hybrid institutions and the embedded power structures through which these institutions are governed. It must be noted that it is not the hybridity or multi-dimensionality of the institutions that are the cause of the conflicts persé, rather it is certain inefficient components within these structures that are the cause of the conflict and the resulting phase of institutional lock-in in which they find themselves. The findings are supported by quotes from respondents where relevant and are indicated in italics with the interview reference codes provided in brackets. The second part of this chapter seeks to analyse what these inefficiencies are why they are causing the conflicts.

5.1.1 Water Management Committee and the irrigation scheme

5.1.1.1 Governance and power

The sole institution in charge of water distribution for the irrigation scheme is the WMC. The irrigation scheme is governed by a WMC comprised of two sub-committees consisting of a total of ten committee members from which a committee chairman is appointed by the farmers. Committee member are comprised of two or three representatives from each of the four secondary furrows designated to irrigate a particular irrigation block (N3, N4, N5, N8, D3, D12, D24). Neither the WMC chairman nor the furrow representatives are chosen by majority vote in the typically Western style of electing leaders. The representatives and the chairman, who must be farmers themselves, are appointed by the farmers after having discussed the characteristics of the person amongst themselves and having reached an agreement based



on consensus (D27, N3, N4, N5). The appointed farmers are free to accept or decline the appointment but typically accept as the appointment is considered an honour. Approximately a decade ago bylaws were drawn up to govern the irrigation scheme but these bylaws are never consulted or enforced and distribution rights and governance have grown organically and have thus become customary. The WMC operates as an informal institution and is not registered with the water authority of Narok County, or WRMA, and no water user fees are paid by the farmers to any institution, nor are funds contributed toward a maintenance fund. Maasai cultural traditions regarding rule and decision making rests with the men, and as such only men sit on the WMC. There is no age limit and men ranging from their early twenties to old age can be appointed. The main eligibility criteria includes being a farmer and having good leadership attributes such as being impartial and fair. Committee representatives and the chairman are not appointed for any particular term and some WMC members have served consecutive 10 - 15 year terms. If farmers consider the members or committee to be corrupt or unfair they will discuss this amongst themselves and ask the deviant to 'stop misbehaving' (D3, D15, D24,

D27, D30, N3, N8, N12) and finally dismiss the person or the entire WMC, as the case may be, should they continue to 'misbehave' and immediately appoint another. This dismissal of deviants is also determined by consensus and no vote is taken. When asked why decisions were made through consensus rather than



Photo 12 Irrigation Scheme (red), dams (dark blue), hot spring stream (light blue)

through Western style majority vote, respondents answered that 'a majority vote can cause fighting and favouritism because some will agree and some will disagree with the choice'. The WMC institution and governance system has evolved over time away from an autocratic elitist institution governed by a handful of politically well-connected and wealthy individuals where clientelism and corruption ran rampant to a more inclusive form of governance where all farmers have a voice. This change occurred in the early 2000's when a powerful local county council representative was thrown from power and the younger educated farmers started a 'revolution' (D29) and ousted the long-serving elitist WMC.



Maasai women cannot own land but as of recently widows are able to own land so that they are protected from becoming landless (D21, D22, D23). The number of women farmers has increased significantly over the past two years (D17, D22) and there are currently an estimated 10 - 30 women operating their own shamba's (N5, N12). There are no women on the WMC (N4, N5, N8, D16, D17, D18, D22, D23, D28) although some of the female farmers are starting to attend the meetings and actively voice their discontent or opinions (N8, N12, D28). One widowed female farm owner tells me that "they [the male farmers] never put ladies on the water committee management. But we are trying to push up because this time around many ladies are doing farming and we want to be represented in the committee" (D16). Today, more and more women are standing up for their rights as they have been empowered by the grassroots NGO through awareness programs on their rights under the 2010 constitution and other statutory laws.

5.1.1.2 Water distribution system and equity during dry spells

Allocation of irrigation water is based on a rotational schedule in accordance with a weekly roster system (D5, D12, D17, D20, D23). The WMC meets twice or three times a week during dry spells to manage the allocation of irrigation water and to intervene in the case of disputes (F24, N3, N4). During dry spells when water levels in the dams are down and water pressure is low, the WMC faces challenges in the distribution of water in an equitable manner due to both the physical constraints of the irrigation scheme itself and the irregular and ad hoc

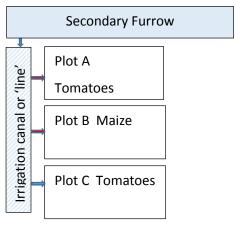


Figure 3 Irrigation Scheme visualization, 2015.

planting style of the farmers. The big dam for instance only has one main furrow to irrigate 100 or more irrigation parcels during dry spells. Water is scarce and tough choices have to be made as to which *shamba* 's will get allocated water which will depend on the distance to the dams, crop type, soil type, and gender. For an overview of the decision challenges please revert to the inset of Box 1. Figure 3 provides a schematic rendering of the roster system for water distribution from the big or

lower dam. The secondary furrow is 'opened' (see blue arrow) to the irrigation canal or 'line'. Today it is Plot C's turn to get water and thus the irrigation canal is 'opened' to Plot C (see



blue arrow). As can be noted from this schematic, the water flows past Plots A and B as it is not their day to get water. Plots A and B are not permitted to 'open' the canal into their plots even if they require water. The reason for this is that there is insufficient water in the furrows

and the flow pressure is too weak to sustain the watering of two shamba's at once. Each week an irrigation line is assigned to receive water from the secondary furrows, and the WMC allocates each farmer one day's worth of water (24 hours, day and night) for his two acres, at least on paper (N5, D17). A relatively recent occurrence is the extensive use of multiple generator pumps at a time which are placed either in the dams or in the furrows to pump water to the owner's *shamba*. The use of the generator is not yet regulated by the WMC although this was under discussion as I finalized my research. For a visual of the irrigation scheme please refer to Photo 12 which highlights the vast expanse of the gravity-fed irrigation scheme and provides an indication to the reader on the distances between the dams and farthest shamba's in 'red', the two dams in the foreground in 'deep blue' and the hot spring and stream in 'light blue'. For an artist's rendering of the layout of the water resources please refer to appendix 7.

5.1.1.3 The zero-sum game: Winners, losers, conflicts

The challenges during the dry spells are many and varied and lead to conflict. First, although technically a farmer is allocated twenty four hours' worth of water, the further away his plot is, the longer it takes for water to arrive, sometimes as long as twelve hours leaving him the balance of twelve hours

Water Distribution in the Irrigation Scheme

"Water distribution for the big dam is 24 hours. So the next goes to one for 24 hours, 24 hours etc. This is what we brought in in 1999.

Also, there is some factors you consider when you are watering or you are arranging the timetable. You must consider:

- 1. distance that water can flow from the dam to the shamba, because you cannot give the person who is just 5 metres from the dam the same hours with the person who is down there. So you start counting hours when water is in that garden. That is when you start counting the 24 hours. Because if you start saying 'now I give you 24 hours' and maybe water starts flowing from the dam takes about 5 hours to reach the garden. So you see, there is no equality there,
- 2. **gender**: there are some ladies or women who are farming and maybe they are widows, so it is very difficult for a women to water in the night so we give them during the day,
- 3. soil status: We must visit the gardens to assess the situation of the plants. Because different gardens has different types of soil. So you find some other gardens that they are sandy, so they don't retain water. It means if you had water yesterday, you come today you find them dry. Maybe there is another garden that can last for 1 week. So the committee members must move around to see how those plants are doing, and
- 4. **plant type:** there are those plants that can last for some days without water and there are those who cannot last. For instance, maize can last for many days, but tomatoes, cabages, cannot last for many days without water. So that is another point we must make sure, we have to visit the shamba maybe on every Saturday to assess the situation".

Respondent D17, agro-pastoralist and former Secretary of the WMC 1999-2006.

Box 1 WMC duties, 2015.



to water his plot. This same farmer then faces the challenge he might not be able to finish irrigating his plot within the remaining twelve hours because of the low pressure of the water flow. Even though he might not be done irrigating, the canal to his *shamba* is closed as it is now someone else's turn to get water (D10, D23, D28). Second, due to the water scarcity and high evaporation rates, not everyone is assigned two times twelve hours and not everyone is assigned sufficient water to cultivate his or her full two acres. The WMC feels that 'to be fair, everyone should get a little water'. With some people getting a 'little water' and others getting 'no water', crop failures are high and some give up farming altogether during dry periods which increases the vulnerability of especially the poorer echelons of the community who are subsistence farmers who's food security is threatened. Third, women farmers, just like the men, are often scheduled to start receiving water during the night. This is a dangerous undertaking due to the presence of wild animals such as hyena, leopard, and elephant and sometimes lion. Unless they have funds to pay the men to irrigate their plots or for male security to accompany them, they run the risk of either not getting water at all or getting insufficient water. As one widow puts it "Oeh! I've had several challenges with this farming. One challenge is that I got water allocated by the water committee at night! So I fear to go and irrigate my parcel at night. So, I have to employ someone to do that. So I must really struggle to find money to pay for that labour" (A03). Remember, in the Maasai culture many of the men are of the 'warriors' or 'moran' age-set and it is their duty to provide security to their community. Also, every male Maasai's mode of dress includes carrying a large, sharp, double edged hunting knife, a bulbnosed solid wooden club, and a stick to provide this security at all times. The fourth challenge is attributed to the well-to-do farmers who tend to have larger, well cultivated plots even during the dry spells as they are able to access water by using a generator to pump sufficient water to their plots when they see the need (D2, D3, D5, D12, D16, D17, D18, D27). A 30 year old, married, male farmer shares the opinion of his cohorts and tells me that "anytime, when it is your turn, you can use that generator to get more water and also when it is not your turn, you can use that generator instead of waiting your day to come, because maybe your plants will not wait your turn, so you can use that generator" (D1). This pumping of water from the dams quickly empties the dams leaving insufficient water for other farmers and for livestock. The



fifth challenge is WMC institution itself as respondents allege that they are 'partial', 'always have water when others don't get any at all', 'practice favouritism' and are 'corrupt'.

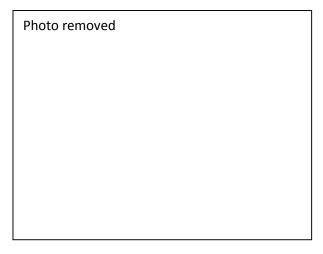


Photo 13 Removed

All of the above challenges lead to the following conflict situations. First there is the conflict between farmers and farmers because of the 'stealing of water out of turn'. When farmers see that they have not received water for some time, sometimes up to a month, and their crops are failing, they will illegally divert the water flow from the secondary furrows to their *shamba* or illegally tap into the irrigation line flowing

past their *shamba* which typically occurs very early in the morning or during the night (N4, N8, N13, D4 D5, D12, D13, D18, D20, D21, D22, D24, D26, A03). The farmers claim that they need to steal water because they are not allocated water fairly by some of the WMC members. A 39 year old male agro-pastoralist, bee keeper and former WMC member tells me "yes, you find that the committee causes problems through favouritism. Because in some cases when I come in I tell you okay, tomorrow is your day to have water, and another committee member says no, it is Simon's day. So the 2 farmers meets at the canal point....there was a case that one man hit the other man on the head with a djembe, because of such conflicts! (D17). A number of respondents complain that the WMC is corrupt because as one widowed agropastoralist from Mokondani village puts it "sometimes you have a committee member with 2 or 3 acres in the dry season and he always has water and full harvest but maybe a regular farmer with 1 acre or less, loses his harvest because of lack of water" (D23).

Conflicts are also increasing between pastoralists and farmers during dry spells. The paradox is that most farmers are also livestock keepers. In the context of this research the main difference between the two is that pastoralists typically tend to have larger herds consisting mostly of large 'cows' whereas the sedentarized farmers are in the process of destocking and keeping fewer 'cows' and more small livestock such as goats and sheep or are getting out of

² In this context 'cows' are cattle (large oxen).



livestock husbandry altogether due the 'prolonged and frequent droughts', for purposes of 'food security', and because keeping livestock requires 'you to be on-site to care for the animals'. The main concern of the pastoralists is the farmers' use of generators to pump water from the dams and the lack of cooperation and help from the WMC, farmers, and the area chief.



Photo 14 'Bead Ladies' of Inchaishi Village, Women's Empowerment Group, 2015.

The problem for the pastoralists is two-faceted: first, the excessive pumping of water drains the dam leaving no or little water for their cattle, and second, the already emaciated and weak cattle get deeply stuck in the mud which places significant stress on both the weakened animal and the pastoralist (D9, D10, D11, D13, D15, D18, N1, N3, N5). One concerned resident and 'person of trust' sums up the pastoralists' dilemma as he explains "there are conflicts with

the farmers and the livestock keepers because of the use of generators by the farmers. The generators pump too much water so that there is no water in the dams! Cows come from far, and no water. They are weak and get stuck in the mud. The Water Management Committee is no help either" (N7). The farmers however have qualms with the pastoralists as well. One widow who's only livelihood is subsistence farming of 1/4 acre explains "during dry season when more livestock and wild animals visit the dam, they finish all the water and contaminate the little that is left with urine etc. and that acidity flows to the farms and dries up the plants" (N12). The use of the generator furthermore elicits conflicts between the wealthier and the poorer farmers many of whom are subsistence farmers. Wealthier farmers tend to be market players as they sell their crops in Narok Town and Nairobi. Smaller or weaker farmers complain that all of the water is pumped from the dams leaving little or no water for their shamba's thereby increasing their vulnerability and food insecurity as crops fail. All of the widows interviewed responded along these lines with regard to the impact of the generator "those who are financially strong can buy or lease the generator and use it like once or twice a week so they always have water. But if you are not rich you cannot afford the generator or the fuel and so your plants get starved because of lack of water" (D16).



5.1.2 The windmill pumping station: institutions, governance structure, and conflict

When the windmill was rehabilitated in 2007 under the UNDP community water project initiative one of the conditions for funding was that a formal governance structure be put in place to guarantee the future sustainability of the water project. The grassroots NGO that facilitated the project implementation helped the stakeholders to structure the water committee and governance bylaws which included water user fees to be paid on a monthly basis to be used for future maintenance and repairs (D29; MMGR, 2007). Once the project was completed and the NGO's had left, the committee never again sat down and the regulations stipulated in the bylaws were never implemented or enforced. Soon enough the stakeholders reverted back to the old way of letting the windmill basically 'run itself' (N7, D15, D17). When respondents were asked who owned the windmill the typical response was 'there is no real owner, it's of the community' (D1, D15, D17, D29, D30, N5, N7, N11). Official blueprints of Maji Moto show the windmill to be constructed on communal land in the riparian area of the hot spring. When asked who was in charge of managing the windmill, the common response was 'there is no one managing that wind mill. If you want to connect you ask the Pastor. The man from the secondary school is the only one trying to do something: he opens and closes the valves. The Pastor sometimes looks for funds from well-wishers to repair the wind mill'. One of the stakeholders representing the mission, who interestingly was an original water committee member, told me 'a long time ago we looked into having a water committee with a fee structure. But the politics! The Girls' Secondary School was already charging a water fee to the students as part of their tuition! But this fee was never deposited into any maintenance account for repairs and maintenance! (N7). A former group ranch chairman who was actively involved with the rehabilitation project and ordered the stakeholders to install a formal water committee as per the IO's conditions believes the governance structure failed because "there was no proper structure in place so people despised this committee and saw them as some fellows just trying to get money from them. Also, there was nobody to really enforce the rules and say you pay or you don't get water". Also at one point they asked me why should we pay for the wind? Who pays the wind?" (D30).

Conflicts arise amongst stakeholders rather frequently for three main reasons. First, in lieu of a legitimate governance structure, the Secondary Girls' School has taken over the



control of the water distribution and the school's store keeper controls the opening and closing of the locked valves. Water rationing is also determined by the store keeper who allocates water to the stakeholders in turn for a few hours each day. This water rationing is not determined through a fixed schedule but depends mainly on the strength of the wind and whether or not there is sufficient water being pumped. Second, conflict arises when the windmill breaks down. The stakeholders then hook up their generator to the source in the hot spring dedicated to the windmill. Only one generator can be hooked up at a time so other stakeholders have to wait their turn. This is challenging when the three schools have to prepare meals for the students around the same time. Each of the three schools have between 150-250 students, excluding the teachers. Not all stakeholders have a generator but feel they have the right to get water and argue to use another stakeholder's generator. And third, stakeholders are expect to contribute funds for minor repairs. There is no fixed formula to determine the size of the contribution and people tend to pay what they can or not at all. If a stakeholder does not contribute, the storekeeper does not distribute water to that stakeholder.

5.1.3 NRM, the hot spring and the water point

Conflicts at the water point in the hot spring are occurring on two fronts. First, there is only one 'water point' or pipe, that serves approximately 500-700 people per day. This results in congestion at the water point which means a certain amount of pushing and shoving and arguments occur, known by the locals as 'corruption at the water point'. Exacerbating the situation is the fact that a rather new phenomenon is occurring at the water point during this



Photo 15 Land degradation at Hot Spring, 2015.

latest drought due to the severe water scarcity in the surrounding areas. Water collection, traditionally a women's role in Maasai culture, is now also done by men who arrive with their motorbikes and cars and fill up multiple twenty litre jerry cans at a time. The men however are not collecting water as part of their household duties for this remains a woman's job. Water

collection by the men is for commercial purposes and practiced as an alternative livelihood strategy whereby they collect water on behalf of families who live far from the hot



spring or businesses and the sick who do not have the ability to make the long trek to the hot spring. Some of these male water collectors come from as far as twenty five kilometres away. The water distribution scheme at the water point is based on the ancient tradition of 'first come, first serve'. The men, however, feel that they should go first regardless of the long queue of waiting women and tempers flare. One sixty two year old woman from Kikurukurr village approximately four kilometres away from the water point notes that "Sometimes men come on their motorbikes and request to go ahead of the queue. But we tell them it's first come first



Photo 16 Hot Spring stream, Mokondani Village, MM, 2015.

serve and they must wait. But they don't and the fights start and it gets physical fighting. Everybody is fighting, verbal, physical, everything during these dry times" (D9). A widow and the first female Village Elder of Mokondani village elaborates on this matter, "Yes the men come to fetch water with their bikes and cars and we keep quarreling a lot and

have that conflict during the dry season. But now that I am an Elder I proposed that water should not be taken to sell. You should fetch, go, and use, but not make business for yourself" (A03).

The second conflict arises due to the excessive pollution in the hot spring. The pollution is a result of various factors including but not limited to an increase in the human and livestock populations, limited awareness of the dangers of pollution amongst the community, and the encroachment of modernity such as the use of westernized clothing and bedding, soap, detergents, plastic bags, bottled drinks, and sanitary napkins (D6, D12, D17, D27, D28, D29, D30, N1, N9, N10). These items all end up on the banks of the hot spring as well as in it. Whereas in the past people owned at most two *shuka's* today everyone is 'all wrapped up' with school uniforms, various pairs of trousers, shirts, dresses, and shoes. No processed foods were eaten by the Maasai: milk was kept in gourds which were washed and stored whilst meals were eaten from the communal pot with one's fingers. This in combination with human defecation and animal dung which is a health hazard as cases of typhoid have increased recently (N10). The main concern of the farmers though is that the items in the hot spring obstruct the flow of water from entering the dams to be used for irrigation purposes. A widow from Mokondani village voices the complaints of other community members, "The water at the water point



where women and girls take showers is dirty and women leave their sanitary towels, and clothes and polyethelene bags so before water reaches the dam, it is dirty. There is no committee or anything that tests the water quality or looks after the environment or the Hot Spring. Only the Area Chief tries to make the community aware not to pollute the area but



Photo 17 Wind mill, water point, commercial water collectors, 2015.

there are no punishments or anything. Only concerned citizens, when they see that the Hot Spring and the area is very polluted, they mobilize people to clean up and charge a small fee to water users [who are at water point at that moment] to fix the broken water pipe. But it's just the community, there is no government involvement" (N12). It is left to the farmers to unblock the stream (D12) who sometimes get assistance from the students in the area. The farmers have complained time and again to the women and to the Area Chief but the pollution still continues. Another key concern of both the farmers and the livestock keepers is the amount of chemical waste flowing into the dams as this hurts their crops and their animals. One learned male, early thirties, agro-pastoralist, and a civic leader laments that "the women bring the clothes and wash at the river, so even the water that the cows are taking and that the shamba's are taking, is completely contaminated. In fact during the drought, when that water[in the dams] is declining, it's just a soapy mess, totally soapy and the cows have no option but to drink that" (D28).

Today the residents living in the area are more aware of dangers of neglecting to care for the hot spring and have various ideas on what must be done to conserve the area. Unfortunately they do not have the financial or human resources nor the knowledge of their rights under statutory law or of the state bureaucracy to tackle a project of this nature on their own.



5.2 Analysis: Inefficiencies in pluralistic institutions and conflict

Although the above findings appear to provide the reasons for the conflicts, it would be both premature and a considerable mistake to take these reasons at face value when seeking to implement projects designed to help resolve the conflicts. It must be recognized that in each of the conflict cases mentioned, the actual underlying causes of the conflicts are the institutions that guide certain behaviours and belief systems, and the structures that govern those systems. A brief outline of the Maasai social structure is in order to understand how institutions and governance structures and their evolutionary changes can be a source of internal conflict.

In traditional Maasai culture, age-sets and clans form the cornerstone for socio-political organization, and just as in any 'Western' institution, each person within these institutions has well-defined roles, responsibilities, rights, and obligations in relation to others in society: Political organization is based on a series of age-sets, and local affairs are decided by councils of elders on the basis of consensus (Grandin n.d., Ch. 3). Although this is not the venue for an in-depth discussion of the age-set system, it is prudent to understand that age-set leaders are leaders for life and are believed to have certain divine powers, whilst village elders have the power to place a curse on you. According to Riamit (2013, pg. 81), age-set leaders do not seek to be leaders but are secretly chosen by the elders and by their age-mates through an elaborate vetting system and appointed in a very solemn and ritualistic ceremony. As such, these leaders cannot 'buy' their way into leadership. Age-set leaders can be ousted from office due to gross abuses or neglect of the greater common good and their black sceptre or Orinka orok, the symbol of their revered status, is then unceremoniously ripped from their hands by their advisors and the ousted leader is then stigmatized and shunned by the rest of the community because his black sceptre is both blessed and cursed during the initiation ceremony: if the leader 'misbehaves' it is then believed that he will be cursed. It is a most disgraceful removal from office akin to a vote of no confidence, and as such rarely happens (Riamit 2013, pg. 84).

At the other end of the spectrum is the contemporary leadership system based on Western style democratic principles such as the group ranch leadership system which was installed in the early 1970's. Under this leadership system, potential leaders lead elaborate campaigns and those with the most successful campaigns typically come out the winners. This institution with statutory powers granted to it under the Group Ranch Representatives Act and



contrary to the traditional Maasai politics of consensus is tasked with the authority to impose their decisions on group ranch members (Grandin n.d., Ch 3). Whilst according to the group ranch bylaws a majority vote from group ranch members is required to take decisions on important matters regarding natural resources, in actuality this does not happen. Group ranch leaders often take these important decisions on their own for various reasons including their belief that they had "already been given the mandate to lead and make decisions on behalf of the group ranch members" (Riamit 2013, pg. 57). This institutional structure is completely foreign to Maasai institutions where leaders are selected through the more community centred approach mentioned earlier and where decision making is through consensus. With the demand for modern institutions encroaching on traditional structures, a learned Maasai gentleman explains that the current leadership structure of the Maasai consists of the Cultural Leadership structure and the Constitutional or Government Leadership structure, with the cultural leadership structure consisting of village elders (men) and the age-set system. Age-sets are stages of learning and each age-set has well defined roles including the age-set of the warrior or Moran and the chief. "The Constitutional or Government leadership is official and organized under the Kenyan law and has the ultimate legal power. This includes the group ranch leadership and the area chiefs and sub-chiefs. The area chiefs are government representatives appointed by the state. There exists a conflict between the role of the community elders and the constitutional chiefs. So to be clear, there is Maji Moto group ranch and within Maji Moto group ranch there are different villages and each village has an area chief and maybe sub-chiefs" (N8).

In summary, group ranches entail a new concept of territorial and administrative organization and a new method of decision making. Unfortunately, this system has incapacitated traditional leadership in many parts of Maasailand, including Maji Moto, without providing a workable solution (Grandin n.d., ch 3). The cultural structure is preferred by many of those who are illiterate and either ignorant or disinterested in the state bureaucracy because of the sense of 'justice without revenge' that is embedded in this structure (D30). This governance structure is made possible since the age-set system contains checks and balances through an elaborate network of indigenous institutions and traditional beliefs in the form of social sanctions and taboos (Riamit 2013, pg. 83). The traditional institutions are changing,



however, and being replaced by state institutions and Western style education, and the constitutional or statutory structure is considered to be expensive, unclear, and dangerous to the Maasai who have an embedded mistrust of the state bureaucracy with its paper system of accountability and laws, the use of the English language to describe these laws, and the perceived corrupt activities of the state's representatives which includes the group ranch leaders (N8, N9, D29). A prominent cultural chief voices the sentiments of some of the older generation: "I prefer the communal land system [to the private titling system]. Now, the Maasai is changing. We are a nomadic people no more. People now do livelihood activities for money. They go to Town, get involved in prostitution, alcohol etc. People also come to get water from the Hot Spring and sell it! Lots of conflicts with that kind of thing [the clash of cultures]" (N8). Many residents, though, regardless of age or social status, tend to prefer the modern market and individual property rights system as opposed to the communal property rights system since money has increasingly replaced livestock as a symbol of wealth and medium of exchange and the more money, the more power. These sentiments highlight the evolutionary trajectories of the institutions in Maasailand and the breakdown of traditional structures.

This lack of uniformity or convergence in statutory and customary institutions are also very evident in matters of water accessibility, water distribution, natural resource management, and conflict resolution mechanisms at the study site. The conflict between pure pastoralists and farmers or agro-pastoralists is a prime example of the pluralistic nature of institutions. Traditional beliefs state that 'water is from God' and pastoralists have ancient rights to communal water resources for their cattle and fail to understand why cultivators appear to have more rights than they do when it comes to water abstraction from the dams. Initially, the big dam was meant for the livestock and the small dam was meant for irrigation purposes. This was decided by the farmers and livestock keepers with the facilitation of a local NGO. Later, as farming increased, the designation of the dams changed: irrigation water was now also abstracted from the big dam and cattle started using the small dam as well (N8). It is unclear whether the pastoralists had a say in this.

Whist conflicts amongst farmers are resolved amongst themselves based on semiformal water distribution regulations with (a minimum of) help of the Area Chief and Village Elders, pure pastoralists lament that they 'just go home and die with their cattle' since no one



represents their water interests. An illiterate 24 year old male pure pastoralist from Kikurukurr village does not understand "why the Area Chief does not get involved and stop the farmers from pumping all of the water from the dams" (D11). A group of women aged 20-80 years of age, also from Kikurukurr village remark that "our husbands and sons [pure pastoralists] cannot do anything [about the pumping of water from the dams by the farmers] because it is the irrigation committee that decides. We have no power because even the Chiefs back those who are doing irrigation. Livestock keepers have no say" (D10). The power for the equitable distribution of water rests with the irrigation scheme even though the original purpose of the dams was for both livestock and irrigation purposes. This could be attributed to the fact that the irrigation scheme was set up by and for 'certain families' by the powerful elite with assistance of the government as part of their agricultural policy. Also, farming is considered a 'modern' alternative livelihood system whilst pure pastoralism is considered 'ignorant and backward' by many of the respondents. One 40 year old widowed female agro-pastoralist and small business owner from Mokondani village summarizes this view when she states "Mokondani is the richest village because we are more developed and other villages depend on us for food, transportation etc. All successful business people are from Mokondani. Compared to other villages who might have large numbers of livestock and have very many sheep, but they don't know how to utilize or do any other thing other than herding livestock" (D16).

The perceived inequity in water distribution within the irrigation scheme is also a hotly debated issue between the subsistence farmers and the WMC. Subsistence farmers with smaller plots accuse the WMC of favouritism when they see the larger plots of WMC members and other wealthy farmers flourishing during dry spells as their own plots wither away and die. They allege that complaining to the WMC about this gets them nowhere as the WMC continues to deny them water which is made possible because 'kicking out' the WMC or allegedly corrupt WMC leaders is only possible by consensus. In its defence the WMC asserts that "it is the hardest job during the dry spells as there simply is not enough water for everyone. We try our best to make sure everybody gets at least some water but people who don't understand will always go against us. That is the nature of groups in all types of institutions" (D24, N4).



In contrast to the irrigation scheme, the windmill and hot spring are managed in a more laissez faire manner. In the case of the hot spring, the community does not appear to be able to overcome collective action dilemmas to achieve mutually beneficial ways of managing the hot spring (Bisung et al. 2014, pg. 148). As mentioned earlier, pastoralists feel that they have the right to all water and bring their cattle down to the hot spring to drink and utilize the salt licks on the spring's banks and graze in the greener riparian areas. Women have a right to the utilize the water to wash clothes and collect water. The rest of the community has the right to bathe in the hot spring. These stakeholders cannot be easily excluded from this natural resource and state that 'everyone, even those not from Maji Moto, may use the hot spring: it is free for everyone'. This free-access mentality can be seen to contribute to a 'tragedy of the commons' type situation as is evident in Photo 15 and Photo 18. Whilst the more educated residents realize

that 'something must be done to conserve that hot spring' people cannot seem to agree on how this should be accomplished. Some proposed an informal volunteer structure whilst others proposed a more formalized governance



structure with a committee and Photo 18 Erosion at Hot Spring, Mokondani Village, MM, 2015.

associated corrective mechanisms for deviants. The overall feeling of most respondents was, however, "why should I volunteer to watch for perpetrators and others benefit? I have to watch my cattle and take care of my other interests. The water point is not mine, it's everybody's." (N9), and this mentality encourages free-riding. Nobody, however, is able or willing to pay a formal (local) institution to manage the hot spring as they mistrust the elite who would likely lead such a venture because they believe these elite 'will just take our money'. They are also of the opinion that "the county government does nothing for us regarding our water needs and



they should come to organize that hot spring" (N1, N3, N4, N9, N10, D15, D17, D21, D23, D28, D30). In a sense, they are not altogether wrong because statutory law under the new constitution does in fact ensure the 'sustainable exploitation, utilisation, management, and



Photo 19 Men's bathing area in protected section of the Hot Spring

conservation of the environment and natural resources' by the state (GOK, Constitution art. 42, 68, 69, 70).

Finally, the management of the wind mill is a poster child for complex pluralistic property rights and is an interesting case. It is constructed on communal land so one would therefore be inclined to think that the

'community' owns the windmill and as such, all have access to pumped water. This 'community' however, only entails the windmill users with deep pockets. Funding for rehabilitation and repair however, is sourced from either well-wishers, NGO's or IO's, or controversially from the group ranch coffers into which member fees are paid. These member fees amongst others, are to be used to for the construction, upkeep, and maintenance of communal group ranch infrastructure and natural resources: the windmill however is an exclusionary institution affordable by a select few. Small repairs on the windmill however, are paid by the windmill users. So, in essence stakeholders already pay group ranch membership fees, so why should they pay a monthly users fee toward maintenance and repairs of the wind mill?

In summary, some water sources appear to be managed better than others. The main reason for this depends on the degree of legitimacy given to the water management institution. This concept is elaborated upon in chapter 6. The government did attempt offer the community its assistance to improve the water resources. Controversially however the government retain management and control over these assets, including the windmill and irrigation scheme, and charge a water user fee. The community could not understand this system and the proposal was rejected. The community felt that the water assets should remain under their ownership and control since they were funded by NGO's and residents had contributed labour, land, and



private funds to the construction and ongoing operation of the infrastructure. Adding to the confusion is that contrary to land laws which distinguish public, communal, and private land tenures and make specific allowances for customary land rights, ownership and control of 'every water resource' is solely vested in the state of Kenya (GOK Water Act 2002, No. 8, Part II, art. 3). The right to use water is acquired through a permit and Section 27 of the Act makes it an offense to 'construct or use works to abstract water without a license'. Residents do not see why they should upgrade their water assets if the government can 'own' them at the end of the day. To receive funding and technical assistance from the government to ensure sustainability of their water resources, Maji Moto must install a formal Water Resource User Association and a water permit must be granted. Interviews showed that the residents at the study site, including the Area Chief, are either unaware or lack sufficient understanding of these new water governing laws and consider government intervention to be 'dangerous'.



6 DISCUSSION: APPLYING THE THEORY TO THE CASE STUDY

This section links the findings and analysis to the broader concepts and theories discussed in chapter two of this paper in order to provide certain key insights which could contribute to a better understanding of water related conflicts in marginalized rural communities in general and at the study site in particular which could ultimately lead to effective solutions.

6.1 Property Rights, Institutions and Governance, and Water Resource Scarcity

The findings and analysis in section 5 of this paper clearly indicate how the politicized environment surrounding the water resources at the study site affects water accessibility of the various water users which during dry spells is leading to an increase in the number and intensity of water related conflicts. Here reference is made to the politics embedded in the institutions and governance of the irrigation scheme, dams, wind mill, water point and hot spring located in Mokondani village. The main observation is the different types of institutions and governance structures that are associated with the different water resources which range from ancient customary to hybrid and to statutory institutions and rules. Complicating matters in Maji Moto are changes in the social structure due to a rapidly evolving society. There is a wide body of literature on African water management systems which supports the notion that customary regulations and technologies adapt over time as a result of changing land tenure systems, population growth, and changing land use systems just to name a few (Orindi and Huggins 2005, pg. 33-4; Meinzen-Dick and Nkonya 2005, pg. 8-2; Mwangi and Dohrn 2007, pg. 246). This discussion focuses on the diverse nature of the institutions and the rules and regulations that legitimize them and how changing institutions are causing the breakdown of traditional socio-political structures thereby causing conflict situations. Earlier chapters outlined how internal and exogenous factors demand change in institutions. Not all change, however, is automatically accepted by all stakeholders: acceptance depends on the perceived legitimacy of authority vested in the various institutions (Komakech et al 2012, pg. 115).

The Maasai of Maji Moto are a people in transition to forms of economic organization that no longer depend only on kinship and face-to-face contact and these new economic conditions demand new institutions such as notarization of property rights by third parties, banking facilities such as the use of the popular *M-Pesa*, and courts to enforce contracts and



property rights. Water management and distribution institutions in Maji Moto are evolving as well albeit not all at the same pace or in the same direction. The difference in institutional change between the windmill and the irrigation scheme for instance is the fact that this change was not demanded by the windmill stakeholders themselves but by the international organization that had financed the windmill rehabilitation project and by the group ranch chairman at the time in his role as custodian of group ranch community water resources. The actual design of the new governance structure for the wind mill was led by an NGO with grassroots links with the community and with the participation of the water users who approved the implementation of the stakeholder representative management committee. As is a common occurrence with these types of projects, the new governance structure was not a success and collapsed shortly after the IO and NGO left and remains non-existent till this day (Orindi and Huggins 2005, pg. 33-11). Sociological institutionalists explain that the reason for this behavior is the concept of the 'paradox of decoupling' which essentially entails that actors and their actions are 'decoupled' when the proposed reforms are based on "impracticable idealistic models, lack of resources or local support for implementing the reforms, unexpected consequences associated with implementation, and actors' expectations for legitimacy in adopting the reforms" (Meyer and Rowan 1977 as cited in Buhari-Gulmez 2010, pg. 255). This concept of legitimacy in the context of water rights and water allocation institutions has been discussed at length in this paper as being an important cause of water-related cooperation or conflict since legitimacy is based on the logic of social appropriateness, and the local embeddedness of institutions in social life must be considered rather than just the crafting or designing of 'efficient institutions' as proposed by North and Ostrom (Orindi and Huggins 2005, pg. 33-5; Wijk 2007, pg. 133; Komakech et al 2012, pg. 115; Cleaver 2002, as cited in Gutu et al 2014, pg. 4; Cleaver 2002, pg. 28).

Contrary to the two semi-formal institutions of the irrigation scheme and the windmill, the governance structures at the water point (i.e the women) and at the water dams (i.e. the pastoralists) are based strictly on customary rules of 'first come, first serve'. The hot spring and its riparian areas, on the other hand, are managed as an 'open access' resource where no rules apply except for the 'free for all' mentality which in and of itself is an embedded social institution. These governance structures have remained unchanged since the 1970's and early



2000 when these water interventions were constructed since institutional efficiency was sustained, at least in the eyes of the stakeholders (North 1990 as cited in Wijk 2007, pg. 134). The 'rules of the water game' is rapidly changing however due the recent phenomenon of the commercialization of water by male water sellers at the water point, the extensive use of the generator pumps by the farmers at the dams and general water scarcity due to the droughts. Furthermore, the community is starting to realize the importance of conserving the hot spring to ensure water security, and are seeking to remedy the current 'tragedy of the commons' which is endangering the very existence of the hot spring and, by extension, their livelihoods. Although the water point and dams are only recently experiencing institutional change which is causing the current water related conflicts, conflicts due to pollution in the hot spring and between livestock keepers and local conservationists exist for almost a decade. This institutional arrangement of 'open access mentality' has become inefficient and finds itself in the phase of 'institutional inertia' which is when institutions are unable to change despite a 'broadly felt urge for institutional change' (Wijk 2007, pg. 135). According to Wijk (2007, pg. 135), there are four main reasons for this inertia of which two apply to the situation at the hot spring. First, even though the institution is in sum inefficient, some actors 'benefit from the current arrangement' and 'show characteristics of free-riding', and second the current institutional arrangement is 'dominant and ignorant of critique causing a lack of feedback'. In the case of the hot spring, the pastoralists, community at large, and water collectors all benefit from the hot spring without payment of fees and with complete disregard for the environment whilst the actual source of the hot spring is protected through funding and management of a grassroots conservation CBO. The dominant institution here is ignorance itself as the residents of this predominantly pastoralist community do not have an understanding of what pollution is or how the overall state of the environment affects the functioning of the hot spring as they believe the hot spring 'has always been, and will always be'. In all of the water-related problems actors show their agency through resistance in the form of stealing water or wooden fence poles, destruction of fencing, and ignoring rules, akin to Scott's 'weapons of the weak' (Lelo et al 2005, pg. 14-6; Turner 1999, pg. 648). Interestingly, it is the duty of the area chief by law to oversee the conservation of natural resources in the region under his authority. He is also authorized by law to require work or services for conservation of natural resources from



'any able-bodied adult male' (GOK Chief Act 128, articles 6, 8, 13). The latter duty is vested in Kenya's new constitution whereby "every person has a duty to cooperate with state organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources" (GOK Constitution 2010, article 69, sub 2). Although the area chief is the final authority under Kenyan law, as is the case in many African rural societies with this system of dual rule, the chief tends to leave various community issues such as the stealing of cattle or water and the management of the natural resources to be sorted out by the community members through indigenous institutions such as the water management committee and the council of elders (Ensminger 1990, pg. 662). The question is why?

According to North (1989, pg. 1320) demand for institutional change occurs when the cost (absolute or relative) of transacting in the old institution becomes too high. For the purposes of this research the concept of relative transaction costs is important. A relevant transaction cost in this case would be the breakdown of traditional forms of authority. North (1989, pg. 1320) posits that one extreme is the simple model of personal exchange as in the case of pastoral societies, where individuals know each other or at least have a great deal of knowledge about the attributes and characteristics of each other, and that in a society such as this where there are strong social linkages, transaction costs are very low as there are socially accepted norms of behaviour where cheating and opportunism are limited or absent. This is in contrast to models of impersonal exchange at the other extreme where the reverse is true, such as the models in the industrialized West. Transactions costs can be high in these models as it can be difficult to measure the attributes of what is being exchanged as well as enforcing the terms of exchange which can lead to cheating and opportunism (1989, pg. 1320). And then there are the hybrid models where the lines of these attributes are blurred. North further posits that in cases of a 'Western' or 'developed'-type model that 'elaborate institutional structures' were devised to constrain participants from partaking in cheating, corruption, and other forms of opportunism to minimize transaction costs and to enable market transactions to occur and efficient products to be produced (1989, pg. 1320). This institution of property rights, however, does not always automatically lead to more so-called 'efficient' institutions as this could mean a breakdown of a common belief system or code of conduct and taboos in traditional societies which some rulers can ill afford (North 1989, pg. 1321). The result is a society where pluralistic



or hybrid institutions operate side by side or in some cases overlap each other. One reason why rulers cannot always afford 'efficient' property rights institutions is because these institutions can offend many of their constituents and thereby jeopardize the security of others' rights (North 1989, pg.1321). An example hereof would be to exclude pastoralists and their cattle from outside the Maji Moto area from fetching water from the Hot Spring or from the dams. Technically speaking, under the Chiefs Act 128, cattle from outside the chief's area of administration caught 'trespassing' within the chief's administrative boundary, must be brought to the attention of the chief if he issues the order to do so (GOK Chiefs Act 128, article 11, sub f). However, pastoralists come from all over the water scarce rangelands to water their cattle and excluding this group from the watering point is not acceptable under traditional norms of reciprocity where water is considered a free access resource for all with no exclusionary rights attached (Leo et al 2005, pg. 14-5; Orindi and Huggins 2005, pg. 33-6).

Stakeholders of the hot spring and the other water interventions are not licensed WSP's as mandated by the new water act nor are they aware of the new water act. This is a departure from the previous law where community water systems, unlike other systems, operated without a license (Mumma 2005, pg. 5-3). There is considerable apprehension to become licensed due to the fear of losing ownership and control of the assets to the government. This fear is legitimate since the new water act controversially mandates that all water resources fall under the ownership and control of the government who has the right to determine the future of water assets depending on whether or not a public water body such as the hot spring is designated a water conservation area (Water Act 2002, Part III art. 17(2) and art.26(1)b(i) and (ii)). There is also the fear of exclusion should people be unable to pay the water abstraction fees due to crop failure. Also, paying water fees would especially impact the ability of certain sub-groups to pay for school fees and food. And yet, there are urgent demands from the agro-pastoralists and cultivators for institutional reform of the local water sector in the form of government interventions to 'protect the Hot Spring to countermand evaporation and degradation' and to 'upgrade the irrigation scheme to safeguard its future integrity'. What the majority of the community fails to understand is that the government must act in accordance with Kenya's statutory water laws and its duties under the Constitution and other state and county natural resource management policies. As outlined earlier, Kenya has mainstreamed IWRM principles



into its natural resources management policies which effectively entails the taxing of nature and water through some kind of water user fee as these resources are considered to be an economic good (Orindi and Huggins 2005, pg. 33-8). IWRM critics argue that this policy will only serve to further marginalize and exclude the already fragile groups such as the poor, women, and children (Saravanan et al. 2009, pg. 76, 81).

Second, the implementation of the water act rules in the governance of water in Maji Moto is sure to face serious challenges from the pastoralists who have always had the right of free access to water. For them, paying for water is an absolutely alien concept. A male agropastoralist, approximately 40 years of age, who is from the study area and who for many years has been involved in community empowerment projects in Maji Moto explains that "there is a high number of livestock taking water at Maji Moto dams, from all over, not only from this group ranch but from everywhere. Thousands of livestock! So, bringing them [pastoralists] into one mind, is not something that is doable I think. Unless something really drastic happens to bring them together. The farmers don't care if the cows don't get water and the livestock keepers don't care if the farmers get water. So, overall there are conflicting interests" (D28). This institutional phase is referred to 'institutional lock-in' which refers to an institution that is unable to change and become more efficient, and inefficient rules start "frustrating the game seriously" (Visser and Hemereijck 1998, as cited in Wijk 2007, pg. 135).

I posit that maintaining pluralistic institutions often referred to erroneously in my view as 'inefficient' institutions is desirable in the case of the study site, rather than transplanting or copy-pasting external new institutional structures just for the sake of 'development' (Wijk 2007, pg. 137; Knox and Meinzen-Dick 1999, pg. 27; Haro et al 2005, pg. 296). These traditional institutions continue to exist since the very nature of Maji Moto's harsh environment characterized by severe water scarcity compels the predominantly pastoralist community of Maji Moto to retain its intricate social networks and rules of reciprocity to obtain access to pastures and water, as well as its traditional institutions such as the age-set system, their belief system, and the village elder system to maintain social order in a place that is largely not incorporated into the state (Taylor 1982 as cited in Ensminger 1990, pg. 663; D29). According to Wijk (2007, pg. 137), "evolution in institutions is more important than a new institutional design". These hybrid institutions in water distribution systems in the study site are not only



necessary to ensure the legitimacy of water governance structures but also to create an enabling environment where residents understand their rights to water access and are protected by these rights to ensure water security. The actual inefficiencies within these pluralistic institutions, however, should be researched and understood to effectively manage the conflicts. A study of the specific inefficiencies as perceived by stakeholders rather than by development practitioners and applicable conflict resolution mechanisms are worthy of a separate case research as this fall outside the scope of this research.

6.2 Environmental Security Thesis and Climate Change

The environmental security literature assigns a primary role to the physical environment in determining conflict and focuses on resource scarcity (Raleigh 2010, pg. 71; Floyd 2008, pg. 55) whilst positing that climate change will "alter the political stability of the poor and underdeveloped states making environmentally related violence more likely" (Homer-Dixon 1994, Homer-Dixon 1999, Baechler 1999, as cited in Raleigh 2010, pg. 69). To test this thesis respondents were asked to provide an account of what they perceived to be the cause of conflicts in their area. The majority responded that they believed that the lack of water for cattle and irrigation water was the cause of the conflict and said they believed this water scarcity to be due to the many and prolonged 'dry spells'. The effects of the perceived climate-induced water scarcity were felt especially by poorer pastoralists and farmers as their cattle got sick and died and crops were lost respectively. Their adaptive capacity largely influenced by the way in which they are resilient enough to be able to cope in the short term with changes to their environment which will be determined by their physical (money) and social (power, status) assets, external support systems, and the state's presence through the provision of social services, legal rights infrastructure, climate information, technical expertise, and health services (Ogalleh et al 2012, pg. 331). In this sense, climate change is seen to undermine human security as it negatively impacts people's livelihoods to extent these livelihoods are dependent on natural resources and ecosystem services and their lack of economic or social forms of capital to adapt as is the case in the study area (Barnett et al. 2007, pg. 641) thereby increasing the propensity for conflict.

However, closer analysis reveals that the communities in the study area lack government provided social services such as piped water to their homes, plantations, and cattle



pens or any other social services or relief aid for that matter which increases people's vulnerability if they are unable to adapt sufficiently. As such they use conflict as a coping strategy to gain access to resources when other modes of coping are not available. The case study literature supports this position and broadly contends that intergroup conflict can only be understood as a way to mediate access to resources in areas characterized by a hostile or sporadic government presence (Raleigh 2010, pg. 71). From the above it becomes clear that environmental changes do not undermine human security and cause conflicts in isolation from other social factors including matters of land tenure, lack of climate change awareness programs, livestock and crop diseases, the degree of support received from the state, the effectiveness of local institutions, and the extent of social cohesion (Barnett et al. 2007, pg. 641). This supports the discussion in the previous section where certain inefficiencies in institutions are the primary cause for conflict as for example simply adding more water pipes at the water point will fail to 'keep the peace' provided certain concrete user rules are laid down.

6.3 Reflections: validity of the case study

The validity of this research hinges on the accuracy and trustworthiness of the instruments used to collect data, the data itself, and the findings. Since perceptions of people were key to assessing the conflict situation the qualitative methodology and case study design were considered to be the best instruments to achieve these goals. Small sample size case studies can be difficult to generalize to a different context but I believe that this case can be representative of various smaller rural communities in Kenya's ASALs experiencing similar conflicts because both the country and rural communities are in transition and legal pluralism does exist in Kenya. Simply put, there are water scarcity issues and related conflicts in similar contexts and the insights of this case study should be taken into consideration when assessing conflicts in these similar contexts.



7 CONCLUSION

This paper has argued that the political ecology framework is best used to assess the water related conflicts in the study area. Through the application of this framework it has been confirmed that climate change and water scarcity are not the main cause of the water-related conflicts at the study site but that they are multiplying factors where other vulnerabilities to conflict are present (Anglia 2014, pg. 5; Raleigh and Kniveton 2012, pg. 51; Raleigh 2010, pg. 69; Farbotko and Lazrus 2012, pg. 382; Kloos et al 2013, 32). Pluralistic institutions and their embedded power relations, land tenure systems, and translocal effects due to urbanization of Mokondani village are amongst others all pre-existing factors that play a role in water accessibility and the resulting water related conflicts.

The water conflict histories at the study site were shown to be quite diverse where certain water management and distribution institutions are based on customary laws whilst others are based on hybrid or multi-dimensional institutions exhibiting overlapping customary and statutory-based governance structures. The institutional dynamic has been one of evolution as both exogenous and internal changes demand institutions that enable stakeholders with different interests to meet their needs. Today, inefficiencies in these structures are causing conflicts but unfortunately the institutions appear to be either in a stage of 'inertia' or 'institutional lock-in' thereby exacerbating and perpetuating the conflict.

This study has discussed the origin and evolution of external and internal factors that have contributed to the current water conflicts. External factors include the various colonial and internationally imposed development interventions on the pastoralist livestock production sector where their land use and livestock production methods were considered 'wasteful' and 'backward'. Alternate livestock production systems such as native reserves, grazing schemes, and group ranch systems were intended to prevent a 'tragedy of the commons' and to 'sedentarize' the pastoralists. Urbanization of Mokondani followed and with it came the translocal effects of participating in the market economy and the necessity of enabling institutions such as the property rights system. Other external factors include population growth and changing weather patterns. Internal factors include changing belief systems, increased awareness and empowerment and alternative livelihood systems.



As a result the traditional institutions of this predominantly pastoralist society are breaking down and being replaced by the group ranch leadership system, land privatization, and the monetary economy. Traditional corrective mechanisms for behaviours considered contrary to Maasai societal norms are therefore losing authority whilst state approved sanctions by the Area Chief are not regularly enforced. This political void has provided room for corrupt practices to flourish relatively unchecked and unsanctioned such as 'corruption at the water point' where the stakeholders no longer adhere to rules of first-come-first-serve and commercialize water collection, 'corruption of the pastoralists at the hot spring' where they destroy fencing and vegetation, 'corruption in the irrigation scheme' where people see no other solution than to 'take water out of turn', 'corruption at the dams' where wealthy farmers pump water to the detriment of poorer farmers and pastoralists, and 'corruption at the windmill' where one stakeholder has assumed all power as the sole water distributor. The motivation for these behaviours can be explained due to the decline in the institution of reciprocity where typically people were 'paid' with cattle for services rendered, and the rise of the institution of corruption where individualistic aims of self-aggrandizement are present as commercial interests are at stake. Agency is also expressed through displaying 'weapons of the weak' type behaviours of stealing and destruction of property as a way to express one's discontent when at wits' end or out of protest in disagreement.

The lesson learnt from this research is that hybrid or multi-dimensional institutions and their governance structures or what much of development policy would be quick to label as 'weak', 'inefficient' or 'dysfunctional' (Berry 1994, as cited in Cleaver 2002, pg. 28) institutions are not necessarily a bad thing in and of themselves but that there can be certain inefficiencies within the hybrid structure. The wind mill case has shown that the introduction a new bureaucratic 'efficient' institution is not necessarily enduring, nor did it automatically ensure mutually beneficial collective action and optimum resource use as the arrangement appeared to bypass or contradict traditional embeddedness of decision-making and cooperation (Cleaver 2002, pg. 28). This new institution was clearly considered by the stakeholders to be costly and lacking in legitimacy. The case of the irrigation scheme which was initially also formally set up but is managed informally fifteen years later, shows how a new institution will gradually evolve where certain processes will become redundant or be adapted to create a more



socially embedded institution (Cleaver 2002, pg. 28). To prevent or mitigate water-related conflict at the study site both internal and external development practitioners must avoid normatively attributing value to the sterile dichotomies of traditional/modern, formal/informal, and economic/social will and recognize that plurality of institutions could effectively better engender social trust and ethical norms and create opportunity for institutional improvisation in terms of negotiation and equity in participation. In conclusion, this chapter has summarized the answers to the sub-questions so that the findings can be connected to the literature in order to answer the main research question: it is foremost a case of relative water scarcity brought about by certain inefficiencies in the pluralistic water resource management and distribution institutions that are the cause of water related conflicts in the area, exacerbated by climate change.



References

Adano, W.R, Dietz, T., Witsenburg, K. and Zaal, F. (2012). Climate change, violent conficts and local institutions in Kenya's drylands. *Journal of Peace Research*, 49(1), 65-80. doi: 10.1177/0022343311427344

AfDB (2014). Kenya Country Strategy Paper 2014-2018. Retrieved from: http://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/2014-2018_-
http://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/2014-2018_-
http://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/2014-2018_-

Alston, M. (2014). Gender mainstreaming and climate change. *Women's Studies International Forum*, 47, 287-294. Available at: http://dx.doi.org/10.1016/j.wsif.201301.016

Anekeya, J. (n.d.). Project Water Engineer's advisory report on the Maji Moto Community Water Project 2005. Available at: ILEPA, Narok, Kenya.

Anglia Ruskin University (2014, September). *Climate change, resource scarcity and conflict.* Retrieved from: www.anglia.ac.uk/gsi

Archambault, C.S. (2011). Ethnographic empathy and the social context of rights: 'Rescuing' Maasai girls from early marriage. *American Anthropologist*, 113(4), 632-643. doi: 10.1111/j.1548-1433.2011.01375.x

Atkinson P. and Hammersley M. (1994). *Ch. 15 Ethnography and Participant Observation*. Handbook of Qualitative Research. N.K. Denzin and Y.S. Lincoln (Eds.). ISBN: 0761915125

Bakker, Karen (2007). The "Commons" versus the "Commodity": Alter-globalization, Anti-privatization and the Human Right to Water in the Global South. Journal compilation 2007 Editorial Board of *Antipode*. pp. 430-455. Doi:10.1111/j.1467-8330.2007.00534.x

Barbour, R.S. (2001). Checklists for improving rigour in qualitative research: a case of the tail wagging the dog? *BMJ*, 322(7294), 1115-1117. Avalable at: <u>URL:http://www.jstor.org/stable/25226718</u>

Barasa L. and Leftie, P (2010, September 9). Scheme to give Kenya chiefs more powers unveiled. *Daily Nation*. Retrieved from: http://www.nation.co.ke/news/Scheme-to-give-Kenya-chiefs-more-powers-unveiled--/-/1056/1007330/-/3q27csz/-/index.html

Barnett, J. (2000). Destabilizing the environment-conflict thesis. *Review of International Studies*, 26(2), 271-288. doi: http://dx.doi.org/ Retrieved from: http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=33445

Barnett, J. and Adger, W.N. (2007). Climate change, human security and violent conflict. *Political Geography*, 26, 639-655. doi: 10.1016/j.polgeo.2007.03/003

Bates, B.C., A.W. Kundzewicz, S. Wu and J.P Palutikof (eds.), 2008. Climate Change and Water. *Technical Paper IV of the Intergovernmental Panel on Climate Change*. Geneva: IPCC Secretariat.

Baxter, P. and Jack, S. (2008). Qualitative case study methodology study design and implementation for novice researchers. *The Qualitative Report*, 13(4), 544-559. Retrieved from: http://nsuworks.nova.edu/tqr/vol13/iss4/2



Benjaminsen, Tor A., F. P. Maganga and J. Moshi Abdallah (2009). The Kilosa Killings: Political Ecology of a Farmer-Herder Conflict in Tanzania. *Development and Change*, 40(3), pp. 423-445. Published: Blackwell Publishing, Oxford, UK and MA, USA.

Bennett, J., Ainslie, A. and Davis, J. (2010). Fenced in: Common property struggles in the management of communal rangelands in central Eastern Cape Province, South Africa. *Land Use Policy*, 27, 340-350. doi:10.1016/j.landusepol.2009.04.006

Bisung, E., Elliott, S.J., Schuster-Wallace, C.J., Karanja, D.M. (2014). Social Capital, collective action and access to water in rural Kenya. *Social Science & Medicine*, *119*, 147-154. Available at: http://dx.doi.org/10.1016/j.soscimed.2014.07.060

Bruns, B. (2005, January 26-28). Community-based principles for negotiating water rights: some conjectures on assumptions and priorities. *International workshop on 'African Water Laws: Plural Legislative Frameworks for Rural Water Management in Africa'*, Johannesburg, South Africa. Retrieved from: http://econpapers.repec.org/scripts/redir.pf?u=http%3A%2F%2Fpublications.iwmi.org%2Fpdf%2FH038750.pdf ;h=repec:iwt:bosers:h038750

Bryant, R.L. (1998). Power, knowledge and political ecology in the third world: a review. *Progress in Physical Geography*, 22(1), 79-94. doi: 10.1177/030913339802200104

Buhari-Gulmez, D. (2010). Stanford School on Sociological Institutionalism: A global cultural approach. *International Political Sociology*, *4*, 253-270. doi: 10.1111/j.1749-5687-2010.00104.x

Burchi, S (2005, January 26-28). The interface between customary and statutory water rights – a statutory perspective. *International workshop on 'African Water Laws': Plural Legislative Frameworks for Rural Water Management in Africa*', 32-1 – 32-8. Johannesburg, South Africa.

Campbell, D.J., Gichohi, H., Mwangi, A., and Chege, L. (2000). Land use conflict in Kajiado District, Kenya. *Land Use Policy*, *17*(4), 337-248. Doi:10.1016/S0264-8377(00)00038-7

Castro A.P. and Nielsen, E. (2001). Indigenous people and co-management: implications for conflict management. *Environmental Science & Policy*, *4*, 229-239. PII: S1462-9001(01)00022-3. Available at: www.elsevier.nl/locate/envsci

Chaudhury, A.S., Helfgott, A., Thornton, T. F., and Sova C. (2014). Participatory planning and costing. Applications in agricultural adaptation in Western Kenya. *Mitigation and Adaptation Strategies for Global Change*. doi: 10.1007/s11027-014-9600-5

Cleaver, F. (2002). Reinventing Institutions: Bricolage and the Social Embeddedness of Natural Resource Management. *The European Journal of Development Research*, *14*(2), 11-30. doi: 10.1080/714000425

Conca, K. (2006). *Governing Water: Contentious Transnational Politics and Global Institution Building*. Cambridge: MIT Press.

Cook, C. and Bakker, K. (2012). Water security: Debating an emerging paradigm. *Global Environmental Change*, 22, 94-102. Doi: 10.1016.j.gloenvcha.2011.10.011

Cresswell, T. (2009). *Discourse*. International Encyclopedia of Human Geography. Nigel Thrift and Rob Kitchen, Eds. Vol. 3 Oxford : Elsevier, 2009. p. 211-214. Retrieved from:



https://pure.royalholloway.ac.uk/portal/en/publications/discourse(6e6542f4-6d9c-4194-b063-77df3af6acc2).html

Cresswell, T. (2003). *Chapter 1. A framework for design* and *Chapter 7. Research questions and hypotheses*. Research Design: qualitative, quantitative, and mixed methods approaches, 2 ed. Sage Publications: London. ISBN: 0-7619-2441-8 (c)

Dalby, S. (2002). Security and Ecology in the age of Globalization. *Environmental Change and Security Program Report*, 8, 95-108. Retrieved from: http://www.isn.ethz.ch/Digital-Library/Publications/Detail/?lang=en&id=136249

Daniels, S. and Endfield, G.H. (2009). Narratives of climate change: introduction. *Journal of Historical Geography*, *35*, 215-222. doi: 10.1016/j.jhg.2008.09.2005

Dey, I. (1993). *Qualitative Data Analysis: a user friendly guide for social scientists.* Ch 3 What is qualitative analysis? Routledge: London/New York. ISBN 0-203-41249-4 Master e-book ISBN

Dietz, T., Ostrom, E. and Stern, P. (2003). The struggle to govern the commons. *Science*, *302*. Available at: www.sciencemag.org.

Ensminger, J. (1987). *Institutional change and the quality of life: Two decades of economic transformation in a rural community*. Working Paper no. 455, Institute for Development Studies, University of Nairobi, Kenya.

Ensminger, J. (1990). Co-opting the Elders: The political economy of state incorporation in Africa. *American Anthropologist*, 92(3), 662-675. URL: http://www.jstor.org/stable/680341.

Ensminger J. and Knight, J. (1997). Changing Social Norms: Common property, bridewealth, ad clan exogamy. *Current Anthropology*, *38*(1), 1-24. Available at: URL: http://www.jstor.org/stable/2744433

Escobar, A. (1996). [lecture handout] Construction nature: Elements for a post-structuralist political ecology. *Futures*, 28(4), 325-343. S0016-3287(96)00011-0.

Fabinyi, M., L. Evans, and S. J. Foale (2014). Social-ecological systems, social diversity, and power: insights from anthropology and political ecology. *Ecology and Society*, 19(4): 28. http://dx.doi.org/10.5751/ES-07029-190428. Retrieved from: http://www.ecologyandsociety.org/vol19/iss4/art28/

Farbotko, C. and Lazrus, H. (2012). The first climate refugee? Contesting global narratives of climate change in Tuvalu. *Global Environmental Change*, 22(2) 352-390. Retrieved from: http://www.sciencedirect.com/science/article/pii/S0959378011002019

Ferguson, Anne E. and Wapulumuka O. Mulwafu (2005, January 26-28). Irrigation reform in Malawi: exploring critical land-water intersections. *International workshop on 'African Water Laws: Plural Legislative Frameworks for Rural Water Management in Africa'*, 24.1 – 24.14. Johannesburg, South Africa. Retrieved from: http://publications.iwmi.org/pdf/H038761.pdf

Figueiredo, P., and Perkins, P.E. (2013). Women and water management in times of climate change: participatory and inclusive processes. *Journal of Cleaner Production*, 60, 188-194. doi: 10.1016/j.jclepro.2012.02.025



Floyd, R. (2008). The environmental security debate and its significance for climate change. *The International Spectator*, 43(3), 51-65. doi: 10.1080/03932720802280602

Fratkin, E., Nathan, M.A. and Roth, E.A (June 2006, 27-28). Is settling good for pastoralists? The effects of pastoral sedentarization on children's nutrition, growth, and health among Rendille and Ariaal of Marsbit District, Northern Kenya. *Presentation for 'Pastoralism and poverty reduction in East Africa: A Policy Research Conference*. International Livestock Research Institute, Nairobi. Retrieved from: http://www.saga.cornell.edu/saga/ilri0606/23fratkin-nathan-roth.pdf

Fratkin, E. (1997). Pastoralism: Governance and Development Issues. *Annual Review of Anthropology*, 26, 235-261. Available at: http://www.jstor.org/stable/2952522

Freeman, H.A., Ellis, F, and Allison, E. (2004). Livelihoods and rural poverty reduction in Kenya. *Development Policy Review*, 22(2), 147-171. doi:10.1111/j.1467-7679.2004.00243.x

Foucault, M. (1982). The Subject and Power, *Critical Inquiry*, 8(4), 777-795. Available at: URL:http://www.jstor.org/stable/1343197

Galaty, J.G. (1982). Being "Maasai": Being "People-of-Cattle": Ethnic Shifters in East Africa. *American Ethnologist*, 9(1), 1-20. Available at: URL: http://www.jstor.org/stable/644309

Gehrig Jason and Mark. M Rogers (2009). Water and Conflict: Incorporating Peacebuilding Into Water Development. *Catholic Relief Services*, Dennis Warner, Chris Seremet, and Tom Bamat (Eds.). ISBN 0-945356-53-6. Retrieved from: www.crs.org.

GOK (n.d.). Water Act 2002. Retrieved from: www.kenyalaw.org

GOK (2010). National Climate Change Response Strategy 2010. Retrieved from: http://cdkn.org/wp-content/uploads/2012/04/National-Climate-Change-Response-Strategy April-2010.pdf

GOK (2011, September). The Constitution of Kenya 2010. Kenya Land Alliance

GOK (2012). Chief's Act Ch. 128, revised edition. Published by the National Council for Law Reporting with the Authority of the Attorney-General. Available from: www.kenyalaw.org

GOK (2010). Land (Group Representatives) Act Chapter 287. Revised Edition 2012 [1970] Published by the National Council for Law Reporting with the Authority of the Attorney-General. Available from: www.kenyalaw.org

GOK (2013). National Climate Change Action Plan 2013-2017 (NCCAP). Retrieved from: http://cdkn.org/wp-content/uploads/2013/03/Kenya-National-Climate-Change-Action-Plan.pdf

GOK (2013, October). Kenya Drought Operation Plan 2013-2014 (DOP). Retrieved from: http://www.africanriskcapacity.org/documents/350251/639347/Kenya+Operations+Plan+Final+-+EN.pdf

GOK (2009). Narok District Environmental Action Plan 2009-2013 (NDEAP).

Grandin, B.E. (1991). Ch 3: The Maasai: Socio-historical context and group ranches. In S. Bekure, P.N. de Leeuw, B.E. Grandin and P.J.H. Neate (Eds.), *Maasai herding: An analysis of the livestock production system of Maasai pastoralists in eastern Kajiado District, Kenya.* ILCA Systems Study 4. ILCA (International Livestock Centre for Africa), Addis Ababa, Ethiopia. ISBN 92-9053-176-2. Retrieved from: www.fao.org/wairdocs/ILRI/x5552E/x5552e00.htm



Grandin, B.E., Leeuw de, P.N. and Pasha ole, I. (1991). Ch 5. The study area: socio-spatial organization and land use. In S. Bekure, P.N. de Leeuw, B.E. Grandin and P.J.H. Neate (Eds.), *Maasai herding: An analysis of the livestock production system of Maasai pastoralists in eastern Kajiado District, Kenya*. ILCA Systems Study 4. ILCA (International Livestock Centre for Africa), Addis Ababa, Ethiopia. ISBN 92-9053-176-2. Retrieved from: http://www.fao.org/wairdocs/ilri/x5552e/x5552e07.htm

Gutu T, Wong, S. and Kinati, W (2014). Institutional bricolage as a new perspective to analyse institutions of communal irrigation: Implications towards meeting the water needs of the poor communities in rural Ethiopia. *Pinnacle Agricultural Research & Management*, 2(1),. Retrieved from: http://www.pjpub.org/parm/parm 115.pdf.

GWP (2000). Toward Water Security: A Framework for Action. *Global Water Partners*. ISBN: 91-630-9202-6.

GWP (2010, March 25). What is Water Security? *Global Water Partners*. [web site]. Retrieved from: http://www.gwp.org/en/The-Challenge/what-is-water-security/

GWP (2010, April 22). The Urgency of Water Security. *Global Water Partners* [web site]. Retrieved from: http://www.gwp.org/The-Challenge/The-Urgency-of-Water-Security/

GWP (2012). Principles of IWRM: What is the Social and Economic value of water? *Global Water Partners* [web site]. Retrieved from: http://www.gwp.org/en/The-Challenge/What-is-IWRM/IWRM-Principles/Social-and-economic value of water

Haro, G. O., Doyo, G. J., and McPeak, J.G. (2005). Linkages between community, environmental, and conflict management: experiences from Northern Kenya. *World Development*, 33(2), 285-299. doi: 101016/j.worlddev.2004.07.014

Hodgson, G. M, (2007). Evolutionary and institutional economics as the new mainstream? *Evolutionary Institutional Economics Review*, 4(1), 7-25. Retrieved from: http://www.geoffrey-hodgson.info/user/image/evinsteconnewmainstream.pdf

Homer-Dixon, T. F. (1994). Environmental scarcities and violent conflict: evidence from cases. *International Security, 19*(1), 5-40. Available at: URL: http://jstor.org/stable/2539147

Homewood, K. (2009). *Chapter 9 Policy and practice in Kenya rangelands: impacts on livelihoods and wildlife.* K. Homewood et al. (Eds.). Staying Maasai?, *5*, 335-367. Series: Studies in Human Ecology and Adaptation. doi: 10.1007/978-0-387-87492-0_13

Hughes, L. (2013). Land Alienation and contestation in Kenyan Maasailand. [Conference paper]. dc.identifier.uri: http://hdl/handle.net/10535/8915. Retrieved from:

https://dlc.dlib.indiana.edu/dlc/bitstream/handle/10535/8915/HUGHES_0880.pdf?sequence=1

Huxley, M. (2009). *Foucauldianism*. International Encyclopaedia of Human Geography Volume 4, R. Kitchin, N. Thrift, (Eds.), 01/2009: chapter Foucauldianism: pages 255-262; Elsevier, Oxford. Retrieved from: http://www.researchgate.net/publication/264585406 Focauldianism

IPCC (2012). Glossary of terms. In: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D.



Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.)]. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change (IPCC). Cambridge University Press, Cambridge, UK, and New York, NY, USA, pp. 555-564, retrieved from: https://www.ipcc.ch/pdf/special-reports/srex/SREX-Annex_Glossary.pdf.

IPCC (2001). Retrieved from: https://www.ipcc.ch/pdf/special-reports/srex/SREX-Annex Glossary.pdf Jackson, P. (1983). Principles and problems of participant observation. *Geografiska Annaler. Series B*, Human Geography, 65(1), 39-46. Available at: URL: https://www.jstor.org/stable/490843

Johnston, B.R., (2003). The political ecology of water: an introduction. *Capitalism Nature Socialism*, 14(3), 73-90. doi: 10.1080/10455750308565535

Kaberia, J. (2014, June 23). *Local Kenyan Chiefs in FMC Controversy*. [web page]. Institute for War and Peace Reporting. Retrieved from: https://iwpr.net/global-voices/local-kenyan-chiefs-fgm-controversy

Kimani, E.N., Kombo, D.K. (2010). Gender and poverty reduction: a Kenyan context. *Educational Research and Reviews*, *5*(1), 024-030. Available at: http://www.academicjournalsorg/ERR2. ISSN 1990-3839.

Kipkoech, J. (2010, September 27). *Kenya: chiefs are necessary in the management of public affairs*. [web page]. Network Al Shahid: News and Analysis from the Horn & East Africa. Retrieved from: http://english.alshahid.net/archives/13274

Klare, M.T., (2001). The new geography of conflict. *Foreign Affairs*, 80(3), 49-61. Available at: <u>URL:http://www.jstor.org/stable/20050150</u>

Kloos, J., Gebert, N, Rosenfeld, T. and Renaud, F. (2013). Climate Change Water Conflicts and Human Security: A Regional Assessment and Policy Guidelines for the Mediterranean, Middle East and Sahel. *United Nations University UNU-EHS*, Report nr. 10, August 2013.

Knox, A., and Meinzen-Dick, R. (1999). Collective Action, Property Rights, and Devolution of Natural Resource Management. *ResearchGate*. Workshop draft 07/15/1999. Retrieved from: http://www.researchgate.net/publication/42764433 Collective Action Property Rights and Devolution of Natural Resource Management

Komakech, Hans C., Madison Condon, Pieter van der Zaag (2012). The role of statutory and local rules in allocating water between large- and small-scale irrigators in an African river catchment. *Water SA*, (38)1, 115-126. Retrieved from: http://www.wrc.org.za. ISSN 0378-4738 (Print), ISSN 1816-7950 (On-line). http://dx.doi.org/10.4314/wsa.v37i4.18

Laerhoven van, F. and Barnes, C. (2014). Communities and commons: the role of community development support in sustaining the commons. *Community Development Journal*, 49(SI), i118-i132. doi: 10.1093/cdj/bsu005

Laws, S., Harper, C., Jones, N. and Harper, R. (2013). *Chapter 17.3 Focus Groups* and *Chapter 18.1 Case Studies*. Research for Development: A practical guide, 2nd ed. Sage Publications: London. ISBN: 978-1-4462-5236-9



Leakey, L.S.B. (1930). Some notes on the Maasai of Kenya Colony. *The Journal of the Royal Anthropological Institute of Great Britain and Ireland*, 60, 185-209. Available at: URL: http://www.jstor.org/stable/2843866

LeMeur, PY., Hochet, P., Shem, M., Toure, O. (2006). Conflict over access to land & water resources within Sub-Saharan drylands: underlying factors, conflict dynamics, and settlement processes. *GRET-FAO LEAD Final Report*. Retrieved from: http://www.fao.org/fileadmin/templates/lead/pdf/fao land conflict report september 2006.pdf

Lelo, Francis K., Wanjiku Chiuri, and Marion W. Jenkins (2005). Managing the River Njoro Watershed, Kenya: Conflicting laws, policies, and community priorities. *International workshop on African Water Laws: Plural Legislative Frameworks for Rural Water Management in Africa*, January 26-28, 2005, Johannesburg, South Africa. 14.1-14.13.

Lesorogol, C.K. (2003). Transforming institutions among pastoralists: inequality and land privatization. American Anthropologist, 105(3), 531-541. Avaliable at: URL: http://www.jstor.org/stable/3566903

Longhurst, R. (2010). *Ch. 8 Semi-structured interviews and focus group discussions*. Key Methods in Geography, 2nd ed. N. Clifford, S. French, and G. Valentine, (Eds.). Sage Publications: London. ISBN: 978-1-4129-3508-1

Makutsa, P, K. Nzaku, P. Ogutu, P. Barasa, S. Ombeki, A. Mwaki and R.E. Quick (2001). Challenges in Implementing a Point-of-Use Water Quality Intervention in Rural Kenya. *American Journal of Public Health*, 91(10), 1571-1573. Retrieved from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1446827/.

Manzungu, E. and Machiridza, R. (2005, January 26-28). Economic-legal ideology and water management in Zimbabwe: implications for smallholder agriculture. *International workshop on 'African Water Laws:Plural Legislative Frameworks for Rural Water Management in Africa'*, Johannesburg, South Africa. Retrieved from: http://projects.nri.org/waterlaw/AWLworkshop/MANZUNGU-E.pdf

Mauthner, N.S. and Doucet, A. (2003). Reflexive accounts and accounts of relflexivity in qualitative data analysis. *Sociology*, *37*(3), 413-431. doi:10.1177/00380385030373002

Meinzen-Dick, R. and Nkonya (2005, January 26-28). Understanding legal pluralism in water rights: lessons from Africa and Asia. *International workshop on 'African Water Laws: Plural Legislative Frameworks for Rural Water Management in Africa'*, 8-1 – 8-12. Johannesburg, South Africa.

Mitchell, T. and Tanner, T (2006). Adapting to climate change: challenges and opportunities for the development community. *Tearfund*. Intstitute of Development Studies. www.ids.ac.uk/ids. Retrieved from: www.tearfund.org/webdocs/website/Campaigning/policy%20and%20research/Adapting%20to%20climate%20change%20discussion%20paper.pdf

MMGR (2002). Minutes of the site meeting held on 19/2/2001 at MM Pan Rehabilitation. *Ministry of Environment and Natural Resources*. Signed by: M.O. Otieno, District Water Officer, Narok.

MMGR (2002). Minutes of MMGR Meeting held at Enkare Nairowua Primary School in 2002, at 1.30 p.m. Topic: Introduction of the government's water project i.e. Desiltation of the Maji Moto dam to MM community.



MMGR (2007). Minutes of the MM Community Water Project (Windmill Stakeholders) Meeting held at the TOLIDP (ILEPA) Office on 31/5/2007 at 2.00 p.m.

Mumma, A. (2007). *Community-based Water Law and Water Resource Management Reform in Developing Countries*, B. van Koppen, M. Giordano and J. Butterworth (eds.). Ch 10: Kenya's New Water Law: an Analysis of the Implications of Kenya's Water Act, 2002, for the Rural Poor. Copyright: CAB International 2007.

Mwangi, E., Dohrn, S. (2008). Securing access to dryland resources for multiple users in Africa: A review of recent research. *Land Use Policy*, 25, 240-248. doi: 10.1016/j.landusepol.2007.07.002

Mwangi, E. (2010). Bumbling Bureaucrats, Sluggish Courts and Forum-Shopping Elites: Unending Conflict and Competition in the Transition to Private Property. *European Journal of Development Research*, 22(5), 715-732. Retrieved from: www.palgrave-journals.com/ejdr/.

Mwangi, E. (2007). The puzzle of group ranch subdivision in Kenya's Maasailand. *Development and Change*, 38(5), 889-910. Doi: 10.1111/j.1467-7660.2007.00438.x

North, D.C. (1989). Institutions and economic growth: an historical introduction. *World Development,* 17(9), 1919-1332. doi:10.1016/0305-750X(89)90075-2.

Ng'ethe, J.C. (1992). Group ranch concept and practice in Kenya with special emphasis on Kajiado District. In *Future of livestock industries in East and Southern Africa*. Retrieved from: http://www.fao.org/wairdocs/ilri/x5485e/x5485e0t.htm#introduction

Ngigi, S. N. (2009). Climate Change Adaptation Strategies: Water Resource Management Options for Smallholder Farming Systems in Sub-Saharan Africa. Publisher: The MDG Centre for East and Southern Africa of the Earth Institute of Columbia University, New York with support from the Rockefeller Foundation. ISBN: 978-92-9059-264-8.

Nkurumwa, A.O., Mwangi, J.G. and Kathuri, N.J. (2010, Sept. 20-24) Livelihood diversification and enhanced food security through agro-pastoralism: socio-cultural and other challenges among Maasai pastoralists of Narok North district Kenya. *Second RUFORUM Biennial Meeting*. Entebbe, Uganda. Research Application Summary. Retrieved from: http://www.cabi.org.proxy.library.uu.nl/gara/FullTextPDF/2013/20133184579.pdf

Nyariki, D.M., A.W. Mwang'ombe and D.M. Thompson (2009). Land-use change and Livestock Production Challenges in an Integrated System: The Masai-Mara Ecosystem, Kenya. *Journal of Human Ecology*, 26(3), 163-173. Retrieved from:

http://re.indiaenvironmentportal.org.in/files/Land%20Use%20Change%20and%20Livestock%20Production%20Challenges.pdf.

Obama, B. (2015, August 3rd). [Youtube]. Retrieved from: https://www.youtube.com/watch?v=C23e_-5BdZM

Ogalleh, S.A., Vogl, C.R. Eitzinger, J. and Hauser, M. Local Perceptions and responses to climate change and variability: the case of Laikipia District, Kenya. *Sustainability*, *4*, 3302-3325. doi: 10.3390/su413302

Orindi, V. and Huggins, C. (2005, January 26-28). The dynamic relationship between poverty rights, water resource management and poverty in the Lake Victoria Basin. *International workshop on 'African Water*



Laws: Plural Legislative Frameworks for Rural Water Management in Africa', 33-1/33-17. Johannesburg, South Africa.

Overton, J. and Diermen van, P. (2014). *Ch. 3 Quantitative Research*. Development Field Work: a practical guide, 2nd ed. Schevens, R. (Ed.). Sage: London. ISBN: 978-1-4462-5476-9

Parry, J.E., Echeverria, D., Dekens, J. and Maitima, J. (2012). Climate risks, vulnerability and governance in Kenya: a review. Commissioned by: Climate Risk Management Technical Assistance Support Project (CRM TASP), joint initiative of Bureau for Crisis Prevention and Recovery and Bureau for Development Policy of UNDP.

Portes, A. (2000). The two meanings of social capital. *Sociological Forum*, *15*(1), 1-12. Available at: URL:http://www.jstor.org/stable/3070334

Priest, H., Roberts, P. and Woods, L. (2002). An overview of three different approaches to the interpretation of qualitative data. Part 1: theoretical issues. *Nurse Researcher*, *10*(1), 30-42. Available at: http://dx.doi.org/10.7748/nr2002.10.10.1.30.c5877

Raleigh, C. (2010). Political marginalization, climate change, and conflict in African Sahel states. *International Studies Review*, *12*(1), 69-86. DOI: 10.1111/j.1468-2486.2009.00913.x

Raleigh, C. and Kniveton, D. (2012). Come rain or shine: an analysis of conflict and climate variability in East Africa. *Journal of Peace Research*, 49(1), 51-64. doi: 10.1177/0022343311427754

Rapley, T. (2013). *Chapter 4. Sampling strategies in qualitative research.* U. Flick (ed.). The SAGE Handbook for Qualitative Data Analysis. Sage Publications: London. ISBN: 978144296691

Resurreccion, B.P. (2013). Persistent women and environment linkages in climate change and sustainable development agendas. *Women's Studies International Forum*, 40, 33-43. Available at: http://dx.doi.org/10.1016/j.wsif.2013.03.011

Riamit, S.K. (2013, July). Dissolving the Pastoral Commons, Enhancing Enclosures: Commercialization, Corruption and Colonial Continuities amongst Maasai Pastoralists of Southern Kenya. Master Thesis, McGill University, Department of Anthropology, Montreal.

Roy, Jessica L., Ben Crow and Brent Swallow (2005, January 26-28). Getting access to adequate water: community organizing, women and social change in Western Kenya. *International workshop on 'African Water Laws: Plural Legislative Frameworks for Rural Water Management in Africa'*, 17.1 – 17.1, Johannesburg, South Africa. Retrieved from: https://dlc.dlib.indiana.edu/dlc/handle/10535/5058

Russell, B.H. (2011). *Ch. 1. Anthropology and the social sciences* and *Ch. 2. The foundations of social research* and *Ch. 3. Preparing for research* and *Ch. 8. Interviewing I: Unstructured and semistructured.* Research Methods in Anthropology: qualitative and quantitative approaches. AltaMira Press: Lanham. ISBN: 9780759112438

Sambu D.K. and Tarheule, A. (2013). Institutional water reforms in Kenya: an analytical review. *Water Policy*, 15, 777-793. Doi: 10.2166/wp.2013.168.



4129-2944-8

Saravanan, V.S., McDonald G.T, Mollinga, P.P. (2009). Critical review of Integrated Water Resource Management: Moving beyond polarized discourse. *Natural Resources Forum*, *33*, 76-86. doi: 10.1111/j.1477-8947.2009.01210.x

Scheltema, W. (2002). Smallholder Management of Irrigation in Kenya. Retrieved from: http://econpapers.repec.org/scripts/redir.pf?u=http%3A%2F%2Fpublications.iwmi.org%2Fpdf%2FH030839.pdf ;h=repec:iwt:bosers:h030839

Scheyvens, R., Scheyvens, H. and Murray, W.E. (2014). *Ch. 10 Working with marginalized, vulnerable or privileged groups.* Development Fieldwork: a practical guide, 2nd ed. R. Scheyvens (Ed.). Sage Publications: London. ISBN: 978-1-4462-5476-9

Seale, C. (1999). Quality in qualitative research. *Qualitative Inquiry*, 5(4), 465-478. doi: 10.1177/107780049900500402

Serneels, S. and Lambin, E.F. (2001). Proximate causes of land-use change in Narok District, Kenya: a spatial statistical model. *Agriculture, Ecocystems & Environment*, 85, 65-81. Retrieved from: http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.465.3574

Shen, S.F., Akcay, E. and Rubenstein D.R. (2014). Group size and social conflict in complex societies. *The American Naturalist*, 183(2), 301-310. Available at: URL: http://www.jstor.org/stable/10.1086/674378

Spaling, H, Brouwer, G. and Njoka, J. (2014). Factors affecting the sustainability of a community water supply project in Kenya. *Development in Practice*, 24(7), 797-811. doi: 10.1080/09614524.2014.944485

Speranza, C.I., B. Kiteme and U. Wiesmann (2008). Droughts and famines: The underlying factors and the causal links among agro-pastoral households in semi-arid Makueni district, Kenya. *Global Environmental Change*, 18, 220-233. doi: 10.1016/j.gloenvcha.2007.05.001.

Stewart-Withers, R., Banks, G., McGregor, A. and Meo-Sewabu, L. (2014). *Ch.4 Qualitative Research.*Development Fieldwork: A practical guide, 2 ed., R. Scheyvens (Ed.). Sage: London. ISBN: 978-1-4462-5476-9

Sumner A. and Tribe, M.A. (2008). *Chapter 5 What is rigour in development studies?* International

Development Studies: Theories and Methods in Research and Practice, 99-128. Sage: London. ISBN: 978-1-

Symons, K. (2014). Anti-politics, Apocalypse and Adaptation in Kenya's National Climate Change Response Strategy. *Scottish Geographical Journal*, *130*(4), 266-278. Doi: 10.1080/14702541.2014.907442.

Tamas, Pal (2003), Water Resource Scarcity and Conflict: Review of Applicable Indicators and Systems of Reference. *Unesco IHP-VI*, *Technical Documents in Hydrology*, *Pc-CP Series No. 21*.

Tittonell, P. (2014). Livelihood strategies, resilience and transformability in African ecosystems. *Agricultural Systems*, 126, 3-14. Available at: http://dx.doi.org/10.1016/j.agsy.2013.10.010

Trombetta, M. J. (2008). Environmental security and climate change: analysing the discourse. *Cambridge Review of International Affairs*, 21(4), 585-602. doi: 10.1080/09557570802452920

Turner, M. D. (2004). Political ecology and the moral dimensions of 'resource conflicts': the case of farmer-herder conflicts in the Sahel. *Political Geography*, *23*, 863-889. doi: 10.1016/j.polgeo.2004.05.009



Turner, M.D. (1999). Conflict, environmental change, and social institutions in dryland Africa: limitations of the community management approach. *Society & Natural Resources*, 12(7), 643-657. DOI: 10.1080/089419299279362

UNDESA [web site]. Retrieved from: http://www.un.org/waterforlifedecade/irrm.shtml.

UNDP (2013). Combating Desertification in Kenya: Emerging Lessons from Empowering the Community. March 2013. Retrieved from: http://www.ke.undp.org/content/dam/kenya/docs/energy_and_environment/Combating Desertification in Kenya v6 -4Sep2013.pdf.

UNDP (2013). Climate Change and Human Development: Harnassing Emerging Opportunities. Kenya National Human Development Report 2013. Retrieved from: http://www.ke.undp.org/content/dam/kenya/docs/SPAU/KNHD%20Report%202013.pdf

UNDP (2013, March). Combating Desertification in Kenya: Emerging Lessons from Empowering Local Communities. Nairobi. Retrieved from:

http://www.ke.undp.org/content/kenya/en/home/library/environment_energy/Combating-Desertification-in-Kenya-Emerging-Lessons-from-Empowering-Local-Communities.html

UNDP (n.d). Wind Mill Rehabilitation Project. Retrieved from:

http://sgp.undp.org/index.php?option=com_sgpprojects&view=allprojects&Itemid=211

UNEP Climate Action [web site]. Retrieved from: http://www.cop21paris.org/about/cop21

UNEP [web page]. Republic of Kenya: Water Profile. Retrieved from: http://www.unep.org/dewa/Portals/67/pdf/Kenya.pdf

UNFCCC [web site]. Retrieved from: http://www.wclimate.com/world-climate-summit-2015/

UN Water (2014, January 27). A Post-2015 Global Goal for Water: Synthesis of key findings and recommendations from UN-Water: Securing Sustainable Water for All. Retrieved from: http://www.un.org/waterforlifedecade/pdf/27_01_2014_un-

water_paper_on_a_post2015_global_goal_for_water.pdf

Valbuena, D., Groot, J.C.J., Mukalama J., Gerard, B. and Tittonell, P. (2014). Improving rural livelihoods as a 'moving target': trajectories of change in smallholder farming systems of Western Kenya. *Regional Environmental Change*, 15(7), 1395-1407. doi: 10.1007/s10113-014-0702-0

Vaus de, D.A. (2001), Part I, What is Research Design?, Ch. 1 The context of design. Research Design in Social Research. Sage Publications: London. ISBN:0-761-5347-7 (pbk)

Vivekananda, J, Schilling, J. and Smith, D. (2014). Climate resilience in fragile and conflict-affected societies: concepts and approaches. *Development in Practice*, 24(4), 487-501. http://dx.doi.org/10.1080/09614524.2014.909384

Warner, M and Jones, P. (1998). Assessing the Need to Manage Conflicts in Community-Based Natural Resource Projects *Natural Resource Perspectives*, *35*. Retrieved from:

Wijk van, M. (2007). Airports as Cityports in the City-region: Spatial-economic and institutional positions and institutional learning in Randstad-Schiphol (AMS), Frankfurt Rhein-Main (FRA), Tokyo Haneda



(HND), and Narita (NRT). ISBN 978-90-6809-394-0. Retrieved from: dspace.library.uu.nl/bitstream/handle/1874/19173/full.pdf

Wiles, J.L., Rosenberg, M.W. and Kearns, R.A. (2005). Narrative analysis as a strategy for understanding interview talk in geographic research. *Area*, *37*(1), 89-99. doi:10.1111/j.1475-4762.2005.00608.x

Women's UN Report Network (2012, December 3). Kenya: Engaging tribal elders and chiefs to promote women's rights [web log]. Retrieved from: http://wunrn.com/kenya-engaging-tribal-elders-chiefs-to-promote-womens-rights/

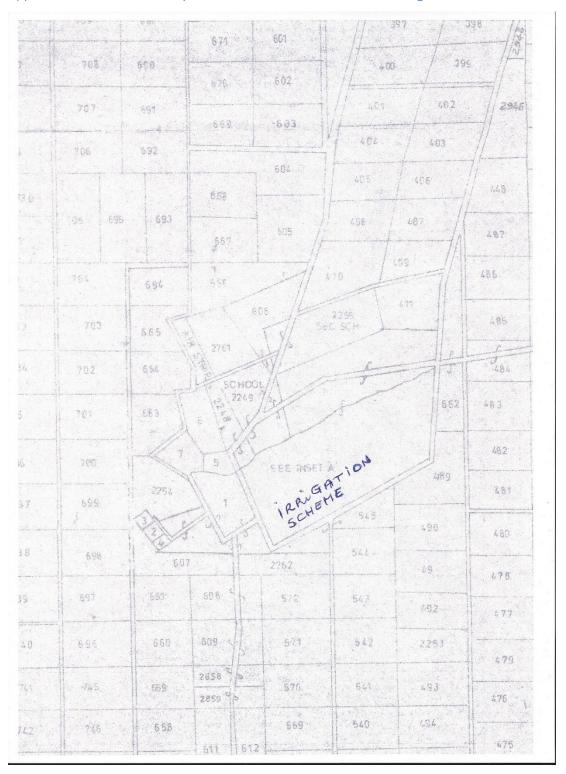
Yasmi, Y., Schanz, H. and Salim, A. (2006). Manifestation of conflict escalation in natural resource management. *Environmental Science & Policy*, 9, 538-546. doi:10.1016/j.envsci.2006.04.003



Appendices



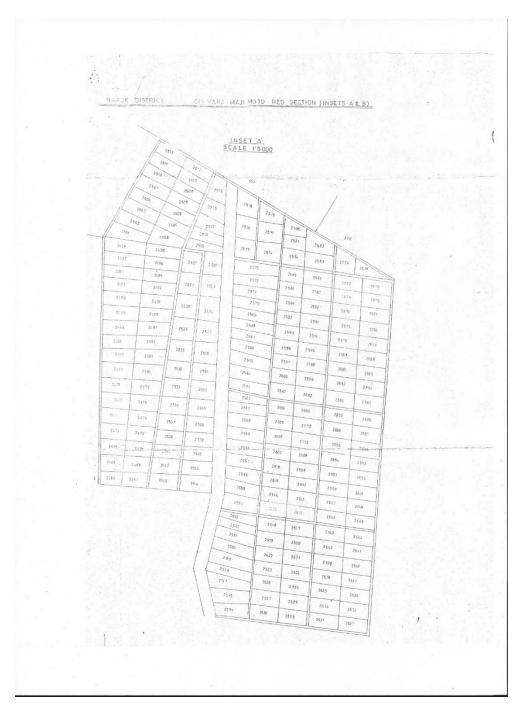
Appendix 1 Formal Survey of Urban Center in Mokondani and Irrigation Scheme



Source: Narok District, Maji Moto Registration Section, CIS-MARA/MM/8, Sheet 2, Provincial Survey Records Office d.d. June, 17, 2015



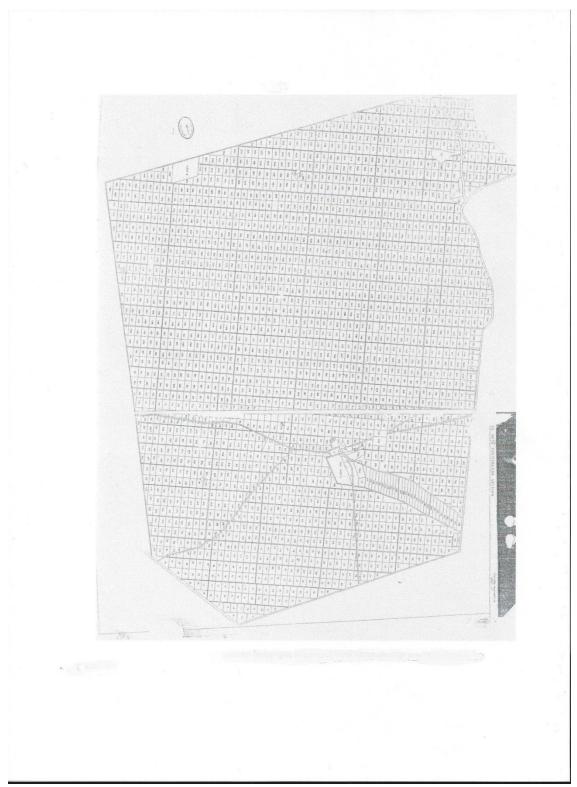
Appendix 2 Formal Survey of Irrigation Scheme in Mokondani Village Inset "A"



Source: Narok District, CIS MARA Maji Moto Registration Section (insert A & B [insert B is not attached, irrelevant]), Provincial Survey Records Office d.d. June 17, 2015



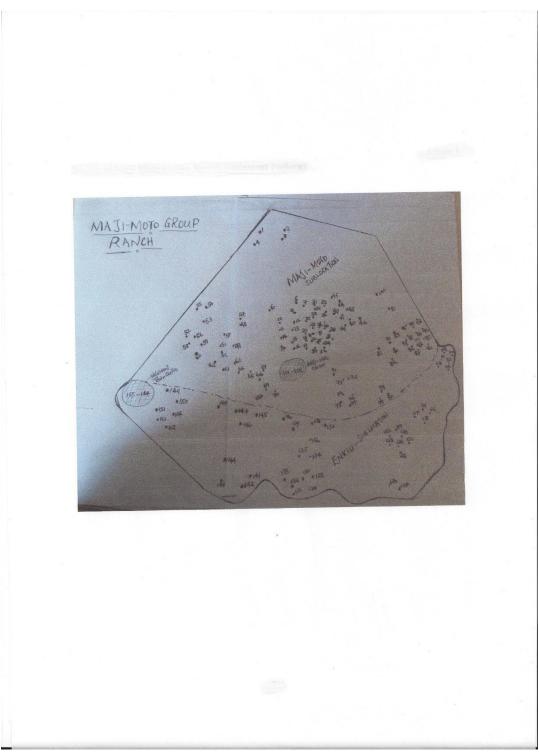
Appendix 3 Maji Moto Group Ranch Overview of Individual Parcels



Source: Riamit (2013)



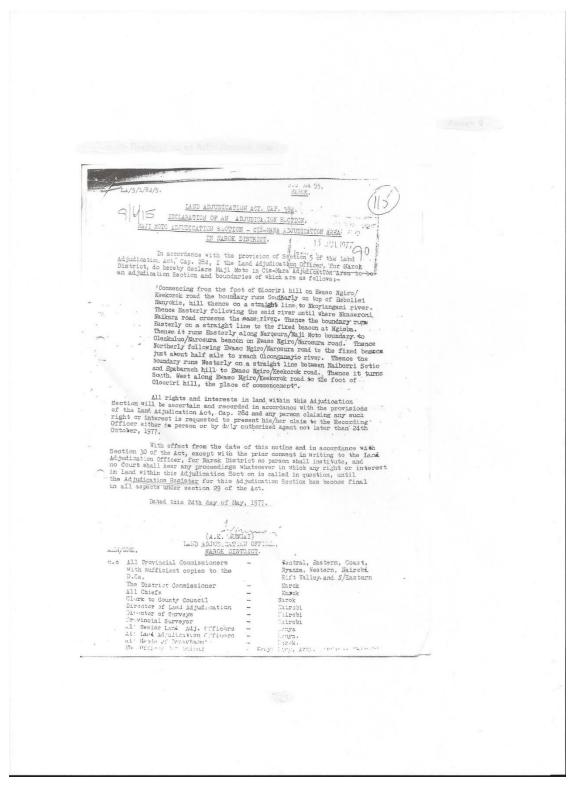
Appendix 4 Maji Moto Group Ranch Settlement Patterns



Source: Riamit (2013) Location 101-108 is the Maji Moto Center in Mokondani Village



Appendix 5 Maji Moto Group Ranch Land Adjucation Declaration -1977



Source: Riamit (2013)



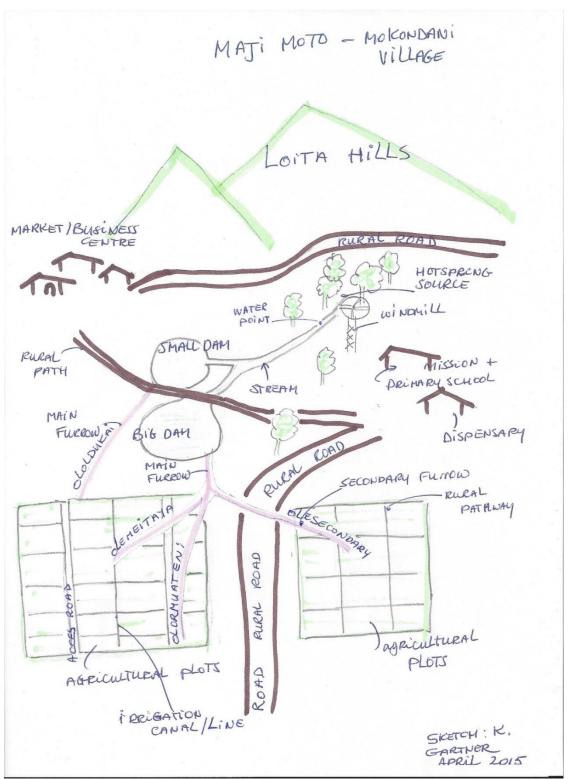
16/4/80 KAJI NOTO CROUP RANGE

Appendix 6 Maji Moto 'Green Card' – Excerpt of the Land Registry, 1980

Source: Riamit (2013)

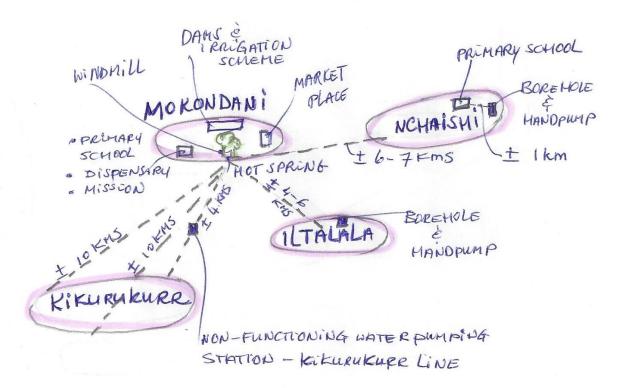


Appendix 7 Maji Moto Sketch – Irrigation Scheme, Dams, Windmill, Water Point, Hot Spring





Appendix 8 Sketch of Maji Moto, Inchaishi, Kikurukurr, Iltalala and distances to Hot Spring



· KMS = DISTANCE TO FEEN HOTSPRING

SKETCH BY: K. GARTHER APRIL 2015



Appendix 9 Livelihood/Food Economic Zones – Narok, Kenya

Livelihood/FEZ Zone	Division/Location	Description
Zone 1 Mixed Farming	North Narok Constituency Mau/Keekonyokie Olokurto Ololulunga Mulot	Highland Dark reddish brown soils – volcanic, deep and fertile High crop productivity More foreign influence
Zone 2 Agro-Pastoral	Mau/Suswa Osupuko/Naroosura Loita/Entasekera	Medium to low crop productivity, mostly around Loita, Mau and Naroosura (which has irrigation available through a river) Grey brown and dark brown soils well drained Medium to high livestock husbandry
Zone 3 Pastoral	South Narok Constituency Mau/Mosiro Osupuko/Ntuka, incl. Maji Moto GR Mara/Olkinyei Loita/Olmesutiei Ololulunga/Lemek	Lowland Low crop productivity Deep reddish brown soils – less fertile but good for grazing High livestock husbandry Most traditional (livelihood revolves around cattle)

Source: Unknown. Compiled from: Zoning meeting and Arid Lands Management Report (Jan. – Mar.

04) – Narok District and the District Development Plan 1994-1996



Farming Pastoral NAROK DISTRICT Administrative Boundaries

Appendix 10 Livelihood/FEZ Zones Visual Representation, Narok District

Source: District Development Plan 2002-2008 (Prepared by CBS 1999 Population Census. Not an accurate representation of the districts but provides an overall visual)



Appendix 11 Free List

To further enhance the quality of the data by ensuring that the research questions were clear and could be substantiated, a free-list interview was used. A free-list is a structured interviewing technique for eliciting a list of items considered important to water security in Maji Moto using an open-ended question. A target of five respondents was set for these structured interviews. In the end three structured interviews were held using convenience non-random sampling on market day at the Maji Moto market. Those interviewed consisted of a widowed female business owner and former farmer who owned her own plot, a male pure pastoralist, and a male agro-pastoralist/nature guide. One of the interviews was conducted in the Maa language, one was conducted in the English language, and one was conducted in a mixture of both languages although English was the language mostly used. The interpreter was present to interpret and facilitate all three interviews.

Each of the three respondents were given an identical, general question on water availability in the community and was asked to speak freely about anything that came to mind related to this topic. The responses were subsequently analysed based on the grounded theory approach as the study site and research topic were unfamiliar. The question used to generate the free-list is as follows:

"Could you please provide me with a short story regarding the users of the Hot Spring and the dams or the windmill and their relationships with each other, so farmers with farmers, between farmers and livestock keepers, and anything else you might consider of importance regarding water accessibility in your community?"

Analysis of the responses produced the following recurring themes from all three respondents:

- Insufficient water for irrigation and livestock especially during dry seasons and persistent periods of drought.
- No government assistance to improve water availability/accessibility although community has requested help during the past 10 years on various occasions.
- Unfair irrigation scheme: elite and larger plots get more water, often to the detriment of other farmers.
- Arguments between pastoralists and agro-farmers as some farmers use a generator to pump water from the dam leaving the dam water at dangerously low levels for livestock.
- Lack of awareness of the history of or participation in the construction of the water interventions.
- Arguments amongst farmers due to illegal or unfair diversion of water away from the scheduled farmer to an unscheduled farmer.
- No fees are paid by the community to the local or county government or to the water irrigation committee or to anyone else for the utilization of water from the natural resource (Hot Spring) or water interventions. 'it is free for everyone to use, including wild animals'.
- No formal or informal natural resource management committee in place.
- Community takes care of the clean-up of the Hot Springs i.e the water point, "when there is a need".

These responses provided a basis/guide for my central and sub-questions and the interview questions. The recurring themes assured me that the use of political ecology as the theoretical framework to inform my research would be adequate.



Appendix 12 Interview Guide May I (voice) record this conversation? a. Yes b. No a. Yes May I (film) record this conversation? b. No May I mention your name in my studies? a. Yes b. No If you answered Yes, what is your name? _ Section A. **Initial Questions for All Respondents** 1. Is your family's main livelihood farming, livestock holding, both, or neither? a. Agro-Farmer b. Livestock Holderc. Both d. Neither If you answered Neither, what is the main activity or activities that your family does to earn a livelihood?_ 2. How long have you lived in this village? The following questions are for All Respondents and should be answered with either Yes or No. Sometimes I will ask you to briefly explain your answer. First I will ask questions about Water resources in your community. Questions about Water resources: To be answered by ALL respondents In your opinion, everyone in this community has access to the Fresh Water Pipe in the Hot Springs. Yes b. No In your opinion, everyone in this community has equal access to the Fresh Water Pipe in the Hot Springs. Yes b. No If you answered No, please explain briefly who, in your opinion, has less access? If you answered No, please explain briefly who, in your opinion, has the most access? 5. Does the community currently pay a government fee to use the water from the Fresh Water Pipe System? a. Yes b. No 6. Does the community pay any kind of other fee to use the Fresh Water Pipe System? b. No If you answered Yes, who gets this fee and what is it used for? ___ 7. Does the community currently pay a government water user fee to use the Water in the Water Dams? a. Yes b. No Does the community pay any kind of other fee to use the water in the Water Dams? a. Yes b. No If you answered Yes, who gets this fee and what is it used for? ___ 9. Does the community pay a fee to the Water Management Committee to manage the Dams? a. Yes b. No 10. Are you a member of the current Water Management Committee? a. Yes b. No 11. Was the community made aware that the Small Dam was going to be constructed? a. Yes b. No If you answered Yes, please explain briefly how the community was made aware? 12. The initiative to build the Small Dam was a community initiative. If you answered No, please explain briefly who came up with the idea for the Small Dam? 13. Was there a Water Dam Construction Committee during the constructions of the Small Dam? b. No c. I do not know If you answered Yes, please indicate briefly which groups sat on the Committee? 14. Who paid for the construction of the Small Dam? a. Village Community members b. Narok government c. Local NGO d. Foreign NGO e. Other _

15. Who constructed Small Dam?



	a. Village Community members b. Narok government Local NGO d. Foreign NGO e. Other	c.
16 a.	Was the community made aware that the Big Dam was going to be constructed? Yes b. No	
	If you answered Yes, please explain briefly how the community was made aware?	
17	 The initiative to build the Big Dam was a community initiative. a. Yes b. No If you answered No, please explain briefly who came up with the idea for the Big Dam? 	
10	Was there a Water Dam Construction Committee during the constructions of the Big Dam?	
10	b. Yes b. No c. I do not know If you answered Yes, please indicate briefly which groups sat on the Committee?	
Who pa	aid for the construction of the Big Dam?	
	a. Village Community members b. Narok government c. Local NGO	d.
	Foreign NGO e. Other	u.
	b. Who constructed the Big Dam?b. Village Community membersb. Narok government	c.
	Local NGO d. Foreign NGO e. Other	٠.
19	 c. Who is in charge of water quality control and maintaining the equipment of the Dams? d. Was the community made aware that the Fresh Water Pipe was going to be built in the Hot Spring? b. Yes b. No 	
	If you answered Yes, please explain briefly how the community was made aware?	
20	The initiative to build the Fresh Water Pipe System in the Hot Springs was a community initiative. a. Yes b. No If you answered No, please explain briefly who came up with the idea for the Fresh Water Pipe System?	
	Was there a Fresh Water Pipe Construction Committee during the construction of the Fresh Water Pipe	in the Hot
Sp	orings?	
	a. Yes b. No Regardless of your answer, please explain who was in charge of the construction or implementation of	the Fresh
	Water Pipe?	
21	. Who paid for the construction of the Fresh Water Pipe? c. Village Community members b. Narok government c. Local NGO Foreign NGO e. Other	d.
22	a. Village Community members b. Narok government c. Local NGO d. Foreign NGO e. Other	
	b. Who is in charge of water quality control and equipment maintenance from the Fresh Water Pip explain briefly. Water the Water Dame designed or constructed with the contribution of local knowledge or in	
	 c. Were the Water Dams designed or constructed with the contribution of local knowledge or in community as to where the Dams should be located, the size of the Dams, the materials us construction of the Dams, the technology used to construct and maintain the Dams? a. Yes b. No 	
23	 a. Yes b. No Was the Fresh Water Pipe designed or constructed with the contribution of local knowledge or inprocommunity as to where the Pipe should be located, the number of Pipes to be placed, the material of the technology used to construct and maintain the Pipe? a. Yes b. No 	
24	When there is a problem with the Dams' valves or other technical problems who is responsible to re problems?	pair these
	a. Village Community members b. Water Management Committee c. Other If you answered Other, please explain briefly who is responsible to fix any problems with the Dams?.	
25	. Who pays for the equipment and labour to fix problems with the Dams?	



	a. Village Community members b. Water Management Committee c. Other If you answered Other, please explain briefly who pays to get the problems fixed?
26.	When there is a problem with the Fresh Water Pipe, who is responsible to repair these problems? a. Village Community members b. Formal Fresh Water Pipe Committee c. Other If you answered Other, please explain briefly who is responsible to repair these problems?
27.	Who pays for the equipment and labour to fix problems with the Fresh Water Pipe? b. Village Community members b. Water Management Committee c. Other If you answered Other, please explain briefly who pays to get the problems fixed?
Please re	espond to the following questions in a brief but concise manner.
	When and why was the Small Dam constructed?
	When and why was Big Dam constructed?
	When was the Fresh Water Pipe System constructed and why was it constructed?
	owing questions are about Land resources in your community.
31.	Who may own Land Titles in MMGR? a. All Maasai b. Only Maasai registered in MMGR c. Any Kenyan b. Everyone, including foreigners
32.	Who may operate business in MMGR? a. All Maasai b. Only Maasai registered in MMGR c. Any Kenyan d. Everyone, including foreigners.
33.	Has the Land in MMGR been specially zoned, in other words, is there a specific zone for homes, for grazing livestock, for constructing schools, for constructing markets, for constructing businesses such as tourist camps or
	tourist lodges? a. Yes b. No c. I do not know
	If you answered Yes, is this zoning enforced?
34.	 a. Yes b. No c. I do not know Who decides which persons may purchase Land in MMGR, in other words, where does one go or what does one do if one wishes to purchase land in MMGR? a. Narok County Government b. Community Leaders
	b. d. Other If you answered Other, please briefly explain the process to buy land in this community?
35.	MMGR has seen a population increase in the lastyears as people buy up more Land. In your opinion, has this population increase had any effect on the availability of water in the Dams or in the Hot Springs? a. Yes b. No If you answered Yes, brief give a brief explanation.
36.	Please explain briefly why (the reason) you think that the population in this village is increasing?
SECTIO	ON B. QUESTIONS FOR FARMERS
The follo	owing questions must be answered with either True or False. Sometimes I will ask you to briefly explain your
answer.	
	1. Which system of water supply do you use to irrigate your agricultural plot (<i>shamba</i>)? (You may choose more than one answer)
	 a. Irrigation system from the Dams b. Generator to pump water from the Dams c. Windmill d. Other 2. All farmers must be registered with the Water Management Committee. a. True b. False
	 3. In your opinion, <u>all</u> farmers have <u>equal</u> access to the irrigation water from the Dams. a. True b. False
	4. In your opinion, only <u>registered</u> farmers have access to the irrigation water from the Dams.
	a. True b. False 5. In your opinion, only formers with active plots have access to the irrigation water from the Water Dame.
	 In your opinion, only farmers with active plots have access to the irrigation water from the Water Dams. a. True b. False
	6. In your opinion, irrigation water from the Dams is available to-all (registered) farmers every day.
	a. True b. False If you answered False, how often is irrigation water from the Water Dams made available to farmers?
	if you answered raise, now often is irrigation water from the water Dailis made available to faithers?



	7. a.	There is an official irrigation roster set up by the water management committee which is strictly followed. True b. False	
]	If yo	ou answered False, how is the irrigation of the agricultural plots organized?	
;	8. a.	Some farmers use generators to pump water from the Dams to their irrigation plots. True b. False	
]	If you answered True, please explain briefly when do they use the generator?		
	a. b.	Anytime they need water b. only when water from the Dams is not available c. Only during the dry seasons d. Other	
		Everyone may use a generator to pump water from the Dams.	
	a. 10.	True b. False There are no rules governing the use of a generator to pump water from the Dams. a. True b. False If you answered False, please explain briefly	
		Regardless if you answered True or False, what is your opinion on the use of the generator to pump water from	
		the Dams? Please explain briefly.	
		Anyone can construct a borehole, windmill pump, or dam in MMGR because there is no formal rule about this matter. a. True b. False	
		If you answered False, please explain briefly.	
	Also	o for Farmers. The following questions must be answered with either Yes or No. Sometimes I will ask you	
1	to b	riefly explain your answer.	
	12. In your opinion, the water allotted to you from the Water Dams is sufficient to adequately sustain agricultural activities.		
		Yes b. No	
	-	ou answered No, please explain briefly.	
		Is there a-farmer cooperative that looks after the farmers' irrigation rights? Yes b. No	
	a. Yes b. No If you answered No, please explain briefly who looks after the irrigation rights of the farmers?		
	-	In your opinion, are-farmers' needs generally adequately represented on the Water Management Committees?	
;	a.	Yes b No ardless if you answered Yes or No, is there anything you would like to see done differently by the Water	
]	Man	agement Committee? Please give a brief answer.	
Also	for f	farmers. The following questions are about the relationships between the users of the Dams. Please provide	
your	ans	wer as indicated.	
	15.	In your opinion, how is the relationship generally between farmers and livestock holders when it comes to water access from the Dams?	
	a.	Bad b. Not so good c. Good d. Very Good	
		In your opinion, how is the relationship generally between farmers and other farmers when it comes to water access from the Dams?	
	a. 17.	Bad b. Not so good c. Good d. Very Good In your opinion, how is the relationship generally between farmers and institutions when it comes to water access from the Dams?	
	18.	a. Bad b. Not so good c. Good d. Very Good Are there any arguments or other issues between farmers and livestock holders for the use of the water of the Water Dam?	
	a. If yo	Yes b. No c. I do not know ou answered Yes, please indicate how often are there arguments or issues.	
]	If you answered Yes, please explain briefly what the arguments or issues are about?		
		Are there any arguments or other issues between farmers and institutions?	
	a.	Yes b. No c. I do not know	



		TO 177 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
		If you answered Yes, please indicate how often there are arguments or issues.
	20	If you answered Yes, please explain briefly what the arguments or issues are about?
	20. a.	Are there arguments or other issues between farmers and households? Yes b. No c. I do not know
		If you answered Yes, please indicate how often there are arguments or issues?
		If you answered Yes, please explain briefly what the arguments or issues are about?
	a.	Are there arguments or other issues between the farmers and the water management committee? Yes b. No c. I do not know
	_	ou answered Yes, please indicate how often there are arguments or issues?
	If yo	ou answered Yes, please explain briefly what the arguments or issues are about?
	22.	Are there arguments or other issues between the farmers themselves? a. Yes b. No c. I do not know If you answered Yes, please indicate how often there are arguments or issues?
		If you answered Yes, please explain briefly what the arguments or issues are about?
	a.	In your opinion, what is the quality of the water in the Dams? Poorb. Average c. Good ou answered Poor or Average, what can you tell me about the water quality?
	If yo	ou answered Poor or Average, has this concern been brought to the attention of the Water Management
	Com	mittee?
		Yes b. No c. I do not know ardless of your answer, does the Water Management Committee or any other group of people do regular water
	quali	ity control tests?
	a.	Yes b. No c. I do not know
	If yo	u answered Yes, who is in charge of water quality control in the Dams?
SECTIO		Please tell me briefly, how the Dams have influenced or changed your life? Questions for Livestock Holders. The following questions are a mix of True/False, Yes/No, and other
answers.	Plea	se answer as indicated.
		There is a formal register for Livestock holders that may use the water from the Dams. a. True b. False
		All livestock holders from the entire MMGR may use the water from the Water Dams. a. True b. False
	a.	In your opinion, all livestock holders have equal access to water from the Water Dams. True b. False
		ardless if you answered True or False, please explain briefly how is it decided which livestock holders may get
		er from the Dams?
		Livestock holders from other villages in MMGR also use the Dams. This causes arguments or other issues. a. True b. False If you answered True, please briefly explain what these arguments or issues are about.
		Some people have few livestock, others have a lot of livestock. Is there a formal or informal agreement that determines the right of access to the Water Dams? a. Yes b. No
		Regardless if you answered Yes or No, please briefly explain the system of how livestock holders get access to
		the water their livestock?
		In your opinion, how is the relationship between livestock holders and farmers with regard to water access from the Dams?
	7.	Bad b. Not so good c. Good d. Very Good Are there any arguments or other issues between livestock holders and farmers with regard to water use from the Dams?



	a. Yes b. No c. I do not know If you answered Yes, please indicate how often are there arguments or other issues
	If you answered Yes, please explain briefly what the arguments or issues are about?
	 8. More and more generators are used to pump water for irrigation purposes. Please explain briefly what your opinion is on this situation. 9. Are there any arguments or other issues between livestock holders and institutions with regard to water use from the Dams? b. Yes b. No c. I do not know
	If you answered Yes, please indicate how often are there arguments or issues?
	If you answered Yes, please explain briefly what the arguments or issues are about?
	 10. Are there arguments or other issues between livestock holders and households that use the Hot Springs or Dam water? a. Yes b. No c. I do not know If you answered Yes, please indicate how often are there arguments?
	If you answered Yes, please explain briefly what the arguments or issues are about?
	11. Are there arguments or other issues between the livestock holders and the water management committee? a. Yes b. No c. I do not know If you answered Yes, please indicate how often there are arguments or issues?
	If you answered Yes, please explain briefly what the arguments or issues are about? 12. Are there any arguments or other issues between livestock holders themselves?
	a. Yes b. No c. I do not know If you answered Yes, please indicate how often there are arguments or issues?
	If you answered Yes, please explain briefly what the arguments or issues are about?
	 13. Are Livestock holders represented in the water management committee? a. Yes b. No c. I do not know 14. Are Livestock holders organized in any kind of cooperative (<i>sacco</i>) that looks after the water access rights of the livestock holders? a. Yes b. No If you answered Yes, is this cooperative a formal or informal organization?
	a. Formal b. Informal
	15. In your opinion, what is the quality of the water in the Water Dams? a. Poor b. Average c. Good If you answered Poor or Average, what can you tell me about the water quality?
	If you answered Poor or Average, has this concern been brought to the attention of the Water Management
	Committee?
	 b. Yes b. No c. I do not know 16. Regardless of your answer to question 15 does the Water Management Committee or any other group of regularly check the quality of the water in the Dams and water control tests? 17. Yes b. No c. I do not know If you answered Yes, who is in charge of water quality control in the Dams?
SECTIO	N D. Questions for Institution (schools, dispensary, missionary, MM Market, Tourist Camps). The questions
consist of	f True/False, Yes/No, and other answers. Please respond as indicated.
1.	Which water supply system do you use? (you may choose more than one answer) a. Big Dam b. Small Dam c. Windmill d. Fresh Water Pipe e. Other(borehole/water truck/rain catchment/etc.)
2.	Who is the owner of the Windmill?



	 a. Community b. One institution c. A group of institutions d. Other If you answered b, c, or d please mention who the owner is
3. 4.	Who may use the Windmill to get water? (you may choose more than one answer) a. Everyone b. Only those registered with the owner c. Other When the Windmill is not working, where do you get your water from?
5.	When the Windmill is not working, where do you get your water from? When the Windmill is not working, and you would like to use the Fresh Water Pipe or the Dams, is special permission required from the community or water management committee? a. Yes b. No
6.	Is there a fee that needs to be paid to the owner of the Windmill to use the Windmill to pump water to your institution? a. Yes b. No
7.	Is there any fee that needs to be paid to the government to pump the water from the Hot Springs to the Windmill? a. Yes b. No
8.	Is there any fee that needs to be paid to the water management committee or other entity to pump water from the Hot Springs to the Windmill? a. Yes b. No
9.	Are there any arguments or other issues between institutions that use the Windmill to pump water from the Hot Springs and institutions that use other methods to get water from the Hot Springs? a. Yes b. No c. I do not know If you answered Yes, please indicate how often there are arguments or issues? If you answered Yes, please explain briefly what the arguments or issues are about?
10.	Are there any arguments or other issues between Institutions that use the Windmill and farmers that use the Dams?
	a. Yes b. No c. I do not know If you answered Yes, please indicate how often there are arguments or
	issues?
11.	If you answered Yes, please explain briefly what the arguments or issues are about? Are there any arguments or other issues between Institutions that use the Windmill and livestock holders that use the Dams? a. Yes b. No c. I do not know
	If you answered Yes, please indicate how often there are arguments or issues?
	If you answered Yes, please explain briefly what the arguments or issues are about?
12.	Are there any arguments or other issues between institutions that use the Windmill and other community members that do not have access to the Windmill? a. Yes b. No c. I do not know If you answered Yes, please indicate how often there are arguments or
	issues?
SECTIO	If you answered Yes, please explain briefly what the arguments or issues are about? ON E. Questions for ALL. The following are questions about the Climate.
SECTIO	In your opinion, the climate is changing in MMGR, Narok.
	a. True b. False If you answered True, please explain briefly what you think is causing the climate to change?
	Did you know that the climate is changing all over the world?a. Yesb. NoIf you answered Yes, how did you hear about this?
	 3. Have there been any climate change awareness programs in this community? a. Yes b. No If you answered Yes, who brings these awareness programs to this community and how often are there work
	shops or information sessions about climate change?



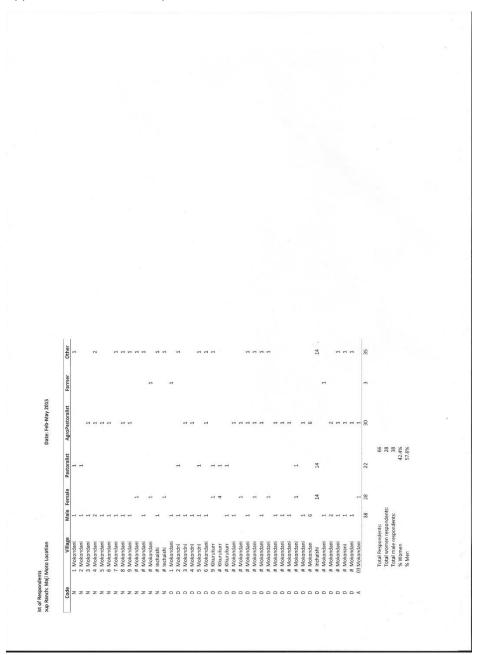
- 4. Apart from the Dams, the Fresh Water Pipe and the Windmill, what other projects have taken place in this village to help secure/guarantee peoples livelihoods (water and food sources) with regard to climate change?
- 5. Climate experts say that the climate is going to continue to change. If this is the case, what in your opinion could the Maasai do to prepare for this? Please explain briefly.

SECTION F. GENERAL QUESTIONS for All.

1.	a.	Sex F M
	b.	How large is your immediate family?
	c.	How many children in your immediate family?
	d.	What are their age-ranges? Youngest Oldest
	e.	How many girls/women in your immediate family? Girls Women
	f.	Do any of the children attend school? Yes, level No
	g.	How many people depend on your livelihood for their wellbeing?
	h.	How old are you?
	i.	Do you practice a religion and if Yes, which one?
	j.	Did you attend school and if Yes, what level is your schooling?
		Primary School Secondary School Other
	k.	If you are a livestock holder, how many cattle do you have?
		Cows Goats Sheep
	l. m.	If you are a farmer, how many <i>shamba's</i> do you have (in acres)? What would you consider your status to be? Poor Middle class Upper Middle class Wealthy
2.		Referring to your answer under m., in your view, what determines your status? The you aware that there are human diseases that can be transmitted by water? The your answer under m., in your view, what determines your status? The your answer under m., in your view, what determines your status? The your answer under m., in your view, what determines your status?
3.	Н	ow has the construction of the Dams impacted your life in terms of health, social life, and economically?
		a. Health
		b. Social
		c. Economically
4.	Ho	ow has the construction of the Fresh Water Pipe impacted your life in terms of health, social life and economically?
		a. Health
		b. Social
		c. Economically
5.	Br	iefly, what do you think can be done to improve the water availability in your village?



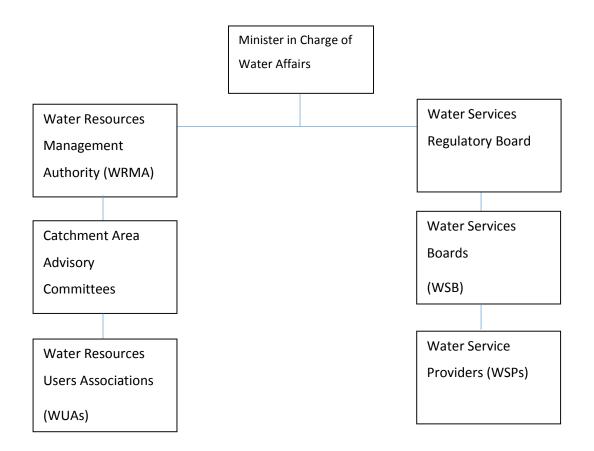
Appendix 13 List of Respondents



^{&#}x27;* Other = other forms of livelihood including but not limited to: teachers, paid laborers, bead making, matatu drivers, nature guides.



Appendix 14 New Institutional Structure: Water Affairs Management, Kenya



Source: Mumma, Albert. Kenya's new water law: an analysis of the implications for the rural poor. International Workshop on 'African Water Laws: Plural Legislative Frameworks for Rural Water Management in Africa', 26-28 January, 2005, Jo'burg, South Africa