LOCAL INSTITUTIONAL CAPACITY TO FOSTER CLIMATE CHANGE ADAPTATION RESPONSES IN THE MARA RIVER BASIN, KENYA

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A THESIS SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN PLANNING

SCHOOL OF PLANNING AND ARCHITECTURE

MASENO UNIVERSITY

DECLARATION

The Candidate:

This thesis is my original work and has not been presented to any other university for the award of any degree

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ACKNOWLEDGEMENT

As I reflect back on the years I have spent at Maseno University and especially the time spent working on this research, it is indisputable that my achievements, especially this thesis, would not have been possible without the many contributions from insightful mentors, gracious friends, and supportive family members. First and foremost I would like to express my deepest appreciation to my supervisors Professor George Mark Onyango and Dr. Leah Akinyi Onyango, who provided me the opportunity to complete my doctoral degree. Your contributions, stimulating suggestions and encouragement assisted me to coordinate my field research and writing of my thesis. Prof GM Onyango I thank you for your patience and simplifying complex issues to enable me make the transition between the field research and the writing process. To Dr. Onyango, I am deeply grateful for the support in getting me to navigate through the numerous issues back and forth, furthermore teaching me that each step mattered in what I did and sharing information big-heartedly. I count myself fortunate to have studied and learnt so much from you.

This work has been made possible due to both financial and academic support from Mistra Urban Futures and Lake Victoria Basin Commission. Thank you for the opportunity you granted me to walk this journey at different points. I also acknowledge with much appreciation, the crucial role of the numerous institutions in the Mara River Basin, who permitted their staff to take part in the research.

Special thanks goes to my research assistants Ms Sharon and Mr Eric Siele who mobilized and organized meetings and supported my data collection process. Many thanks go to the Project Manager of the Mara River Basin Association Mr Kennedy Onyango for his tireless efforts in mobilizing community institutions associated with MRBA to be available during the field research.

I highly appreciate the guidance given to me by Faculty members within the School of Planning and Architecture at Maseno University as well as the panels especially in the School defences that gave comments and advice that improved my final document. I consider myself lucky to have worked alongside colleagues that were always willing to share information they felt was pertinent to my research namely: Dr George Wagah, Dr Moses Kola, Dr Walter Alando, Dr Emmanuel Midheme, Dr Helen Kamwele, Ms. Peris Teyie, Ms. Jennifer Otieno, Architect Samuel Ndeda, Mr Mathenge Mwehe, Ms Susan Rabare, Dr Marylin Appella and. Special thanks to Dr Ayonga for introducing me to theories. I value the time, encouragement and relentless support I received from Dr Patrick Onyango and his team at School of Graduate Studies, Professor Bernard Oindo and Professor Francis Angawa.

Over the years, I have had many inspirational discussions with many friends who kept my nose on the grindstone and graciously endured my long periods of silence. Special thanks to Edward and Norah Odero, Dr Emily Teshome and Dr Betty Osumba. To Margaret Otieno and Mary Aloka thanks for your constant prayers and encouragement through the years. I humbly acknowledge my family members who cheered me on and kept me from drifting astray. Thank you Ayub, Rose and Robert, Sarah and Kenn, Far Alfred, Jed and Ethan, Roman and Nala for always asking questions and pushing me on. My siblings Charles, Nelly, David, Anton and Ruth thank you for being the calming effect when my head felt full. To many more who I cannot name but who gave me support thank you so much.

DEDICATION

This thesis is dedicated first to the Almighty God for granting me strength, skills and who rallied the support I required to completion and second to my loving parents who taught me that quitting was not an option and believing in myself was paramount.

ABSTRACT

Climate change is a global reality that has made communities vulnerable. The international community and Kenya's national government have responded to climate change by fostering adaptation and mitigation at multiple levels. Adaptation is critical in the immediate present because it provides for adjustment to suit the changing environmental conditions and establish resilience. The global and national institutional landscape for adaptation is well defined with clear mandate and capacity. However at the local level where adaptation action is implemented there are questions raised about the ability of the local institutions to effectively carry out adaptation since these local institutions were established for other reasons and not adaptation. The purpose of this study is to examine the extent to which local institution in the Mara river basin can carry out adaptation. The main objective of the study was to establish the capacity of local institutions to foster climate adaptation responses in the Mara River Basin. The specific objectives were 1) to assess local institutional practices that promote climate change adaptation in the Mara river basin, 2) to evaluate the internal institutional structures that enable or hinder climate change adaptation in the Mara river basin, 3) to analyze the opportunities in the institutional landscape that enhance community involvement in climate change adaptation in the Mara river basin. The systems theory was applied to examine the institutional framework as a complex system with boundaries that allow input and output for maximum efficiency and delivery thus enabling understanding of the relationship between different variables. The study adopted a cross-sectional survey design and a sample of 137 institutions drawn from government, NGOs, CBOs, FBOs and private sector were interviewed. The study developed an Institutional Effectiveness Tool for data collection and analysis. The study established that local institutions implement 81% of the adaptation practise interrogated by this study. It also established all scores on the institutional effectiveness tool were above 60% meaning the internal institutional structures of local institutions promote adaptation. Finally it established that the institutional landscape had 44 linkages of which 55% were vertical and 45% horizontal creating a network with opportunities for adaptation. The study concluded that local institutions in the Mara river basin have adequate capacity to foster adaptation despite not having it in their mandate. It recommends that stakeholder engagement in adaptation be institutionalised so as to better engage the local institutions and also explore the opportunities present in the linkages.

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LIST OF ABBREVIATIONS

AAP	Africa Adaptation Programme
ADB	Asian Development Bank
AMCEN	African Ministerial Council on the Environment
Asl	Above Sea Level
CBA	Community-based Adaptation
CBI	Community Based Institutions
CBO	Community Based Organization
CDKN	Climate and Development Knowledge Network
CGOB	County Government of Bomet
CGON	County Government of Narok
CH_4	methane
CIDP	County integrated development Plans
CO_2	carbon dioxide
DoE	Directorate of Environment
EAC	East African Community
ECA	Economic Commission for Africa
EMCA	Environmental Management and Coordination Act
ESARPO	Eastern and Southern Africa Regional Programme Office
FAO	Food and Agriculture Organization
FBO	Faith Based Organization
GDP	Gross domestic product
GHG	Greenhouse Gases
GOK	Government of Kenya
IIED	International Institute for Environment and Development
IMWI	International Water Management Institute
IPCC	Intergovernmental Panel on Climate Change
IUCEA	Inter-University Council of East Africa
IUSP	Integrated Urban Strategic Plans
KMD	Kenya Meteorological Department
LVBC	Lake Victoria Basin Commission
LVFO	Lake Victoria Fisheries Organization

MRB	Masai River Basin
MEMR	Ministry of Environment and Mineral Resources
NAPA	National Adaptation Programmes of Action
NAP	National Adaptation Plan
NCCAP	National Climate Change Action Plan
NCCC	National Climate Change Council
NCCRS	National Climate Change Response Strategy
NCCS	National Climate Change Secretariat
NEC	National Environment Council
NEMA	National Environment Management Authority
NEP	National Environment Policy
NGO	Non-Governmental Organisation
ODI	Overseas Development Institute
UNDP	United Nations Development Programme
UNECA	United Nations Economic Commission for Africa
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNIFEM	United Nations Development Fund for Women
USAID	US Agency for International Development
WCED	World Commission on Environment and Development
WMO	World Meteorological Organization
WWF	Worldwide Fund for Nature

OPERTATIONAL DEFINITION OF TERMS

Adaptation

Adaptation is the adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities IPCC, 2007b)

Climate Adaptation

Refers to an adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects that moderate, harm or exploit beneficial opportunities.

The IPCC defines climate change adaptation for human systems as "the process of adjustment to actual or expected climate and its effects, in order to moderate or avoid harm or exploit beneficial opportunities" (United Nations Global Compact, 2015)

The operationalization of climate adaptation refers to climate adaptation becoming institutionally codified and implemented through planning policies and objectives, making it a central tenet of planning governance (Tony Matthews, 2013)

Climate Change

Climate change is the long-term alteration in average temperature and shifts in the seasons resulting in increasing frequency of extreme weather events covering a wide area. It is the average of thirty or more years of observed weather. Climate change has been influenced natural events and human activity

Climate change refers to any change in climate over time, whether due to natural variability or as a result of human activity IPCC, 2007b).

Climate change is a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods (United Nations, 1997)

Closed system

System or institution independent of the environment around it

Closed Systems enquiry strongly tends towards process improvement and depends on feedback and feed forward circular loops to quantify (not qualify) interactions, with focus on the holistic plane rather than agency (Phelan, 1999).

Kapsali (2009) supports that closed system approach is pervaded by a control system thinking mentality, which aims to produce uniformity by creating the necessary conditions for rational action at the operations level.

Climate mitigation

This is the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, including its sensitivity, and its adaptive capacity

Lackner et al. (2012) refers to climate mitigation as enacting measures to limit the extent of climate change.

Foster
Nurture and promote development for a desirable result

Institutions
The institutions comprises organizations, governance structures and social arrangements.

Uphoff, 1999 informs that institutions'' are taken to be ''complexes of norms and behaviors that persist over time by serving collectively valued purposes.

Thompson (2013) refers to institutions characteristics as simple locally devised rules, easily enforced, graduated sanctions, harvest restrictions match resource regeneration

Institutional landscape
In the study institutional landscape is viewed as the climate change adaptation institutions within a given geographical area and the linkages that exist between them. These linkages can be vertical or horizontal. The vertical linkages connect institutions that operate small geographic spaces (e.g. county) with those that operate large geographic spaces (e.g. continent). Horizontal linkages connect institutions that operate within the same geographical space (e.g. within a county) at the same level

Benson-Rea and Ditter (2011) discuss the concept of institutional landscape as integrating the physical and the socio-economic contexts, the outcomes of which are the business models and interactions observed.

Institutional practices
For the study, institutional practices were viewed as institution mandates that enable functions of climate change adaptation to happen. This focuses on regulations in climate change adaptation and implementing climate change adaptation action. It involves undertaking specific actions regularly in order to enable implementation to take place for adaptation to be attained.

Willems, S., & Baumert, K., 2003 states that practices will help public policies, like climate policies, when they foster co-operation among individuals and institutions, participation in public policy and a sense of individual or collective responsibility towards the environment, acceptance of the Rule of Law.

Institutional Structures
Institutional structures for the purpose of this study were viewed as frameworks around which coordination, planning, management and logistics take place. Structures are mechanisms of how social order is maintained, it involves issues of governance inclusive of rules, plans, procedures, roles and responsibilities and hierarchy for reporting.

Sam Wong & Liz Sharp, 2009 states that applying the institution-structure framework to a sustainable water innovation project in north-west England, it argues that the meaning of environmental rights, the understanding of required environmental responsibilities, and the degree of public participation in decision-making, are shaped by individuals' subjective values, institutional arrangements and structural conditions.

Local Institutions
Institutions that are based and carrying out operations within a given catchment that has been defined to the local

Open System
A system that continually interacts with the environment around it

Open Systems thinking argues that the system needs to adjust by differentiating and elaborating its structure and thus by becoming complex, and needs to import energy to maintain order at its levels of complexity (Kapsali, Maria, 2009)

Social arrangements
Postlewaite (2001) refers to social arrangements as the ways that basic wants or needs are satisfied within a group.

System Boundary
The point at which data flows (perhaps as output) from one system to another (perhaps as input)

Boundaries define systems and determine the relationships within and between systems. The way in which boundaries are managed affects how organizations function. Establishing and negotiating boundaries create the levels of differentiation and integration necessary for effective functioning (Schneider, S. (1987)

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CHAPTER ONE: INTRODUCTION

1.1 Background

In the last two decades, climate change has been a major concern globally, according to United Nations Framework Convention on Climate Change (2007) developing countries are the most vulnerable to climate change impacts because they have fewer resources to adapt socially, technologically and financially. Further to this, many regions in Africa are recognized as having climates that are among the most variable in the world on seasonal and decadal time scales. Floods and droughts can occur in the same area within months of each other. These events often lead to famine and widespread disruption of socio-economic well-being (UNFCCC, 2007).

Lisk (2009) notes that climate change in Africa is a reality, as evidenced by prolonged and intensified droughts in Eastern Africa, unprecedented floods in Western Africa, depletion of rain forests in equatorial Africa and an increase in ocean acidity around Africa's southern coast. Vastly altered weather patterns and climate extremes threaten agricultural production, food security, health, water and energy security. In Kenya, climate change has manifested itself in form of rising temperatures, seasonal changes in rainfall with some areas facing increased rain while others have less rain. There is also decreased and varying intensity in river flow, water scarcity, disease outbreaks; biodiversity loss, landslides, bush fires; fluctuating water levels in lakes, rivers, sea flooding, droughts and salt water intrusion (Government of Kenya [GOK], 2010).

Action to deal with climate change is taken through adaptation and mitigation. Adaptation is the process of changing behaviour in response to actual or expected climate changes (McKibbin & Wilcoxen, 2003). While Mitigation is the act of reducing the culmination of greenhouse gases in the

atmosphere (McKibbin & Wilcoxen, 2003). East African Community (2011c) states that adaptation is crucial because climate change will occur regardless of future greenhouse gases (GHG) reduction measures. Thus adapting to or coping with climate change is of utmost importance in order to ensure socioeconomic and environmental systems function and development. Ford, Berrang-Ford, Lesnikowski, Barrera, and Heymann (2013) is in agreement with this, noting the need for adaptation research in order to understand what society needs to adapt to, identify options available to adapt, and understand how adaptation can be effectively promoted and implemented. Adaptation is often framed as a community issue, because climate change impacts are largely experienced at the local level (Global Leadership for Climate Action [GLCA], 2009; Preston, Mustelin, and Maloney, 2013). Thus the impacts of climate change need to be addressed from the local level the point of greatest effect.

Institutions with an interest in taking action on climate change are found at international, regional, national and local levels. These institutions have governance structures and social arrangement in place that guide their work towards climate change adaptation. It is important to begin by distinguishing between global, regional, national and local institutions for adaptation.

The global institutions bring together nations and build scientific knowledge and capacity for climate change work in the world. They produce protocols on climate change adaptation and mitigation that are cascaded to the nations for implementation. The global institutional landscape for adaptation include the Intergovernmental Panel on Climate Change (IPCC), United Nations Framework Convention on Climate Change (UNFCCC), the United Nations Environment Programme (UNEP) - Global Climate Change Adaptation Network, and World Meteorological Organization (WMO). These institutions have been at the forefront in spearheading action on adaptation and mitigation to climate change.

In Africa, the African Ministerial Conference on Environment (AMCEN) is the main African region institution that provides advocacy for environmental protection that foster local adaptation practices in Africa. The AU has created adaptation and mitigation monitoring policies as well as frameworks for low carbon development (Africa Partnership Forum, 2009; AMCEN, 2011). AMCEN brings together fifty four African ministers of environment drawn from 54 African countries providing continent wide leadership and developing strategic policy guidance that promotes sound environmental management.

The East African regional level brings together the six nations within the East African Community (EAC) comprising Burundi, Kenya, Rwanda, Southern Sudan, Tanzania and Uganda. The EAC has put together a climate change policy that guides partner states and stakeholders in climate change adaptation and mitigation actions. The institutional landscape for adaptation within the EAC is comprised of the East African Community institutions such as East African Community (EAC) Climate Change Coordination Unit. EAC (2011) recognizes that climate change initiatives are currently undertaken in an uncoordinated manner by various departments, institutions and organizations at the regional level and in the Partner States. The East African Community has worked on strengthening policies on climate change adaptation for the region (EAC, 2011; EAC, 2011c).

At the national level in Kenya, the national level institutions lead in national policy formulation, coordination and implementation for adaptation. Bridging the gap between international, regional and national climate change frameworks is best replicated by plans and strategies in Kenya that respond to climate change. The institutional landscape for adaptation is established through the Climate Change Act of 2016 which sets up the National Climate Change Council (NCCC) and the Climate Change Secretariat as lead institutions in climate change (GOK, 2016a). The NCCC will have

oversight on the mainstreaming of adaptation functions at national and county levels; approve and oversee the implementation of the National Adaptation Plan (GOK, 2016b). These institutions are guided through adaptation using the National Climate Change Response Strategy (NCCRS) 2010, the National Climate Change Action Plans (NCCAP), the Climate Change Act 2016 and National Adaptation Plan 2015 – 2030 (GOK, 2010; GOK, 2013a; GOK, 2016a; GOK, 2016c).

At the local level, the Climate Change Act 2016 provides for the establishment of County Executive Committee member to coordinate climate affairs (GOK, 2016a). County Governments are mandated to integrate and mainstream climate change actions, interventions and duties into County Integrated Development Plans (CIDPs). The county governments are responsible for integrating and mainstreaming climate change actions into their County Integrated Development Plans (CIDP), and reporting annually to the County Assemblies on the implementation of climate change. County governments are expected to establish climate change units that will oversee the implementation of all climate actions (GOK, 2016a, GOK, 2018c). The national public policies establish mechanisms for the setup of state institutions that act on climate change adaptation, the non-state institutions are not specifically established in the policies. At the local level, the non-state institutions' core business is development. However, because of the changing climatic conditions and its impact in their areas of operation they have found themselves addressing climate change adaptation issues. Given the foregoing, the question arises on how suitable their structures are for uptake of climate change adaptation.

The local institutions, shape the impact of climate change on rural communities; shape the ways that communities respond to climate change by different incentive structures; and are the intermediaries for external interventions and support to local climate adaptation (Agrawal 2010). Local institutions

know their communities and bring together stakeholders to develop community-based strategies and maximize use of local resources for development.

Local institutions are categorized into five different types namely, government institutions operating at the county level and to lower administrative units in the community, non-government organizations (NGO) who work directly with the communities and have offices in the sub counties and wards, community based organizations (CBO) comprised of community members, Faith based organizations (FBO) that are present in the community and whose mandate is beyond spiritual matters and private sector institutions who also are based within the county and to the lower administrative units.

This study sought to find out the contribution of local institutions capacities in fostering climate change adaptation within the Mara river basin, unlike in previous studies that have majorly focused on international and national institutions. GOK (2013b) states that capacity development for climate change must focus on those individuals and institutions that are dedicated to climate change and to those that are mainstreaming climate change adaptation.

Ayers, Saleemul Huq, Wright, Faisal, & Hussain (2014) note that much of the information around climate change impacts exists externally, in the realm of international bodies such as the IPCC. Thus, a first step is to invest in national-level capacity to generate locally appropriate evidence that can speak to policy decision-making forums. Supporting this step requires harnessing national-level expertise around vulnerability as well as building capacity around climate science, to ensure that adaptation priorities are country-owned and nationally responsive (Ayers et al., 2014). Focussing on local level institutions will enhance action at the lowest level of impact.

Kenya has demonstrated a strong commitment to addressing climate change challenges. The Climate Change Act, 2016, the first legislation in Africa dedicated to climate change, sets out the legal basis for mainstreaming climate change considerations and actions into sector functions (Kajumba, Karani, & Fisher, 2016). As such, the Climate Change Act requires the development of a National Climate Change Action Plan (NCCAP) every five years that sets out measures and mechanisms to guide the country toward the achievement of low-carbon, climate-resilient development.

Local level institutions have other core businesses and climate change has been added onto their mandate. Nonetheless, these institutions are expected to build community resilience to climate change through adaptation practices. Va Dany, Bowen & Miller (2015) point out that assessing the institutional capacity to adapt needs to take into account the characteristics of adaptation and will differ depending on whether the focus of concern is on national policy and funding priorities, community-based initiatives, or some other form of adaptation, such as household livelihood decision making or adaptation technology transfer. Contrary to this thinking, Andresen (2015) postulates that climate change is a global problem, and it makes sense for nations to seek to solve the problem together, favouring a centralised and universal (top-down) approach. However, Brown & Sonwa (2018) argue that the diversity within village institutions could open the doors for learning new things about adapting to climate change. Thus, community resilience in the context of climate change could be better fostered by building capacity within local institutions and social networks to further extend their learning about potential climate change impacts and how to respond.

Understanding how institutions function in relation to climate and its impacts is a core component in designing interventions that can positively influence the adaptive capacity and adaptation practices of poor populations (Agrawal, 2008). UNFCCC (2013) has established protocol for countries, regions

and communities to adapt to present and future impacts of climate change by undertaking a comprehensive and iterative process, consisting of first, assessing impacts, vulnerability and risks; second, planning for adaptation through identification of adaptation activities and their appraisal; third, implementing adaptation measures at national, regional and local levels and fourth, monitoring and evaluating adaptation. Key initiatives to address adaptation are noted in terms of financial support of international and national institutions through the adaptation fund for countries that are parties to the Kyoto Protocol.

The policy direction offered by UNFCCC has been domesticated in the East African Region through the East African Community (EAC) Climate Change policy framework. This policy framework has three critical instruments. That is the EAC Climate Change Policy, the EAC Climate Change Strategy 2013-2017 and the EAC Climate Change Master Plan 2013. EAC (2011) identifies inadequate institutional, legal and regulatory frameworks for adaptation as one of the major challenges facing climate change adaptation activities. EAC (2011c) further notes that the institutions in charge of overseeing climate change are already over-burdened with other mandates, and climate change was not a priority when these institutions were set up, and is therefore yet to be fully mainstreamed within their operations.

It is within the international and regional climate change agenda that Kenya has domesticated adaptation mechanisms. Kenya has an economy that is highly dependent on its natural resource base, this makes it highly vulnerable to climate variability and change. A coherent and coordinated regulatory framework must therefore guide the national and local level responses to the impacts of climate change. The absence of internal coherence in laws and policies has resulted in duplicity and overlap in execution of institutional mandates, with a suboptimal outcome for Kenya (GOK, 2016b).

This has meant harmonization of the various sectoral laws, policies and institutional mandates that define roles and functions required for climate change response in order to enhance coordination and mainstream climate change into their functions. The changes to the national governance framework introduced by the Kenya Constitution of 2010, introduced national and county levels of government, thus the need to promptly ensure internal coherence and proper coordination of functions (GOK, 2014; GOK, 2016b).

A number of climate change policies and plans have been produced by countries to guide and support their adaptation efforts. Kenya has passed into law it's Climate Change Bill, has in place a National Climate Change Strategy and National Climate Change Action Plan, and has prepared a draft national climate change framework policy and a draft climate finance policy (GOK, 2013a; Parry & Terton, 2016; GOK, 2016a; GOK, 2018).

The National Adaptation Programmes of Action (NAPAs) are the most prominent national-level effort to identify priority areas in which adaptation to climate change is necessary. However, NAPAs have paid minimal attention to local institutions or to the relationship between local and higher-level institutions – even for projects that are focused on agriculture, water, forest management, fisheries, small scale infrastructure and capacity building at the local level (Agrawal, 2008). Only 20 of the 173 projects described in the NAPA reports identify local level institutions as partners or agents in facilitating adaptation projects, despite the fact that the NAPA process required widespread consultations with NGOs and other civil society actors (Agrawal, 2008).

Kenya on its part, has put in place its National Adaptation Programmes of Action (NAPAs) in a document known as the Kenya National Adaptation Plan - NAP 2015-2030. It is Kenya's first

exclusive plan on adaptation, and provides direction towards achieving Vision 2030 goals by mainstreaming climate change adaptation into planning and action. The NAP supports national and county governments to implement the National Climate Change Action Plan (NCCAP) by providing guidance on priority actions. The NAP articulates a mainstreaming approach under which adaptation and development goals are complementary. This approach is recommended in the National Climate Change Action Plan 2013-2017, and articulated in the Climate Change Framework Policy and Climate Change Bill.

Counties in Kenya form the devolved planning units within which institutions operate. The counties are expected to feed the NCCAP with information on climate change challenges in each county and county specific action plans on climate change. In order to achieve this, there is need for institutions which are drivers of planning to have the capacity to ensure collaborative planning for strategies to be used in addressing climate change impacts. Kenya's adaptation needs are informed by its national circumstances, including current and projected climate scenarios that impact decision making. The NAP broadly adopts the institutional structures recommended in the NCCAP and established in the Climate Change Bill (GOK, 2013a; GOK, 2016). The NAP sets out priority adaptation actions in the planning sectors and describes a monitoring and reporting framework for use (GOK, 2016b).

Each County in Kenya designates planning to start from the internal local departments at the ward, city or urban areas and cascades upwards to the sub County, county and national level. The planning process is spearheaded by the government departments but non-state actors are incorporated to ensure a holistic coverage of the issues raised. These plans are then used to develop budgets for implementation of the plan. The major types of plans where climate change adaptation issues should

be incorporated include the county integrated development plans (CIDP), county spatial plans, county sectoral plans and city or municipal plans (GOK 2012, GOK 2013b).

Owing to a lack of the technical and financial capacity of both national and local institutions, public services for adaptation to climate change are being governed by various combinations of the state, social networks, individuals, entrepreneurs and external aid agencies. Such agencies provide different modes of brokerage, mediation and translation that create the basis for different forms of the co-production of collective services (Friis-Hansen, Aben, Okiror, Bashaasha, & Suubi, 2015).

However, this may not always work in the favour of local communities as noted by Va Dany et al (2015) who reflected that the lack of institutional capacity can inhibit the realization of policy objectives. Institutional capacity is an important element for climate change adaptation. Further to this, Akenji, Elder, Bengtsson, Olsen, & King (2018) note that adequate capacity is needed at all levels of government, not least at local levels where much of implementation takes place. Strengthening the capacity to mainstream environmental concerns into development planning and policies is necessary.

Agrawal, McSweeney and Perrin (2008) argue that adaptation to climate change is inevitably local and institutions influence adaptation and climate vulnerability in three important ways. First they influence how households are affected by climate impacts secondly they shape the ability of households to respond to climate impacts and pursue different adaptation practices; and thirdly they mediate the flow of external interventions in the context of adaptation. Further to this, Jegede (2018) notes that local populations may have time-tested knowledge systems, but the intensity of climate change poses a different challenge. Hence, the accommodation of proposals dealing with capacity

development of local populations is pivotal to helping them develop the capacity to cope with loss and damages.

Local institutions, structure livelihood impacts of climate hazards through a range of indispensable functions they perform in rural contexts. Institutional functions include information gathering and dissemination, resource mobilization and allocation, skills development and capacity building, providing leadership, and relating to other decision makers and institutions. Each of these functions can be disaggregated further, but the extent to which any given institution performs the above functions depends greatly on the objectives with which the institution was formed, and the problems it has come to address over the course of its existence (Agrawal, 2008). This is echoed by GLCA (2009) that notes that adaptation to climate change is highly local, but support from national governments, international donors, and NGOs will be necessary to reduce vulnerability, identify and fill gaps in adaptation planning, prevent maladaptation and ease the impact of climate variability and change on the vulnerable.

Adaptation is inherently local and therefore it is critical to attend to local institutions in thinking about effective adaptation (Agrawal and Perrin, 2008). However, in the Mara River basin where adaptation is critical, the capacity for local institutions to foster adaptation is not known. The majority of the institutions here tackle issues related to agriculture and food security, water, environment and energy that are heavily dependent on the climate, but the institutions have not been able to fully embrace the protocols put in place by the UNFCCC on climate change adaptation, the national adaptation plan or the National Climate Change Action Plan.

This study sought to find out the capacities of local institutions in fostering climate change adaptation mainstreaming within the Mara river basin unlike in previous studies that have majorly focused on international and national institutions. National Climate Change Action Plan 2013-2017, (GOK 2013a) states that capacity development for climate change must focus on those individuals and institutions that are dedicated to climate change and to those that are mainstreaming climate change adaptation. The Narok county integrated development plan and the Bomet county integrated development plan (GOK, 2018a; GOK, 2018b) stipulate how the counties are developing legislation and structures to address climate change action as mandated by the national level policies. Nonetheless, adaptation is ongoing in the counties done by non-state actors. The capacities of these non-state actors to address adaptation is still unknown.

Government institutions have specific mandate in the county policies for example in the Narok county integrated development plan 2018-2023 strategic priority on climate change is to draft and implement a climate change policy and work-plan including the formation of the Narok County Climate Change Fund (County Government of Narok, 2018). The draft climate change policy for Bomet county mandates the Governor to designate a County Executive Committee Member to coordinate climate change affairs and to give prominence to Climate Change in the title of the department. The county government is also mandated to put in place a technical institutional framework to guide policy and functional implementation of climate change legal obligations of the county government (County Government of Bomet, n.d). However, the institutions mandated to do so are still in their formative stage at the county and are not carrying out climate change adaptation. The non-state actors comprising NGOs, CBOs, FBOs and private sector institutions have varied mandates ranging from humanitarian action to development action that are not directly classified as climate change adaptation obligation.

Butler et.al, (2015) notes that community, government, and NGO respondents' views of livelihood challenges differ significantly. The institutional domain NGO respondents differed by prioritizing transformational strategies that balance traditional values and practices with current government structures. Anugwom, Igbokwe & Nweze (2017) are in agreement that local knowledge and expertise are needed in developing management strategies and to provide a sense of ownership over a resource and make the community responsible for its long-term sustainability.

NGOs, CBOs, FBOs are often charged with implementing humanitarian programmes which are short term and development programmes that are long term (Martin, 2012). In the Mara River basin where adaptation is critical, the capacity for local institutions to foster adaptation is not known. The majority of the institutions here tackle issues related to agriculture and food security, water, environment and energy that are heavily dependent on the climate. Therefore, climate change adaptation actions they are undertaking are by default, it is important to understand how the mandates they have relate to what is in the international and national climate change adaptation mandates. Local level institutions have other core businesses and climate change has been added onto their mandate. Nonetheless, these institutions are expected to build community resilience to climate change through adaptation practices. How are these institutions addressing the climate change adaptation issues?

Harvey (2013) shares that institutional structure need to address the character of and relations between major institutional spheres i.e. its private-sector economy, government, and civil society. Agyemang, Gatsi & Ansong (2018) further notes that good institutional structures serve as an important issue for growth and development. The different categories of institutions operating in the Mara river basin each have their own set of rules, schemas, and strategies which they utilize to undertake adaptation.

The institutions utilize the structures of coordination, planning, management and logistics affects climate change adaptation differently. This wide range of structures are likely to affect climate change adaptation delivery in different ways that need to be understood and linked to delivery.

The institutional landscape and its linkages promotes different programs and networks. Wilbanks and Kates (1999) in their study found that the process to connect national or global expertise with local action, is far more effective when general expertise is focused on interactions with experts at the local scale, who then provide the linkage with local decision makers. Kamatsiko (2017) concurs that establishing strategic horizontal collaboration and linkages is as important as creating vertical ones that connect to national level and reach out to grassroots efforts and peoples. At the international and national level, the institutional landscape and linkages are guided by international policies laid down in the UNFCCC and the National Adaptation plan 2015 – 2030 respectively. The institutional landscape in the Mara river basin is known however, the linkages that exist and promote adaptation are still unclear.

1.2 Statement of the Problem

Institutions, together with communities, have responded to climate induced vulnerability by fostering adaptation and mitigation at multiple scales ranging from the global to the local arena. Adaptation yields immediate results because it involves an adjustment to the way of doing things to suit the changing environmental conditions and establish a better chance to survive. The global, regional and national landscape for adaptation is well defined with clear mandates and capacity. At the local level "the process of adjustment to actual or expected climate is not institutionalised and is undertaken in an uncoordinated manner. In Kenya where the government is decentralized, in 2020 the county

structures for addressing climate change are still in the preliminary stages of establishment. Institutions that are non-state actors involved in development activities find themselves implementing climate change adaptation activities by default. These institutions while implementing development are forced to adopt to a changing climate and thus implement adaptation actions. It is not clear to what extent their structures and social arrangements are able to fulfil climate change adaptation. This study therefore sets out to examine how the structures of these local institutions affect their functions.

1.3 Research Objectives

The main objective of the study was to establish the capacity of local institutions to foster climate adaptation responses in the Mara River Basin.

The specific objectives were to:

1. Assess local institutional practices that promote climate change adaptation in the Mara river basin.
2. Evaluate the internal institutional structures that enable or hinder climate change adaptation in the Mara river basin.
3. Analyze the opportunities in the institutional landscape that enhance community involvement in climate change adaptation in the Mara river basin.

1.4 Research Questions

The study had the following research questions:

1. To what extent do local institutional practices in the Mara basin promote climate change adaptation practices?
2. In what ways do the internal institutional structures enable or hinder adaptation?
3. How do opportunities in the institutional landscape enhance community involvement in climate change in the Mara River Basin?

1.5 Scope and Limitations

The representatives of local institutions comprising government agencies, Non-governmental organizations, Community based organizations, Faith based organizations and private sector institutions interviewed are located within the Mara River Basin middle catchment which lies in the two Counties of Bomet and Narok. Qualitative research design was used to interview one hundred and thirty seven institutions drawn from policy makers at the county were specifically targeted to gain insight into climate change adaptation policies in use at that time or policies proposed for future use. The field research covered the period from 2015 to 2018.

One of the initial challenges was accessing a documented list of institutions operational in the climate change arena. This was addressed by getting a list from area administrators including provincial administration chiefs and government officials. The list was then consolidated for study. In 2013, the new constitution (2010) of Kenya was promulgated and devolved governance was introduced to the counties. The transition process, however, took time with various institutions within the counties introduced by merging or separating some so that the administrative operations took long to stabilize.

Significance of the study

The process of adaptation to climate change is integrated into other activities at the community level and it is not known how well equipped the local institutions are to foster adaptation which is not the primary reason for which they are established. The study examined the extent to which the local institutions undertake adaptation to provide evidence that they actually carry out adaptation. This will give them credibility when partnering with other stakeholders. The study also examines the structure

of local institutions to know what structures work for adaptation, what does not and what needs to be improved. Improved performance should translate to successful adaptation.

CHAPTER TWO: LITERATURE REVIEW

Introduction

The aim of this chapter is to trace and explore past literature. The literature review enabled the researcher define the study, review possible theories to guide the study and explore institutions' capacity in climate change adaptation practice. This involved review of other studies focussing on institutions and climate change adaptation. It established the ground for the research in enabling obtaining knowledge of the research problem, set objectives and design the methodology for the research. The research, is anchored around the objectives that leads to the conceptual framework.

2.1 Local institutional practices that promote climate change adaptation

Local institutional practices that promote of climate adaptation was reviewed in line with institution mandates with analysis focussing on regulations on climate change adaptation, planning for climate change adaptation, promotion of climate change adaptation and implementing adaptation. To foster adaptation to climate change requires institutions with an interest in taking action on climate change. Institutions include organizations, governance structures and social arrangements.

Institutions exist to reduce uncertainty in the world, they are the incentive systems that structure human interaction. Institutions structure human interactions by providing incentives and disincentives for people to behave in certain ways (North, 2003; Moura, Bianchi, Mazato, Espig, and Falaster, 2019). Lobo (2008) agrees that institutions matter, in that they determine the growth path of society, as well as distribution of benefits, access to resources and power. Further to this representative, robust and effective institutions play a significant role in advancing the development of a society and enhancing the quality of life. A similar interpretation is provided by Agrawal (2009) who indicates

that local institutions are central to local adaptations to climate risks. Without local institutions, rural poor groups will find it extremely costly to pursue the adoption of effective adaptation practices relevant to their local needs, as well as difficult to increase their level of information and knowledge on adaptation options. UNFCCC (2007) show that local institutions are necessary to enable households and social groups to deploy specific adaptation practices. Similarly, Pauw (2015) points out that local entrepreneurs need to take the lead as externals find it difficult to start in unknown areas, and that larger SMEs operate on a larger level and do not penetrate the rural areas where much of the adaptation is needed.

Institutions operate at different levels of jurisdiction ranging from the world system to localized interpersonal relationships. According to Pauw (2015), small and local businesses are important for adaptation and sometimes better able to respond to the needs of the poorest than government bodies or NGOs. Agrawal and Perrin (2008) agree that institutions influence the livelihoods and adaptation of rural households in structure the distribution of climate risk impacts; constitute and organize the incentive structures for household and community level adaptation responses; and finally mediate external interventions into local contexts.

In Agrawal and Perrin (2008), it is worth highlighting that, unlike the situation for climate change mitigation, private and market institutions have been relatively absent in facilitating adaptation in rural areas. This absence constitutes an important arena of interventions for public policy to start crafting incentives that can draw private institutions more centrally towards facilitating adaptation.

Adapting to climate change entails taking the right measures to reduce the negative effects of climate change by making the appropriate adjustments and changes in human practices. According to World

Bank (2010), to reverse climate change, action will be required in three thematic areas of inertia, equity and ingenuity. Policy has to overcome institutional inertia, which has three implications for climate change and smart development. Firstly, institutional change should be a priority, success will hinge on reshaping the institutional frameworks that support adaptation and mitigation interventions. Secondly there is need to review institution reforms which look at addressing institutional determinants of climate policy to ensure effectiveness and sustainability of interventions to maximize the impact of finance and technology and lastly, there is need to increase gender inclusion, recognizing indigenous people's rights and reforming property rights (World Bank, 2010). Inertia is the defining characteristic of the climate challenge and is the reason World Bank (2010) states as pushing for the need to act now. Equity is the key to an effective global deal, the reason for acting together; finally ingenuity is the answer to a problem that is politically and scientifically complex - the quality that could enable nations and communities to act differently from the past (World Bank, 2010).

Matthews (2013) points out that institutional change take place when an institution adds, removes or changes some or all of the social constraints it is responsible for. Weak capacity is not always the most critical factor, flawed incentive structures can be in conflict with the need to reflect environmental concerns in planning, policy-making and implementation (Akenji, Elder, Bengtsson, Olsen, & King 2018), involving citizens in the budgeting process can help ensure that spending priorities are aligned with locally recognized needs (Akenji et al 2018).

The foregoing is consistent with Agrawal and Perrin (2008) who reviewed 118 institutions from government, civil society and private sector, although the outputs differ, the situation in Yemen as noted by World Bank (2011) indicated that even if institutions are present, they are not associated

with assistance for climate change adaptation, and formal institutions hardly provided any assistance in terms of training, inputs, or cash; most of the adaptation strategies adopted by the households were financed and realized by the households themselves using their own resources. Agrawal, McSweeney and Perrin (2008) note three types of local institutions relevant to adaptation: civic, public, and private in their formal and informal forms. These institutions shape the livelihoods impacts of climate hazards through a range of indispensable functions they perform in rural contexts such as information gathering and dissemination, resource mobilization and allocation, skills development and capacity building, providing leadership, and networking with other decision makers and institutions.

According to Bosello, Carraro, & De Cian (2012), adaptation can be identified along three dimensions - the subject of adaptation (who or what adapts), the object of adaptation (what they adapt to) and the way in which adaptation takes place (how they adapt). Adaptation responses are critical for the sustainability of the ecosystem. Adaptation should be used to deal with reasonably well understood local phenomena (Bosello, Carraro, and De Cian, 2012; Mikulewicz, 2018; Friis-Hansen & Funder, 2019). Agrawal and Perrin (2008) take a step further to identify the forms of adaptation which communities work through in order to build resilience. These are categorized into four areas namely mobility, storage, diversification, communal pooling and market exchange. These strategies are unpacked and shared in Table 2.1 below:

Table 2.1: Strategies for Adaptation

Class of Adaptation Practice	Corresponding Adaptation Strategies
Mobility	1. agro-pastoral migration 2. wage labour migration 3. involuntary migration
Storage	1. Water storage 2. food storage (crops, seeds, forest products) 3. animal/live storage 4. pest control
Diversification	1. asset portfolio diversification 2. skills and occupational training 3. occupational diversification 4. crop choices 5. production technologies 6. consumption choices 7. Animal breeding
Communal pooling	1. forestry 2. infrastructure development 3. information gathering 4. disaster preparation
Market exchange	1. improved market access 2. insurance provision 3. new product sales 4. seeds, animal, and other input purchases

Source: Agrawal and Perrin 2008

Local institutions know their communities and should have the main responsibility for identifying the poor and vulnerable, and supporting them in building safe rural and urban settlements. These institutions should ensure that locally appropriate information about best practices for risk management and adaptation reaches the poorest and most vulnerable citizens through extension services. They should be able to manage public goods effectively, in cooperation with the private sector, and should be stakeholder-driven to move resources efficiently from global to local levels, develop community-based strategies, and maximize local resource mobilization (GLCA, 2009). At local levels, institutions have arisen that have interest in addressing climate change as part of their wider mandate. However, more analytical work is needed on how to integrate adaptation into sectoral policies.

McGray and Sokona (2012) argue that institutions are central to the climate resilient development agenda. That is why building a climate-resilient society will require long-term and potentially fundamental transformations, including both large and small changes. In the same way successful adaptation practices rely on the availability of knowledge about current and expected climate impacts, and about the options that exist to address these impacts (Klein et al, 2017). Thus institutions play a crucial role in enhancing development but more importantly in supporting communities build resilience and secure their livelihood. Institutions use schemas and rules to deliver on their goals, the goal delivery starts with identifying the needs and planning for these needs especially in relation to climate change adaptation.

Therefore, given the foregoing, it is evident that any action that will reduce the impact of climate change and increase resilience of the population will need to be anchored in institutions that support community actions. Identifying these institutions including their mandates and current actions in addressing issues of climate change adaptation is thus crucial for long term sustainability. Institutions in Kenya are guided through adaptation using the National Climate Change Response Strategy (NCCRS) 2010 which focuses on evidence of the key climate risks to Kenya; assessing of climate change impacts on the sectors; documenting climate adaptation activities that are underway and planned; developing a set of potential and priority adaptation actions per sector and supporting the integration of climate change adaptation into relevant new and existing sector policies, development, budgetary and planning processes (GOK, 2010). Government institutions are at the forefront in planning for climate change adaptation and mitigation issues guided by the National Climate Change Action Plan, the Climate Change Act 2016, and the National Adaptation Plan 2015 -2030.

The Climate Change Act No. 11 of 2016 guides the process of climate change adaptation and mitigation (GOK, 2016a). The Act requires the National Government to develop five-year National Climate Change Action Plans (NCCAP) to guide the mainstreaming of adaptation and mitigation actions into sector functions of the National and County Governments. According to the Act, henceforth, all policies developed on climate change shall be in relation to adaptation to, and mitigation against climate change.

The Climate Change Act 2016 requires that the public is involved in the development and review of the Climate Change Action Plan. This role as stipulated in part I subsection 3 of the Act is applied to the development, management, implementation and regulation of mechanisms to enhance climate change resilience and low carbon development for the sustainable development of Kenya by the national and county governments in all sectors of the economy.

Among the key functions of the Council is to provide an overarching national climate change coordination mechanism inclusive of ensuring mainstreaming of climate change by the national and county governments; approval and overseeing implementation of the National Climate Change Action Plan; advise the national and county governments on legislative, policy and other measures necessary for climate change response and attaining low carbon climate change resilient development, provide policy direction on research and training on climate change including the collation and dissemination of information relating to climate change to the national and county governments, the public and other stakeholders; and administer the Climate Change Fund established under this Act. The foregoing is in line with Tänzler and Carius (2013) who recognize that a coherent implementation of adaptation measures is likely to be facilitated by an institutionalization of responsibilities.

Local adaptation strategies in Kenya have been streamlined by the National Climate Change Action Plan (NCCAP) 2013-2017 and more recently the 2018-2022 plan and the National Adaptation Plan 2015 – 2030 pinpoint individual sector responsibility in climate change (GOK, 2013a; GOK, 2018; GOK, 2016c). Agrawal (2009) notes that the National Adaptation Programmes of Action (NAPAs) are the most prominent national-level effort to identify priority areas in which adaptation to climate change is necessary. The NAPAs, in identifying priority areas for adaptation interventions, have tried to consider the local nature of adaptation as well as the need for external support in effective local adaptation. Most NAPA projects seem to be aimed at building national governments' capacities rather than strengthening the capacity of local actors and institutions to undertake adaptation (Osman-Elasha & Downing 2007; Agrawal 2008). The National Adaptation Programmes of Action (NAPA) funded under UNFCCC funding mechanisms have shown that 85% of the projects pay little to no attention to local institutions, limiting their effectiveness and legitimacy (Chishakwe, Murray, & Chambwera, 2012). Yet climate change impacts are felt at the local level.

Kenya's adaptation obligations are documented in detail in the NAP 2015 -2030. The NAP recognizes the governance and institutional arrangements for implementation of adaptation actions as stipulated in the NCCAP and Climate Change Act, 2016. NAP proposes macro-level adaptation actions and sub-actions in 20 planning sectors, for each sector, the NAP identifies gaps, estimates costs of the macro-level actions projected to 2030, and identifies key institutions required for their implementation (GOK, 2016c). NAP aims to mainstream climate change adaptation into all County Integrated Development Plans and other county sectoral level plans. NAP actions are divided into three short term, medium term, and long term.

Counties in Kenya form the devolved planning units within which institutions operate. The counties are expected to feed the NCCAP with information on climate change challenges in each county and county specific action plans on climate change. The Climate Change Act 2016 (GOK, 2016a) stipulates that county governments shall integrate and mainstream climate change actions, interventions and duties into the CIDPs. In order to achieve this, there is need for institutions which are drivers of planning to ensure that they take a lead role in collaborative and design strategies to be used in addressing the issues of climate change impacts. The Bomet County Integrated Development Plan 2018-2022 (County Government of Bomet, 2018a), recognizes that the Mara River Basin goes beyond administrative boundaries has a responsibility of identifying and implementing viable cross-border socio-economic programmes and project activities including developing of policies and strategies; inventorising and mapping of natural resources within the basin; environmental protection, regulation and coordination; water catchment area conservation, control and protection; and coordination of climate change affairs within the basin.

At the county level, each government agency spearheaded by the Ministry of Planning reviews climate related issues within their mandate and ensures that these are incorporated in the County Integrated Action Plans (CIDP) and the County Spatial Plans. Once the climate related activities are budgeted for according to what has been planned, and finances disbursed to the relevant ministries for implementation, the planning process emanates from discussions at the ward level and cascades to the sub county and finally to the county. Counties are encouraged to identify their priority actions from the actions in the NCCAP and NAP and come up with County Adaptation Plans, the adaptation plans go beyond what is not listed in the national priority list as long as they are in line with their CIDP priorities.

According GLCA (2009), effective adaptation strategies require coherent and coordinated policies and cooperation among governments, civil society, and the private sector. Because impacts are local and contextual, the principle of subsidiarity should apply. The bulk of responsibility will fall on local and national governments supported by international actions to provide appropriate capacities and resources.

Adaptation is inherently local and therefore it is critical to attend to local institutions in thinking about effective adaptation. However, at the local level, non-state actors comprising NGOs, CBOs, FBOs and private sector institutions tackle issues related to agriculture and food security, water, environment and energy that are heavily dependent on the climate. This is to support communities cope with increasing climate change impacts. The core business of these institutions is in the area of humanitarian and development agendas.

Although much work on climate change and social responses to climate risks recognize the relevance of institutions to adaptation, existing work on the subject has tended either to focus on highly specific case studies of local adaptation, or to examine national level policies around adaptation. The local level climate change adaptation practices, as adopted by local institutions, is an area that requires in depth study to understand which institutions exist and what adaptation practices drive interaction at the community level.

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depth study to understand which institutions exist and what adaptation practices drive interaction at the community level. This study sought to find out which local institutions had a presence in the Mara river basin, the institutional mandates they have to undertake climate change adaptation practices.

2.2 Institutional structures that enable or hinder adaptation to climate change

In this section structures are discussed as mechanisms of how social order is maintained, structures are frameworks around which coordination, planning, management and logistics take place, it involves all issues of governance and includes roles and responsibilities. Structures take into consideration functions, hierarchy for reporting and tasks. Bandaragoda (2000), states that the basic minimum for institutions is to have laws, policies and administration which are the three pillars of the institutional framework for integrated resources management in a river-basin context. Agrawal (2008) further highlights the following elements of local institutions working on climate change adaptation as having organizational rules that are simple and easy to understand, broad local involvement in the organization and its rules, fairness in resource allocation, clear mechanisms for enforcing rules, clear, broadly acceptable mechanisms for sanctioning rule infractions, availability of low-cost adjudication, accountability of decision makers and other officials. The foregoing is in agreement with Scott (2004b) and North (2003) who consider structures as schemas and rules set by institutions to ease the way work is accomplished.

Every institution is primarily differentiated according to the specific task it fulfils for members in the society. Furthermore, the institutions enjoy a substantial degree independence, as what goes on inside one institution is relatively independent of what happens in another institution (Aakvaag, 2015). Institutions are crucial for processing pressures from the environment, they establish rules for

cooperation that bring about better outcomes but requires collective efforts (Peters, Jordan, & Tosun, 2017; Zgiep & Kioupkiolis, 2019). The presence of rules and frameworks guide local adaptation action.

Lüdemann and Ruppel (2013) discuss structures as methods for ensuring that priority in the use of public funds is given to funding adaptation costs; in agreement with this are Agyemang, Gatsi and Ansong (2018) who point out in their study that adequate functioning of institutional structures represents a significant condition for financial sector evolution, which has a relevant contribution to sustainable economic development.

Structures of institutions are perceived as relatively malleable, with inconsistent policy responses where individual preferences are pursued (Kondra & Hurst, 2009; Peters et al., 2017). This is further concurred by Bhatasara and Nyamwanza, (2018) who state that asset-oriented framings and approaches in essence mask and understate the role of structures, mediating processes and institutions in shaping, and supporting adaptive capacity. Wimsatt (2019) asserts that group structure manifests on different size and time scales, sometimes as a hierarchical organization and sometimes in a stable manner that cuts across hierarchical relations.

According to UNFCCC (2013), countries, regions and communities are adapting to present and future impacts by undertaking a comprehensive and iterative process, consisting of first, Assessing impacts, vulnerability and risks; second, Planning for adaptation through identification of adaptation activities and their appraisal; third, Implementing adaptation measures at national, regional and local levels and fourth, Monitoring and evaluating adaptation. Key initiatives to address adaptation are noted in terms of financial support of international and national institutions through the adaptation fund for countries

that are parties to the Kyoto Protocol. The foregoing can become a reality with incorporation and facilitation of local institutions taking a lead role and liaising with communities.

UNFCCC framework has been widely used by the African Union to develop policy and formulate national climate change adaptation policies and legislations that encourage low carbon technology growth (UNECA, 2011). Building capacity of environmental institutions has also been boosted under regional frameworks where comparisons can be made on other regions. Through UNFCCC agreements on climate change, Africa can get aid when climate changes seem to overburden its capability.

The African Ministerial Conference on Environment (AMCEN) is the main regional institutional framework that fosters local adaptation practices in Africa. The AU has created adaptation and mitigation monitoring policies as well as frameworks for low carbon development (Africa Partnership Forum, 2009; AMCEN, 2011). Despite these efforts, IPCC, (2013) notes that African states require advanced management of natural resources, land and water as well as food security policies. Political momentum to safeguard these resources and develop ecosystems based on local adaptation strategies is paramount in the African region (World Metrological Organization, 2015). Bringing together of nations on their environmental policies, natural resource management and legislations as well as institutional capacity development would foster local adaptation practices.

A combined political commitment through institutional frameworks is needed from the developed countries and all nations to make a binding agreement in achieving international adaptation level (Mwambaza & Kotze, 2009). International frameworks act as the top supervision in monitoring regional and national adaptation strategies through funding and policies. Reporting and monitoring is

thus done through Action Plans at national level with greater facilitation from international institutional frameworks (IPCC, 2013). Literature of regional and national institutional frameworks, show that a vertical relationship exists in reporting climate change to international frameworks.

The policy direction offered by UNFCCC has been domesticated in the East African Region through the East African Community (EAC) Climate Change policy framework. Within this are three critical instruments. First is the EAC Climate Change Policy that identifies climate change adaptation as a priority of the region while mitigation is secondary. The policy's priority adaptation are in line with the UNFCCC i.e. Climatic Vulnerability and Risk Reduction, building socioeconomic resilience, climate change adaptation planning and enabling environment and sectoral approach to climate change mainstreaming (East African Community 2011). The second is the EAC Climate Change Strategy 2013-2017 whose goal is to contribute to the successful implementation of EAC Climate Change Policy through strategic interventions. The third is the EAC Climate Change Master Plan 2013 with the mandate of ensuring strengthening of regional cooperation by responding to climate change as shared resources.

Climate change is a global issue that demands international intervention, however, regional. National and local action is required to reduce negative impacts of climate change. The national institutional frameworks bridge the gap between international institutions and fostering of local adaptation to climate change. Bridging the gap between international, regional and national climate change frameworks is best replicated by strategies in Kenya that responded to climate change. In Kenya specifically, the Ministry of Environment and Mineral Resources launched the National Climate Change Response Strategy (NCCRS) in 2010. This enhanced comprehensive monitoring and reporting framework on climate change through the National Climate Change Action Plan (NCCAP)

to international institutional frameworks like United Nations Framework Convention on Climate Change (UNCCFC 2007; GOK, 2010; GOK, 2013a). Local adaptation strategies in Kenya have been streamlined by the NCCAP that pinpoints individual sector responsibility in climate change and NAP that specifically outlines mechanisms for mainstreaming climate change adaptation practices.

Kenya has demonstrated a strong commitment to addressing climate change challenges. The Climate Change Act, 2016, the first legislation in Africa dedicated to climate change, sets out the legal basis for mainstreaming climate change considerations and actions into sector functions (Kajumba, Karani, & Fisher, 2016). The Act requires the government to develop five-year National Climate Change Action Plans (NCCAP) to guide the mainstreaming of adaptation and mitigation actions into sector functions of the national and county governments (GOK, 2016a). According to the Act, henceforth, all policies developed on climate change shall be in relation to adaptation to, and mitigation against climate change.

The institutional coordination structure provides for ensuring climate change adaptation issues are incorporated into development plans and acted upon. Among the key functions of the Council is to provide an overarching national climate change coordination mechanism inclusive of ensuring mainstreaming of climate change by the national and county governments; approval and overseeing implementation of the National Climate Change Action Plan; advise the national and county governments on legislative policy and other measures necessary for climate change, provide policy direction on research and training on climate change including the collation and dissemination of information relating to climate change to the national and county governments, the public and other stakeholders; and administer the Climate Change Fund established under this Act. The foregoing is

in line with Tänzler and Carius (2013) who recognize that a coherent implementation of adaptation measures is likely to be facilitated by an institutionalization of responsibilities.

The elements of institutions—regulative, normative, cultural-cognitive—may not be aligned, and one may undermine the effects of the other (Scott 2004a). However, this means that when the elements work effectively then the structure would deliver on adaptation practices. In line with this, the capacity of local institutions to foster climate adaptation responses in the Mara River Basin varies and relates more to their internal governance policies, length of existence and operations in the climate change arena, skills and staff competencies on climate related issues, membership type and status, planning and budgets o adaptation activities and decision making control as opposed to being solely guided by the laid down international and national mandates. This capacity requires the institution to pick up and act on policies set up at different levels – international, regional, national, county and institution's own policies in order to operate efficiently and deliver the best adaptation practices.

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Past studies in the Mara river basin have not examined institutions present as climate change adaptation bodies with core structures to them function effectively. Bridging this gap requires in-

depth understanding of the different structures that exist in institutions and which of these structures enable uptake of climate change adaptation concepts and which ones hinder climate change adaptation uptake within the institution. Identifying these institutions including their governance structures and social arrangements that are located within communities and assessing their capabilities in addressing issues of climate change adaptation is thus crucial for long term sustainability.

A closer look at the existing literature reveals that structures are contextualised as frameworks or as systems within organizations. Past studies have not examined climate change institutions as climate change adaptation bodies with core structures that make them function effectively. Bridging this gap requires in-depth understanding of the different structures that exist in institutions and which of these structures enable uptake of climate change adaptation concepts and which ones hinder climate change adaptation uptake within the institution. According to Corlett (n.d) System theory has been widely applied to the study of organizations cluster around four themes as:

1. System as it illuminates productive processes: the input-throughput-output mechanisms that result in products and services going out the door.
1. System as it illuminates energizing processes: the myriad ways in which the organization affects and is affected by its environment.
2. System as it illuminates enabling processes: the mechanisms that control and measure the relationships and interactions among the organization's subsidiary parts--individuals, groups, departments, etc.
3. System as it illuminates developing processes: the systems and programs that provide for the differentiation, i.e., growth and development, of the organization's subsidiary parts--individuals, groups.

2.3 Opportunities in the institutional landscape that enhance community involvement in climate change

The institutional landscape in this study is defined as the climate change adaptation institutions within a given geographical area and the linkages that exist between them. Since climate change impacts are felt at the local level, this raises questions of how sustainable climate change adaptation strategies will be able to reverse the impacts of climate change, given that the institutions in question are, in most cases, nationally located. Wilbanks and Kates (1999) in their study found that the process to connect national or global expertise with local action, is far more effective when general expertise is focused on interactions with experts at the local scale, who then provide the linkage with local decision makers.

Kamatsiko (2017) states that establishing strategic horizontal collaboration and linkages is as important as creating vertical ones that connect to national level and reach out to grassroots efforts and peoples. Ming Xia (1997) notes four different categories of institutional linkages namely (1) Enabling linkages, which provide for authority and safeguarding, (2) Functional linkages, which provide inputs and outputs through relationships with stakeholders, (3) Normative linkages, which provide moral support and creating a favourable image, and (4) Diffuse linkages, which indirectly help with innovation and creation of new resources. Further to these, Robinson and Kagombe, (2018) note that exploration of the relationships between institutional linkages and dimensions of governance such as deliberation, equity and inclusivity, accountability, learning, and the resolution of trade-offs can be expected to yield important insights for the design of governance systems that better fit social-ecological landscapes and ultimately provide better governance.

The foregoing is concurred by the World Bank (2011) in their study in Yemen where most of the adaptation strategies adopted were financed and realized by the households themselves using their own resources. Formal institutions hardly provided any assistance in terms of training, inputs, or cash. People from the community helped each other by providing of labour for rehabilitating terraces and setting up irrigation or water management measures. The low number of strategies adopted may partly be explained by this low institutional coverage.

Opportunities create a space for potential action, by observing trends and challenges within the institutional landscape. One of the major challenges to climate change adaptation has been occasioned by the low capabilities of institutions to pick up and implement adaptation mechanisms. O'Riordan and Jordan (1999), state that institutions are central to understanding and responding to global environmental challenges. In their discussion, Antle and Capalbo (2010) indicate that public investments in research on resilient systems, and provision of this information to the public, can reduce uncertainties and encourage adoption of resilient systems in agriculture. EAC (2011) identifies inadequate institutional, legal and regulatory frameworks for adaptation as one of the major challenges to supporting climate change adaptation activities.

The climate change adaptation community has attained substantial strides towards pushing the boundaries of research and analysis around exploring workable adaptation measures and strategies in different contexts; opportunities for and barriers to adaptation; in addition to the politics of and institutional dynamics in adaptation planning (Bhatasara & Nyamwanza, 2018). There is significant interplay between barriers and limits to adaptation (Barnett et al., 2015).

Opportunities in the institutional landscape exist but have not been fully tapped. The government, NGOs, CBOs and FBOs have been at the forefront in exploring opportunities in climate change adaption in undertaking their work. Therefore, there is need to increase the private sector involvement in CCA, in the Mara River Basin. The private sector is willing to be part of the adaptation action but, as in the case of Antle and Capalbo (2010) study, adaptation needs to be viewed as an investment. Further to this, there is a need to avail the kind of information that can support both private and public decisions about adaptation investments.

Walker, Spaling and Sinclair (2016), note that embedded in the country's new constitution and EMCA, Kenya has unique opportunities for advancing environmental sustainability because the right to a clean, healthy environment, the right to participate in the management, development and conservation of the environment, the devolution of natural resource development and management, and provisions for environmental assessment, auditing and monitoring.

Klein et al. (2017) indicate that information and uncertainty continue to be of concern for adaptation researchers. Yet local level institutions can be an arena where information and understanding of future change, knowledge around adaptation options can be exchanged. Institutionally, they can serve as a conduit for distributing relevant information between community level and the national level. (Chishakwe et al., 2012).

Eriksen, O'Brien and Rosentrater (2008) note that there is a rich set of indigenous strategies to deal with multiple threats, variability and environmental change, but they are not sufficient enough to reduce the impacts of climate change. One of the reasons that indigenous strategies are inadequate is the fact that they largely operate without any formal government support or facilitation. The local

knowledge, networks, customary institutions and local biodiversity that are used for coping are often ignored by the formal financial, technological and institutional framework of most countries. Va Dany el al (2015) observed that capacity building as a process provides an opportunity for stakeholders from different organizations to meet and build relationships, and foster cooperation rather than competition.

Successful adaptation practices rely on the availability of knowledge about current and expected climate impacts, and about the options that exist to address these impacts (Klein et al., 2017). Ayers et al. (2014) from their study point out information needs to be presented in a useable form, and capacity needs to be built to enable its use. Civil society plays a key 'boundary organization' role in translating scientific information into usable policy advice.

The United Nations, a key player in climate change, has shaped policy in relation to global environmental issues and climate change since the 1970s. In 1972 the conference on human environment in Stockholm prompted creation of World Commission on Environment and Development (WCED) and produced the 1987 Brundtland Report 'Our Common Future', that states that the integrated and interdependent nature of the new challenges and issues contrasts sharply with the nature of the existing institutions (UN, 1987). The report further noted that these institutions tend to be independent, fragmented, and they work to relatively narrow mandates with closed decision processes. Those responsible for managing natural resources are institutionally separated from those responsible for managing the economy (UN, 1987). Tänzler and Carius (2013) recognize this and go further to suggest that adaptation will require both effective local activities and national and regional coordination for the design and implementation of appropriate action. Further to this, Adger et al

(2007) notes that adaptive capacity also enables sectors and institutions to take advantage of opportunities or benefits from climate change, such as a longer growing season.

Ayers et al. (2014) note that much information around climate change impacts exists externally, in the realm of international bodies such as the IPCC. Thus, a first step is to invest in national-level capacity to generate locally appropriate evidence that can speak to policy decision-making forums. Supporting this step requires harnessing national-level expertise around vulnerability as well as building capacity around climate science, to ensure that adaptation priorities are country-owned and nationally responsive.

The dependence structure of skills and knowledge thus modulates likely directions for forming interdisciplinary linkages (Wimsatt, 2019). Action that will reduce the impact of climate change and increase resilience of the population will need to be anchored in institutions that support community actions. Mikulewicz, (2018) asserts that local power structure, its local traditions, norms, and customs, and its linkages to and situation relative to outside power centres such as development agencies, the market or the government.

Va Dany et al (2015) found that capacity building as a process provides an opportunity for stakeholders from different organizations to meet and build relationships, and foster cooperation rather than competition. Walker, Adger and Russel, (2015) underlines that many local governments find it difficult, however, to implement greater cross-departmental coordination and to strengthen the dynamics between national and local level government. Landscape approaches, of necessity, are seen as aiming at collaboration and coordination (Robinson & Kagombe, 2018). Understanding which

adaptive capacity exist in the institutional landscape and how these provide for inter institutional linkages towards climate change adaptation is paramount.

Climate change institutions in Kenya observe Knowledge Management and Capacity Development, the Ministry of Environment and Mineral Resources (MEMR) coordinates climate change issues in the country with the National Climate Change Secretariat (NCCS) leading the day-to-day coordination. Other key government actors in addressing climate change are the MEMR Departments/Directorates of Resource Survey and Remote Sensing, Meteorology and the National Environment Management Authority (NEMA) and climate change units in other line ministries including agriculture, livestock and health among others. These form the government institutional landscape at national level.

The lead national public institutions found in the institutional landscape include the following nine who are researching and implementing technologies and enabling conditions towards local adaptation practices. Research is anchored in Kenya's Vision 2030 and aims to generate new knowledge. The areas identified here are those with a climate change focus;

1. Kenya Meteorological Department (KMD) who take responsibilities of research on climate change information while developing seasonal climate information towards early public warning and preparedness.
2. IGAD Climate Prediction and Application Centre (ICPAC) are charged with developing seasonal climate information products for the IGAD countries in collaboration with the National Meteorological Services of the region.
3. Kenya Agricultural Research Institute (KARI) is the lead agricultural institution in Kenya and East Africa. KARI conducts research and development on the relationships between climate variability and change with respect to agricultural crops and livestock.

4. Kenya Forestry Research Institute (KEFRI) conducts research on forestry and observes reduced emissions from deforestation and degradation (REDD)
5. Kenya Medical Research Institute (KEMRI) has its main focus on research on climate-sensitive human diseases, such as malaria.
6. Kenya Marine and Fisheries Research Institute (KEMFRI) focuses on marine resources, especially fisheries, also investigating the impacts of climate change on marine resources.
7. Kenya Industrial Research and Development Institute (KIRDI) performs research and development of environmentally-sound industrial technologies.
8. Department of Resource Surveys and Remote Sensing (DRSRS) in the Ministry of Environment and Mineral Resources is involved in conducting research and monitoring of national resources by satellite and aircraft technologies
9. International Livestock Research Institute (ILRI) has a key role in observing climate change on livestock pests and diseases. Presently in the University of Nairobi, an Institute of Climate Change and Adaptation (ICCA) has been established towards research and training on local adaptation practices

Kenya has set up clear national institutional frameworks meant to drive climate change adaptation and mitigation. However this has not translated into local institutions accessing and internalizing this information to increase sustainable climate change adaptation practices and building of resilience at the community. Antle and Capalbo (2010) go further to suggest that the information needs to be supported with public funds, to reduce uncertainties about climate change and its likely impacts. Lexina (2007) observes that adaptation is still confined to the agenda of the climate change community. It rarely shows up in the work programmes of other sectors that should be concerned with adaptation. A big task that still remains is to create awareness about adaptation among decision-makers in the sectors that are sensitive to climate change, such as water, agriculture, health, energy, building and natural resources management.

Many challenges and barriers exist in the institutional landscape. One of the major challenges to climate change adaptation has been occasioned by the capabilities of institutions to pick up and implement adaptation mechanisms. The Kenya National Adaptation Plan 2015-2030 identifies key challenges as capacity and research, awareness raising, financing and technology (GOK, 2016c). These form the gaps and basis for undertaking the investigation of the situation in the Mara river basin.

2.4 Theoretical framework

The Systems theory is a set of theoretical concepts used to describe a variety of things in terms of a model called a system. The roots of the Systems Theory can be traced within the biological sciences, where some of the founders were biologists including Ludwig Von Bertalanffy and Humberto Maturana. Ludwig von Bertalanffy advanced the general theory of systems or, more popularly known as General Systems Theory - GST). Von Bertalanffy (1951) established that, a consequence of the existence of general system properties is the appearance of structural similarities in different fields.

Von Bertalanffy (as cite in Johnson et al, 1964) outlined five aims of the General Systems Theory as: (1) There is a general tendency toward integration in the various sciences, natural and social. (2) Such integration seems to be centered in a general theory of systems. (3) Such theory may be an important means for aiming at exact theory in the non-physical fields of science. (4) Developing unifying principles running "vertically" through the universe of the individual sciences, this theory brings us nearer the goal of the unity of science. (5) This can lead to a much-needed integration in scientific education.

The principles of the Systems Theory state that every system is made up of inputs, throughput, outputs, feedback loops, boundaries and the environment (Johnson, Kast and Rosenzweig, 1964; Chen and Stroup, 1993; Laszlo and Krippner 1998). Observed phenomena in the natural and human-made universe do not come in neat disciplinary packages but they invariably involve complex combinations of fields, and the multifaceted situations they give rise to (Laszlo and Krippner 1998).

Secondly, systems can be open or closed, open systems have porous boundaries allowing for free flow of resources and information as opposed to closed systems that do not interact through their boundary. Johnson et al (1964) defined the systems concept as a framework for visualizing internal and external environmental factors as an integrated whole, allowing for the recognition of the proper place and function of subsystems. Each system has both inputs and outputs and can be viewed as a self-contained unit. A system exists within an environment and has boundary that differentiates the systems interior from the exterior.

The Systems Theory has the potential to provide a trans-disciplinary framework for a simultaneously critical and normative exploration of the relationship between perceptions and conceptions and the worlds they purport to represent. This is seen in the case of climate change which cuts across institutions that are different in their setup yet working in the same field. Thus the need to address each field separately in order to understand the whole becomes crucial for learning and addressing climate change at the local level.

The selection of the Systems Theory was influenced by the fact that the researcher was reviewing a complex set of multidisciplinary variables and needed a theory that would holistically be used to address all the elements. The Systems Theory views an institution as a complex system with

boundaries that allow input and output thereby influencing institutional performance and the process of delivering the output is based on recognizing that institutions go through change. Reviewing the institution type and mandate makes it possible to observe the connection between adaptation practice and institution type. Internal institutional governance structures and best arrangement for adaptation practices are closely linked to the System Theory where inputs and outputs are observed and the relations distinguished.

The Mara River Basin was viewed as a system having a set of distinct parts (institutions) forming a complex whole. To study this distinct parts required a theory that takes into consideration that each of the institutions - subsystem- operates within its own set of rules and regulations thus forming a boundary into which other institutions can contribute to enhance delivery of outputs. To appreciate and grasp the dynamics of climate change adaptation in the Mara River basin requires a holistic viewpoint. The Systems Theory thus allowed the research to be experienced as a whole, as opposed to the parts being considered separately. This is in agreement with Tamas (2000) who noted that, community development is a very complex activity with many elements involved that creates a challenge when describing development in a clear and organized manner, with its many components and processes the way of organizing information in community development is through a Systems Theory.

The institutions operate as sub-systems with boundaries. These boundaries enable institutions have a demarcation in terms of operationalizing their adaptation practices. The theory can be adapted when studying institutions across international, regional, national and local levels. Figure 2.1 shows this at local levels which covers the county.

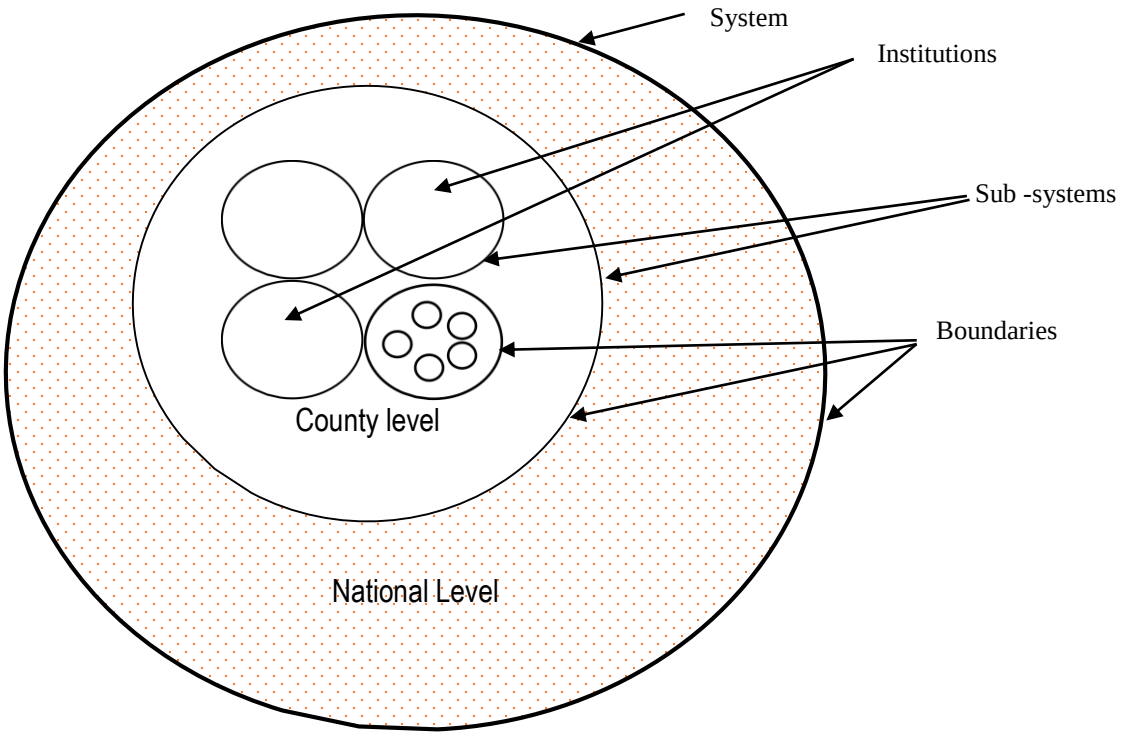

Figure 2.1: Institutions as systems and subsystems
Adapted from Tamas (2000)

In a situation where there are multiple level institutions that work towards a common goal, complexity is expected, especially if the institutions have other mandates not common to one another. Chen and Stroup (1993) agree on this and state that the ability to understand the world on more than one level is important for engaging complexity. The ability to relate individual and aggregate behaviour is crucial for understanding complexity. Insight requires shifting back and forth from the micro-level to the macro-level. Neither level can be reduced to or fully explained without the other. System thinking articulates the tension between these levels and the need to engage both levels in constructing understanding.

2.5 Conceptual framework

The conceptual framework guiding this study was conceived from the Systems Theory as shared in figure 2.2 showing the variables. The aim of using the Systems Theory was to understand how interconnectedness can enhance adaptation to climate change. Two broad assumptions were made first that institutions are complex systems with boundaries that allow input and output and making this is an open system. Secondly that institutions aim to have maximum efficiency and need to have structure, mandate and strategy by functioning at optimal levels for success

In this study, climate change adaptation is influenced by the independent variables. Practice, structure and linkages are the key tenets of the independent variable that influence the dependent variable which is adaptation to climate change.

In order to deliver climate change adaptation in the Mara river basin, the first set of inputs is local institutional practices which provide a platform for action to take place in the community. For the practices to be delivered, the second set of inputs required are the institutional structures that make for a robust institution with effective structures. The third set of inputs are opportunities created by linkages in the institutional landscape. Linkages contribute to how adaptation happens in space and time. The above set of inputs are expected to be influenced by intervening variables comprised of mandates and obligations.

This interconnectedness can be summarised as follows, the independent variables of practice, structure and linkages are internal to the institutions and are closely influenced by intervening

variables of mandate and obligations; if they work at an optimal level they will produce the dependent variable which is adaptation to climate change. The independent and intervening variables act as inputs while the dependent variable is the output.

The process of delivering the output is based on recognizing that the institution will need to have the appropriate capacities and may need to go through change.

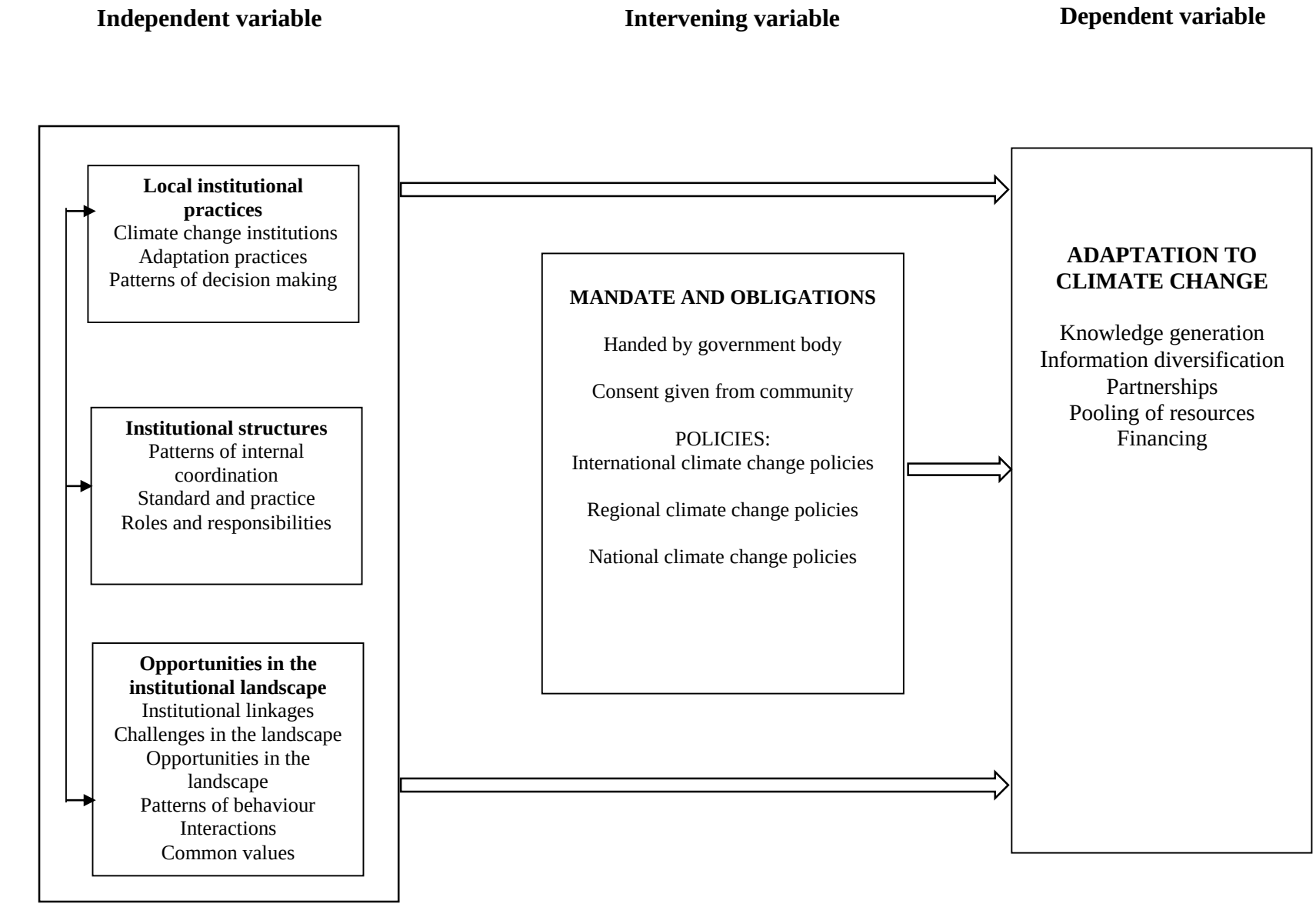

Figure 2.2: Conceptual Framework
Source: Researcher 2020

2.6 Study Gap

Local institutions represented by government, NGOs, CBOs, FBOs and the private sector engage in a range of activities some of which are adaptation practices and others that are not. It is not know to what extent they engage in adaptation. These institutions also have different mandates and structures. It is not know to what extent their structures affect their functions as implementers of adaptation practices. It is also not known how their mandates relate to adaptation and the impact this has on their operations. The aim is to understand how the local institutions mandates relate to adaptation. The internal structures of institutions are the key to whether adaptation is taking place effectively. This study aims to fill this knowledge gap, primarily by investigating the connection between the institutional mandates, structures and their functions in relation to adaptation.

CHAPTER THREE: METHODOLOGY

Introduction

This chapter presents the research design used in this study. The section gives an overview of the study area, the research design, the study population, sampling, data collection methods and data analysis are discussed. The chapter concludes with a discussion of the validity and reliability of the approach used.

3.1 Study Area

The research was carried out in the Mara River Basin in Kenya, the Basin derives its name from the Mara River which originates from the Napuiyapui swamp in the Mau Escarpment (2,932 m asl) and flows through farmlands into the plains of Masai Mara National Game Reserve in Kenya and Serengeti National Park in Tanzania before entering Lake Victoria (1,134 m asl). Sixty five percent of the Mara River Basin (MRB) lies in Kenya and thirty five percent in Tanzania. The basin is located between longitudes 33º 47’ E and 35º 47’ E and latitudes 0º 28’ S and 1º 52’ S. The main ecosystem of the basin consists of the forested habitats of the Mau Forest and the Mara riverine forest; the Serengeti-Masai Mara Ecosystem; and the aquatic habitats of the Mara River and the Mara Swamp (LVBC & WWF-ESARPO, 2010; GOK, 2018b; GOK 2018c). The Mara basin is typical of the situation across many river basins of East Africa, but it is also special because of its international profile and biodiversity conservation importance (McClain et al., 2014). The Mara ecosystem exhibits the impacts of unsustainable land use, environmental degradation, and high poverty levels and diminished livelihood options that are linked to poor land use practices and their socio-economic drivers (County Government of Bomet, 2018b).

The basin lies within the two counties of Narok and Bomet (refer map 3.1), Narok County is located in the South Rift Valley to the north of Tanzania. The county covers an area of 17,944 square kilometres, rainfall averages 1,100mm to 1,500mm annually and temperatures average 18^0 C. The low temperatures favour dairy farming, tea, coffee, maize and pyrethrum farming. Narok County is one of the country's top tourist destinations, housing the world famous Masai Mara game reserve. It is estimated that the county collects an average of Sh2.1 billion a year from tourism (County Government of Narok, 2018).

Bomet County is located in the South Rift of Kenya and covers an area of 2037.2 square kilometres. It is characterized by the undulating topography that gives way to gentle terrain in the South. The temperatures range from a minimum of 8°C to a maximum of 28°C. It has two rainy seasons with average rainfall ranging from 500 to 1,800 mm per annum. The county boasts a rich abundance of natural resources, including formerly untouched forests which are now threatened with destruction (County Government of Bomet, 2018a). The county integrated development plan of 2018 – 2023 (County Government of Bomet, 2018a) recognizes that the Mara River Basin goes beyond administrative boundaries and the counties have a responsibility of identifying and implementing viable cross-border socio-economic programmes and project activities. A key priority for the partner counties include the coordination of climate change affairs within the basin.

The study area is demarcated by two of the river Mara tributaries. The two perennial tributaries, the Nyangores and Amala rivers, drain the forested headwaters and join to form the Mara main stem, which is also perennial throughout its length (McClain et al., 2014). Further to this, the Bomet District Development Plan, divides the basin into three broad ecological zones namely

forest, agricultural and park (GOK, 2009). The forest zone is sparsely inhabited by the forest community who have lived in a positive symbiotic relationship with nature for centuries. The agricultural zone comprises the bulk of the basin population that practise agriculture and pastoralism. The majority of the households practise subsistence farming on land holdings below 20 acres. The park zone is sparsely populated and comprises mainly large scale farmers, pastoralists, conservancies and Masai Mara Game Reserve, one of the world's renowned ecosystems (County Government of Bomet, 2018a; County Government of Narok, 2018).

The focus of the study was on the middle catchment (refer to map 3.1 and plates 3.1 and 3.2), most anthropogenic activities in the Mara Basin take place here including deforestation and increased urban settlements. This is the zone with the greatest need for adaptation. A host of local institutions working on climate change issues are found here. These include government agencies, NGOs, CBOs, FBOs and private sector institutions all who have a local base/presence in the basin.

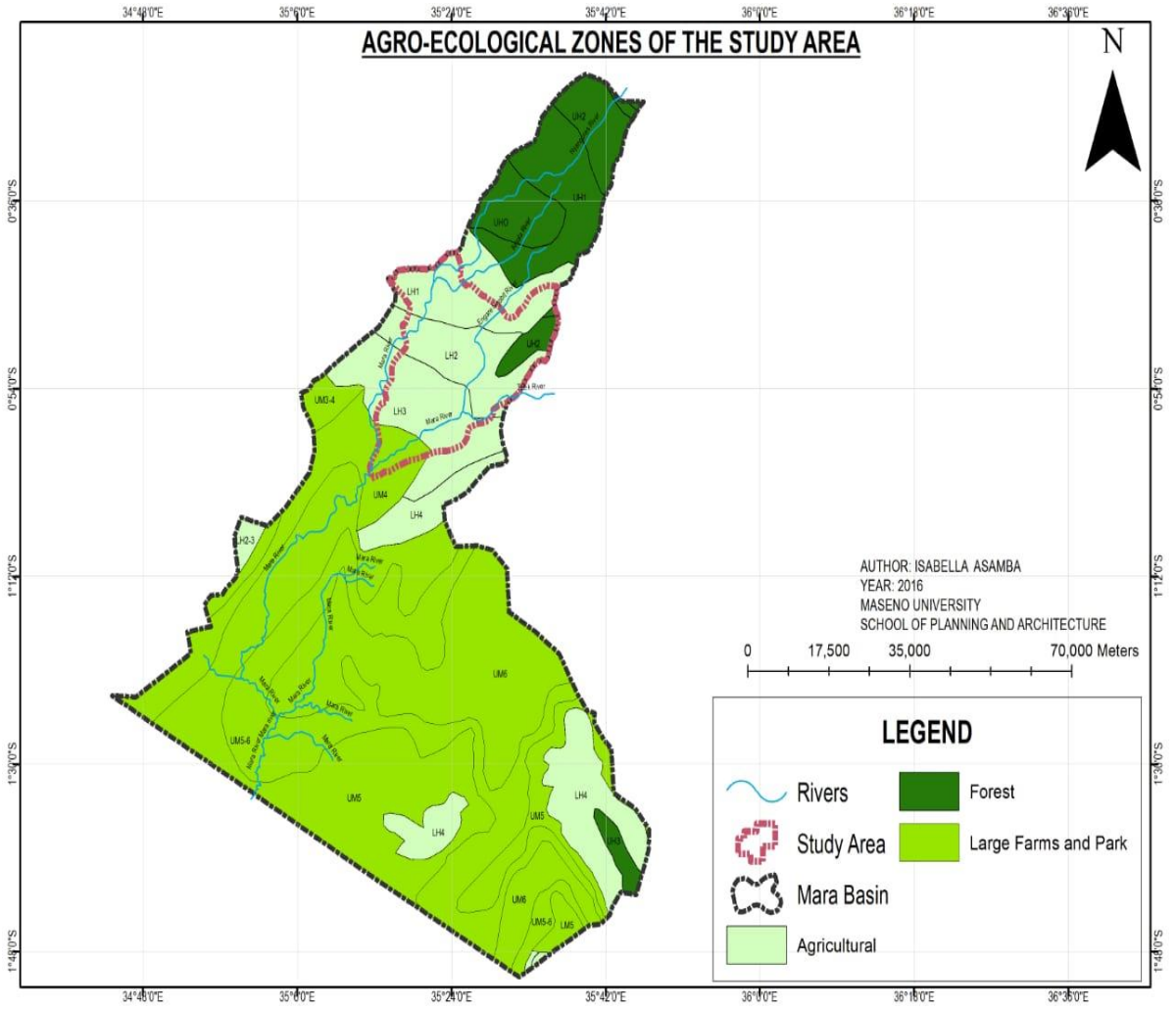

Figure 3.1: Location of Study area
Source: Researcher

Plate 3.1: View of the Mara River Basin landscape
Source: Author (2016)

Plate 3.2: Soil erosion along Mara River
Source: Author (2016)

3.2 Study Design

The study adapted a cross sectional research design. Cross sectional design allows for systematic data collection of more than one case. Kothari (2004) describes research design as the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure. The study adapted a cross sectional research design to enable collect data at one point in time.

The research design looked at linking the research questions with data collection instruments. The data required was to understand the functions of local institutions in climate change adaptation, the structure of institutions involved in adaptation within the Mara river basin, and the linkages they have in place to sustain climate change adaptation responses. The study primarily used qualitative research supported with quantitative survey in order to reduce bias in data and increase accuracy of the data collected. The purpose of using mixed methods in the research was to strengthen the study. Mixed method research involves the integration of qualitative methods and quantitative methods (Gaber & Overacker, 2012).

The study adapted a cross sectional research design where institutions in a similar environment with links to climate change adaptation practices were interviewed. The institutions in the study included government agencies, NGOs, CBOs, FBOs and private sector institutions found in the demarcated study area.

Qualitative research aimed at answering the how and what research questions allowing for documenting of processes and linkages for climate change adaptation.

Study population

The study population comprised institutions that have activities in climate change adaptation and work within the study area. The unit of analysis for this study were the institutions operating in the Mara River Basin (middle catchment). The study population was comprised of institutions of government, non-governmental organizations, community based organizations, faith based organizations and private sector institutions. The study aimed to establish the institutions involvement in climate change adaptation. The study area cut across two counties but the study population was restricted to those found in the subcounties of Bomet Central, Chepalungu, Bomet East and Narok South.

Sampling Procedure

The sampling frame for the study is shared in table 3.1 and comprised of 365 institutions working on climate change issues within the study area. Of these 296 are located within Bomet county and 69 are located within Narok county.

Table 3.1: Number of Institutions with adaptation related activities

County	Institution	Number with focus on climate change issues	Sample size at saturation
Bomet	Government	21	12
	NGO	8	4
	CBO	140	52
	FBO	60	20
	Private Sector	67	23
Sub Total		***296***	
Narok	Government	8	4
	NGO	2	2
	CBO	31	10
	FBO	11	4
	Private Sector	17	6
Sub Total		***69***	
TOTAL		**365**	**137**

Source: Department of Social services and Ministry of Economic Planning of Bomet and Narok South 2012

The study used qualitative research that entailed carrying out purposive sampling in the sub-counties. As stated by Kothari (2004), this sampling method involves purposive or deliberate selection of particular units of the universe for constituting a sample which represents the universe. Purposive sampling is considered desirable when the universe happens to be small and a known characteristic of it is to be studied intensively.

The institutions were interviewed in rounds to a stage where saturation was attained as shown in table 3.2. Mason (2010) states that saturation determines the majority of qualitative sample size, how quickly or slowly this is achieved is influenced by the aim of the study. He states further that as a study goes on more data does not necessarily lead to more information. Fusch and Ness (2015) further point out that when deciding on a study design, the student should aim for one that is explicit regarding how data saturation is reached.

For this study, the researcher carried out interviews in the sub counties in rounds. A complete round of interviews started in a sub county with each category of institutions after completion of a round the interviews were then repeated with different institutions in the same sub-counties in the same sequence until saturation was attained as shown in table 3.2.

Table 3.2 list of sampling to saturation

Round	Institution	Numbers	Cumulative
1	Government	2	2
	NGO	2	2
	CBO	10	10
	FBO	4	4
	Private sector	4	4
2	Government	2	4
	NGO	2	4
	CBO	10	20
	FBO	4	8
	Private sector	4	8

3	Government	2	6
	NGO	2	6
	CBO	10	30
	FBO	4	12
	Private sector	4	12
4	Government	2	8
	NGO	0	0
	CBO	10	40
	FBO	4	16
	Private sector	4	16
5	Government	2	10
	NGO	0	0
	CBO	10	50
	FBO	4	20
	Private sector	4	20
6	Government	2	12
	NGO	0	0
	CBO	10	60
	FBO	4	24
	Private sector	4	24
7	Government	0	0
	NGO	0	0
	CBO	2	62
	FBO	0	0
	Private sector	4	28
8	Government	0	0
	NGO	0	0
	CBO	0	0
	FBO	0	0
	Private sector	1	29
	TOTAL		**137**

3.3 Data Collection

Data collection was planned and undertaken against each of the following objectives (1) to assess local institutional practices that promote climate change adaptation; (2) to evaluate the internal institutional structures that enable or hinder adaptation practices; and (3) to analyse opportunities in the institutional landscape that enhance community involvement in climate change.

Objective one of the study was to Assess Local Institutional Practices that promote climate change adaptation. For clarity of the study, institutional practices were viewed as the actions/activities of an institution as it implements its mandate.

The data required for this objective was in three broad areas, (1) types of institutions present in the study area and where they can be found, (2) the mandate of the institutions, (3) the type of adaptation practices that the institutions carry out. For the types of institutions present in the study area this required profiling of the institutions to establish the geographical location and scope. Information on this was found through secondary literature within government offices at the county and sub-county in inventories used to register non-state institutions and in reports of the different institutions. The researcher also undertook key informant interviews with each institution's representative and group discussions with institution members to complete the profiling.

The study also examined the extent to which the mandates of the institutions related to climate change adaptation and compared this with the climate change adaptation action as stipulated in the Climate Change Act 2016.

Lastly for objective 1, the study selected climate change intervention areas based on the National Climate Change Adaptation Plan (2013-2018) guidelines and examined the extent to which local institutions engage the sectors in adaptation. This involved reviewing institution progress reports and carrying out key informant interviews with representatives of the institution, group discussions with staff members and site visits to observe the practices they undertake in the community.

Objective two of the study was to evaluate the institutional structures that enable or hinder adaptation practices. Institutional structures for the purpose of this study are considered as frameworks around which coordination, planning, management and logistics take place. Structures are mechanisms of how social order is maintained, it involves issues of governance inclusive of rules, plans, procedures, roles and responsibilities and hierarchy for reporting.

The data required for this objective was in three broad areas, namely (1) the types of structures/frameworks that exist within the different institutions; (2) how different structures/frameworks enable adaptation practices and (3) how different structures/frameworks hinder adaptation practices. For the types of structures/frameworks that exist within the different institutions, the focus was on understanding the different types of structures that exist in institutions. This information is found in literature and was collected through a desk review, officials of local institutions were also interviewed and they were able to provide information on structures that exist in their institutions. For how different structures enable adaptation practices, the interest was on plotting the extent to which structures promote adaptation practices. In order to gain data institutional effectiveness questionnaire was administered to officials of local Institutions. For insight into ways that different structures hinder adaptation practices the focus was on plotting the extent different structures have a negative effect on adaptation practices. To attain data for this, officials of local Institutions were interviewed using an institutional effectiveness questionnaire.

Institutional effectiveness tool

This tool was grounded on Corlett (n.d) four thematic areas of developing processes, enabling processes, productive processes and energizing processes. These processes relate to one another

and also relate to different sections in the institution. **T**he researcher developed four quadrants shown in table 3.3, from the thematic areas and further designed questions linked to each of the quadrants in order to measure structures that enable or hinder effective function of the institutions. These were used to interview the institutions. Each institution responded to the questions in relation to their work in climate change adaptation practices. The aim was to check on the relationship between their performance and their effectiveness in delivery of adaptive practices to climate change given the structures they have in place.

Table 3.3: Institutional quadrants

The **developing processes** quadrant looked at institutional human resources in the context of inputs such as skills; knowledge; participation; effective communication; and how these translate to immediate outputs such as decision making and finally efficient service delivery towards adaptation to climate change. Strategy is the pattern of decision making which shape the institution and its delivery of services.	The **energizing processes** quadrant gauged the relationship between the institution and key stakeholders especially the community and the institution's sponsors and collaborators. It required assessing the institution's role areas of networking locally, nationally, regionally, and internationally; ability to lobby and advocate for adaptation to climate change; linking legitimacy to performance in the climate change arena.
The **enabling processes** quadrant reviewed the institutions as a system's ability to create stability in order to deliver on the required mandate. It requires managing resources at the institutions disposal by initiating plans and budgets; putting into place and working with rules/procedures, documentation that is accessible and useable; keeping financial records and human resource records	The **productive processes** quadrant assessed strategies used within the institution to enhance visible actions. Goals, objectives, actions, results in relation to adaptation were reviewed and timeliness of institution while taking action.

Adapted from Corlett (n.d)

Officials from each of the participating institutions was interviewed using questions and the score table in Appendix 2.

Objective 3 of the study was to analyze the opportunities in the institutional landscape that enhance community involvement in climate change adaptation. The study viewed institutional landscape

as institutions within a given geographical area and the linkages that exist between them, the linkages can be vertical and horizontal. The vertical linkages connect a lower level to a slightly higher level and horizontal linkages connect institutions within the same geographical level. For this study, institutions in the same geographical area and the linkages they exhibit were studied.

The data required for this objective was in four broad areas, (1) types of institutions in the landscape engaged in adaptation (2) Horizontal and vertical linkages, (3) Challenges faced by different types of institutions and (4) an inventory of opportunities in the institutional landscape. For the types of institutions in the landscape, identification and classification of the institutions to establish their geographical scope. Information on this was found through secondary literature in reports within the different institutions, key informant interviews with each institution's representative and group discussions with institution members was also undertaken.

For the vertical and horizontal linkages the researcher established the existence on institution collaboration, the nature of the associations and the associations that are related to adaptation. This data was found in secondary literature specifically institutions' progress reports, annual reports and evaluation reports. Further to the foregoing group discussions with institution members were undertaken to gain insight into the linkages. For data on challenges faced by different types of institutions the issues of interest was to identify the challenges, whether the challenges are related to adaptation and if the challenges specific to each category of institutions. Officials of institutions were interviewed using the institutional challenges mapping (Appendix 3)

For the fourth broad area where data was needed, inventory of opportunities, data was sourced on what institutions considered as opportunities in their associations and whether the opportunities

can be used to support adaptation. An opportunities identification template (Appendix 4) was used by officials and members of local institutions in group discussion to identify the specific opportunities.

3.4 Data Analysis

Analysis can be categorized as descriptive analysis and inferential analysis (Cooper 1998; Kothari 2004). The purpose of inferential approach to research is to form a data base from which to infer characteristics or relationships of population. Descriptive analysis is largely the study of distributions of one variable, this sort of analysis may be in respect of one variable – unidimensional analysis, or two variables - bivariate analysis or more than two variables - multivariate analysis (Kothari 2004). To depict the characteristics of the institutions and climate change adaptation practices, the researcher used descriptive analysis, bias was minimized by ensuring that analysis considered both qualitative and quantitative methods of data analysis. Preparation of data analysis was done separately for quantitative and for qualitative data analysis. For quantitative data analysis questionnaires were cleaned, coded, sorted, and entered into SPSS data base. Further analysis involved checking for trends and distributions and taking the data through a statistical test. The specific statistical tools for analysis of quantitative data used were cross tabulation and frequency to explore associations.

From the detailed field notes, qualitative data analysis started with findings being first recorded and aggregated at each focus group discussion level and then across discussion groups. This were followed by coding the data into thematic areas, clustering similar themes, classifying data into smaller themes and finally checking for links between the themes. Based on the themes, the current roles, gaps in roles and overlaps in roles of different institution categories on supporting

communities to adapt to climate change were identified and described. An analysis of the institutions strengths were done with a focus on the existing structure, membership, resource base and technical capacity.

Objective one of the study was to assess local institutional practices that promote climate change adaptation practices; the type of data collected and analyzed included (1) types of institutions present in the study area, (2) mandate of the institutions in relation to climate change adaptation (3) type of adaptation practices that the institutions carry out. For the types of institutions present in the study area, data collected from secondary sources was recorded and aggregated at each discussion level and then across discussion groups into thematic areas. This enabled to gain a record of institutions present in climate change adaptation. Further to this, from the primary sources the data collected was cleaned, coded and sorted. Frequencies and distributions were checked to enable have knowledge of the categorization of the institutions operating in the study area within the Mara basin.

For data on the mandate of the institutions in relation to climate change adaptation, content analysis of government policies, non-state institutions' constitutions and bye laws that mandate their actions were examined to gain insight into the content and what it says. It involved recording and aggregating information into institution categories and information on procedures laid down to implement adaptation.

For data on type of adaptation practices that the institutions carry out, analysis was done in two steps. Firstly to gain knowledge and information on the adaptation practices undertaken as stipulated in the national climate change adaptation documents and the county integrated plans,

data collected was recorded and aggregated into thematic areas and groups. Secondly, a comparison was done on what the reports indicate and the areas that the institutions are involved in. Further to this, cross tabulations was then used to show the association between the adaptation practices and the category of institutions. This enabled gain insight on the practices different institution types were involved in and whether this relates to their mandate thus the capacity of the institutions to foster climate change adaptation practices. The data was presented using tables and images, explanations were done to strengthen discussion.

Objective two of the study was to evaluate the institutional structures that enable or hinder adaptation practices. The data for this objective was in three areas (1) the types of structures/frameworks that exist within the different institutions; (2) how different structures/frameworks enable adaptation practices and (3) how different structures/frameworks hinder adaptation practices. Analysis for the types of structures/frameworks that exist within the different institutions was undertaken by using the institutional quadrants. The information gathered was recorded and aggregated into themes per institution, this was then plotted into spider diagrams to visualize the strong and weak areas.

Analysis on how different structures/frameworks enable adaptation practices and on how different structures/frameworks hinder adaptation practices was done by using data from the institutional effectiveness tool interview. The data was cleaned, coded, sorted and entered for analysis for frequencies.

Checking for frequencies and distributions by using the institutional quadrants and spider diagrams enabled showed the structures that enable climate change adaptation practices function and those that hinder climate change adaptation practices to function effectively within each category of institutions. The information generated showed which category of institutions is best placed to handle climate change adaptation while appreciating the structures that each need to scale up adaptation practices.

Objective 3 of the study was to analyze the opportunities in the institutional landscape that enhance community involvement in climate change adaptation. Data analysis was done in four areas (1) types of institutions in the landscape engaged in adaptation (2) Horizontal and vertical linkages, (3) Challenges faced by different types of institutions and (4) an inventory of opportunities in the institutional landscape. Objective three yielded qualitative data, analysis for the types of institutions in the landscape engaged in adaptation was undertaken to know the institution categories present in the basin landscape. The classification of institutions involved aggregating information at each discussion level and then across discussion groups to know the types of institution present. Horizontal and vertical linkages involved analyzing to know the institutions collaborations and linkages within the same localities at the sub-county level and upward to the county level. Data was first classified into smaller themes followed by checking for links between themes and institutions.

Analysis on challenges faced by different types of institutions and opportunities in the institutional landscape was done by recording and aggregating information at each discussion level and then across discussion groups between the different institutions. Coding of data into thematic areas was done followed by clustering similar themes/challenges. Data was then further classified into

smaller themes and links between the themes were checked for. After transcribing text this allowed by interpretations of the data collected which was used to create a narrative with classification of challenges and opportunities into thematic areas by the different categories of institutions.

3.5 Reliability and Validity

Two pre-tests of the questionnaires and focus group discussion tools were undertaken three months prior to the full study. Prior to the pre-tests, two separate visits were undertaken by the researcher. The first visit was to gain an understanding of the geographical scope of the potential study area and also to make preliminary links with officials in the basin. The second visit went a step further to identify key climate change adaptation issues that would need to be included in the study. It was also meant to gather information on the existing institutions and their key activities.

The third and fourth visits were conducted to pre-test the tools in selected institutions in Mutarakwa and Melelo wards within Bomet and Narok counties respectively. The questionnaire and checklists were administered and checked for clarity, ease of administration, repetitions and sensitivity. The focus was also on ensuring objectivity of the questionnaire so that, even when translated, the meaning and understanding of the questions by different respondents would remain the same. Revisions were than undertaken prior to the study. Based on the outputs of the first pre-test, corrections were made and the tools administered a second time to institutions in the same locality. Some of the key issues addressed and corrected during the pre-tests including flow of questions, clarity of questions and simplicity to ensure that institutions, whether government, NGO or agribusinesses in the village, understood the question without major challenges. During the

main study, these two wards of Mutarakwa and Melelo where the pre-tests had taken place were omitted.

Further to the above, validity of the research was tackled throughout the research. The research was grounded in the system theory to guide the study. Tools selected were linked to the objectives, throughout process the tools were shared with the supervisors to ensure that the questions posed and tools were valid and had the potential for scaling up in any other setting. Sampling took into consideration that all categories of formal local institutions - government, NGO, CBO, FBO and private sector institutions - were considered and were spread throughout the study area.

3.6 Ethical Considerations

The researcher maintained objectivity at all times during the research to avoid bias in data collection, data analysis, and data interpretation. Respondents were assured of confidentiality of data hence only the institution name and first name of the respondent was required in the questionnaire for identifying data. Confidentiality and privacy were paramount and were maintained in keeping company secrets and records and ensuring respect of intellectual property. The research also ensured equity in the selection of institutions to be involved in the research at all points. Towards this, the researcher avoided discrimination on the basis of financial and non-financial resource base, location of institution, age and other affiliations and maintained honesty in all communication. Integrity that is, acting with sincerity, striving for consistency of thought and action and keeping promises guided the whole research. Finally, the researcher ensured that the research conformed to laws of Kenya and other international guidelines governing research involving human participants.

CHAPTER 4: DATA PRESENTATION, ANALYSIS AND DISCUSSION

Overview

This chapter presents findings and discussions of the study based on three objectives. The main objective of the study was to establish the capacity of local institutions to foster climate adaptation responses in the Mara River Basin. The specific objectives were 1) to assess local institutional practices that promote climate change adaptation in the Mara river basin, 2) to evaluate the internal institutional structures that enable or hinder climate change adaptation in the Mara river basin, 3) to analyse the opportunities in the institutional landscape that enhance community involvement in climate change adaptation in the Mara river basin.

4.1 Local institutional practices that promote climate change adaptation

The first objective of this study was to assess local institutional practices that promote climate change adaptation in the Mara river basin. The objective was addressed by gaining insight into three critical areas specifically the types of institutions present in the study area, the mandate of the institutions and the adaptation practices that the institutions carry out.

4.1.1 Institutions present in the study area

The first step under this objective was to identify institutions that operate in the Mara basin middle catchment with a focus on climate adaptation actions. This was followed by categorization of the institutions to gain clear insight on the institutions that operate in the study area and their coverage. The inventories used to register non-state institutions at the county's Ministry of Sports and Gender office of the social development officer and the Ministry of Planning and Devolution office were reviewed and provided the required information. Also used were reports provided by different

institutions during interviews with the specific institution's representative. The foregoing literature review revealed that the Mara River Basin has a host of institutions operating within its boundaries and spread across different sub counties. The study placed the institutions into the following five broad categories i.e.

1. Government agencies
2. Non-governmental organizations
3. Community based organizations
4. Faith based organizations
5. Private sector institutions

Government Institutions

The study interviewed sixteen respondents from key government ministries and departments of government found at the county and sub-county levels that are engaged in climate change adaptation in Bomet and Narok Counties. These institutions are governed by rules and regulations that determine their role in climate change activities and are guided by the Climate Change Act of 2016, the National Adaptation Plan 2015-2030, the National Climate Change Plans and the specific county integrated development plans. Table 4.1 indicates the point of contacts for these institutions.

Table 4.1: Site location of institutions

GOK	NGO	CBO	FBO	Private Sector
Government institutions are stationed at the county, sub county and ward administrative headquarters from where they carry out their operations.	NGOs are found stationed either at the county, sub county or ward level. Depending on if they are international or national, NGOs can transcend county boundaries. However their operations are run specifically within a ward of a sub-county	CBOs are found within the communities where they are located. These institutions are located at the ward and village levels where they carry out their operations.	FBOs are stationed at the county, sub county and ward levels	Private sector institutions are located at the county, sub county and ward levels.
Government institutions have established offices and contact telephone numbers and emails	NGOs have offices and contact telephone numbers and emails	Very few CBOs have physical offices but CBOs can be traced through their umbrella organization offices situated in Silibwet township and Mulot township. CBOs can also be found at the point where they are carrying out activities such as tree nurseries sites. CBO officials also have telephone contacts that can be used to contact them.	FBOs use space provided by their mother church or mosque.	Private sector institutions have physical infrastructure in the form of their business premises where they can be accessed

Non-Governmental Institutions (NGOs)

In addition to the government institutions, the study area has Non-Governmental Organizations. These are the organizations that have an interest in development and for purposes of this study, those that have a focus on climate change adaptation either locally or nationally. The study interviewed six NGOs in the Mara Basin as shown in appendix 1. In the Mara River Basin the non-governmental organizations are composed of both international and national NGOs, they are not numerous and in most instances they cover wide geographical areas. The Narok County Integrated Development Plan 2018-2023 states that the Narok County has few Non-Governmental Organizations which support development of the area. The NGOs are mainly involved in water

and sanitation, health, education and social protection (County Government of Narok, 2018). Reid et al (2010) indicate that NGOs are considered an important bridging group in facilitating information flows between CBOs and research organizations. Table 4.1 indicates the point of contacts for these institutions.

Community Based Organisations (CBOs)

The third category of institutions are Community Based Organizations (CBO), these are formal and informal institutions that are found within the community and within easy reach of households. CBOs were found to be institutions established by community members coming together with a common goal aimed at supporting development initiatives at the village level. Hussain, Khattak and Khan (2008) view CBOs as not for profit organizations on a local level, facilitating community efforts for community development. CBOs work through people-centered modes of development such as availability of micro-finance and community participation in development ensuring the community improves over time. Thompson (2013) is in agreement that CBOs are all nonprofit voluntary bodies are registered with the government as legal entities.

A total of 62 CBOs took part in being interviewed for this study as shown in appendix 1. The Mara River Basin Water Users Association (MRWUA) is the largest association in the basin, it is an umbrella organization composed of over thirty three CBOs tackling environmental and climate change issues, an example is Sugutek Youth Group (see Plate 4.1) a CBO that focuses on tree planting whose aim is to reforest the hills in their catchment. The focus group discussions showed that this collaborative engagement allows for various community institutions to come together and support households build resilience through various adaptation practices. CBOs are exclusively

managed by local people who reside in the vicinity of their operations. Often the persons running the operations are not formally employed but serve on voluntary basis.

Plate 4.1: CBO focussing on tree nurseries and tree planting

Faith Based Organisations (FBOs)

The fourth category of institutions engaged in climate change adaptation in the Mara River Basin are Faith Based Organizations (FBO). For the study twenty four FBOs were interviewed as shown in appendix 1. Faith Based Organizations are establishments' setup by religious bodies such as churches and mosques to support the immediate congregation meet their basic needs. These basic needs include actions towards access to clean water, access to food and access to shelter. Olarinmoye (2012) notes that a faith-based organization is 'any organization that derives inspiration and guidance for its activities from the teachings and principles of the faith or from a particular interpretation or school of thought within the faith. Further to this, FBOs have been important actors in the social, economic and political life of developing countries since the colonial

period when they ‘partnered the colonial state in providing vocational training centers, hospitals, health clinics in the colonies’ (Olarinmoye, 2012).

Iati (2008) argues that overlooking the role of religion, and in particular the influence of the church, in relation to social action would be ignoring a key factor in mobilizing people to respond to climate change. Bringing to the fore the importance of religion in everyday life. In the Mara Basin, most FBOs are located within the villages but have a wider geographical coverage reacting to the ward level. Table 4.1 indicates the point of contacts for these institutions.

Plate 4.2: Private sector institutions in Mara River Basin: Small businesses
Source: Researcher

Private Sector

The Private sector institutions are primarily businesses/companies that are based in the community and support climate related activities include telecommunication companies and their dealers; Agrovets and chemists; Agribusinesses - Cereal Stores, Community Forest Management, Bomet Traders association; learning institutions - schools; clinics and hospitals e.g. Tenwek Mission hospital and large companies such as Kenya Tea Development Authority. While the smaller enterprises are limited to the ward level, the larger ones cover the sub-county and the county. Table 4.1 indicates the point of contacts for these institutions.

4.1.2 Mandates of local institutions

The study examined the mandates of locations to establish what their core businesses were and the extent to which these included adaptation related practices.

Government Institutions have the key mandate to effect and ensure climate change adaptation takes place in each county. The broad objective of government ministries and their agencies is to oversee development through provision of services, regulatory services and research. These institutions are stationed at the county, sub county and ward level and are supported by their national level counterpart offices which are based within the counties. The Climate change Act 2016 gives the county government the mandate to mainstream climate change action into county government functions (GOK, 2016a) it further state that during development, updating and approval of the CIDP and county sector plans, the county should mainstream the NCCAP into the sectors taking into consideration county priorities (GOK, 2016a). A summary of the core mandates is presented in table 4.2.

Table 4.2: Summary of Government Institutions Core mandates

Government institutions *(Cluster)*	**Summary Mandate**	**Where mandate is drawn from**
Agriculture	Crop and horticulture production Food security and nutrition Livestock production Cooperative and marketing	County government ministry policies
Environment and Natural resources (Water, Forestry, energy)	Sustainable management of the county environment and natural resources Riparian protection Forest protection and management, increase forest cover Soil and water conservation Waste management	County government ministry policies
Ministry of Youth, Gender, Sports and Culture Department of Social services	Youth and Women empowerment Registration of community groups Capacity building of groups in leadership and management skills	County government ministry policies

At the county level, the CIDP further provides mandates to the government institutions, for instance the Narok County Integrated Development Plan 2018-2023 states its strategic priority on climate change as drafting and implementing a climate change policy and work-plan including the formation of the Narok County Climate Change Fund (County Government of Narok, 2018). Bomet County has in place a draft Climate Change Policy which mandates the Governor to designate a County Executive Committee Member to coordinate climate change affairs and to give prominence to Climate Change in the title of the department. The county government is also mandated to put in place a technical institutional framework to guide policy and functional implementation of climate change legal obligations of the county government (County Government of Bomet, 2018b). However, the institutions mandated to do so are still in their formative stage at the county.

The county government with the County Climate Change Units are expected to spearhead actions

on climate change as shown in the Climate Change Act 2016, the National Adaptation Plan 2015 – 2030 and the county integrated development plans for Bomet and Narok counties (GOK, 2016a; GOK, 2016c; County Government of Bomet, 2018a; County Government of Narok, 2018). The County Climate Change Units within the Mara River Basin have not been set up. The Bomet County Draft Climate Change Policy of 2018 states the need to put in place a technical institutional framework to guide policy and functional implementation of climate change legal obligations of the county government (County Government of Bomet, 2018b). In Narok County, different government departments spearheaded by the department of Environment, are engaging stakeholders as they develop their County Climate Change Policy (County Government of Narok, 2018).

The Bomet County Draft Climate Change Policy of 2018 provides evidence of the key climate risks at the county, climate change impacts on the sectors, climate adaptation activities that are planned and those being implemented, mechanisms for the integration of climate change adaptation into relevant new and existing sector policies, planning and budgetary processes for climate change (County Government of Bomet, 2018b). Ministry staff at the county level derive their authority from the county headquarters. The national government has strong influence locally (within the county and sub-counties) in terms of technical expertise and advice, financing, policy formulation and regulation. A summary of the core mandates is presented in table 4.3.

Table 4.3: Summary of NGO core mandates

NGO	Core mandate	Where mandate is drawn from
Forest Action Network	Policy and research for sustainable management of the environment natural resources Forest conservation Tree planting Capacity building of community groups Partner with government and other CSOs for implementation of sustainable environment	Within the institution's policy documents inclusive of the institution's constitution. Their activities change over time and are often dictated by the donors they have at a given time
Kenya Red Cross	Humanitarian actions related to disasters	Within the institution's policy documents inclusive of the institution's constitution.
Action Aid – Kenya	Water projects (access to clean water) Agriculture and livestock support Support to women empowerment Policy and research	Within the institution's policy documents inclusive of the institution's constitution.
World Vision Kenya	Poverty reduction Water projects Food security project	Within the institution's policy documents inclusive of the institution's constitution.
Worldwide Fund for Nature	Biodiversity research Partnering with government and NGO for biodiversity conservation Capacity building of CBOs and FBOs through the Mara River Basin Water Users Association	Within the institution's policy documents

NGOS are set up for the implementation of short term humanitarian programmes and long term development programmes. NGOs have other core businesses and climate change has been added onto their mandate. Reid et al., (2010) note that the development of NGO interest in climate change adaptation has come with an introduction of new institutional and management frameworks which have added responsibilities to them at local community levels.

NGOs are governed by their specific institutional rules and regulations. However, these regulations have to fit into the public sector policies as laid down by the national government. The NGOs working on climate change are guided by international climate change policies and national public policies on climate change adaptation priorities. Each NGO uses these policies to design its own internal adaptation policies for implementation.

CBOs commonly gain their mandate from their immediate population, thereafter they get registered by the government under the Department of Social Service for purposes of regulation. Among these are local welfare groups - inclusive of women groups, youth groups, societies and associations. CBOs have rules and regulations that govern them mostly written as simple constitutions or bye-laws. The Narok County Integrated Development Plan 2018-2023 stipulates the mandate of societies as marketing of members' farm produce, provide credit facilities and farm inputs to members. A summary of the core mandates is presented in table 4.4.

Table 4.4: Summary of CBO core mandates

CBO cluster	Summary Mandate	Where mandate is drawn from
Agriculture and livestock	The key mandate is to address welfare and income generation needs of their target community Welfare the interest is on agriculture inputs, school feeding programs On income generation focusing on generating income from sale of farm produce	Drawn from the bye-laws/constitution used during registration. The activities do not always tally with what is written in their constitution but they are based on what a donor or the community want addressed
Environment, Forest and energy	The key mandate is to address welfare and income generation needs of their target community Welfare the interest is on environmental conservation On income generation focusing on generating income from sale of tree seedlings, wood fuel	Drawn from the bye-laws/constitution used during registration. The activities do not always tally with their constitution but they are based on what a donor or the community want addressed
Water and Health	The key mandate is to address welfare and income generation needs of their target community Welfare the interest is in clean water provision On income generation focusing on generating income from sale of water from improved sources	Drawn from the bye-laws/constitution used during registration. The activities do not always tally with what is written in their constitution but they are based on what a donor or the community want addressed

In Hussain, Khattak and Khan (2008) the purpose of CBOs is stated as to plan, implement, and monitor social and economic development programs and provide technical and financial help to

the communities. CBOs positively affects the process of rural change i.e. increase in income, improvement in health, nutrition and literacy status of the populations. Chechetto-Salles and Geyer (2006) assert that CBO leadership is charged with sourcing for funds from members and well-wishers. Established CBOs are able to generate budgets based on their interactions with the community and external stakeholders such as government, the private sector institutions and NGOS. Despite the foregoing, Yi-Yi Chen (2013) states that Community-based organizations (CBOs) generally face challenges of meeting clients' complex needs with limited resources.

From the interviews carried out the overall goal of CBOs was stated as improving the living standards of residents. The majority of the CBOs tackle issues related to welfare and income generation in order to secure livelihood for community members. The overall goal of CBOs is to improve the living standards of residents and climate change has been added onto their mandate in order for them to improve their outputs.

The role of CBOs is thus to encourage community members to contribute for work to be done as they coordinate and manage the resources at their disposal for sustainable development. In terms of climate change action, CBOs were noted to be strong in mobilizing community members to participate in identification of development needs of the community, implementation and management of community development plans and projects, and representing community interests.

FBOs core business is spiritual outreach, Iati (2008) asserts that many churches are preoccupied with the spiritual and other needs of their congregation. Their strength lies in their capacity to

influence society and mobilize people for social and political change. Moyer, Sinclair and Spaling (2012) state that FBOs in Kenya engage in a wide variety of projects addressing both development and environmental issues. The beneficiaries of these projects are chosen mostly by need or based on a particular geographical area where the organization operates. A summary of the core mandates is presented in table 4.5.

Table 4.5: Summary of FBO core mandates

FBO	Summary Mandate	Where mandate is drawn from
Christian and Islam based FBOs	The key mandate is to provide spiritual nourishment and psycho – social support	Drawn from the bye-laws used during registration. The bye-laws are influenced by the mother church/mosque who manage the finances

In the last decade many FBOs have widened their mandate to reach all persons within their catchment on issues pertaining to livelihood security, within this climate related issues have become prominent. In terms of climate related action, FBOs are inclined towards support on awareness creation activities. There is a close link between management of the development activities and the religious institution's spiritual leaders, the larger institutions for instance the Catholic Church, recruit staff whose skills are built to enable them handle issues of climate change adaptation. Some FBOs support schools with activities related to climate change adaptation such as setting up tree nurseries and tree planting. In the study area, FBOs are managed by the mother church or mosque. In a few instances, staff are recruited to manage the development activities but the final/overall decision still rests with the pastor, priest, or imam.

The private sector institutions have clear regulations that govern their operations and eventually aim to make some level of profit. Private sector institutions' influence ranges from local to regional

levels. While Kenya Tea Development Authority, Tenwek hospital and the telecommunication companies (Safaricom, Airtel) have a wider influence covering the county and beyond. The smaller businesses such as the Agrovets and agribusinesses (see Plate 4.2) have a local influence within the sub-county, wards and nearby villages.

The National Adaptation plan 2015 -2030 and the National Climate Change Plan 2018 -2022 notes that the private sector is an active partner in adaptation, providing technologies, insurance products and climate information services, many of which are facilitated by smart phone applications (GOK, 2016c; GOK, 2018). This has come about because the private sector institutions have been impacted by climate variability and has suffered negative impacts of droughts and flood risks (GOK, 2016a). A summary of the core mandates is presented in table 4.6.

Table 4.6: Summary of private sectors core mandate

Cluster of Private sector institutions	Summary Mandate	Where mandate is drawn from
Agrovets	Provision of farm and livestock inputs and services at a cost	License issued guides their operations
Education	provision of education services at a cost	License issued guides their operations
Health based services and pharmacies	Provide health services to the community at a fee	License issued guides their operations
Communication	Provide communications products and services at a cost	License issued guides their operations

From the foregoing it is notable that the institutions in place who are the actors on the ground have differing mandates in relation to climate change. It is only the government institutions that in the last decade put in place clear mandates to manage its operations in climate change adaptation. Even these mandates for the government institutions have not yet been completely operationalized. Iati (2008) noted that NGOs work with communities and at the same time are able to engage policy

makers from governments, multilateral development organizations and aid donors. Added to this, the collaboration between NGOs and churches could prove very effective, particularly given the influence the church can have on mobilizing social action. Klein et al (2017) is in agreement and argues that non-governmental organizations and civil society have major contributions to make, and private actors and small-to-medium enterprises are increasingly held up as potentially key players in the adaptation arena.

4.1.3 Climate change adaptation practices

Adaptation practices in this study refers to the actions/activities of an institution in addressing climate change as it implements its mandate. The National Climate change adaptation plan (2013-2018) indicates the climate change intervention areas from which this study has selected a number of areas to interrogate with a view to establishing if the institutions in the Mara river basin actually implement adaption in relation to the selected intervention area. The intervention areas selected include Agriculture, Environment, Forestry, Energy and Water

Government institutions are at the forefront in planning and implementing for climate change adaptation issues guided by the County integrated development plans which draw their mandates from the Climate Change Act 2016, the National Climate Change Action Plan 2013 – 2017 and the National Adaptation Plan 2015 -2030. Each government institution at the county reviews climate related issues within their mandate to that these are incorporated in the County Integrated Action Plans and the County Spatial Plans. Once the climate related activities are budgeted for according to what has been planned, and finances disbursed to the relevant ministries for

implementation, the planning process emanates from discussions at the ward level and cascades to the sub county and finally to the county.

The adaptation actions are contextualized within the national/county planning documents and for purpose of this study were clustered into the specific sectors of agriculture and livestock, environment, forestry, energy and water (County Government of Bomet, 2018a; County Government of Narok, 2018). This is in agreement with Chishakwe et al, (2012) who note that the successes of community based adaptation are likely to be hinged on those attributes that enable local communities to be in control of their adaptation, covering various sectors such as agriculture, water, natural resources and others.

Five major types of adaptation activities that the Mara River Basin institutions carried out as gathered from the key informant interviews are summarized in tables 4.7 to 4.11. Institution respondents were asked to indicate the major climate adaptation activities they are supporting in the community and these were recorded to show which category of institutions was undertaking the adaptation practice.

Table 4.7 that follows shows the agriculture adaptation related activities.

Table 4.7: Adaptation activities related to agriculture that are supported in the community

Agricultural Support provided(practices)	Supporting Institution					Total (n=5 institutions)
	GOK	NGO	CBO	FBO	Private sector	
Land preparation	1	0	1	1	0	3(3/5)
Farm inputs	0	0	1	1	1	3(3/5)
Soil conservation	1	0	1	1	0	3(3/5)
Agro forestry practices	1	1	1	1	0	4(4/5)
Storage	1	1	1	1	1	5(5/5)
Access to crop production Information	1	1	1	1	1	5(5/5)
Livestock breeding	1	0	0	0	0	1(1/5)
Access to livestock production Information	1	1	1	1	1	5(1/5)
Total (n=8 practices)	7	4	7	7	4	

1= adaptation activities supported, 0= adaptation activities not supported
Good performance=more than 50% of the institutions engage in the practice……(7/8)100=87.5%
Bad performance=less than 50% of the institutions engage in the practice……(1/8)100=12,5%

Interpretation:-87.5% of the adaptation practices examined under the agriculture had a score of over 50 %%.(*More than 50% of the institutions implemented the adaptation practice).*

An overall examination across all the institutions reveals that the main agricultural adaptation related activities supported in the communities by all the local institutions are storage, access to crop production information and access to livestock information. This is followed by agroforestry practices (see plate 4.3) where government, NGOs, CBOs and FBOs are supporting the activity. The least area of concern was livestock breeding which was only supported by the government. The government institutions, CBOs and FBOs are involved in the support of seven out of eight agriculture and livestock adaptation activities in the community. For the government institutions

they do not support the provision of farm inputs, while for CBOs and FBOs the only adaptation practice they do not support in the community relates to livestock breeding.

IFAD (2014) states the importance of investing in the agricultural sector as it is one of the most powerful ways to address climate change adaptation. These investments do not just benefit smallholder farmers but contribute to wider development goals such as poverty reduction, functioning environmental services and cutting carbon emissions. The NAP 2015-2030 states the need for promotion of sustainable climate smart agriculture methods as a key to making the sector more resilient to the impacts of climate change (GOK, 2016c).

The common agro-forestry activities include border tree planting, trees interspersed in cropland, trees in soil conservation structure, and woodlots within homes and schools (County Government of Narok, 2018; County Government of Bomet, 2018a). In the Narok County CIDP 2018-2023, the County proposes to increase the area under agroforestry by 10% mainly undertaken with collaborative efforts of all institutions supporting communities (County Government of Narok, 2018).

Plate 4.3: Mara River WUA tree nursery used for agroforestry practices in the communities

The study further pursued to establish environmental adaptation related activities supported in the community by the institutions as shown in Table 4.8.

Table 4.8: Adaptation activities related to environment that are supported in the community

Environmental Support provided	Supporting Institution					Total (n=5 institutions)
	GOK	NGO	CBO	FBO	Private sector	
natural regeneration of vegetation cover	1	1	1	0	0	3(3/5)
natural drainage	1	0	1	1	1	4(4/5)
Landscape restoration/Terracing	1	0	1	1	1	4(4/5)
Access of Biodiversity	1	1	1	0	0	3(4/5)
Access to environment Information	1	1	1	1	1	5(4/5)
Total (n=5)	5	3	5	3	3	

1= adaptation activities supported, 0= adaptation activities not supported

Good performance=more than 50% of the institutions engage in the practice…….ALL (100%)

Bad performance=less than 50% of the institutions engage in the practice

Interpretation:-100% of the adaptation practices examined under the Environment had a score of over 50%. (*More than 50% of the institutions implemented the adaptation practice).*

The findings indicate that access to and sharing of environment information is the highest adaptation activity supported by the institutions in the communities. Of all the activities, natural regeneration of vegetation cover and access to biodiversity are the two adaptation activities that were least practiced environmental adaptation practice in the communities. Government institutions and CBOs undertake all the specific environment related activities.

Conserving natural environment especially forests, wetlands and rivers which are experiencing environmental degradation is key to addressing climate change adaptation in Bomet county (County Government of Bomet, 2018a). The choice of adaptation options is influenced by the perceived cost attached to the option **(**Mapfumo et al 2015), this is seen in the large number of institutions that are supporting access to information to climate change in the Mara basin. Likewise, Cisneros (2019) agrees that information is a critical resource in contexts of regulatory uncertainty, and its effective distribution could promote a better understanding of the characteristics and potential effects of policy change.

In the forest sector the respondents indicated the forestry adaptation related activities supported in the community as shown in Table 4.9.

Table 4.9: Adaptation activities related to Forestry that are supported in the community

Forestry Support provided (n=6)	**Supporting Institution**					**Total (n=5 institutions)**
	GOK	**NGO**	**CBO**	**FBO**	**Private sector**	
Tree seedlings production	1	1	1	1	1	5(5/5)
Tree planting	1	1	1	1	1	5(5/5)
Tree harvesting	0	0	0	0	1	1(1/5)
forest conservation	1	1	0	0	1	3(3/5)
forest protection	1	0	0	0	0	1(1/5)
Access to forestry Information	1	1	1	1	1	5(5/5)
Total n=6	5	4	3	3	5	

1= adaptation activities supported, 0= adaptation activities not supported

Good performance=more than 50% of the institutions engage in the practice…..(4/6)100=67%
Bad performance=less than 50% of the institutions engage in the practice……..(2/6)100=33%

Interpretation:-67% of the adaptation practices examined under the Forestry had a score of over 50 %%.(*More than 50% of the institutions implemented the adaptation practice).*

The findings indicate that production of tree seedlings, tree planting and access to forest information are the highest adaptation activities in the forestry sector that have been practiced. The least scored are tree harvesting and forest protection. The findings further indicated that government institutions and private sector institutions are involved in five out of six activities in the forest sector.

According to the Narok County CIDP 2018 - 2023, the county's forest cover which is estimated at about 16% has reduced due to encroachment, clearing of land for agriculture, charcoal burning,

illegal logging, financial challenges and political interference (County Government of Narok, 2018). Within the study area lies Chepalungu forest with an area of 47,977.1 hectares, this is the largest forest in the county but it is degraded. According to Bomet county government CIDP 2018 – 2022, the forest is earmarked for rehabilitation (County Government of Bomet, 2018a). The County proposes to increase afforestation of the degraded forest areas and overall to increase forest cover in Narok County by 1,800km2 (County Government of Narok, 2018).

Energy related climate change adaptation practices findings from the interviews are shared in Table 4.10 below.

Table 4.10: Adaptation activities related to Energy that are supported in the community

Energy Support provided	**Supporting Institution**					**Total (n=5 institutions)**
	GOK	**NGO**	**CBO**	**FBO**	**Private sector**	
Use of wood fuel	1	1	1	1	1	5(5/5)
Use of fossil fuels	0	0	0	0	0	0
Use of solar energy	1	1	1	1	1	5(5/5)
Use of hydro power	1	0	0	0	1	2 (2/5)
Use of wind energy	0	0	1	0	0	1 (1/5)
Access to and share Energy Information	1	1	1	1	1	5(5/5)
Total (n=6)	4	3	4	3	4	

1= adaptation activities supported, 0= adaptation activities not supported
Good performance=more than 50% of the institutions engage in the practice…..(4/6)100=67%
Bad performance=less than 50% of the institutions engage in the practice…….(2/6)100=33%

Interpretation:-67% of the adaptation practices examined under the Energy had a score of over 50 %%.(*More than 50% of the institutions implemented the adaptation practice).*

Use of wood fuel, use of solar energy and access to and sharing energy information are the three energy related activities supported in the community by all of the institutions categories. On the other hand, the use of fossil fuel was not scored by any of the institutions interviewed as an activity they support in the community. Only one of the CBOs indicated support to the community in the use of wind energy.

Bomet and Narok counties are well endowed with solar energy, biogas energy and wind which have high potential for green energy. To promote green energy, Bomet County is in the process of developing a green energy policy (County Government of Bomet, 2018a). Narok County is looking at exploration of geothermal energy and increased use of solar energy as alternative energy sources (County Government of Narok, 2018).

Institutions support to communities in water sector are shown in Table 4.11 with the specific adaptation activities noted.

Table 4.11: Adaptation activities related to Water that are supported in the community

Water Support provided	Supporting Institution					Total (n=5 institutions)
	GOK	NGO	CBO	FBO	Private sector	
Water catchment management	1	1	1	1	1	5
Water conservation	1	0	1	1	0	3
Water infrastructure development	1	0	1	1	1	4
Riparian land management	1	1	1	0	1	4
River bank conservation and protection	0	0	1	1	1	3
Access to and share Water Information	1	1	1	1	1	5
Total (n=6)	5	3	6	5	5	

1= adaptation activities supported, 0= adaptation activities not supported
Good performance=more than 50% of the institutions engage in the practice
Bad performance=less than 50% of the institutions engage in the practice

Interpretation:-87.5% of the adaptation practices examined under the Water had a score of over 50 %%.(*More than 50% of the institutions implemented the adaptation practice).*

From the findings, water catchment management and access to and sharing water information were the main activities supported by the local institutions. Water conservation and river bank conservation and protection are the least supported activities in the community. CBOs are involved in all six water adaptation related activities while NGOs are involved in only three out of six activities. Overall, it emerged that the institutions share information with communities in an effort to enhance adaptation uptake. As part of its effort to undertake adaptation in the water sector the county government of Narok has earmarked Narok South sub-county to benefit from construction of a dam and auxiliary structures to meet the water needs of communities (County Government of Narok, 2018).

In the Mara River Basin the majority of the institutions are supporting communities to access information related agriculture, livestock, water, environment, forest and energy. These are sectors that are heavily dependent on the climate. Local level institutions can be an arena where information and understanding of future change, knowledge around adaptation options can be exchanged. Institutionally, they can serve as a conduit for distributing relevant information between community level and the national level (Chishakwe et al., 2012). However, the local institutions have not been able to fully embrace the National adaptation Plan 2015-2030 which provides guidelines on short term, medium term and long term adaptation issues nor have mechanisms been put in place to include climate change adaptation in their mandates.

Reid et al (2010) note that there is a great need to integrate good adaptation practices into existing development planning at community, regional and national levels, in collaboration with government institutions in order to achieve faster up-scaling. Within institutions sharing of information needs to be systematized to enable sharing and decision making to take place. This is in agreement with Armstrong, Krasny and Schuldt (2018) note that climate literacy skills include communicating about climate change, assessing climate-related information and participating in constructive dialogue. Schlager and Blomquist (2008) who earlier suggested that adaptive management has high information requirements, these include comparison and observation of policy actions with clear set of indicators.

In the CIDPs it is not evident which are the specific adaptation actions, thus the details left to each implementing institution to decide. The counties are mandated by the NCCAP 2018-2022 to put in place climate change units which should engage with stakeholders at the county level (GOK,

2018), however, these are still in the formative stage and are yet to cascade their work to the sub county and ward levels. Further to this, to enable local institutions take up comprehensive support to the community on adaptation practices, specific funds for climate change need to be accessible at the county. The foregoing needs the climate change units that are mandated to undertake climate change action to draw up resource mobilization strategies and mobilize resources for the climate fund. The fund will need to have mechanisms for all legible local institutions in the county to access the climate funds for adaptation work.

According GLCA (2009), effective adaptation strategies require coherent and coordinated policies and cooperation among governments, civil society, and the private sector. Because impacts are local and contextual, the principle of subsidiarity should apply. The bulk of responsibility will fall on local and national governments supported by international actions to provide appropriate capacities and resources. Finally, as we increase the number and type of voices represented in the adaptation dialogue, more work is needed to understand the roles of new partners (Klein et al, 2017).

From table 4.12 shows the summary drawn from the results on adaptation practices that local institutions are undertaking.

Table 4.12: Adaptation Practices and the proportion of institutions engaged in them

Adaptation Practice (n=31 practices)	Proportion of institutions that engage in practice-(n=5 institutions)
1. Land preparation	3(3/5)
2. Farm inputs	3(3/5)
3. Soil conservation	3(3/5)
4. Agro forestry practices	4(4/5)
5. Storage	5(5/5)
6. Access to crop production Information	5(5/5)
7. Livestock breeding	1(1/5)
8. Access to livestock production Information	5(1/5)
9. natural regeneration of vegetation cover	3(3/5)
10. natural drainage	4(4/5)
11. Landscape restoration/Terracing	4(4/5)
12. Access of Biodiversity	3(3/5)
13. Access to environment Information	5(5/5)
14. Tree seedlings production	5(5/5)
15. Tree planting	5(5/5)
16. Tree harvesting	1(1/5)
17. forest conservation	3(3/5)
18. forest protection	1(1/5)
19. Access to forestry Information	5(5/5)
20. Use of wood fuel	5(5/5)
21. Use of fossil fuels	0
22. Use of solar energy	5(5/5)
23. Use of hydro power	2 (2/5)
24. Use of wind energy	1 (1/5)
25. Access to and share Energy Information	5(5/5)
26. Water catchment management	5(5/5)
27. Water conservation	3(3/5)
28. Water infrastructure development	4(4/5)
29. Riparian land management	4(4/5)
30. River bank conservation and protection	3(3/5)
31. Access to and share Water Information	5(5/5)

Good performance=more than 50% of the institutions engage in the practice…….(25/31)100=81%
Bad performance=less than 50% of the institutions engage in the practice……(6/31)100=19%

Interpretation:-81% of the adaptation practices examined under the agriculture had a score of over 50 %%.(*More than 50% of the institutions implemented the adaptation practice).*

From the above a summary is given in table 4.13 showing overall institution performance and the extent are the adaptation practices implemented.

Table 4.13: Overall institution performance

Sector of adaptation	**Type of institution**				
	GOK	**NGO**	**CBO**	**FBO**	**Private Sector**
Agriculture (n=8)	7	4	7	7	4
Environment (n=5)	5	3	5	3	3
Forestry (n=6)	5	4	3	3	5
Energy (n=6)	4	3	4	3	4
Water (n=6)	5	3	6	5	5
Total (n=31)	**26 26/31 (83.8%)**	**17 17/31 (54.8%)**	**25 25/31 (80.6)**	**21 21/31 (67.7%)**	**21 21/31 (67.7%)**

The study also established that all categories of institutions scored above the 50% mark in terms of implementing adaptation practices. This implies all of them are extensively involved in adaptation (table 4.13) although not at the same level. The highest score was obtained by Government Institutions (83%) followed by CBOs (80.6%), FBOs and Private Sector (67%), NGOs (54%).

These findings seem to indicate that CBOs, FBOs and Private sector mandates do not provide for adaption yet they implement adaptation activities extensively. A possible explanation can be found in Klein et al (2017) who notes that governments are identifying adaptation priorities and crafting national strategies, but the effort required far exceeds what the public sector alone can achieve, in

developing and developed countries alike. As a result other partners are invited hence the involvement of these institution.

4.2. Internal Institutional structures that enable or hinder adaptation

Overview

Objective two of the study was to evaluate the institutional structures that enable or hinder adaptation practices. The main focus of this objective was specifically to identify the types of structures that exist within the different institutions; to examine in what ways different structures enable adaptation practices and in what ways different structures hinder adaptation practices.

Institutional structures for the purpose of this study are considered as frameworks around which coordination, planning, management and logistics take place. Structures are mechanisms of how social order is maintained, it involves issues of governance inclusive of rules, plans, procedures, roles and responsibilities and hierarchy for reporting. These structures are indicative of how an institution functions and is managed, how information flows and is processed within an institution and flexibility or responsiveness of the institution to its environment.

4.2.1 Types of structures in different institutions

This study developed a tool for measuring institutional effectiveness described in chapter three (3.3). The tool introduces four quadrants used to assess internal structures of institutions. The quadrants are the developing processes quadrant, the enabling processes quadrant, the productive processes quadrant and the energizing processes quadrant.

The *developing processes quadrant* focused on growth and development and looked at institutional human resources in the context of inputs such as skills, knowledge, participation, effective communication, and how these translate to immediate outputs such as decision making and finally efficient service delivery towards adaptation to climate change.

The *enabling processes quadrant* is focused on mechanisms that control and measure delivery such as rules, procedures, monitoring, coordination and stability. It reviewed the institutions as a system's ability to create stability in order to deliver on the required mandate. It requires managing resources at the institutions disposal such as budgets and putting into place workable procedures for adaptation to be achieved.

The *energizing processes quadrant* is affected by the external environment and the focus here is to gauge the relationship between the institution and key stakeholders especially the community and the institution's sponsors and collaborators. It required assessing the institution's role areas of networking, ability to be creative and to quickly respond to change, thus be able to address emerging climate change issues in a constantly changing and dynamic environment

Finally the *productive processes quadrant* had a focus on products and services. It assessed strategies used within the institutions to enhance visible actions. Planning and project execution of goals and objectives were reviewed in relation to timely adaptation delivery. The quadrants work through a scoring process. Once institutions are interviewed, high scores signify that the structures are functioning well thus enabling the institution to deliver on adaptation practices. While low scores show the structures are hindering adaptation.

4.2.2 Extent to which structures enable or hinder adaptation practices

Responses from the institutional effectiveness tool for each category of institution is shared below in tables 4.6 to 4.10. They indicate the extent to which each quadrant enabled adaptation practices to function effectively. The results are analysed based on the scores obtained.

4.2.2.1 Government institutional structures in climate change adaptation

Table 4.14 show the analysis of government institution structures in the study area and how the structures affect work on adaptation practices.

Table 4.14 Analysis of government institution structures

Quadrants	Structural parameters	Score (%)
Developing processes	Participation in decisions Skills and knowledge	40%
	Positive interpersonal relations Effective communication	55%
Enabling processes	Rules, Procedures Monitoring	95%
	Coordination Stability	98%
Productive processes	Timely service delivery Planning and project execution	55%
	Direction, Goal Clarity Accomplishments	62%
Energizing processes	Creative solutions Response to Change	80%
	Legitimacy from the community/donors Stakeholder confidence	42%

From Table 4.6 it was established that the government institutions' most enabling structures fall in the enabling processes quadrant. Here the government institutions are indicated as having strong coordination ability and are stable at (98%) and they have rules and procedures that guide their activities that are measureable (95%). On the other hand, the government's weakest structures are

found in the developing processes quadrant where participation in decisions, skills and knowledge stands at 40%.

Climate change is dynamic and constantly evolving thus requiring institutions that have the ability to transform fast but remain stable resource wise. Government institutions have structures that create predictability and stability in ways they operate to deliver climate adaptation practices in a coordinated and consistent manner. Kallinikos (2006) argues that the strong focus on the efficiency of the arrangements by which welfare and other public services are produced inevitably brings to the fore the key question concerning the kind of goods governments are supposed to deliver and safeguard.

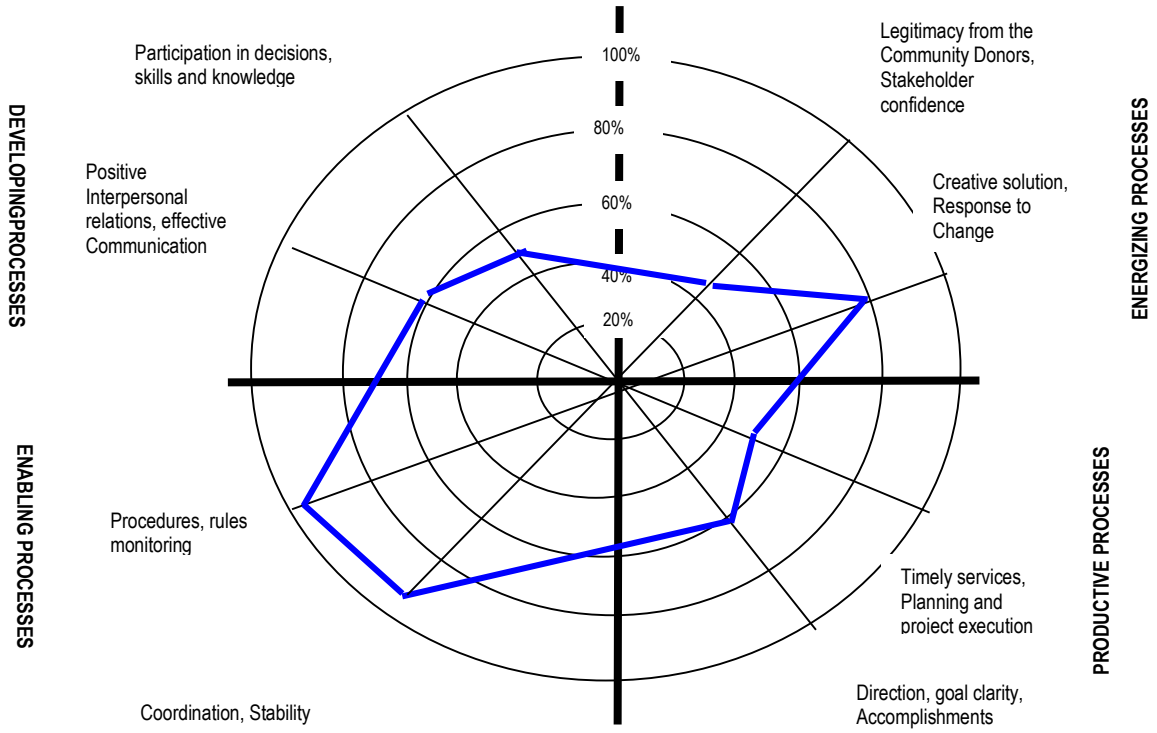

Figure 4.1: Government structures enabling and hindering adaptation practices

Focussing on having strong predicable standards as shown in 4.1 has slowed down the delivery of timely services. Reid et al (2010) note that governments do not have a good record of channelling

money to their most remote or vulnerable citizens. In addition, when most governments think about adaptation, they are considering the need to modify infrastructure, make changes to export agriculture, or provide for additional health risks, rather than supporting vulnerable communities (Reid et al., 2010). This is in agreement with Kallinikos (2006) who state that the key elements of bureaucratic organization such as standard operating procedures, formal role systems and centralized responsibility are part of a much more complicated picture that recounts the need for accountable but also socially responsive ways by which the government, must operate. Christoplos (2012) bureaucratic public sector extension service structures are in most cases unlikely to be able to exhibit the flexibility required to mobilize campaigns for fast response. The study is in agreement with this showing structures in the energizing processes quadrant i.e. legitimacy from the community and stakeholder confidence at 42% that are hindering adaptation work with the community.

4.2.2.2 Non-governmental organization structures in climate change adaptation

Table 4.15 below shows the outputs from respondent interviews.

Table 4.15: Analysis of non-governmental structures

Quadrants	Structural parameters	Score (%)
Developing processes	Participation in decisions Skills and knowledge	90%
	Positive interpersonal relations Effective communication	70%
Enabling processes	Rules, Procedures Monitoring	90%
	Coordination Stability	80%
Productive processes	Timely service delivery Planning and project execution	70%
	Direction, Goal Clarity Accomplishments	60%
Energizing processes	Creative solutions Response to Change	81%
	Legitimacy from the community/donors Stakeholder confidence	58%

The structures that are most supportive of adaptation actions are participation in decisions, skills and knowledge 90% found in the developing processes quadrant and rules, procedures and monitoring under enabling processes is also 90% found in the enabling processes quadrant. The weakest structure was on legitimacy from the community/donors and stakeholder confidence at 58% which is in the energizing processes quadrant. Overall, non-governmental organizations' greatest enabling structures are in the enabling processes quadrant, followed by the developing processes quadrant. This is visually represented in Figure 4.2.

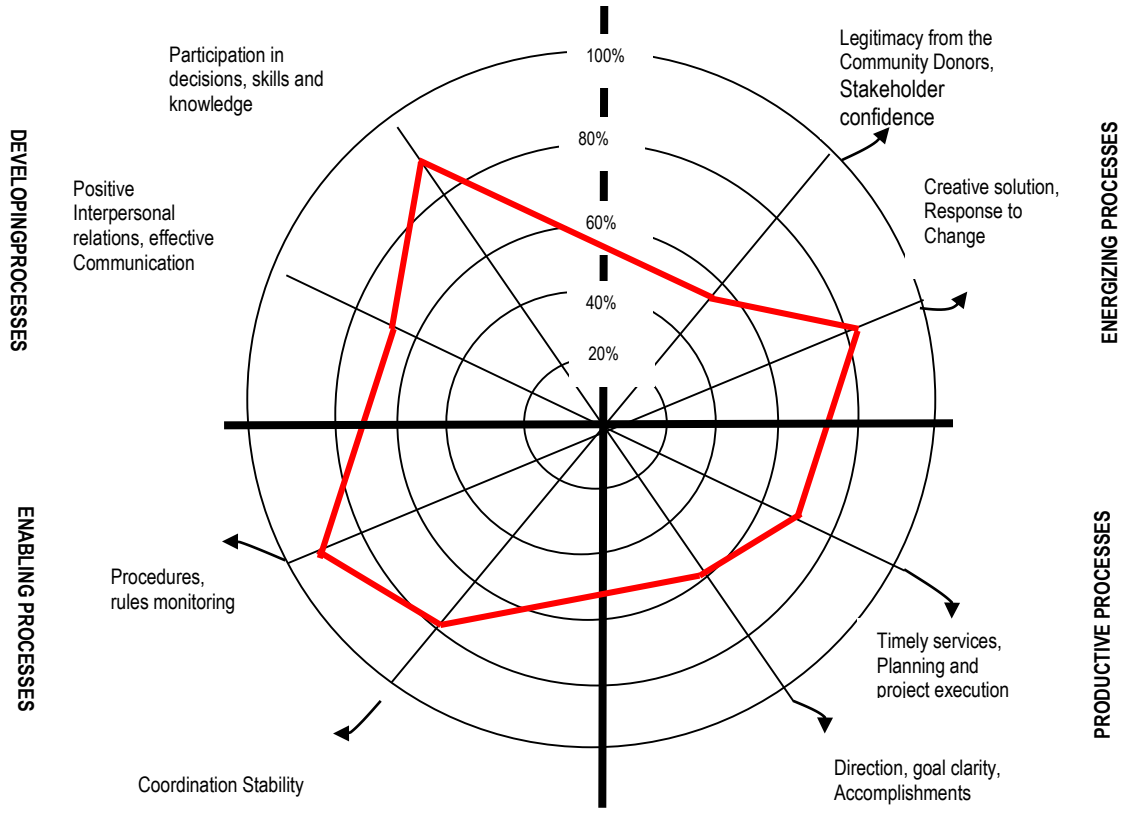

Figure 4.2: Non-Governmental structures enabling and hindering adaptation practices

Metin and Coskun (2016) and Metin, (2017a) noted that NGOs are crucial for society with respect to their humanitarian, political, and social objectives and the economic activities that take place within them. NGOs are voluntary, non-profit private organizations whose diverse activities aim

towards change, support or promotion of different social issues. In the Narok County integrated development plan 2013 -2017, NGOs together with CBOs, FBOs and private sector institutions mandates are indicated as capacity building to local community in project planning, management and implementation; financial support to development projects; consultancy and provision of credit; provision of extension services and environmental conservation (County Government of Narok, 2013).

4.2.2.3 Community Based Organization structures in climate change adaptation

Table 4.16 below shows the structures that were identified as being enabling or hindering CBO work in climate change adaptation

Table 4.16: Analysis of Community Based Organization structures

Quadrants	Structural parameters	Score (%)
Developing processes	Participation in decisions Skills and knowledge	70%
	Positive interpersonal relations Effective communication	90%
Enabling processes	Rules, Procedures Monitoring	45%
	Coordination Stability	55%
Productive processes	Timely service delivery Planning and project execution	80%
	Direction, Goal Clarity Accomplishments	68%
Energizing processes	Creative solutions Response to Change	70%
	Legitimacy from the community/donors Stakeholder confidence	75%

The highest score was in developing processes quadrant with structures on positive interpersonal relations and effective communication that scoring 90% followed by timely service delivery, planning and project execution in the productive processes quadrant that scored 80%. The least

score were both in the enabling processes quadrant where structures on rules, procedures and monitoring scored the lowest at 45% and those on coordination and stability scored 55%.

Figure 4.3 visually represents the complete picture showing which quadrant has the most supportive structures and which has the least supportive.

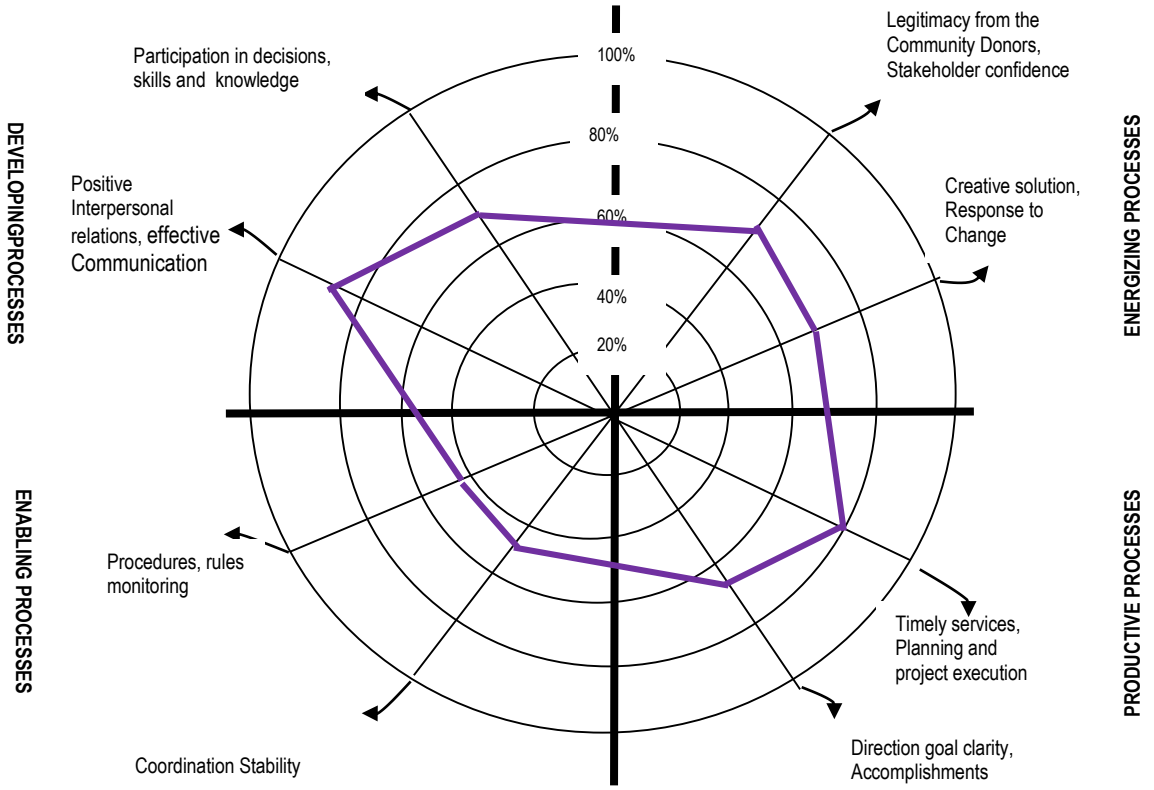

Figure 4.3: Community Based Organization structures enabling and hindering adaptation practices

CBOs, as seen in Figure 4.3 have weak structures related to rules, procedures and monitoring. This is the differs to Agrawal (2008) who states that local institutions working on climate change adaptation have organizational rules that are simple and easy to understand, broad local involvement in the organization and its rules, fairness in resource allocation, clear mechanisms for

enforcing rules, clear, broadly acceptable mechanisms for sanctioning rule infractions, availability of low-cost adjudication, accountability of decision makers and other officials.

4.2.2.4 Faith Based Organization structures in climate change adaptation

Table 4.17 below is the presentation of the interview results from FBOs on structures they have that support or hinder climate change adaptation.

Table 4.17: Analysis of Faith Based Organizations structures

Quadrants	Structural parameters	Score (%)
Developing processes	Participation in decisions Skills and knowledge	50%
	Positive interpersonal relations Effective communication	65%
Enabling processes	Rules, Procedures Monitoring	45%
	Coordination Stability	48%
Productive processes	Timely service delivery Planning and project execution	78%
	Direction, Goal Clarity Accomplishments	60%
Energizing processes	Creative solutions Response to Change	78%
	Legitimacy from the community/donors Stakeholder confidence	78%

Faith based organizations in the Mara River Basin are mostly churches and mosques and the programmes they operate. For this set of institutions, the most supportive structures were found in the energizing processes quadrant at 78% for creative solutions and response to change and 78% for structures on legitimacy from the community/donors and stakeholder confidence. This legitimacy is consistent with the expected, as Ebaugh, Pipes, Chafetz and Daniels (2003) point out six characteristics of religious institutions that give them a unique role in the community. These are first, in every community, second, they are more stable than other institutions and have an enduring membership base, third, religious institutions bring together a cross-section of the community, fourth, they promote activism, therefore strengthening social control, fifth they foster ties in the neighborhood, and sixth, they aid in the development and maintenance of other

organizations in the community. Olarinmoye (2012) noted that within the changed context of donor approach to faith, FBOs are seen, even more so than secular NGOs, to possess a greater level of independence, flexibility, and creativity that give them the potential to 'add value' to development

Figure 4.4 below gives a visual presentation of the structures that enable climate change adaptation activities and those that hinder climate change activities.

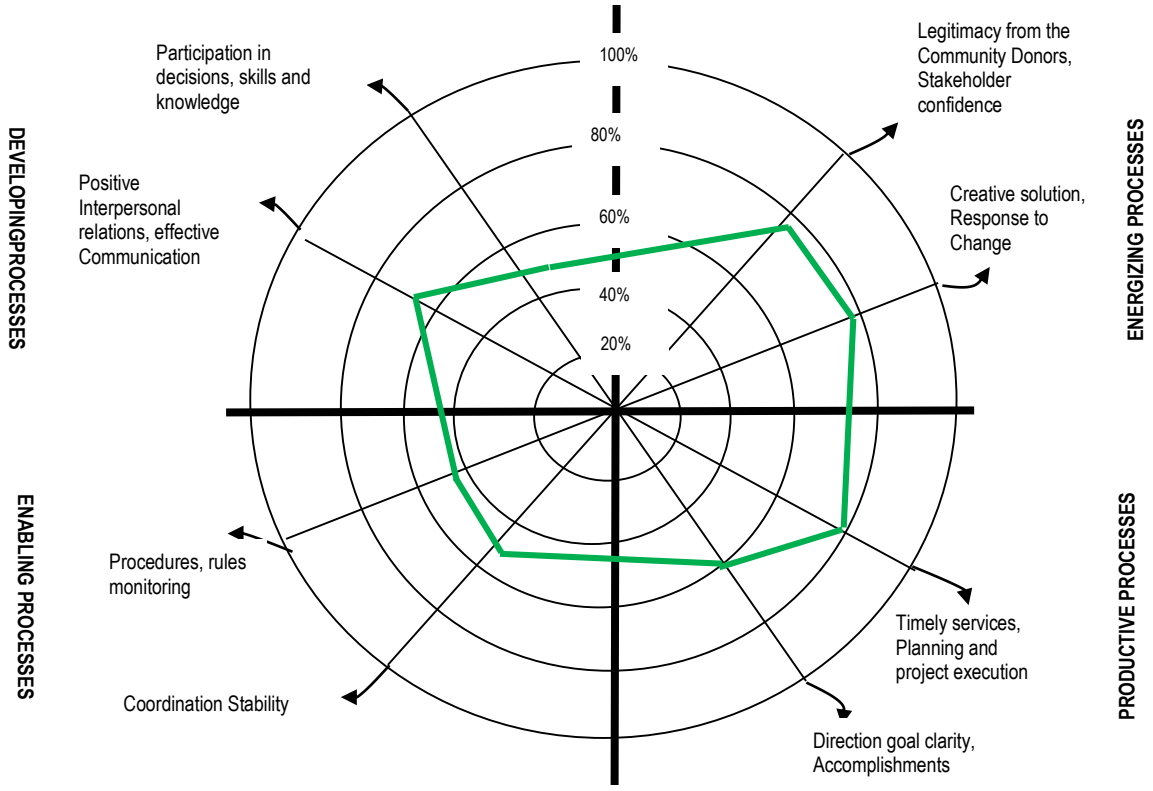

Figure 4.4: Faith Based Organization structures enabling and hindering adaptation practices

The enabling processes quadrant had the weakest scores with rules, procedures and monitoring scoring 45% and coordination and stability scoring 48%. From the results, it is notable that structures that need measurement and tracking are the poorest performing. Yet Segura (2005)

declares that, for institutional development to take place, it is requires defining, measuring, and monitoring performance indicators.

4.2.2.5 Private sector institution structures in climate change adaptation

The table 4.18 below shows the structures that enable and those that hinder adaptation practices among private sector institutions in the study area.

Table 4.18: Analysis of Private sector institution structures

Quadrants	Structural parameters	Score (%)
Developing processes	Participation in decisions Skills and knowledge	30%
	Positive interpersonal relations Effective communication	50%
Enabling processes	Rules, Procedures Monitoring	90%
	Coordination Stability	80%
Productive processes	Timely service delivery Planning and project execution	78%
	Direction, Goal Clarity Accomplishments	80%
Energizing processes	Creative solutions Response to Change	89%
	Legitimacy from the community/donors Stakeholder confidence	50%

The developing processes quadrant had the lowest score of 30% for participation in decisions, skills and knowledge. The highest score was in enabling processes quadrant with rules, procedures and monitoring scoring 90%, another high score of 89% was in the energizing processes quadrant where structures on creativity and responding change are found. Bennett et al (2018) note that for success, one of the key concept of institutions revolves around rules, norms, strategy, regulations, laws, compacts and constitutions. Scott (1995) specifies, that, in order to survive, organizations must conform to the rules and belief systems prevailing in the environment, because institutional isomorphism, both structural and procedural, will earn the organization legitimacy.

From figure 4.5 private sector institutions have the strongest structures in the enabling processes quadrant.

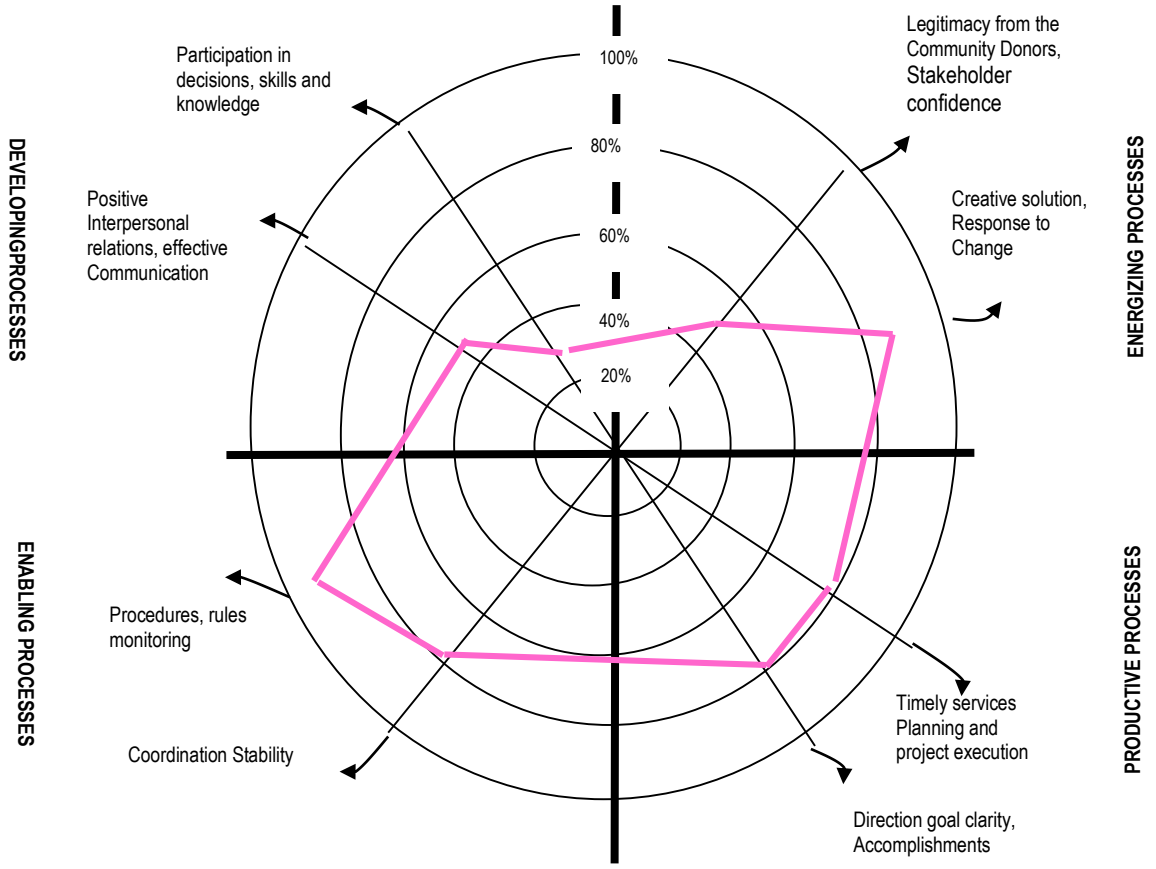

Figure 4.5: Private sector institution structures enabling and hindering adaptation practices

Table 4.19 shows the overall results for each quadrant for the five categories of institutions.

Table 4.19: Overall Score of the structure

Quadrants	Structural parameters	Average scores (%)					
		GOK	**NGO**	**CBO**	**FBO**	**Private Sector**	**Overall quadrant score**
DEVELOPING PROCESSES	Participation in decisions Skills and knowledge	48%	80%	80%	58%	40%	61.2%
	Positive interpersonal relations Effective communication						
ENABLING PROCESSES	Rules, Procedures Monitoring	97%	85%	53%	46%	85%	73.2%
	Coordination Stability						
PRODUCTIVE PROCESSES	Timely service delivery Planning and project execution	59%	65%	74%	69%	79%	69.2%
	Direction, Goal Clarity Accomplishments						
ENERGIZING PROCESSES	Creative solutions Response to Change	61%	70%	73%	78%	70%	70.4%
	Legitimacy from the community/donors Stakeholder confidence						
Total		265	300	280	251	274	
Overall institution average		**66.3**	**75**	**70**	**62.7**	**68.5**	

Overall the quadrant with the most enabling structures to support adaptation practices was the enabling processes quadrant that scored 73.2%. The high scores were notable within institutions of government (97%), NGO (85%) and private sector (85%). This is in line with Bandaragoda (2000), who states that the basic minimum for institutions is to have laws, policies and administration which are three pillars of the institutional framework for integrated resource management in a river-basin context.

The quadrant with the most hindering structures within institutions was the developing processes quadrant that scored an average of 61.2%. The low scores were among private sector institutions (40%) and government at (48%).

Further to this, Agrawal *et al.* (2009) states that adaptation does not occur in an institutional vacuum. Instead institutional and social factors play a key role in shaping the extent to which rural households and communities become vulnerable to different environmental risks and how they respond to such risks.

The study viewed institutional structures as a system, with each of the four quadrants – developing processes, enabling processes, energizing processes and productive processes - acting as a subsystem that is influenced and interrelates with the other quadrants. The aim was to understand how one quadrant influences action in another and the likely impact this has in terms of delivery on adaptation practices. Each of this served to observe the structures within the institutions in terms of delivery to the adaptation process. The structure of institutions within the quadrants, included issues related to planning, budgeting, project financing, governance, service delivery, procedures and documentation. These are critical in supporting effective planning for climate change response. This corroborates the finding of North (2003) who affirmed that institutions are made up of formal rules, informal constraints and their enforcement characteristics. It is reinforced by Scott (2004a) who stated that structures include schemas, rules, norms, and routines, and how they become established as authoritative guidelines for social behaviour. Scott (2004b) further notes that students of institutions must, perforce, attend not just to consensus and conformity but to conflict and change in social structures.

4.3 Opportunities in the institutional landscape that enhance community involvement in climate change adaptation

Overview

The third objective of the study was to analyze the opportunities in the institutional landscape that enhance community involvement in climate change adaptation. The study viewed institutional landscape as institutions within a given geographical area and the linkages that exist between them. These linkages can be vertical or horizontal. The vertical linkages connect institutions that operate small geographic spaces (e.g. county) with those that operate large geographic spaces (e.g. continent) Horizontal linkages connect institutions that operate within the same geographical space (e.g. within a county) at the same level.

The parameter interrogated in this section was the geographical scope of institutions; the horizontal and vertical linkages; the challenges faced by different types of institutions and opportunities in the institutional landscape. Lyth, Harwood, Hobday and McDonald (2016) discuss the need to explore linkages across sectors and scales; identify drivers of, and barriers to, adaptation; and observe the dynamics of adaptation stakeholder interactions on the topic of climate change adaptation. Klein et al (2017) note that governments are identifying adaptation priorities and crafting national strategies, but the effort required far exceeds what the public sector alone can achieve, in developing and developed countries alike. This has made it a priority to engage the private sector in adaptation.

4.3.1 Institutions and their linkages

Landscapes can be delineated at different scales. In the case of this institutional landscape there are four (4) primary levels.ie. International/global, regional, national and local. Figure 4.6 gives an overall picture of the institutional landscape for climate change as laid down at different levels in different literature (UNFCCC, 2007; EAC, 2011; GOK, 2010; GOK, 2013; GOK, 2016a; GOK, 2016c).

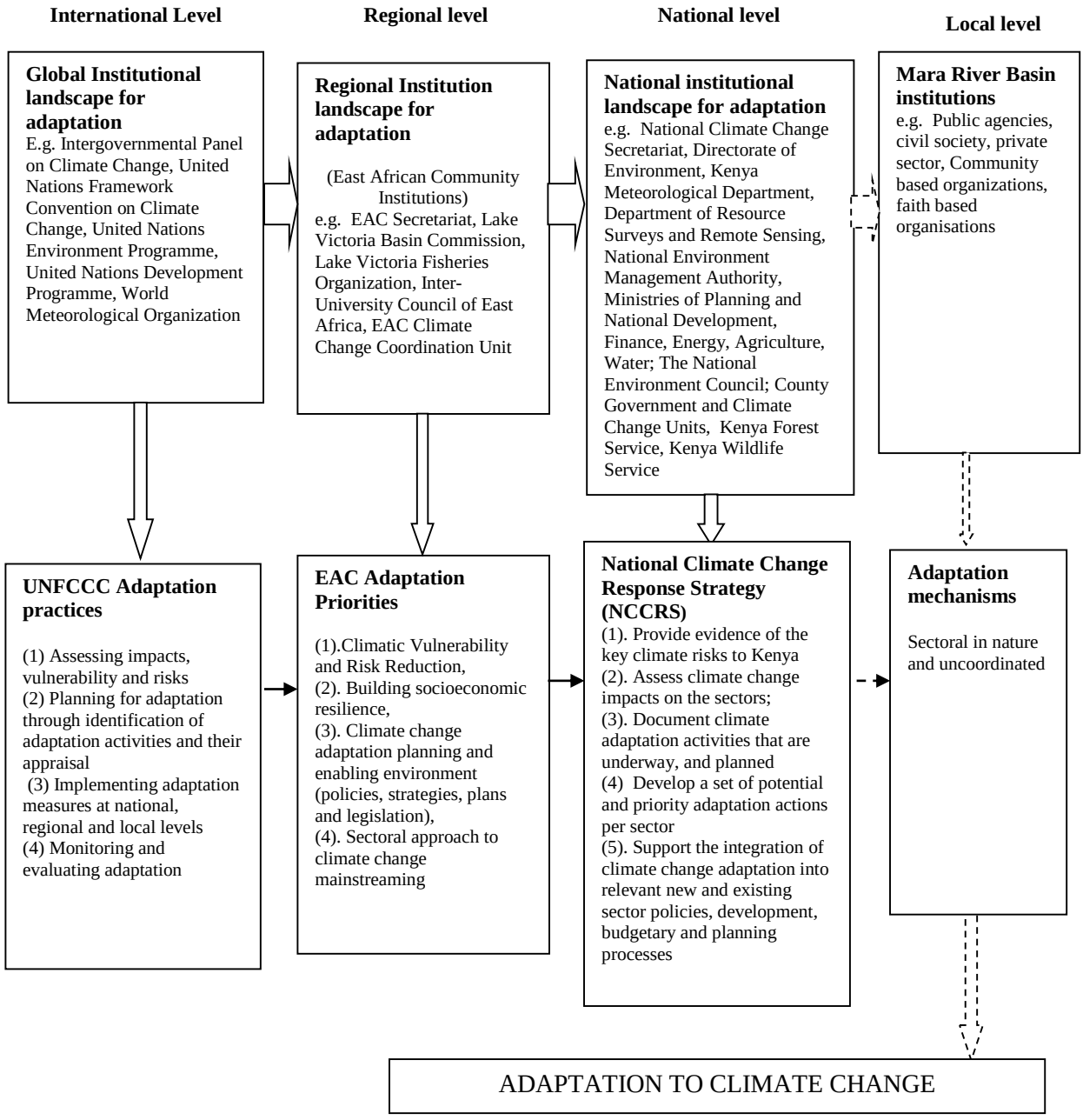

Figure 4.6: Overall institutional landscape: Relationship between adaptation practices and institutions
Source: Researcher- 2019

At the international level, the institutional landscape for adaptation has institutions that include the intergovernmental panel on Climate Change, United Nations Framework Convention on Climate Change (UNFCCC), United Nations Environment Programme, United Nations Development Programme and World Meteorological Organization. They provide policy guidelines which apply globally and are domesticated at the national level. UNFCCC adaptation practices include:

(i) Assessing impacts, vulnerability and risks

(ii) Planning for adaptation through identification of adaptation activities and their appraisal

(iii) Implementing adaptation measures at national, regional and local levels

(iv) Monitoring and evaluating adaptation

Regions are defined using different sets of criteria. For example there regions that are defined by physiography such as mountains ranges, desert, river basins, continents etc. The regional context of this study is the East African Community (EAC). At the regional level, the institutional landscape for adaptation is composed of institutions from the East African Community which include the EAC Secretariat, Lake Victoria Basin Commission, Lake Victoria Fisheries Organization, Inter-University Council of East Africa, and the EAC Climate Change. These institutions are guided by the EAC Adaptation Priorities, namely:

(i) Climatic vulnerability and risk reduction,

(ii) Building socioeconomic resilience,

(iii) Climate change adaptation planning and enabling environment (policies, strategies, plans and legislation),

(iv) Sectoral approach to climate change mainstreaming

The national level institutional landscape for adaptation includes institutions such as the National Climate Change Secretariat, Directorate of Environment, Kenya Meteorological Department, Department of Resource Surveys and Remote Sensing, National Environment Management Authority, Ministries of Planning and National Development, Finance, Energy, Agriculture, Water; the National Environment Council; county government and Climate Change Units, Kenya Forest Service, Kenya Wildlife Service among others. The institutions are guided by the following polices:

(i) The Constitution of Kenya 2010

(ii) Vision 2030

(iii) The Climate Change Act 2016

(iv) The National Climate Change Response Strategy (NCCRS) of 2010

(v) National Climate Change Action Plan

(vi) National Adaptation Plan 2015 – 2030

Institutions in the study area include government institutions, Non-Governmental Organizations (NGOs), Community Based Organizations (CBOs), Faith Based Organizations (FBOs) and private sector institutions. Table 4.20 provides details on the geographical scope of the local institutions in the Mara river basin.

Table 4.20: Institutional Landscape of the study area.

Institutional Landscape of the study area.		
Institutions	**Geographical scope**	**What influences their scope**
GOK	National government agencies have a presence at both the county and national levels County government agencies have a presence at the county and sub county levels.	Mandate through the Constitution of Kenya (2010) that devolved governance The county has mandate to operate only within the county
NGOs	Found at the village, subcounty, county and National level. There are also international NGOs that have a global presence.	The registration determines the geographical scope of its operations
CBOs	Found at the Ward and village levels	The nature of their registration restricts their operation to the local level(sub county) only
FBOs	Churches operate at all levels from the local to the global. For example the major churches such as catholic, Anglican, Adventist, have a global presence. They are however smaller churches who operate across smaller geographical spaces.	The type of church they are affiliated to will determine the scope of operations
Private Sector	They operate across all scales from local to global to call	The nature of the registration they have undergone determines the scope of their operations

On the institutional landscape, the vertical and horizontal linkages developed from discussions on linkages (Appendix 4) were shared as shown in figure 4.7 and 4.8 respectively. Areas that the institutions identified as having linkages were in access to and sharing information, capacity development, access to finances and access to technology. The linkages shown in the graphs are summarised in tables 4.21 and table 4.22.

Fig. 4.7 Vertical Linkages

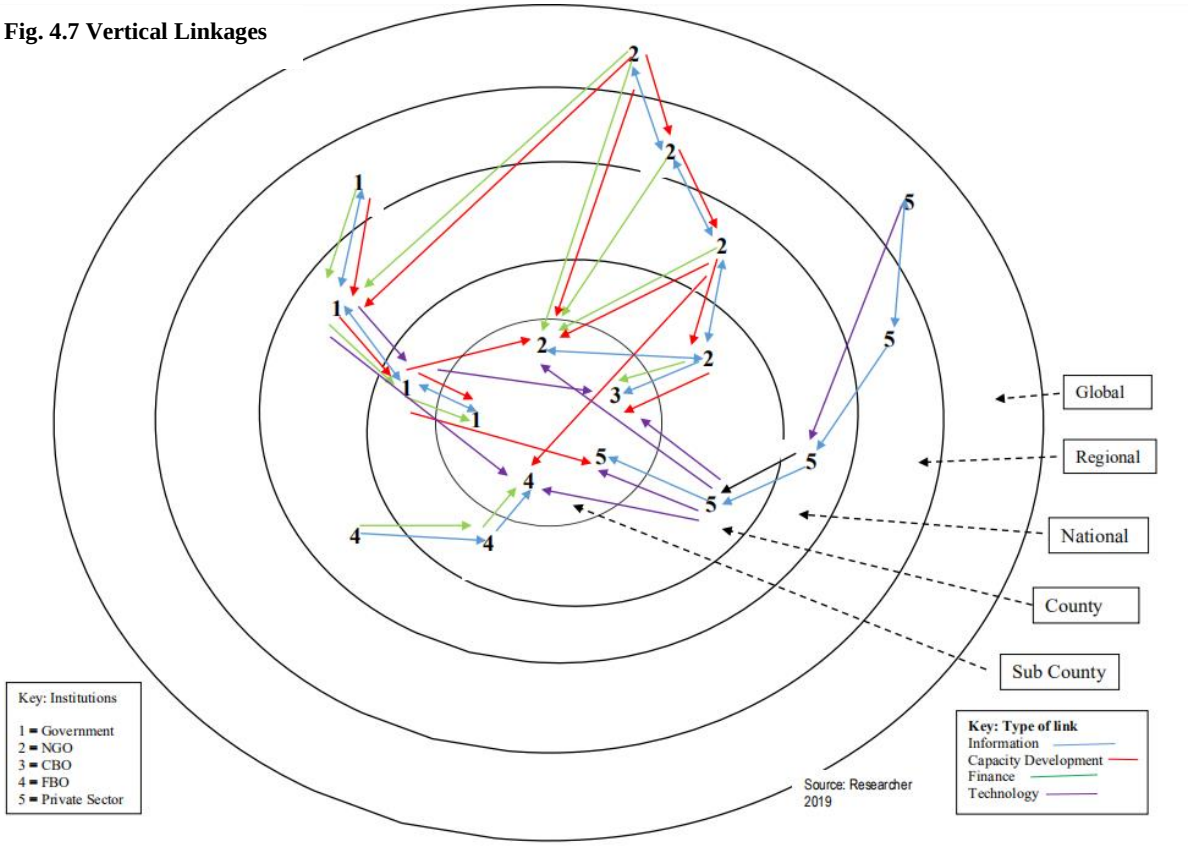

Fig. 4.8 Horizontal Linkages

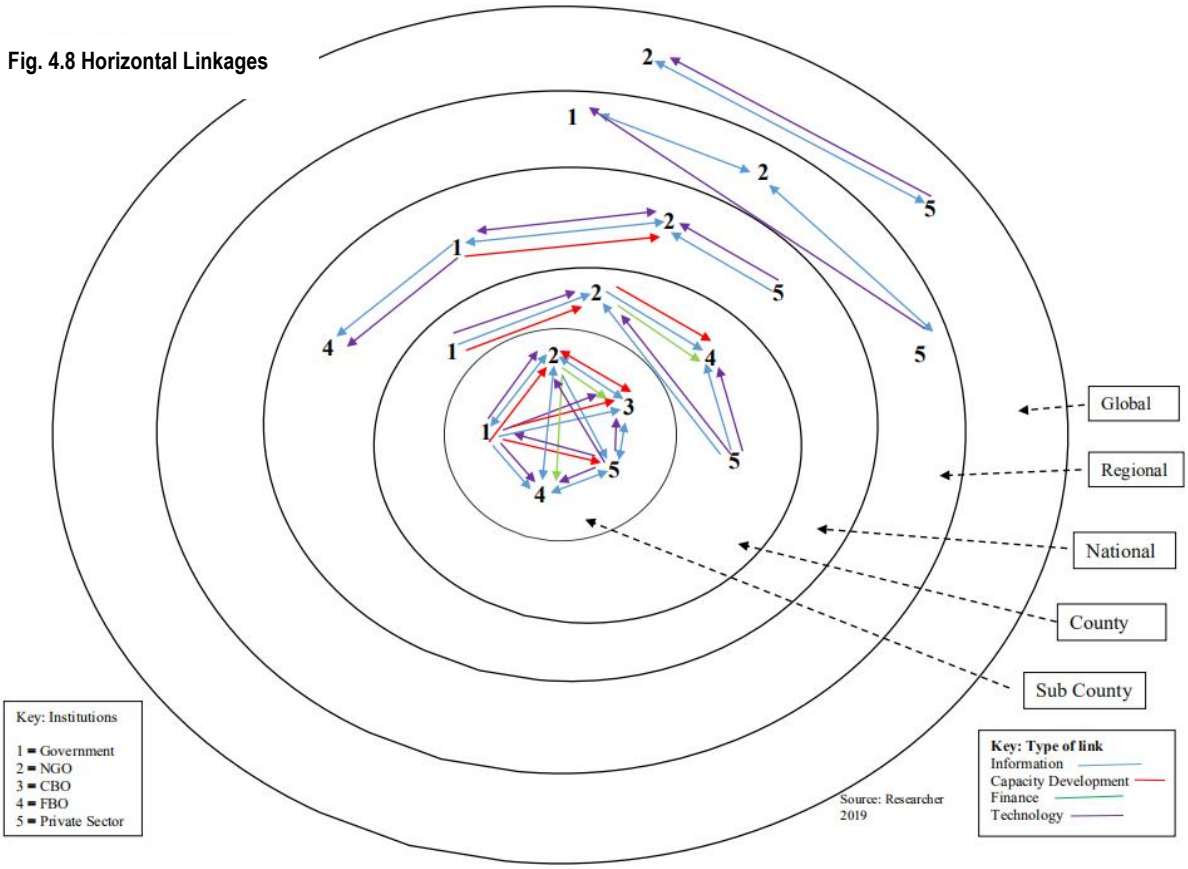

Table 4.21 is a summary of the vertical linkages shown in figure 4.7

Table 4.21: Vertical linkages in the institutional landscape

Opportunity	No of linkages	GOK	NGO	CBO	FBO	Private Sector
Information	5	1 link from national government Information can be enable the institutions improve adaptation practices	1 link from national level NGOs Information can be used with partners to support adaptation practices Select adaptation practices where impact will be greatest	1 link from NGOs Information received can be used to support CBO in adaptation practices at the community	1 link from FBOs at National level	1 link from national level Lead to accessing adaptation information that can be shared with clients visiting the business
Capacity development	7	1 link from national government Training of staff will strengthen cohort to drive adaptation practices	3 links from national NGO, international NGO and national government Training of staff on adaptation practices in current areas of implementation to increase effectiveness	1 link from NGOs Training of officials and volunteers to enhance adaptation practices	1 link from NGO Capacity development of volunteers and officials this will increase knowledge levels of the FBOs to handle adaptation	1 link from private sector Enable train staff to better reach out to community members on adaptation practices
Finance	6	1 link from national government This can support set up climate change fund	3 links from international, regional and national NGOs. Upscale current practices that have greatest impact on partners and communities	1 link from NGO Will enable replication of adaptation practices	1 link from FBO higher up Support can be channelled to successful adaptation practices	
Technology	6		1 Link from private sector Technology can be used to improve production at the local level Technology will also be used to communicate and predict adaptation practices	2 links from government and from private sector Technology can be used to scale up adaptation work, document best practices, communicate with partners	2 links from government and from private sector Increase access to technology leading to scaling up adaptation practices at the community	1 link from private sector Increase ability to reach out to other partners

Table 4.22 below summarises the horizontal linkages in the graphs presented in figure 4.8

Table 4.22: Horizontal Linkages

Opportunity	No of linkages	Nature of link	opportunity
Information	7	Linkages exist with mutual sharing of information between GOK and NGO, GOK to FBO, NGO to CBO and FBO CBO and private sector FBO and private sector	Bring in experiences from each category to create learning and scale up adaptation practices
Capacity development	4	Linkages between NGO and CBOs GOK to NGO GOK to CBO GOK to private sector	Inter institutional training to enhance greater collaboration on adaptation practices
Finance	2	Linkages NGO to FBO NGO to CBO	Opportunity for the county government and private sector institutions to support CBOs and FBOs given that there exists mechanisms already set up
Technology	7	Links from private sector to FBOS, CBOS, NGOS, GOK Links from GOK to FBOs, NGOs, CBOs	Technology in terms of seed for agriculture and forestry Equipment to enhance documentation especially for CBOs and FBOs Equipment to support in prediction and communication of potential negative climate impacts

4.3.2 Challenges faced by different types of institutions

Challenges identified by the institutions during the interviews were clustered into five areas as follows:

(i) Climate Change adaptation information needs

(ii) Capacity to implement climate change

(iii)financing of climate change adaptation action

(iv)outreach services for climate change adaptation

(v) Technology and equipment to act on climate change

Each of the above challenges, was taken through a further analysis in focus group discussions focus groups and each institution represented specified the challenge that affected those most. This process is described in Appendix 3- Institutional Challenges mapping tool and the results are presented in tables 4.23 to 4. 27.

For the challenge on information, the difficulties faced by institutions in relation to climate change adaptation information were:

(i) Scarcity of information on climate change adaptation

(ii) Limited access to climate change adaptation information

(iii)Technical nature of presentation of climate change adaptation information

(iv)High cost of information on climate change adaptation

(v) Poor flow of information on climate change adaptation information within the institution

Tackling these challenges should lead to increased and streamlined adaptation practices by institutions in the Basin. The focus group discussions indicated areas of greatest challenge for each set of institutions as shown in table 4.23.

Table 4.23: Challenges related to information on climate change adaptation

Type of institution	Scarcity of information on CCA	Limited access to CCA information	Technical nature of presentation of CCA information	High cost of information on CCA	Poor flow of information on CCA within the institution	Total no. present for FGDs
Private sector	6	9	7	4	4	30
FBO	5	10	1	6	8	30
CBO	17	26	27	12	3	85
NGO	0	1	5	1	1	8
GOK	1	1	3	3	8	16
Total	**29**	**47**	**43**	**26**	**24**	**169**

Overall, limited access to climate change information scored the highest with 47 institutions indicating this was the greatest challenge for them, followed by 43 institutions indicating that the technical nature of presenting climate change adaptation information is a big challenge to them.

For government institutions the main challenge is the poor flow of information on climate change adaptation within the government institutions. Half the government institutions interviewed (8) indicated this as a critical challenge that needs to be addressed. Five of the eight NGOs engaged with indicated that the greatest challenge they face is in relation to the technical nature of most information they are able to access on climate change adaptation. CBOs face two critical challenges in relation to information, the first is the technical nature in which climate change information is presented which is faced by 27 of the responding CBOs and 26 of the CBOs in the study specified that they have limited access to the available climate change adaptation information within the county. Given that most CBOs do not have climate change experts the lack of access to information has proved a major problem in carrying out support to communities on adaptation. For instance, the inability by the Mara River Basin CBOs to access information was associated with inability to idenfity the right offices to acquire the information from, the lack of equpment for example computers and poor internet connectivity all these putting them at a disadvantage. For FBOs and the private sector institutions face a similar challenge with 10 out of 30 and 9 out of 30 respectively indicating the major challenge as limited access to climate change adaptation information.

For climate change adaptation work to be supported, local level institution need access to public policies and plans that show the mandates as stipulated by national and county governments, the

situation in the county on climate change impacts, the plans that have been approved by the government. Klein et al (2017) states that adaptation policy-makers and practitioners require robust climate modelling information, more complete risk analyses, and data that is useful to a variety of practitioners operating on multiple scales (Klein et al., 2017). Earlier Ayers et al. (2014), noted that much of the information around climate change impacts exists externally, in the realm of international bodies. However, in Kenya, national level information is available in specific public policy documents. Amongst the key documents that are available but may not be easily accessible are national policy documents such as the NCCRS OF 2010, the NCCAP, EMCA 1999, the Climate Change Act of 2016 and the NAP 2015-2030. At the county level key documents with information on adaptation are the CIDPs, the climate change policy and various sector specific policies. It is within these documents that mandates are stipulated, plans drawn and budgets made, thus acting as guidelines for adaptation practice.

Government institutions in the Mara basin have information on climate change within the office of environment but this information is not reaching all the relevant persons working on issues of climate change adaptation. Government of Kenya (2013) NCCAP recommends the development of a climate change knowledge management system which will serve as a one-stop electronic space where most climate change-related information and knowledge in Kenya will reside. While NCCAP has made this recommendation, information will need to be simplified for ease of internalization and practice. Armah, Luginaah, Hambati, Chuenpagdee, and Campbell (2015) notes that providing individuals with scientifically sound information will not necessarily translate to information assimilation, increased knowledge, action and support for policies based on this information. This is in line with the outputs from CBOs and NGOs in the Mara River Basin who

noted the complexity of most climate change information they access. The NGOs find this a challenge as they often need to repackage this information in order to share it out to their stakeholders taking up resources and time.

Information that is overly technical takes longer to internalise prior to sharing with their stakeholders. Often this information in the process of being intepreted loses the initial meaning. GLCA (2009) further notes that institutions should ensure that locally appropriate information about best practices for risk management and adaptation reaches the poorest and most vulnerable citizens. This reinforces Armah et al (2015) who assert that the lack of information, the lack of resources, institutional limitations, poor communication, and the deeply held values and beliefs that show how people respond to climate risks and their management often act as barriers to adaptation.

The government institutions were the set of institutions that indicated that they have adequate information on climate change adaptation but there is poor flow of information within the institution with few staff who have internalised and are able to utilize the information for decision making while others have little appreciation on what the information can guide them to undertake. Brown and Sonwa (2015) in Cameroon noted that local-level agencies of government were not being provided with any information from the national level related to climate change. The case for the Mara River Basin was different as the national government has been able to share information on policies and plans taking place in climate change adaptation with the county governments. However, this information is yet to adequately cascade to the non-public institutions and information available is provided in a non-systematic piecemeal fashion.

A growing body of literature highlights the importance of effective communication of climate change information to increase awareness and understanding, provide continuity, and constructively engage policy-makers, stakeholders, and the public (Moser, Ekstrom and Kasperson, 2010; Barnett el al., 2015).

Communities must build their resilience, including adopting appropriate technologies while making the most of traditional knowledge, and diversifying their livelihoods to cope with current and future climate stress. Local coping strategies and traditional knowledge need to be used in synergy with public policies and local interventions. Ansu-Kyeremeh (2005) maintains that indigenous communication systems remain at the heart of community social interactions, information, education, development and entertainment. Indigenous communication in Africa, is largely interactive and participatory and closely linked with community activities. According to UNFCCC (2006), adapting to climate change entails adjustments and changes at every level - from community to national and international levels. ADB (2009) is in agreement and observes that adaptation options and their supporting policies should be adopted by the appropriate level of government and implemented by institutions in direct contact with beneficiaries. Economic Commission for Africa (2016) notes that increasing knowledge and raising awareness about climate change, environmental stewardship includes the timely sharing of climate information, and encouragement of environment-friendly business practices are key challenges that a Blue Economy approach could help overcome.

The second set of challenges faced by institutions was in relation to capacity to implement climate change as listed below and presented in table 4.24.

(i) Lack of and inadequate climate change expert personnel

(ii) Weak or poor planning for climate change adaptation

(iii) Low capacity to handle climate change adaptation practices

(iv) Low participation in climate change adaptation practices

(v) Weak follow-up on climate change adaptation practices

Table 4.24: Challenges related to capacity on climate change adaptation action

Type of institution	Lack of/inadequate climate change expert personnel	Weak or poor planning for CCA	Low capacity to handle CCA practices	Low participation in CCA practices	Weak follow-up on CCA practices	Total no. in FGD
Private sector	8	6	3	8	5	30
FBO	9	5	6	4	6	30
CBO	42	14	15	3	11	85
NGO	4	3	1	0	0	8
GOK	2	6	4	1	3	16
Total	**65**	**34**	**29**	**16**	**25**	**169**

The greatest challenge faced under capacity is the lack of and inadequate climate change adaptation personnel, which scored 65, only the government institutions had this as low priority. The least pressing challenge was low participation in climate change adaptation practices.

Given their resource base, government institutions in the Mara basin is the main driver of climate change adaptation work. Yet from table 4.13 above, 6 out of the 16 government institutions indicated weak planning of climate change adaptation work. From the Bomet CIDP 2013 -2017 climate change adaptation is mentioned 3 times but it is not planned for in the current CIDP 2018-2022 adaptation is mentioned once and also not specifically planned for (CGB, 2013; CGB, 2018a;

CGB, 2018b). Similarly the Narok CIDP 2013 – 2017 and the CIDP 2018-2023 mentions adaptation a total of 5 times but does not specially plan for adaptation practices. Both CIDP do plan for climate change using general statements. Butler et al (2015) affirms that adaptation planning provides an opportunity to build the capacity of multiple stakeholders, and hence the system they are embedded within. If integrated, the strengths of top-down and bottom-up planning could generate greater adaptive capacity than either may achieve in isolation. In the Mara basin, specific institutions still have the opportunity to cascade what is in the CIDPs into specific annual adaptation workplans.

Francisco (2008) recognizes that the sooner that capacity is built prepare for climate change in as many vulnerable communities as possible, the more lives and properties will be protected. An aspect of this planning should involve building the capacity of all local institutions to respond and improve the relationships between local and national-level adaptation planning (Brown & Sonwa, 2015). Berke and Lyles (2013) in their research recognize that local governance capacity to plan needs to be improved to foster interactive dialogue between experts and stakeholders. Such a dialogue would construct plausible futures that are well understood and technically informed, and it would create flexible strategies that are publicly relevant, tangible, and adaptable across a range of future impacts. Parry & Terton (2016) suggest that greater capacity is needed among subnational actors, including local organizations and communities, to plan, implement, monitor, and evaluate adaptation action to better enable the identification, prioritization and implementation of adaptation actions that respond to institutions diverse needs and priorities.

The National Environment and Management Authority in the Mara River Basin indicated that, while the government has expertise, their geographical coverage is wide and the government also covers many sectors where issues of climate change are constantly emerging. Brown and Sonwa (2018) argue that community resilience in climate change could be better fostered by building capacity within local institutions and social networks to further extend their learning about potential climate change impacts and how to respond. Moura, Bianchi, Mazato, Espig, and Falaster, (2019) note that while institutions have a primary role in reducing uncertainties, they also make risks manageable and make it possible to transform uncertainties into risk. When institutions work well, there will be fewer uncertainties regarding interactions (Moura et al., 2019).

In the Mara River Basin, the Bomet CIDP 2013 - 2017 set aside finance for capacity development in broad development areas for women, youth, SMEs and government staff (CGB, 2013). The CIDP states that focus will shift to competency-based training and capacity building for improved service delivery. However, in the Bomet County CIDP 2018-2022 and Narok County CIDP 2018-2023, capacity building is still handled in general with no clear focus on building capacity to address climate change impacts (CGB, 2013; CGB, 2018a; CGN, 2013; CGN, 2018). Capacity building is still handled in a sectoral manner, this has led to local institutions struggling to develop innovative ways of addressing adaptation issues. The expertise they seek are persons with skills and knowledge on issues related to climate change who can take up lead roles in spearheading adaptation practices.

The devolved system of governance has worked well up to the county and sub county levels but for public institutions working in the climate change arena this has not adequately cascaded to the

ward and village levels. Nonetheless Takao (2012) notes that the key problem for local capacity building is an inadequate delegation of power to lower levels of government, local governments do not have the fiscal capacity to include funding requirements into their environmental programs.

The third challenge discussed with the institutions was related to financing of climate change adaptation action. Four key issues deliberated here were:

(i) Limited finances for climate change adaptation action

(ii) Poor fundraising skills for climate change adaptation action

(iii) Limited information on sources of climate change adaptation funds

(iv) Low institutional funding for climate change adaptation activities

Table 4.25 shows the scoring of the above deliberations by each category of institutions.

Table 4.25: Challenges related to financing of climate change adaptation action

Type of institution	Limited finances for CCA action	Poor fundraising skills for CCA action	Limited information on sources of CCA funds	Low institutional funding for CCA activities	Total no. in FGD
Private sector	11	10	6	3	30
FBO	7	12	6	5	30
CBO	22	43	15	5	85
NGO	4	2	0	2	8
GOK	6	3	1	6	16
Total	**50**	**70**	**28**	**21**	**169**

Overall, poor fund raising skills for climate change adaptation action was scored highest by 70 institutions noting it as their greatest challenge. This was followed by limited finances for climate change adaptation action that scored 50. Low institutional funding for climate change adaptation action received the lowest score with 21 institutions noting it as their biggest challenge.

From the discussions, 43 CBOs, 12 FBOs and 10 small businesses indicated that they have never received formal fund raising training and climate change adaptation is a relatively new field for them. They specified during the discussions that the skills within their institutions are not adequate to enable them raise the required resources. This is especially in developing proposal for large financing with external donors. The institutions indicated that they lacked access to statistics that would strengthen their argument, had weak writing skills and were limited in terms of mobility and access to internet connectivity. Lüdemann and Ruppel (2013) notes that the challenge for the parties and stakeholders involved in the climate negotiations is to develop secure, adequate and predictable funding streams for the financing of adaptation needs in poorer, more vulnerable countries with least adaptive capacity. The Bomet County CIDP 2018 – 2022 has not indicated how financing for climate change will be tackled. On the other hand, the Narok CIDP 2018-2023 has set aside 500 million Kenya shillings to support set up the county climate change fund for adaptation and mitigation (CGN, 2018).

With reference to Table 4.25, limited finances for climate change adaptation action is a key challenge for NGOs with 4 out of 8 of the respondents indicating that given their adaptation plans and area of operation the funding they have for adaptation is limited. This is echoed by government institutions (6 out of 16) who stated that they cover whole counties and countless communities. Within the private sector, the responding institutions stated that finances for climate change adaptation action has contributed to their slow uptake of adaptation strategies. The private sector institutions also added that their setup and accessing donor funds is still a challenge for them as many donors especially communities and national government have yet to build that trust as the private sector is viewed as a profit making entity. Va Dany, Bowen and Miller (2015) assert that

lack of funding for implementing key CCA works is one of the key challenges in fostering cooperation on this issue, even government organizations have only limited budgets for implementing their key priority activities.

The fourth set of challenges related to outreach services for climate change adaptation, these were stated in relation to:

(i) Weak outreach

(ii) Poor uptake of new ideas

(iii)Low creativity in climate change adaptation action

(iv)Weak gender mainstreaming skills

(v) Language barrier for effective communication on climate change adaptation issues

Table 4.26 shows the field study outputs based on discussions using the institutional challenges mapping process.

Table 4.26: Challenges related to outreach services for climate change adaptation action

Type of institution	Weak outreach	Poor uptake of new ideas	Low creativity in CCA action	Weak gender mainstreaming skills	Language barrier for effective communication	Total no. in FGD
Private sector	6	5	1	13	5	30
FBO	5	8	6	11	0	30
CBO	10	27	15	33	0	85
NGO	1	0	2	1	4	8
GOK	3	2	4	7	0	16
Total	**25**	**42**	**28**	**65**	**9**	**169**

From the responding institutions, the challenge of gender mainstreaming scored the highest with 65 institutions indicating it as a key challenge to their work in adaptation. Only 9 institutions scored language barrier for effective communication of climate change action as a challenge.

From, the institution engagement 7 of the 16 government institutions, 13 of the 30 private sector institutions, 33 of the 85 CBOs and 11 of 30 FBOs noted that they are challenged in terms of having the requisite gender mainstreaming skills. Only NGOs showed that their gender mainstreaming skills were good.

In the Mara River Basin it was stated that women and men contribute differently to management and degradation of natural resources. From the discussions institutions declared that climate change affects men and women differently and addressing their concerns requires a gender sensitive approach in order to deliver most effective results. The findings are consistent with Pratiwi, Rahmawati and Setiono (2016) who noted that the process of climate change adaptation

is not gender neutral. Men and women have different bodies of knowledge, skills, and experience which can contribute to mainstreaming strategies.

A gender approach to climate change helps identify different impacts of climate change on different categories of groups in the society – it makes visible their levels of vulnerability, their access to what resources and the necessary adaptation interventions. The Bomet CIDP 2018-2022 states the need to undertake gender assessment to establish a baseline upon which county specific gender mainstreaming policies and strategies can be developed to guide the design, resourcing and the implementation of programmes and projects (CGB 2018a).

Given that two thirds of the world's poor are women, it is imperative that they are reached with the required skills to enable them learn and undertake adaptation practices. Women form the majority of those who constantly interact with the environment in the basin and the need to specifically ensure that they have the requisite skills for adaptation cannot be minimized. UNIFEM (2008/09) also states that women are predominantly responsible for sectors that are most threatened by climate change such as food production and water, sanitation and firewood provision at domestic level makes them more vulnerable as women bear high social, economic and opportunity costs. Climate change adaptation should therefore be gender responsive to reduce women's vulnerability and augment their roles in the decision-making processes of planning and implementation (Pratiwi et al., 2016).

Based on the foregoing, any meaningful way of addressing gender mainstreaming into adaptation will need to be aware of the importance to identify climate impacts on men and women. Tessa and Kurukulasuriya (2010) note that bridging the institutional divides will be fundamental to fostering

knowledge exchange and experience-sharing. A study undertaken in Thailand by Bennett, Dearden, Murray and Kadfak (2014) noted that there were extremely limited programs of outreach, education, and awareness building. This had led to lack of knowledge about boundaries, regulations and thus ability to respond to local situation challenges. The need to enhance knowledge of climate change at all levels of government and in local communities through extensive outreach and education programs of was considered to be paramount.

The fifth key challenges was in relation to technology and equipment to act on climate change, specifically:

(i) Lack of equipment and computers

(ii) Poor technology options

(iii) Poor institutional infrastructure

(iv) Limited access to internet

(v) Lack of new innovative ideas

Table 4.27 presents the results from discussing technology and equipment challenges

Table 4.27: Challenges related to technology and equipment for climate change adaptation

Type of institution	Lack of equipment and computers	Poor technology options	Poor institutional infrastructure	Limited access to internet	Lack of new innovative ideas	Total no. in FGD
Private sector	6	15	2	6	1	30
FBO	14	8	2	2	4	30
CBO	33	23	7	8	14	85
NGO	1	6	1	0	0	8
GOK	1	9	3	3	0	16
Total	**55**	**61**	**15**	**19**	**19**	**169**

From the discussions the most pressing challenge was related to poor technology options that was scored by 61 institutions followed by lack of equipment and computers needed for climate change action that was scored by 55 institutions. Six out of eight NGOs, nine of sixteen government institutions and fifteen of thirty private sector institutions mentioned this as a major deterrent to fast adaptation uptake and delivery.

The technology that the three institutions stated as having a shortfall include improved seed varieties for agriculture and forestry, low cost and appropriate water infrastructure technologies among others. The challenge is best put forward by Tessa and Kurukulasuriya (2010), who state that developing and low-income countries are not attractive markets for entrepreneurs wishing to introduce new technologies. Moreover, assuming that technologies are effectively transferred, there is a need for complementary domestic policies and institutions ensuring that these technologies are effectively adapted and absorbed. Efficient use of technology requires prior technical knowledge, skills and resources. Va Dany, Bowen and Miller (2015) recognize that assessing the institutional capacity to adapt needs to take into account the characteristics of adaptation including technology transfer.

While this also affected FBOs (8) and CBOs (23), their more critical challenge was lack/limited access to equipment and computers. For FBOs (14) and CBOs (33), with poor or no equipment the latter two expressed that they are limited in accessing current data and information on emerging adaptation practices and trainings. They are also not able to document nor share their successes and challenges to a wide audience. One of the challenges leading to the lack of equipment is the lack of resources, given the nature of income generation CBOs and FBOs utilize the little they

raise on adaptation practices leaving no allocation for purchase of equipment. Francisco (2008), notes that the lack of resources and limited adaptive capacity constrains technology transfer.

4.3.3 Opportunities in the institutional landscape

Opportunities were generated by officials and members of institution who attended the focus group discussions using the table in Appendix 4 to generate discussions. Barriers to adaptation were first discussed by focus groups thereafter these were clustered and the groups discussed on potential opportunities existing in the basin, these were thematically clustered into five areas as presented in table 4.28 to table 4.32.

Opportunity 1: Climate change adaptation information

Table 4.28 contains outputs collated from different discussions on opportunities in information.

Table 4.28: Opportunities in Climate change adaptation information

Barrier to adaptation	Opportunity cluster	Specific opportunities suggested by institution type				
		GOK	NGO	CBO	FBO	Private sector
Lack clear mandate to implement climate change adaptation	Climate change adaptation information	Develop a database of all actors working on climate change adaptation issues in the county Through the county assemblies pass bills that provide mandates for non-state climate change institutions to work within set boundaries Internalization opportunities on climate change practices by subcounty/zones Create Resource centers with climate change information in print & digital form in each subcounty	Clear mandate from the county government on climate change adaptation engagement Develop user friendly climate change adaptation information for other institutions to use Develop easy digitized clips for sharing successful adaptation practices Domesticate existing policies to suit each institution's situation	Negotiate information flows on different coping measures at household level. Simplify climate change adaptation information Translate climate change adaptation information into local language	Source for affordable climate change adaptation information and share with community	Access climate change adaptation information for sharing

From table 4.28 the thematic areas of interest for the local institutions under the information cluster were accessing and sharing of user friendly climate change adaptation information in different forms for it to be practiced. Developing a database will enable the county climate change coordination units track activities and progress, this is in line with the Narok CIDP 2013-2017 that aims at managing the duplication of effort among stakeholders by putting in place data base (CGN, 2013). This was cascaded further in the CIDP 2018-2023 that states that the county shall compile a register/database of all on-going programmes and projects in the county to support monitoring

and evaluation (CGN, 2018). Bomet CIDP 2013-2017 looked at creating databases for landuse and housing (CGB, 2013) but in the focus groups they indicated the need to cascade this to other sectors especially of climate change.

Putting in place climate change bills by county government was seen by government institutions as critical in providing direction to other actors in the counties who are working in the Mara river basin. For the NGOs and CBOs, the groups stated that there exists an opportunity to design user friendly information packages for all stakeholders. The ability to access and use climate change adaptation information was mentioned by all groups as being of importance in scaling up adaptation work in the basin.

Four specific opportunity clusters were identified to address information challenge and foster climate change adaptation practices. The first is to create an overall increased access to information on climate change adaptation. This can be achieved by creating county and sub county level resource centres with climate change information available to all actors at the local level. The information can be in print or electronic forms as well as physical models and artefacts. The information availed should include statistics and maps for the Mara River Basin. This will require addressing the structural impediments that exist such as acquisition of equipment and internet connectivity.

The second set of opportunities focus on ensuring access to user friendly information on climate change adaptation to institutions working in climate change by review climate change adaptation of information available and repackaging of this information for local institutions and communities to use. For the public policy documents it may be necessary to develop abridged versions for

CBOs, FBOs and private sector institutions. These are the institutions that have few or no climate change expertise and yet work directly with the community, therefore requiring the deepest understanding on climate change adaptation issues. In the Mara River Basin, the government institutions have the highest number of officers who have been trained or sensitized on climate change adaptation. This can serve as an excellent pool for the county to cascade knowledge to other institutions.

The third set of opportunities looked at enhancing affordability of climate change adaptation information. Based on copyright laws the government can design abridged versions of policy documents for sharing with local institutions, the local institutions ability to access climate change related funding will increase their purchasing powers of climate change adaptation information.

The fourth cluster of opportunities should look into increasing the number of interactions within institutions discussing climate change adaptation, this will ensure climate change adaptation discussions are mainstreamed into daily institutional activities. The foregoing can be achieved by ensuring climate change adaptation is planned and budgeted for on an annual basis and implementation undertaken; posters on climate change adaptation practices should be displayed on institution walls to generate discussion among staff; supervisors need to be accountable for reporting on their division/section on climate change adaptation actions among staff and volunteers. Weekly meetings/ seminars on emerging climate change adaptation issues and practices should be mainstreamed into institutional work plans and work. Information flow within the institution is vital as once this is internalized it can be shared with partners. Documentation of all adaptation processes needs to be done by the responsible officers/volunteers. Information on

climate change shows disconnect with local institutions who do not necessarily view the information as climate change adaptation information but as a set of practices that are affecting their target communities' livelihoods.

Reviewing the capacity of institutions to handle adaptation practice requires having access to information on regulations and practices thus enable planning to take place and smooth implementation. Adaptation to climate change happens at the local level, addressing the knowledge gap that exists will be achieved tapping on opportunities in the institutional landscape. For institutions to enhance community resilience, there is need to not only address access to information but to holistically look at the specific factors hampering information utilization for transformative change. Ahmed and Fajber (2009) noted the same when stating that development of livelihood options requires access to training and skill development, and information on technologies and ways of adding value to create profit.

There is a large amount of information on adaptation policies but little information on local institutions' integration of these frameworks in their adaptation practices. Yet the institutions are required to make decisions on adaptation practices on a regular basis. The information should guide them to identify and reach beneficiaries, finance for adaptation practices, indicators for monitoring and evaluating adaptation and gauging of impact of adaptation on households in their catchment. Berke and Lyles (2013) note that integrating information generation with public engagement expands prospects for seeking new opportunities to produce co-benefits that have a positive effect on multiple interests to a wider section of communities. Thus the ability of the Mara River basin institutions to access and utilize climate change adaptation information in their activities from project conceptualization to completion increases benefits. This concurs

Jantarasami, Lawler and Thomas (2010) who concluded that adaptation projects are hindered by insufficient climate change impacts information at a scale relevant to regional level or local level management. Pelling and Manuel-Navarrete (2011) state that information networks that have been pathways for learning and spreading alternative visions and challenging discourse were informal, personalized and extensive.

Antle and Capalbo (2010) show that private sector decision makers need information that can reduce uncertainty about climate change and its impacts on the systems they are managing now and may be managing in the future. Public sector decision makers need information that can show the economic and other public benefits of investments that reduce uncertainty about climate change and adaptation options.

Tapping on indigenous knowledge for uptake of adaptation practices will support in reducing cost of information that has to be acquired from global and regional sources. The data and information required for planning for adaptation action can thus be easily availed through knowledge of local traditions. A study by Eriksen, O'Brien and Rosentrater (2008), notes that there is a rich set of indigenous strategies to deal with multiple threats, variability and environmental change, but they are not sufficient for reducing the impacts of climate change. One of the reasons that indigenous strategies are inadequate is because they largely operate without any formal government support or facilitation. Responding to the multiple issues posed by adaptation requires coordination mechanism that brings together information on the impacts of climate change, adaptation activities, and financial disbursements from donors for aiding such activities (Morris and Krishnan, 2012).

Opportunity 2: Technology and equipment to act on climate change

Table 4.29 shares outputs from local institutions on opportunities in technology for climate change adaptation

Table 4.29: Opportunities in Technology and equipment

Barrier to adaptation	Opportunity cluster	Specific opportunities suggested by institution type				
		GOK	NGO	CBO	FBO	Private sector
Lack clear mandate to implement climate change adaptation	Technology and equipment to act on climate change	Research on new technologies to be introduced for adaptation Introduce fast growing crops Introduce green energy for use in institutions and households Develop a climate change adaptation plan that looks into the technologies and equipment needed at the local level to enhance adaptation.	Introduce new and appropriate products and technology in agriculture, forestry, energy, water sectors among others Provide technology such as computers and telephones to institutions and communities at affordable rates	Access equipment to support adaptation work Support communities uptake of solar energy for lighting and cooking Support in setup of biogas systems	Access equipment to support adaptation work Support communities uptake of solar energy for lighting and cooking	Introduce new and appropriate products and technology in agriculture, forestry, energy, water sectors among others Provide technology to institutions and communities at affordable rates Introduce green energy for use in institutions and households

With reference to table 4.29, technology opportunities were identified in four areas by the institutions. These are opportunities in research, acquisition, use and sharing of the technologies to enable increase adaptation practices. The technologies mentioned were clustered as biological technology looking into seeds that are fast germinating and maturing, construction technology focusing on structures in water provision, energy and power technology for example solar and

wind power and finally communication technology such as computers, telephone and other media related technology that would support adaptation work.

There is need to develop a climate change adaptation plan that looks into the technologies and equipment needed at the local level to enhance adaptation. The initiatives on action plans implemented will continue to support the country to adapt to the effects of climate change through new technologies, modification of transferred technologies to fit national circumstances and the adjustment of the present technologies on climate. Pegram et al (2013) suggest that where basin plans are produced, they should ideally sit within a tiered hierarchy of planning from the national to the local level. It is suggested that this will enhance efficient management of the plans and adaptation action.

Ford et al (2013) recognized that Technology development and diffusion is important for expanding the range of adaptation possibilities by increasing opportunities and/or reducing costs. However, a study done by Tessa and Kurukulasuriya (2010) brings out some pertinent facts among them is the failure to transfer technology to developing countries which stems from concerns surrounding intellectual property rights, poor market driven technology transfer and the weak capacity of absorption from inadequate institutions and policies. These will need to be comprehensively raised by the climate change committees at the counties and shared with donors and other research partners. However, there is some level of headway in the Mara River Basin where institutions are in place and sound policies exist, challenge is in absorption capacity of the institution who would require technical capacity enhancement as the technology is introduced, putting in place a policy on intellectual property rights.

Opportunity 3: Capacity for implementation of climate change adaptation

Table 4.30 looks at the discussions on opportunities on capacity to implement adaptation practices.

Table 4.30: Opportunities on capacity to implement climate change adaptation

Barrier to adaptation	Opportunity cluster	Specific opportunities suggested by institution type				
		GOK	NGO	CBO	FBO	Private sector
Uncoordinated and limited skills and knowledge on adaptation	Capacity to implement climate change	Train staff on adaptation practices Train non-state actors on planning for adaptation an	Recruit and train CBOs, FBOs and small private sector institutions working on climate change adaptation	Recruit volunteers and train them on adaptation practices Tap onto the existing knowledge on participatory adaptive practices to train communities	Attend trainings and seminars on climate change adaptation	Design climate change adaptation forums in collaboration with actors Attend trainings and seminars on climate change adaptation

All the institutions indicated that training, and other forms of sensitization on climate change adaptation knowledge and skills is crucial to enable them effectively undertake adaptation. NGOs and CBOs also indicated the need to recruit local staff and volunteers to support adaptation work. Training and skills upgrading for staff and volunteers was stated as needed to bridge the climate change expert personnel gap. This will lead to improved planning for climate change adaptation and enhance the capacity of institutions at the local level to handle climate change adaptation practices. Capacity development will also enhance mainstreaming of climate change adaptation into overall county development. The need to build institutional capacity to handle climate change adaptation issues in the Mara River Basin is crucial for sustainable livelihoods and holistic development.

The lack of required skills in adaptation among NGOs, CBOs, FBO, and private sector institution is a major determent to the quick uptake and implementation of climate change adaptation practices. With improved skills in these institutions there should be reciprocal improvement in uptake of adaptation practices in the community leading to increased resilience to climate change impacts. Increasing the participation of local institutions in climate change adaptation requires building the skills of staff members in these institutions to have the confidence to undertake adaptation. This will require scaling up of the currently existing capacity building forums both internal and across the different institutions. The issue of frequency of forums in the initial stages will boost capacity of those institutions that are weak and increase their participation in climate change adaptation practices.

The national and county governments have a major interest in addressing climate change impacts through adaption. Both have information and expertise to take local institutions through formal and informal trainings in workshops, seminars, exposure and on the job trainings through staff internship programs. Brown and Sonwa (2015) in their study in Cameroon established that many local NGOs, with the support of international institutions, have facilitated the development of community forests in the villages. These activities build capacity for climate change adaptation through diversification of livelihood strategies.

The Climate Change Act 2016 by authorizing the county governments to integrate and mainstream climate change actions into their County Integrated Development Plans (CIDP) and designating a County Executive Committee member to coordinate climate change affairs (GOK, 2016a), was aiming to enhance capacity at the local level. County governments are expected to establish climate

change units that will oversee the implementation of all climate actions including adaptation actions thus enhancing capacity at the local level. This is in agreement with LVBC (2012) which states that there is need to improve education and training opportunities.

In line with capacity development, strategic basin planning considering issues of conservation, protection and management will need to be given prominence in climate change planning. Addressing climate change adaptation practices by implementing the developed basin plans will further provide an opportunity for increased community resilience to climate change. Pegram et al (2013) note that implementation is the greatest challenge in basin planning – and even more difficult in stressed basins – and there is always a great risk that the plan will become a paper plan that does not change management practice, actions or behaviour in the basin. Munaretto, Siciliano, and Turvani (2014), note that adaptation capacity is dynamic, and is influenced by economic and natural resources, technology, infrastructure, social networks, human resources, and institutions. Berke and Lyles (2013) noted that a planning process that integrates information generation with public engagement also expands prospects for seeking new opportunities to produce co-benefits that have a positive effect on multiple interests rather than having narrowly defined benefits that suit individual interests.

Opportunity 4: Financing of climate change adaptation action

Presented in table 4.31 are the output discussions on financing for climate change

Table 4.31: Financing of climate change adaptation action

Barrier to adaptation	Opportunity cluster	Specific opportunities suggested by institution type				
		GOK	NGO	CBO	FBO	Private sector
Inadequate resources to fund climate change adaptation practices	Financing of climate change adaptation action	Set up a climate change fund clearly stipulating the share for adaptation work Allocate a percentage of the fund for non-state institutions working on climate change	Fund raise and disburse funds to CBOs and FBOs	Build skills of leaders and volunteers in resource mobilization Strengthen local resource mobilization mechanisms	Build skills of leaders in resource mobilization Strengthen local resource mobilization mechanisms	Develop skills for resource mobilization

Institutions in the study area indicated that, currently, they face limited access to climate financing mechanisms and the number of local forums to support learning and sharing on adaptation to climate change. This provides an opportunity for improving skills on resource mobilization, creating and increasing research links and funding.

Appreciating an increasing local level climate change financing in terms of skills development for sourcing financing and increasing level of financing is non-negotiable if resilience through adaptation is to be scaled up. With local level financing taking place, the poor and marginalized can be better targeted by institutions closest to them. Putting in place county climate change funds in all counties will enable the Mara River Basin institution mainstream climate change adaptation into planning. This will result in increased levels of positive response by the community. This agrees partially with Lüdemann and Ruppel (2013) who note that fairness will involve an increased transfer of financial resources from industrialised countries to developing countries. Accordingly, the challenge for the parties and stakeholders involved in the climate negotiations is to develop

secure, adequate and predictable funding streams for the financing of adaptation needs in poorer, more vulnerable countries with least adaptive capacity.

Working at the national level, is the Adaptation Consortium (ADA) a Consortium of partners led by the National Drought Management Authority (NDMA) to support county governments mainstream climate change into development and planning through the County Climate Change Fund Mechanism. They work with the National Treasury, Climate Change Directorate (CCD), National Environment Management Authority (NEMA), Ministry of Devolution and ASALs and the Council of Governors (CoG) to align their work with national policies and processes. Narok county has already started work with ADA on implementing this mechanism which will go a long way towards funding adaptation.

The foregoing concurs with Agrawal 2009 who noted that, without local institutions, rural poor groups will find it far costlier to pursue the adoption of effective adaptation practices relevant to their local needs, as well as difficult to increase their information knowledge on adaptation options. Uphoff (1992) declares that public sector institutions backed by authority are better able to achieve consistency and predictability in their performance. However, they operate at a fairly high cost, and they are often slower or more rigid than other institutions. They are amenable to policy direction, which is important for sustainable development if this goal has backing from the government. They are also liable to politicisation, which can have adverse consequences.

Ford et al (2013) stated that there is increasing evidence that governments, industry, and NGOs are investing in adaptation with funding of adaptation activities becoming a major theme of international climate negotiations and domestic climate policy. This provides an opportunity to

link encourage the set-up of the climate change fund at county level. Funding for adaptation is needed as few adaptation policies can implemented solely with existing funding streams (Ford et al 2013) this will require the Green Climate Fund to also begin to mobilize resources for adaptation in the global south.

Opportunity 5: Outreach services for climate change adaptation

The following are findings from discussions on opportunities for outreach services for adaptation.

Table 4.32: Opportunities in outreach services

Barrier to adaptation	Opportunity cluster	Specific opportunities suggested by institution type				
		GOK	NGO	CBO	FBO	Private sector
Uncoordinated and limited skills and knowledge on adaptation	Outreach services for climate change adaptation	Integrate gender in county policies on climate change Train staff on gender mainstreaming Generate desegregated data by sex and vulnerability from target groups Monitor and disaggregate data for planning	Recruit local persons on their staff to address the language barrier and increase the rapport the institutions have at the community. Use schools as points of entry to share on adaptation practices that can be cascaded to the households Share success stories on men and women's adaptation work	Develop participatory strategies on adaptation and risk reduction Develop skills in gender mainstreaming Train men and women in adaptation work Develop simple gender responsive monitoring tools to track progress	Build skills of the staff and volunteers in the institutions on gender mainstreaming	Adopt a village annually to support their adaptation

From Table 4.32 the most mentioned opportunity on outreach centred on gender mainstreaming in climate change adaptation, monitoring and evaluation, public participation and the private sector institutions suggested adopting a village to develop a show case on adaptation. Institutional capacities to address gender mainstreaming skills as part of outreach will require institutions to generate disaggregated data by sex and vulnerability, develop empowerment strategies on

adaptation and risk reduction. Schools can be used as means of access to share on adaptation practices with pupils who can then practice and share at the households for replication and scaling up adaptation.

To address the issue of weak follow-up on climate change adaptation practices, the local institutions will develop participatory monitoring and evaluation approaches to track progress. Planned adaptation response can be introduced and can include providing women and men at the community with information on key risks and adaptation measures they can each promote and use towards securing their livelihoods. This will require local institutions to tap onto the existing knowledge on participatory adaptive practices. Brown and Sonwa (2015) note that the links that local NGOs and international institutions have with rural communities can facilitate the exchange of knowledge, but this should go beyond raising awareness to more focused climate adaptation interventions for both men and women.

Local institutions in the Mara River Basin have taken on a lead role in reaching out to communities to address issues of adverse climate change and the consequent insecure livelihoods. In this way local institutions and communities are taking part in meeting a large aspect of the adaptation costs for the Basin. According to Francisco (2008), one way to reduce the burden of adaptation cost is by sharing it among those who stand to benefit from adaptation measures. Another way is to transfer risk through the use of catastrophe bonds, catastrophe pools, and weather index-based insurance or micro-insurance schemes. This is an opportunity that is also proposed by UNDP (2010) which recognizes that institutions have the ability to foster adaptation at the local level by brokering information flows on different coping measures at household level. Franscisco (2008) further states that in risk sharing and risk transfer, the contributions of social institutions like

community groups and private organizations are important, groups of people who are likely to be affected by an adverse climate event jointly carry out adaptation measures by contributing their time and resources.

CHAPTER 5: SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Overview

This chapter contains a summary of the main findings, conclusions and recommendation. The main objective of the study was to establish the capacity of local institutions to foster climate adaptation responses in the Mara River Basin. The specific objectives were to:1)Assess local institutional practices that promote climate change adaptation in the Mara river basin;2)Evaluate the internal institutional structures that enable or hinder climate change adaptation in the Mara river basin;3)Analyse the opportunities in the institutional landscape that enhance community involvement in climate change adaptation in the Mara river basin.

5.2 Summary of findings

The first objective of the study was to assess local institutional practices that promote climate change adaptation practices. The study interrogated government institutions, Non-Governmental Organizations, Community Based Organizations, Faith Based Organizations and private sector institutions.

The study established that the mandates of most local institutions do not make direct provisions for their involvement in adaptation. The mandates of Government institutions provide for mainstreaming climate change in all its activities. All the NGOs sampled in the study were international NGOs and their mandates provided for adaptation. However the core mandates for CBOs is welfare and income generation with no direct provision for adaptation. The core mandate for FBOs is spiritual and Psycho social support with no provisions for adaptation. The core mandate of the private sector is to generate profits and there are no direct provisions for adaptation.

The study interrogated 5 Adaptation intervention areas (Agriculture, Environment, Forestry, Energy and Water) and established that in all of these areas there was above average implementation of adaptation practices across the 5 categories of institutions in the study. The overall score was of 81% meaning that 81% of the adaptation practices examined were implemented by over 50 %. Of the institutions in the Mara river basin. This score is an indicator of the extent to which adaptation practices implemented in the Mara river basin? Environment scored highest (100%), followed by Water (87.5%), Agriculture (87.5%), Forestry (67%), and Energy (67%),

The study sought to establish how each institution score performed in terms of implementing Adaptation practices? It established that all categories of institutions scored above the 50%mark in terms of implementing adaptation practices. This implies that all of them are extensively involved in adaptation (table 4.13) although not at the same level. The highest score was obtained by Government Institutions (83%) followed by CBOs (80.6%), FBOs and Private Sector (67%), NGOs (54%). These findings seem to indicate that CBOs, FBOs and Private sector mandates do not provide for adaption yet they implement adaptation activities.

The second objective of the study was to evaluate the institutional structures that enable or hinder adaptation practices. Using the institutional effectiveness tool, the study deemed any score above 50% as favourable and below 50 unfavourable. The average score for the developing processes quadrant across the 5 categories of institutions was 61.2%, for enabling processes quadrant 73.2 %, for energizing processes quadrant 70.4% and for productive processes quadrant 69.2%.

The institution that yield the highest score was NGO which scored 70%.Hoever the range was not wide s and is closely followed by CBOs(70%),Private sector(68.5%),Government(66.3) and FBO(62.7%)

The third objective of the study was to analyse the opportunities in the institutional landscape that enhance community involvement in climate change adaptation in the Mara river basin. The study established that there were a total of 44 links between the institutions in the study area. Out of this total 55% were vertical links and 45% were horizontal links. When these linkages were analyses against 5 categories of opportunities the results indicated that 27% presented access to information as an opportunity, 25% capacity building, 18% finance and 30% technology

Challenges identified by the institutions are clustered into five areas first climate change adaptation information needs, second capacity to implement climate change, third financing of climate change adaptation action, fourth outreach services for climate change adaptation and fifth technology and equipment to act on climate change. The issues faced by institutions in relation to climate change adaptation information were technical nature of presentation of climate change adaptation information affecting 26% of the respondents, limited access to climate change adaptation information (22.81%), poor flow of information on climate change adaptation information within the institution (22.44%), high cost of information on climate change adaptation (16.85%) and scarcity of information on climate change adaptation affected by 11.89% of the respondents. Opportunities identified to address information challenge and foster climate change adaptation practices include first creating an overall increased access to information on climate change adaptation through resource centers at the county and sub county level. Secondly, ensuring

access to user friendly information by reviewing repackaging of information to have abridged versions of large technical documents. Thirdly, enhance affordability of climate change adaptation information. Fourthly, increasing the number of interactions within institutions discussing climate change adaptation and creating visibility of climate adaptation issues in offices. Lastly, tapping on indigenous knowledge for uptake of adaptation practices as it will also support in reducing cost of information that has to be acquired from afar.

The second set of challenges faced by institutions is in relation to capacity to implement climate change the following were identified lack of and inadequate climate change expert personnel 33.9% of the respondents indicated this as a major challenge, weak or poor planning for climate change adaptation (24.86%), low capacity to handle climate change adaptation practices (18%), weak follow-up on climate change adaptation practices (13.9%) and low participation in climate change adaptation practices at 9.3%. the opportunities to address this capacity problems are training and skills upgrading through formal and informal trainings in workshops, seminars, exposure and on the job trainings through staff internship programs. This will serve three purposes first to bridge the climate change expert personnel gap, second improve planning for climate change adaptation and lastly enhance the capacity of institutions at the local level to handle climate change adaptation practices. Strategic basin planning will address the issue of weak implementation while to address weak follow-up on climate change adaptation practices, there is need to develop participatory monitoring and evaluation formats to track progress. The third challenge is related to financing of climate change adaptation action key issues being limited finances for climate change adaptation action affecting 34% of the respondents, poor fundraising skills for climate change adaptation action (31.5%), low institutional funding for climate change

adaptation activities (20.7%) and limited information on sources of climate change adaptation funds affecting 13% of the respondents. The opportunities include improving skills for sourcing financing and develop secure, adequate and predictable funding streams for the financing of adaptation needs by setting up of a climate change fund at county level. The fourth set of challenges related to outreach services for climate change adaptation the greatest one being weak gender mainstreaming skills (34.88%), poor uptake of new ideas (18.12%), weak outreach (18%), low creativity in climate change adaptation action (16.6%) and language barrier for effective communication on climate change adaptation issues (13.57%). Institutional capacities to address gender mainstreaming skills as part of outreach will require institutions to generate desegregated data by sex and vulnerability; work within responsive policies or domesticate existing policies, build staff skills for gender mainstreaming. Secondly recruit local persons on as staff this will address the language barrier and increase the rapport the institutions have at the community. Finally use schools as points of entry to share on adaptation practices that can then be cascade to the households for uptake. The fifth key challenges was in relation to technology and equipment to act on climate change, such as poor technology options (44.9%), lack of equipment and computers (25.4%), poor institutional infrastructure (11.73%), limited access to internet (11.56%) and lack of new innovative ideas (6.3%). The opportunity to address the technology needs will start with developing a climate change adaptation plan that looks into the technologies and equipment needed at the local level to enhance adaptation. Introduce new technologies and modify transferred technologies to fit local circumstances.

5.2 Conclusions

The study concludes that many local institutions implement adaptation practice even when they are not expressly provided for in the mandate because the government institutions mandated to mainstream adaptation does not have enough capacity to implement and therefore engages other stakeholders in implementation. The adaptation activities manifested in the study confirm that adaptation is being implemented at a high rate of 81% across the intervention areas. The study concludes that concludes that internal structures of local institutions promote adaption to climate change since all quadrants of the institution effectiveness tool yielded a score of over 50 percent and there was evidence that all institutions were extensively engaged in adaptation practices. The institutional landscape exhibited both vertical and horizontal linkages in close to equal measure (55% and 45%).The findings of the study indicate the opportunities for enhancing community participation that are presented by the links which lead to the conclusion that local institutions in the Mara river basin have capacity to foster climate change adaption..

5.3 Recommendations

1. Mainstreaming climate change. There is need to undertake climate change adaptation mainstreaming within the Mara River Basin middle catchment using the NCCAP guidelines. This can be achieved by first establishing climate change units in the sub counties of the Mara River Basin the secretariats will work closely with the county climate units. These units can benefit from local institutions wich this study has established have capacity to implement adaptation practices.

2. Expand the mandates of CBOs to include adaptation since they are already undertaking the practices. This will provide more opportunities for expanding their work in adaptation.

3. Stakeholder engagement in climate change Adaptation should be institutionalized for all institutions involved in Adaptation. This can make use of Opportunities that are present in the landscape. It will be in line with the EAC climate change Master plan whose goal is strengthening cooperation in responding to climate change.

5.4 Suggestions for further study

1. Assess climate change impact on major sectors by conducting a vulnerability assessment study
2. The capacity of local institutions to monitor and evaluate climate change projects

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APPENDICES

Appendix 1: Key Informant Interview

Consent to proceed with interview

Good morning/ good afternoon. My name is Isabella Asamba a PHD student at Maseno University. I am undertaking a research on Local institutional capacity to foster climate adaptation responses in the Mara River Basin. The information obtained from you as a respondents will be treated with utmost confidentiality and privacy. This information will only be used for academic purposes only and your name will not appear in any document. Are you willing to proceed with the interview?

Date of interview	**Time Started:**	**Time Ended:**
Name of interviewer		
Name of interviewee		
Name of Institution		
Contacts (telephone/email)		

County, Sub county, Ward, Location	**To be captured using GPS**

Status of the organization (tick one)

1. Government [GOK]
2. Non-governmental organization (NGO)
3. Community based organization (CBO)
4. Faith based organization (FBO)
5. Private sector [businesses etc]

Are you are registered institution?

1. Yes
2. No

If yes, What are you registered under?

1. Act of parliament
2. Societies act
3. Ministry of gender and Sports
4. Companies and business act

Does your organization have a physical office?

1. Yes
2. No

What policies guide your functions as an institution? (Get access and read)

1. Public policies as laid down by government ministries
2. Internal policies /constitution of your institution
3. None of the above

What is your target area (tick one):

1. Village
2. Sub-Location
3. Location
4. Division
5. Ward
6. Sub county
7. County

How long have you been implemented climate change adaptation strategies? (tick one)

1. Less than 1 year
2. from 1 to 3 years
3. From 4 to 10 years
4. Over 10 years

Which of the following best describes your institution?

1. Membership organization
2. Non membership organization

What is your total staffing level (numbers)?

1. Over 100 persons
2. 50 to 100
3. 25 to 49
4. 10 to 24
5. Less then 10

What percentage of your institutional staffing is made up of salaried staff?

1. 100%
2. 75% to 100%
3. 50%-75%
4. 25%- 50%
5. Less then 25%
6. None

What percentage of your institutional staff has undergone climate change training?

1. 100%
2. 75% to 100%
3. 50%-75%
4. 25%- 50%
5. Less then 25%
6. None

Who provides overall direction on issues of climate adaptation practices?

1. Board
2. Management staff
3. Field officers
4. All

As an institution how often do you plan and budget for adaptation activities

1. Annually
2. Quarterly
3. Monthly
4. Never

What percentage of your institution budget is spent on adaptation practices?

1. 100%
2. 75% to 100%
3. 50%-75%
4. 25%- 50%
5. Less then 25%
6. None

Who makes decision of final adaptation activities to be selected for action?

1. Communities
2. Donors
3. Your management committee
4. The government
5. Patterns of decision making

Who do you target in the community? (tick)

1. Other institutions
2. Farmers
3. All households
4. Youth
5. Men
6. Women

What has been the major benefit of your activities on the target groups? (tick one)

1. Improved farm yields
2. Reduced food stress
3. Greater access to clean water
4. Less risk to disasters
5. Reduced livestock diseases
6. Increased access to energy
7. Reduction in human diseases

Do you document your activities on climate adaptation practices?

1. Yes
2. No

How do you share information of adaptation practices with the community? Rank

1. Face to face in seminars/workshops
2. One on one with individual households/farmer
3. Publications
4. Radio
5. Use of mobile phone (messaging services)

How often do you hold staff meetings to discuss climate adaptation issues?

1. Annually
2. Half yearly
3. Quarterly
4. Monthly
5. Weekly
6. As need arises
7. Never

How often do you carry out monitoring of climate adaptation issues?

1. Annually
2. Half yearly
3. Quarterly
4. Monthly
5. Weekly
6. As need arises
7. Never

When was your last evaluation on climate adaptation issues?

1. Less then 1 year ago
2. 2 to 3 years ago
3. 4 to 5 years ago

4. Cannot recall
5. Never

In what areas do you as an institution face the greatest challenge when working on climate adaptation issues?

1. Mandate and Obligations as handed down by the government and community inclusive of Public Policies
2. Structure -patterns of internal coordination to enhance deliver
3. Strategy of patterns of decision making towards adaptation plans
4. Culture patterns of behaviour amongst staff and volunteers

What has been the major climatic change in your area of operation?

1. Increased precipitation (rainfall)
2. Reduced precipitation (rainfall)
3. Increase in temperatures
4. Reduced temperature

What is the major impact associated with climate change in your area of operation?

1. Floods
2. Forest fires
3. Food stress
4. Increased frequency of current Diseases
5. Introduction of new Diseases
6. Biodiversity loss

Which is the major climate adaptation activity that you currently under take?

1. Improved cropping patterns
2. Addressing water stress
3. Forestry practices – conservation, protection, Reforestation
4. Flood risk management

Which is the major climate adaptation activity that you plan to put in place in the next 1 year?

1. Improved cropping patterns
2. Addressing water stress
3. Forestry practices – conservation, protection, Reforestation
4. Flood risk management

Rank the major adaptation action that is a priority to your institution

1. Assessment of climate trends
2. Vulnerability assessment on livelihoods
3. Monitoring and evaluating interventions
4. Early warning system
5. Development of adaptation options
6. Fire and alien plant management
7. Zoning protected areas
8. Awareness on climate related health impacts

What major role does your institution play in adaptation to climate change?

1. Assessment of climate trends
2. Vulnerability assessment on livelihoods
3. Monitoring and evaluating interventions
4. Early warning system
5. Development of adaptation options
6. Fire and alien plant management
7. Zoning protected areas
8. Awareness on climate related health impacts

Which of the following is the major form of agriculture related support that your institution provides to community on adaptation mechanisms? (Please tick)

	Yes	No
Land preparation		
Inputs		
Soil conservation		
Agro forestry practices		
Storage		
Access to crop production Information		
Livestock breeding		
Access to livestock production Information		

Which of the following is the major form of environment related support that your institution provides to community on adaptation mechanisms? (Please tick)

	Yes	No
Natural regeneration of vegetation cover		
Natural drainage		
Landscape restoration/Terracing		
Access of Biodiversity		
Access to environment Information		

Which of the following is the major form of forest related support that your institution provides to community on adaptation mechanisms? (Please tick as appropriate)

	Yes	No
Tree seedlings production		
Tree planting		
Tree harvesting		
Forest conservation		
Forest protection		
Access to forestry Information		

Which of the following is the major form of energy related support that your institution provides to community on adaptation mechanisms? (Please tick as appropriate)

	Yes	No
Use of wood fuel		
Use of fossil fuels		
Use of solar energy		
Use of hydro power		
Use of wind energy		
Access to and share Energy Information		

Which of the following is the major form of water related support that your institution provides to community on adaptation mechanisms? (Please tick as appropriate)

	Yes	No
Water catchment management		
Water conservation		
Water infrastructure development		
Riparian land management		
River bank conservation and protection		
Access to and share Water Information		

What form of support do your institution provide to community on adaptation mechanisms?

1. Material inputs
2. Information on best practices
3. Training
4. Financial support to vulnerable target groups

To what extent are your current plans, policy positively contributing to your adaptation practice?

1. 100%
2. 75% to 100%
3. 50%-75%
4. 25%- 50%
5. Less then 25%

What barriers do you face in accessing information on adaptation to climate change?

1. Lack/limited access to Climate Change adaptation electronic and printed information
2. Limited access to training opportunities on climate adaptation
3. Lack/limited access to climate fund /financing for climate change adaptation action
4. Limited numbers of local forums to support learning and sharing on adaptation to climate change
5. Limited access to technology and equipment to act on climate change?

Adaptation Practices carried out in the Mara River Basin
Type of institution_____ Catchment _____

Sector	Practices	Which practice are you involved in?		Which other institutions are supporting this practice?	What information do you need to make decision related to this practice?
Agriculture	Land preparation				
	Inputs				
	• Seeds				
	• Fertilizer				
	• Pesticides				
	Storage				
	Access to crop production Information				
	Livestock bred				
	Zero grazing				
	Open pasture				
	Access to livestock production Information				
	n				
Environment	natural regeneration of vegetation cover				
	natural drainage				
	Access of Biodiversity				
	Access to environment Information				
	n				
	Tree planting				
	Tree harvesting				
	Tree seedlings production				
	forest conservation				
	f forest protection				
	Access to forestry Information				
	n				
Energy	Use of woodfuel				
	Use of fossil fuels				
	Use of electricity				

	Use of hydro power				
	Use of geothermal power				
	Access to Energy Information				
	n				
Water	river water resources				
	Protection of swamps				
	Use of rain as a source of water				
	Use of underground aquifers				
	Use of springs				
	Use of dams and pans				
	Riparian land management				
	Water catchment management				
	Access to Water Information				
	n				

Appendix 2: Institutional effectiveness Tool

Questions
Developing processes
1. Is participative decision making on climate change practices encouraged and widely used?
2. Do the staff members have pre-requisite knowledge and skills to handle climate change adaptation activities?
3. Within your institution, is there is a positive interpersonal environment?
4. In your opinion are issues related to climate change clearly communicated in the institution?
Productive processes
5. Are services related to climate change adaptation delivered on time?
6. Are climate change adaptation activities planned and budgeted for in advance?
7. Are the project goals clearly articulated by most members in the institution?
8. Are your targets on climate change adaptation achieved and/or surpassed?
Enabling processes
9. Is the work process on climate change activities is well coordinated?
10. Does your institution have a stable predictable work environment?
11. Do you have rules and procedures that guide your climate change work process?
12. Does the institution put emphasis on quantification and measurement of work done on climate change adaptation activities?
Energizing processes
13. Are you as an institution, able to develop creative solutions towards reaching out to external environment on issues of climate change adaptation?
14. Do you respond to external environment changes quickly?
15. You are seen to be legitimate by the community and your donors?
16. Do your stakeholders see you as a dynamic institution in relation to climate change adaptation action?

The process had six steps as follows:

Step 1: Each question was asked and the score noted beside the question, a scale of 1 to 5 was used to respond to each question. Scale 1 to 5, where 5 = very frequently, 4 = frequently, 3 = sometimes, 2 = rarely and 1= almost never.

Step 2: The scores were transferred to the analysis table against the question number

Step 3: For each set of scores were computed and total made

Step 4: A concentric ring chart termed the spider diagram was designed from the quadrants and was used to visualize the scores. The averages were plotted on the chart with the concentric rings (2=20%, 4=40%, 6=60%, 8=80%, 10=100%). Each concentric circle accounts for 20% and there are five rings, bringing the highest to 100%, this is in line with the scores in the table below

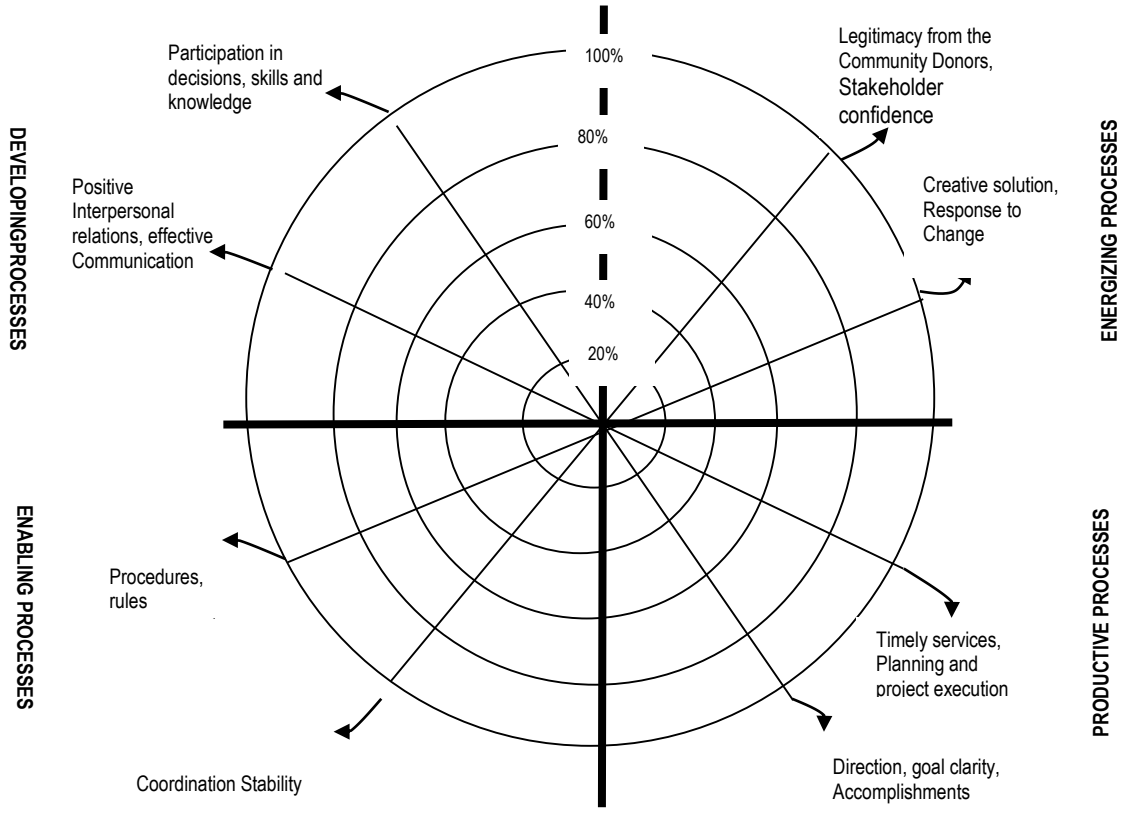
Step 5: Each marked point was then linked to the next to develop a spider diagram

Step 6: The final diagram was used for the final analysis and for visualization. Where the scores are above 50%, these were considered as structures fostering adaptation practices while below 50% were considered as structures hampering adaptation practices.

Scoring table

Developing Processes				
Participation in decisions Skills and knowledge			Positive interpersonal relations Effective communication	
Question 1			Question 3	
Question 2			Question 4	
Total	=		Total	2 =
Productive Processes				
Timely service delivery Planning and project execution			Direction, Goal Clarity Accomplishments	
Question 5			Question 7	
Question 6			Question 8	
Total	=		Total	=
Enabling Processes				
Coordination Stability			Rules, Procedures Measurements	
Question 9			Question 11	
Question 10			Question 12	
Total	=		Total	=
Energizing Processes				
Creative solutions Response to Change			Legitimacy from the community/donors Stakeholder confidence	
Question 13			Question 15	
Question 14			Question 16	
Total	=		Total	=

.



Concentric ring/ Institutional Effectiveness chart

Appendix 3: Institutional Challenges mapping

This tool was designed to combine simple ranking and use of visual matrix to map out major challenges affecting institutions in climate change adaptation. The challenges had been identified earlier during two initial preliminary visits to the study area and during the pre-test of research instruments. The steps used were as follows:

1. The pre-designed matrices on flip charts were pinned up
2. In the mixed focus group discussions, each institution was given the same number of stickers.
3. Using the stickers they were asked to identify the most pressing challenge for their category of institution.
4. The allocation of stickers to the institution used the following criteria from 0 – 3 stickers as follows: 3 stickers for highly challenged, 2 stickers for moderately challenged, 1 sticker for marginally challenged, 0 sticker for not challenged

Type of challenges	**Type of institution**				
	Government	**NGO**	**CBO**	**FBO**	**Private sector**

Appendix 4: Opportunities identification table

Barrier to adaptation	Opportunity cluster	Specific opportunities suggested by institution type				
		GOK	NGO	CBO	FBO	Private sector

Stakeholder Linkage Matrix

Stakeholder	Government	NGOs	CBOs	FBOs	Private sector
Government					
NGOs					
CBOs					
FBOs					
Private sector					

In your group discussion indicate

1. Type of linkage you have with the other institution
2. Where that institution is located (e.g. in the Mara basin – County/subcounty, national, within east Africa, global)

Appendix 5: List of institutions interviewed

List of government institutions interviewed

County	Institutions
Bomet	1. National Environment Management Authority
	2. Ministry of National Development – Office of the DDO
	3. Department of Social Services
	4. Ministry of lands – Physical Planning Department
	5. Ministry of Health – Olokyin Health Center
	6. Ministry of Energy
	7. Ministry of Water
	8. Kenya Forest Services
	9. WRMA
	10. NEMA
	11. Soil and Water Conservation Department
	12. County department of Environment
Narok	1. Ministry of National Development – Office of the DDO
	2. Department of Social Services
	3. Ministry of Water
	4. NEMA
Total	**16**

List of key non-government organizations interviewed

County	Institutions
Bomet	1. World Vision
	2. Kenya Red Cross
	3. Action Aid
	4. Worldwide Fund for Nature
Narok	1. Worldwide Fund for Nature
	2. Forest Action Network
Total	**6**

List of Community Based Organizations interviewed

County	Institutions
Bomet	1. Bondet Self Help Group
	2. Boongo Self Help Group
	3. Cheboin Self Help Group
	4. Chebirrir welfare Group
	5. Cheimen CBO
	6. Chepnyongea women group
	7. Emityot Self Help Group
	8. Kabosirir community dam
	9. Kichwatembo Self Help Group
	10. Kilima Self Help Group
	11. Kimana welfare group
	12. Kimasian Water Spring
	13. Kimintet welfare group
	14. Kapkessoka group
	15. Kapkimolwa Self Help Group
	16. Kapsimotwa welfare group
	17. Kiptulwa Self Help Group
	18. Kipyosit welfare group
	19. Kiramkok Self Help Group
	20. Kitoben Self Help Group
	21. Kongosis welfare group
	22. Kositany Self Help Group
	23. Kyongong self help group
	24. Lelaitich Women Group
	25. Longisa Community Water
	26. Masare welfare group
	27. Masese welfare group
	28. Mogogosiek Self Help Group
	29. Mpata Self Help Group
	30. Mugango group
	31. Mutai water project
	32. Ndaraweta welfare
	33. Nerone youth group
	34. Nyahururu welfare group
	35. Nyambugo Self Help Group
	36. Nyongaa welfare
	37. Nyongores group
	38. Olbobo self help group
	39. Olkinyie welfare group
	40. Olseki Self Help Group
	41. Royalm Self Help Group
	42. Sagenya welfare group
	43. Salaik welfare group
	44. Sekenani CBO
	45. Serian Self Help Group
	46. Shrikisho Farmers society
	47. Sianaa CBO
	48. Siogiro Self Help Group
	49. Sugutek youth nursery
	50. Tenwek welfare group
	51. Tupcho Self Help Group
	52. Chebunyo Market Group

Narok	1. Chepkirib Self Help Group
	2. Emarti Self Help Group
	3. Mara River Basin Association
	4. Laluk Water Spring
	5. Lamaiyat Water Spring
	6. Saptet Self Help Group
	7. Sogoo
	8. Enelerai Water Spring
	9. Chebinyiny Self Help Group
	10. Mengit CBO

TOTAL 62

List of Faith Based Organizations interviewed

County	**Institutions interviewed**
Bomet	1. Anglican Church of Kenya – Bomet
	2. Anglican church of Kenya - Sigor
	3. African Gospel Church Chemaner
	4. African Gospel Church Kiplabotwa
	5. Africa Inland Church [AIC] Youth Group Bomet Town
	6. Africa Inland Church Longisa
	7. Bethel AGC
	8. Catholic Church – Bomet
	9. Catholic Church - Longisa
	10. Church of Christ
	11. Deliverance Church
	12. Elim Church
	13. Full Gospel Church (FGC)
	14. Holeman Ministries
	15. Hosanna full gospel church
	16. Jamia Mosque
	17. Kings Outreach Church Mugango
	18. KIB Church
	19. Penfar church
	20. Seventh Day Adventist [SDA]
Narok	1. African Gospel Church Mulot
	2. Africa Inland Church [AIC]
	3. Full Gospel Church (FGC)
	4. Hosanna

TOTAL 24

List of Private Sector institutions interviewed

County	Institutions
Bomet	1. Bomet Traders association 2. Chemaner agrovet 3. Chemaner multipurpose 4. Community Forest Management group (Ndarawet) 5. Devilla children's Homes 6. Kembu stores 7. Kenduiywo children's home 8. Kenya Tea Development Authority (KTDA) 9. Kenya seed company 10. Kipsegon chemist 11. Koros Agrovet 12. Longisa chemist 13. Longisa Coperative 14. Ndarawet Agribusiness 15. Ntulele Stores 16. Nyongores agrovet 17. Olokyin Academy 18. Olokyin stores 19. Orange Office 20. Oshothane Farm Input store 21. Silibwet agrovet 22. Tegat project 23. Tenwek Mission hospital
Narok	1. Chepalungu agrovet 2. Enelerai genral store 3. Mulot Cereals store 4. Mulot hotel restaurant 5. Skylight Cereal Store 6. Sogoo chemist,
Total	**29**

Appendix 6: Focus Group Discussions (FGDs) list

Sub County	No of FGDs	GOK	NGO	CBO	FBO	Priv Sec	Tot
Bomet Central	3	6	2	15	4	5	32
Chepalungu	3	2	2	13	8	6	31
Bomet East	5	4	2	34	12	14	58
Narok	4	4	2	23	6	5	40
Grand total	**15**	**16**	**8**	**85**	**30**	**30**	**169**

County	Type of institution	No in FGD
Bomet	Government	12
	NGO	6
	CBO	62
	FBO	24
	Private Sector	25
Sub Total		***129***
Narok South	Government	4
	NGO	2
	CBO	23
	FBO	6
	Private Sector	5
Sub Total		***40***
TOTAL		**169**