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Abstract

Through comparative document analysis of the 47 County Integrated Development plans, this study assesses the climate readiness of Kenya by reviewing types of climate information, water development priorities, and the perceived climate risks of the counties. Results show that the climate information used in the documents is mainly information about climate hazards that have either been experienced in the counties or are anticipated in the future, and local knowledge being used in just one document. Development of water supply infrastructure is the main water development priority across all the counties while floods and droughts are the most stated climate risks anticipated by the counties. While there are 91 instances of climate initiatives used across all the documents, the information is mostly not adopted to the specific context and geographical scale of the counties. The water development priorities of the counties are usually the same despite the climate risk faced by the county, with a lot of counties leaning towards ground water exploration, building of supply infrastructure and expansion of land under irrigation. The study concludes that there is need for uniformity of the information that goes into the CIDPs, and adaptation of integrated water management.

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List of Abbreviations

NDCs – Nationally Determined Contributions

CIDP – County Integrated Development Plan

CoK – Constitution of Kenya

GoK – Government of Kenya

CI – Climate Information

CKRC – Constitution of Kenya Review Commission

MTP – Medium term Plan

WASREB – Water Services Regulatory Board

WRA – Water Resources Authority

WSP – Water Services Provider

BWRC – Basin Water Resources Authority

WASH – Water and Sanitation Hygiene

ASAL – Arid and Semi-Arid Land

GMC – Global Model Circulation

UNDP – United Nations Development Program

FAO – Food and Agricultural Development

GDP – Gross Development Product

NEMA – National Environmental Management Authority

CMO County Meteorological Office

CDMS County Director of Meteorological Services

CIS Climate Information Services

CAQDAS – Computer Aided Qualitative Data Analysis Software

CUREC Central University Research Ethics Committee

RCP – Representative Concentration Pathway

GHG- Green House Gases

1. Introduction

1.1 Background

Future water resources allocation and planning face significant challenges from climate change and rapid growth in demand as changing hydroclimatic conditions increase abstraction rates and threaten stability of freshwater resources globally (Hirpa et al., 2018). By 2020, UNICEF/WHO's Joint Monitoring Program estimated that one in four people still lacked access to safe drinking water. With climate change expected to impact both quality and quantity of available water resources, this situation is bound to get worse, unless properly mitigated. One of the key concerns of climate change has been identified as the impact it will have on water resources, particularly rural water supplies (MacDonald et al., 2009). Climate is expected to result in changes in precipitation patterns by increasing frequency and intensity of extreme events such as floods and droughts, accelerating melting of glaciers and ice caps and modifying soil moisture and runoff (Bates et al., 2008). Change in precipitation and an increase in temperature affect both availability of surface water and recharge of ground water consequently leading to over reliance on ground water sources (Hirpa et al., 2018). In Africa, temperature is estimated to rise by 3-4^{0}C by 2100. In addition to this, an increase in frequency and duration of drought events and increased rainfall during precipitation events is expected (Bryan et al., 2012; Mwangi et al., 2020). In East Africa, Bryan et al., (2012) mentions that models project very little reduction in the amount of precipitation, but this will not result in increased agricultural productivity as there is change in timing and intensity of the rainfall. There have however studies that show that climate models have been incorrectly predicting increasing rainfall trends in previous decades in East Africa (Rowell et al., 2015). In East Africa, severe droughts have caused food crises that have affected millions (Haile et al., 2019). With about 80% of the population depending on agriculture, and agriculture contributing 40% of the GDP,

the impacts of climate change on agriculture will likely affect many livelihoods and the economy (Adhikari, Nejadhashemi and Herman, 2015).

The impacts of climate change coupled with increasing population necessitate long term water management planning (Abiye, 2016; Kahsay, Pingale and Hatiye, 2018). This can already be seen in planning documents as the water sector is one of the most prioritized sectors when it comes to adaptation in Africa as over 90% of African countries have water adaptation targets in their Nationally Determined Contributions (iNDCs) (Zvobgo et al., 2022). The success of building resilience to climate variability and climate change depends on our ability as society to bridge the gap that currently exists between climate information and water management (Kirchhoff, 2013). A key challenge of using past knowledge is that it can no longer be used for planning owing to the increase in change of climate patterns that has been observed (Dorward et al., 2019). However, it is important to remember that using wrong or incorrect climate information can lead to maladaptation in the long run(Thornton et al., 2014).

The observed and predicted changes to water availability deficit and increased demand is important to both policy makers and water managers to inform long term planning (Mwangi et al., 2020). Addressing challenges caused by climate change gives policy makers and water managers an opportunity to plan for and manage resilient landscapes. The use of climate information is not new as traditionally, water management decisions have been knowledge heavy where the water managers bring knowledge and data to aid in making water management decisions. While weather forecasts and real time monitoring have been highly used in informing water management decisions, use of seasonal forecasts and interannual climate projections to inform long term water management decisions has been less (Abtew et al., 2010; Kirchhoff, 2013). With the impacts of climate change, factoring climate information into planning plays a big role in guiding building of climate resilient futures (Jones). It is against this background that this study seeks to investigate the integration of climate information in

policy documents in Kenya. There are a lot of policies governing water resources and service provision in Kenya, with the main ones being the Kenyan Constitution, the 2016 water act and the 2002 Water Act. These documents set out the institutions in the water sector and the roles of the different players. The constitution led to the formation of county governments that are mandated with water service provision, while water resource management is done at a national level. At a sub national level, County Integrated Development Plans (CIDPs) are one of the main types of county plans. The public finance act stipulates that no funds can be allocated without a planning framework. CIDPs contain strategic priorities of the various counties which inform the annual budgeting process and development of annual development plans. Considering that all counties are mandated to develop CIDPs upon assumption of office, this study picked review of the CIDPs as they indicate the priorities of the county governments, which are in charge of water services and resources at a county level.

1.2 Aim, scope, Research questions

This study appraises the county governments established by the 2010 Constitution of Kenya on what has been planned to adapt and mitigate the effects of climate change by looking at the integration of climate change information in the second generation CIDPs 2018-2022, the water development priorities of the counties and the water development priorities. By comparative document analysis of the CIDPs, this study seeks to examine the extent to which policy has shaped the resilience agenda through the integration of climate information in the plans in the water resources and services sections of the plans. CIDPs being the main document in guiding development in the counties, are the only documents being reviewed in this study.

The objectives of this research are:

1. Investigating the integration and use of climate information in County Integrated Development Plans (CIDPs) for all counties in Kenya through comparative document analysis to understand how this informed development plans.

2. Evaluating the suitability of the climate information in the CIDPs based on the understood climate risks and water development priorities of the different counties.
3. Assessing if the water development priorities align with the perceived climate risks and how climate-informed these priorities are.

1.3 Thesis structure

The second chapter reviews literature that is relevant to this topic of study, providing further background information on the study. The next chapter outlines the methodology used to generate and collect the data while the fourth chapter explains the results that were obtained from the coding process. The fifth chapter of the study answers the research questions one by one by using the results obtained in the fourth chapter of the study while providing recommendations from the study and the sixth chapter provides a summary of the whole paper.

2. Literature review

2.1 Decentralization of Governance in Kenya

Decentralization is the transfer of responsibility, resources, power and authority from a higher level of government to a lower level of government to enhance efficiency in service delivery and policy making (Laryea-Adjei and van Dijk, 2012). There has long been a growing conviction that centralized systems of governance are unable to generate development and that they need to transfer responsibilities and resources to lower levels of administration (Nyandiko, 2020). A lot of the discourse on Africa's development has focused on how development challenges can be addressed by decentralization where devolution gaining much attention (Kindiki and Ambani, 2005; Kanyinga, 2016). Kenya's adaptation of a devolved system of governance stemmed from recommendations of the Constitution of Kenya Review Commission (CKRC) and from the realization that inequities and historical injustices needed to be addressed and powers of the national government needed to be curbed(CKRC, 2003). This coupled with global influence to adopt decentralization that had grown in the 1980s and peaked in the 1990s that viewed decentralization as a solution to economic and development problems faced in the "developing world" (Kanyinga, 2016; Avidar, 2019; Nyandiko, 2020). In 2010, Kenya promulgated a new constitution that devolved state functions to lower administrative levels creating a two-tiered government system comprising of the national government and county governments. Key state function such as health, agriculture, natural resource management, county roads and water and sanitation services were devolved to the county governments. While there was a framework for what the devolution sought to attain, there were no specifics on how this would be implemented (Avidar, 2019).

The fourth schedule of the Kenyan constitution allocates different functions to the national and the county governments. The national government is responsible for environmental protection and natural resources with a view of sustainable development while counties are responsible

for implementing national government policies dealing with natural resources, and environmental conservation, and water and sanitation services(CoK , 2010). Under the constitution, counties are mandated to develop CIDPs which are five-year developmental governments that guide development in the counties. The first generation of CIDPs was claimed to be developed mainly by development partners and external consultants leading to lack of ownership of the documents by the first round of county governments under the 2010 constitution(Nyandiko, 2020). This led to a more hands off approach by development partners and external parties in developing of the second generation CIDPs and more involvement of the county governments. The development of CIDPs is guided by Kenya Vision 2030 and its five-year Medium-Term Plans (MTPs) (Nyandiko, 2020). Vision 2030 aims to have Kenya reach middle-income status by 2030 and provide a high-quality life to all Kenyans (Government of Republic of Kenya, 2007). Central to its vision, infrastructure development is key in vision as it "aspires for a country firmly interconnected through a network of roads, railways, ports, airports, water and sanitation facilities, and telecommunications" (Ibid). While devolution does allow the various counties to direct resources to where they deem fit, studies have found that different counties direct development funds differently among sectors as there is no mandate on what the county governments ought to prioritize (Kanyinga, 2016; Ghai, Kinama and Ghai, 2021). This is despite the constitution having a requirement that mandates that funding should be allocated in such a way that enables citizens to enjoy the fundamental rights guaranteed by the constitution, especially marginalized and vulnerable communities.

2.2 Water governance in Kenya

Water scarcity is endemic in Kenya as against the world benchmark of 1,000 cubic meters per capita annual, Kenya is classified as water scarce at 700m^3 annual per capita (Kenya Cradle, 2021; Mwihaki, 2018). Despite continuous government efforts to improve water supply through various legislations, at least 50% of the rural population still does not have access to

potable water (Ogendi and Ong' oa, 2009; Mwihaki, 2018). Over the years, the Kenyan water sector has undergone changes, the main ones of which are summarized in the table below:

#	Year	Act	Objectives
1	1974	1974 Water Act	Sought to have water withing accessible distance for all households by 2000
2	1999	National Water Resources Management and development plan	Emphasized increased local participation of the private sector and local actors in management and development of water resources.
3	2002	National Water Policy	Defined the government's role as regulatory and delegated water service provision to the private sector, municipalities and communities.
4	2002	Water Act	Legislated separation of power by dividing the water sector functions into policy making, provision, supervision and regulation
5	2010	Constitution of Kenya	Establishes a two-tier level of governance transferring power from national to 47 newly established county governments. Transferred water services provision to the county governments
6	2016	Water Act	Specified implementation of devolution in the water sector while trying to correct the shortcomings of the 2002 act. This Act mandated full transfer of national responsibilities of water and sanitation services from the national to the county governments. It gave the county governments and members of the county executive committee responsibility for water management, production and supply and distribution through existing water service providers.

Table 1: Major institutional Changes to the Kenyan Water Sector

The Kenyan Constitution, the 2002 and 2016 water acts are the three legal documents that make a distinction between water resources which are a public good that is protected by the state and water services. The 2002 act was criticized for being unimplementable, excluding the rural poor, and not being pluralistic enough. It was also claimed to have formed too many bodies

that had overlapping responsibilities making it ineffective leaving many governance issues unresolved (Avidar, 2019). Currently water services and resource management in Kenya is carried out under the following structure:

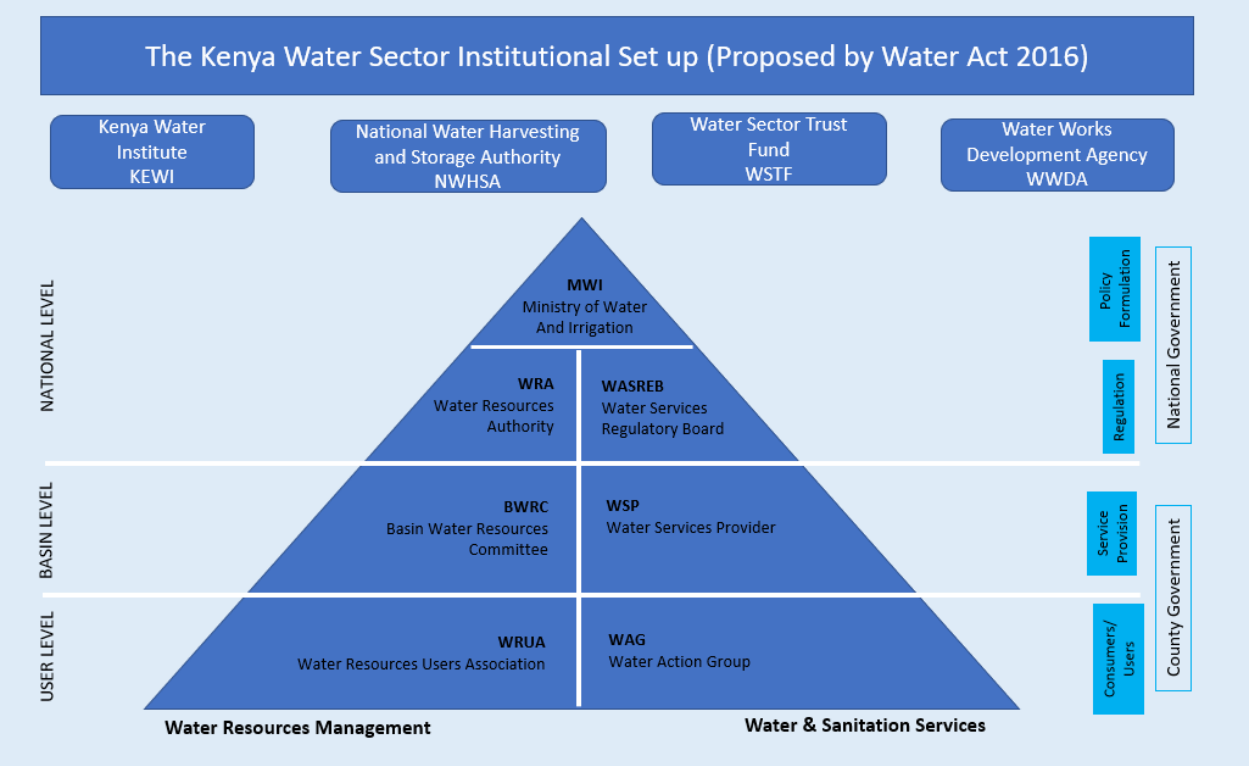

Figure 1: Institutional Set-up of the Kenyan Water Sector from the Water Act 2016. Adapted from (Okoth et al., 2017)

Under this model of governance, Water service provision is left to the county governments that work with Water Service providers (WSPs). The WSPs are regulated by one independent national regulator, the Water Services Regulatory Board (WASREB). The WSPs regulated under WASREB are operated as commercial entities fully capable of generating profits, while the WSPs that do not fit this criterion are managed under the county government department of water. Water resources management is nationally coordinated under the Water Resources Authority (WRA). Under WRA, Basin water Resources Committees, formerly Water Works Development Authorities, which oversee development and management of water resources at a basin level, covering several counties. Under the BWRC are the Water Resource Users Committee which are committees made of individuals that utilize the water resources. While

water service provision is neatly delegated to the county level, management of water resources is slightly more complicated as BWRCs cut across several counties, and so there is need to bring together all county governments involved when it comes to development of these resources. Under the constitution, the county governments are mandated to manage water resources as per the various policies that dictate water resource management.

While the right to access to clean and safe water is entrenched in the human rights policy, the budgetary allocation targeted at this need is still very low. The use of resources in the counties is not always equitable with the treasury saying that the limited WASH data means that the counties are not targeting investments by need. This is in addition to each county getting the same ward development fund irrespective of their level of need and development(Ghai, Kinama and Ghai, 2021). The Kenyan government has however made effort to increase resilience and adaptation through activities aimed at improving water security, for example the pledge to restore 5.1 million ha of forests by 2030 to restore the five main water towers (Mwangi et al., 2020). Currently, understanding the effect of climate change to water resources is one of the most pressing issues as economic success and sustainable development will partly depend on adequate water resources to be used for irrigation to ensure food security and for the use in other key sectors including energy, agriculture, industry and health (Garrick and Hall, 2014)

Kenya's Third Medium Term Plan (MTP) and vision 2030 are incorporated into almost all policy documents as the different government entities need to work together to achieve the goals, including the CIDPs. Due to all the policies and the legal frameworks in place, the Kenyan water sector has an excessive number of players to ensure inclusion at all levels of governance but there is little coordination amongst the different players to achieve the desired objectives (Avidar, 2019). Avidar, (2019) conducts a case study showing how power struggle and the struggle for resources has led to unsuccessful and uneven implementation of

decentralization in the water sector, a situation that had led to grave consequences for the local population.

2.3 Climate change in Kenya

Kenya experiences a diverse range of climatic conditions given the nature of the country. A bimodal rainfall season is influenced by the location of the country relative to the equator with mean annual rainfall ranging from 250mm in the arid and semi-arid regions to 2000mm in humid regions (Bryan et al., 2012). Kenya has 7 Climatological zones as shown in Figure 2: Climatological Zones in Kenya adapted form (Kenya Meteorological Department, 2021) Only 12% of the land in Kenya is considered arable and ideal for livestock production, the remainder classified as arid and semi-arid lands (ASALs) (Kabubo-Mariara, 2008). With a poverty rate of 36.1%, and 73% of the labour force dependent on agriculture, the effects of climate change are going to be particularly dire for a country like Kenya(Awiti et al., 2018; The World Bank, 2018). Agricultural production being the main source of income in Kenya, creating resilience to climate change will require huge investment in the agricultural sector in irrigation, drought tolerant crop varieties, disaster reduction and management and social welfare programs to reduce livelihood risks posed by climate change (Schlenker and Lobell, 2010). The impacts of climate change in Kenya can already be felt for example in the second half of 2017, food assistance was required by 3.4 million people in 23 ASAL counties in Kenya due to drought (Kenya Food Steering Group, 2017).

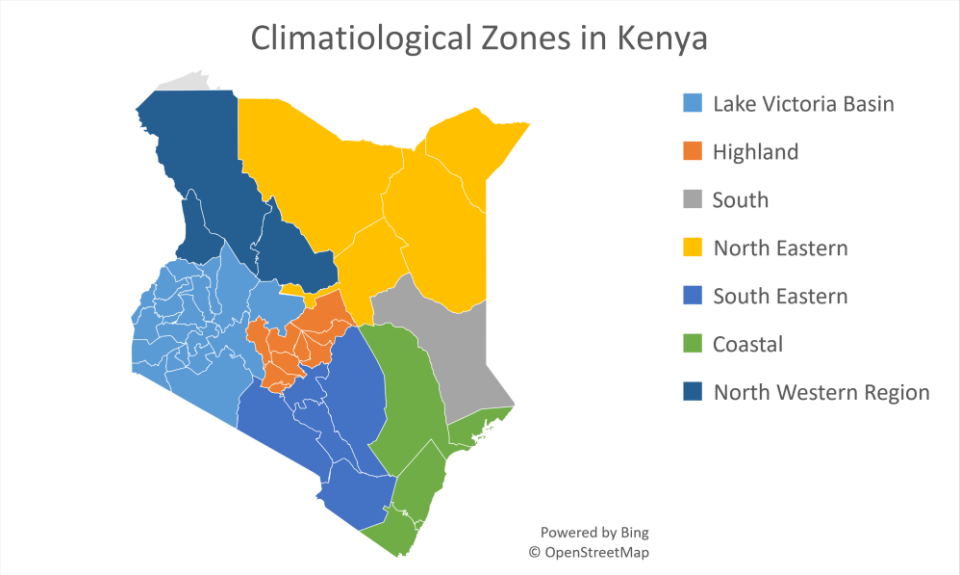

Figure 2: Climatological Zones in Kenya adapted form (Kenya Meteorological Department, 2021)

Climate risks in Kenya are characterised by the occurrence of frequent droughts, late rainfall onset, early rainfall withdrawal, dry spells and increased temperatures which has led to reduced agricultural production, increased pests and diseases, crop failure, forest degradation and fires among others. (Mwangi 2020). Kenya's National Adaptation plan states an increase in the average rainfall in the short rainy season and rainfall received during storms. Global Circulation Model (GMC) data estimates increases in rainfall to range from between 2% to 11% by 2060s and 2-12% by 2100, while mean annual temperature is expected to rise by 0-8-1.5 degrees in 2030s and 1,6-2.7 in 2060s (Mwangi et al., 2020). Recent trends in the climatic conditions point that Kenya's natural resources continue to face significant pressure due to both natural and anthropogenic stressors (Mwangi 2020). UNDP Kenya's climate change profile shows that since 1960, the mean annual temperature has increased by one degree Celsius while a report by FAO estimates a temperature increase by 3oC by 2050 (McSweeney et al., 2010; Ojwang et al., 2010). With the sea levels expected to rise by 0.3m, the coastal part of Kenya is threatened by flooding and inundation, which is a threat to Kenya's economy (Awuor, Orindi and Ochieng Adwera, 2008). The rising temperatures have led to depletion of mountain

glaciers, a vital fresh water source in addition to leading to prolonged droughts and severe floods (Hastenrath, 2005).

Kenya's vulnerability and water security situation is expected to get more dire in the face of climate change. Some studies done on this include Mwangi 2020 who studies the five water towers in Kenya that contribute at least 5% to the country's GDP facing increased vulnerability due to climate change. Mwangi further states that the effects of climate change to these ecosystems will be spatially varied meaning different interventions will be needed for each different water tower. Modelling studies show that while water yield in catchment areas might increase, the predicted increase will likely lead to increased flooding intensity and severity (Rwigi, 2014). Increased rainfall will lead to flash floods especially in areas with steep slopes. Projected increased temperatures will not only lead to increased drought occurrences but will also impact water resources. The increased precipitation coupled with increased temperatures result in nil gains due to increased evapotranspiration rates. This will deplete surface water resources leading to an overreliance in ground water sources. Change in precipitation patterns impacts sediment loading and surface runoff which causes an increase in water treatment costs which in turn affects fresh water supplies and public health(Mwangi et al., 2020). Uncertainty of these scenarios is however high as they are also impacted by future water management decisions(Charles et al., 2022). There is also uncertainty on rainfall projections and there is expected to be great regional variation of precipitation, while little can be said about the frequency of drought and flood events (Herrero et al., 2010). Translation of scientific data into usable information remains a challenge in building resilience in Kenya (Olashore, 2019).

Continued reliance on rain fed agriculture in a face of a changing climate and economic restructuring in the context of structural adjustment programmes has led to the deterioration of food security situation in Kenya over the last couple of years (Ghai, Kinama and Ghai, 2021). To address the food security situation, the Kenyan Government has adopted irrigation to

increase yields while reducing drought risks as part of the Vision 2030 with large monetary commitments to the rehabilitation of irrigation schemes and establishment of others. Some of the adaptation strategies that Kenya can focus on to build resilience to climate change include investment in more tolerant crop varieties, investment in water harvesting and irrigation, disaster relief, and social welfare programs to reduce livelihood risks to climate change (Schlenker and Lobell, 2010).

2.4 Climate Change Governance in Kenya

The Kenyan government has given prominence to climate change and developed policies and legislations to address climate change and meet its international obligations and commitments. The National Environmental Management Authority (NEMA) is obliged by the Act to integrate assessment of climate risk and vulnerability in all assessments to understand the implications of climate change induced by development. NEMA however has weak monitoring and enforcement of environmental compliance (Ghai, 2021). The County Meteorological Office (CMO) under the Kenya Meteorological Department was established in 2012 to provide counties with relevant weather and climate information. The CMO is headed by a County Director of Meteorological Services (CDMS) who implements national policies at the county level and delivers Climate Information Services (CIS). CIS supports and informs the implementation if CIDPs and decision making in the county principal sectoral livelihood group. Some of the main international and national climate change agreements and policies that govern Kenya are outlined in the table below:

#	Policy/Framework	Year	Aim/Objective
1	The United Nations Framework Convention on Climate Change (UNFCC	1992	Established to stabilize GHG concentrations to a level that would prevent anthropogenic interference with the climate system

2	United Nations Convention on Biological Diversity (UNCBD) and	1992	Legally binding treaty aimed at sustainable use of biodiversity, conservation of biodiversity, and equitable sharing of benefits from biodiversity.
3	UN Convention to Combat Desertification (UNCCD)	1996	The only legally binding international agreement that links environment and development to sustainable land management.
4	National Climate Change Response Strategy (NCCRS)	2010	Recognizes that climate being a major driving factor for economic activities in Kenya should be included in government policies and puts into place robust measures that are needed to address challenges posed by climate variability and climate change.
5	The climate change Act 2016	2016	Provides a regulatory framework to enhance response to climate change, provide mechanisms and measures to achieve low carbon climate development and connected purposes
6	Climate Change Directorate	2016	Coordinating body charged with implementation of the Act established by the 2016 Act
7	The second National Climate Change Action Plan (2018-2022)	2018	Commits to reduce greenhouse gas emissions by 30% by 2030 relative to the business-as-usual scenario
8	Green Economy Strategy and implementation plan (GESIP) 2016-2030	2016	Seeks to increase adaptation and resilience in various sectors of the economy
9	The National Climate Change Policy Framework	2016	Complements the actions of the Climate Change Act by providing an enabling environment for the execution of the Act.

Table 2: Policy frameworks governing Climate Change in Kenya

Kenya has at least 90 national laws and policies pertaining to climate change which include by-laws, supplementary regulations and statutory agreements that extend to the local level making it one of the first countries in Africa to enact comprehensive laws and policy guiding both national and sub national responses to climate change in line with the international treaties (Olashore, 2019). Despite the existence of these legal frameworks and regulations, there is

general lack of awareness and lack of technical skills among the involved stakeholders in monitoring and reporting, a requirement need be developed to meet the requirements of the Paris Agreement which requires regular monitoring and reporting on adaptation efforts, emissions and climate action support received (Ghai, Kinama and Ghai, 2021). Decision making in society is highly shaped by the legal instruments that are in place in the society. Despite the existence of robust legal frameworks and policy on climate change in Kenya, the country has often been caught on the wrong foot whenever climate disaster strike (Nyandiko, 2020)An example of this is the ongoing drought which has rendered 3.3 million people food insecure with lack of access to water and ongoing floods in Lake Turkana region and the Rift Valley which has left more than 40,000 people displaced (Floodlist 2021, Un 2022, GoK, 2022). Olashore, (2019) argues that as of 2018, there were no indications that many parts of the Climate Change Act were in operation and the act has not yet produced deliverables under any of the treaties that the country is party to.

2.5 Climate Information

The range of what can be considered climate information, based off various studies, is wide as this could range from carbon footprint information in foods sold in supermarkets to information generated from scientifically developed climate models to observational data on weather patterns change over time to local and indigenous knowledge pertaining to the climate (Kirchhoff, 2013; Elofsson et al., 2016; Olashore, 2019; Zvobgo et al., 2022). Kirchhoff, (2013) narrows it down to mentioning that climate information could include but is not limited to paleoclimate data; extremes, means and instrumental climate data; global and regional projections of climate change; and seasonal climate forecasts. The more traditional types of climate information such as weather information and historical weather patterns are more widely used in decision making at both a household level and at a national planning level (Milly

et al., 2008; Olashore, 2019; Zvobgo et al., 2022). Bearing this in mind, the sources of climate information is as wide and varied as the list of what can be considered climate information.

The risk that climate change poses to societies, communities and nations has led to more scientific studies on climate consequently leading to production of even more climate information. This has been driven by the desire to better understand the climate change process and building resilience through activities aimed at mitigation and adaptation. Despite all the effort put into producing this kind of climate information and encourage its uptake, the gap between use of this information and its generation continues to persist (Kirchhoff, 2013). Various studies have assessed the barriers facing use of climate information. Some of the barriers include the perception of the reliability of climate information; prior- negative experience using climate information; organizational and structural barriers; inaccessibility of the information based on the format in which it is represented; lack of technical capacity to use the information; difficult to understand nature of climate change; and suitability of the information (Kirchoff, Olashore, Callahan 1999 & Lemos 2008 in Kirchoff). This dissertation seeks to understand the use of climate information by policy makers in Kenya in shaping the resilience agenda through an analysis of the CIDPs for climate information.

2.6 Literature Summary

There is a general understanding that more climate information needs to be incorporated into water management decisions. While water managers are traditionally known to use data in decision making, there is need to use information that can inform planning in the face of a highly variable climate. Studies have been conducted to understand the kind of information that is used in decision making and the barriers preventing increased uptake of this information. (Zvobgo et al., 2022) examines various planning documents and national NDCs across anglophone Africa to determine the inclusion of indigenous knowledge and local knowledge in climate adaptation documents and policies. (Bryan et al., 2012) studies how farmers

perceive climate change and what they do to build resilience to the effects of climate change while Milk et al seeks to understand how inclusion of climate information in retail products affect consumers purchasing decisions. While devolution in Kenya can still be called young, studies have been conducted to look at how policy documents are shaping the climate change adaptation and mitigation discourse. (Nyandiko, 2020) assesses the integration of disaster risk reduction in county climate adaptation plans for 5 arid and semi-arid counties in northern Kenya that face the highest risk from the effects of climate change due to the vulnerabilities of the communities.

3.0 Methodology

The following chapter describes the research design and the methods employed to collect and analyse the data. It also explains the ethical considerations during the research and the limitations of this study.

Research design

This study sought out to understand the level of integration of climate change information in water policy documents in Kenya as an attempt at gauging the climate change readiness of Kenya based on the 47 counties. Comparative document analysis of CIDPs was used to collect data points and the data analysed to answer the research questions.

3.1.1 Sampling strategy

The three main areas of interests in this study are water, climate and policy in Kenya. Following this criterion, a review of the available water policy documents in Kenya was done to identify the document that was most likely to incorporate all these aspects. This started from reviewing of the National Water Masterplan that outlined Kenya's plans for the water sector up to 2030, to review of the water act and other policy documents including the constitution of Kenya. Come of the documents reviewed in the process include the Water Acts of 2002 and 2016, Kenya Vision 2030 and the various Climate Acts. The National level policy documents reviewed while covering policy, were blanket when it comes to implementation on the ground while the water specific documents such as the water acts were too sector specific for this study. Different counties face different climate risks and so it is expected that the preparation needed by different counties would be different. A criterion for the most relevant document was thus developed. The ideal document would be:

i. County specific, addressing the specific climate risks in the county
ii. A time bound plan that had to be achieved in a set amount of time
iii. Legally enforceable through specific mandates

The CIDPs were eventually settled for as the document of choice because they fully represent the diversity of the country and the various climate risks that Kenya faces. Moving development to a county level means that the county governments can best speak on what the priorities of the country are and what efforts are being made to shape the resilience agenda. The counties governments overseeing carrying out development in the counties as they deemed fit making county governments the main players when it comes to development in Kenya. Considering that one of the main problems faced by Kenya and other countries is climate change, it is important that any kind of development and planning takes into account climate change and how to better prepare for it so that the citizens and communities are more resilient.

Data Collection and Generation

Data was collected and generated through review of relevant literature and coding of CIDPs using NVivo.

3.2.1 Literature Review

Journal articles, scientific reports, national development documents, similar studies and grey literature was reviewed as the first step in the data collection. This was done to gain a deeper understanding of the water sector in Kenya, studies that have been done on similar topics to identify gaps, and to help with identification of codes to be used in the coding process.

Government policies and reports were reviewed to understand the national priorities and objectives when it comes to climate change mitigation and adaptation. Scientific documents provided deeper understanding on climate change and the use of climate information in water management. Studies focusing on decentralization in Kenya were reviewed to give a better understanding of ow decentralization in Kenya has affected governance of the water sector. The information obtained from this review process informed the coding process.

As a preliminary step to the coding process, 5 CIDPs were reviewed in detail alongside the CIDP preparation guideline (National Treasury and Planning, 2020). This process helped in understanding the outline of the CIDPs, the content that the CIDPs are expected to have, and identification of the different sections of interest when reviewing the CIDPs. The CIDPs are roughly 500-page long documents and a line-by-line review of all the 47 documents would not be feasible given the time constraints of this research. During this phase, the various chapters, and sections to focus on in coding were identified, some preliminary codes to be used later were identified and developed and specific sections that might need a quick look over were identified. The format of the CIDPs is mostly standard allowing narrowing down of the sections needing review for the data generation process. The different sections of the CIDPs were:

i. The acknowledgement section should list out the organizations that help in development of the plan. Different organizations have different priorities, and this might be seen in the kind of influence that they have on the counties.
ii. The Climatic conditions and ecological conditions section outlines the climatic conditions of the county, weather patterns, perceived climate risks and how the county perceives climate change.
iii. The Disaster Risk Management/Reduction Section provided an overview of what the counties consider risks that are worth preparing and planning for, especially for counties lacking a climate change section.
iv. The environment and climate change section of the plans outlined the environmental threats and climate change risks faced by the counties. The risks outlined in this section were both historically and anticipated risks.
v. The development priorities section outlined what the county development priorities were for the next five years. This helped in understanding what the county priorities in the different sectors were. Under this section, the water, climate change, and

environment sections were reviewed since the three sectors are cross cutting to make sure no information was missed.

3.2.2 CIDP Coding

Coding is the identification of segments of text in a data set and labelling them with codes. (Saldaña, 2009) defines codes as words or phrases that "symbolically assign a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data". With the sections to be reviewed already identified, category development was done through both inductive and deductive coding processes. The coding was done using Nvivo 1, a Computer Aided Qualitative Data Analysis software (CAQDAS) that allows review of all the documents comparatively.

Inductive category development

Inductive coding is the development of codes from the data using phrases and terms from the data rather than using theoretical vocabulary or vocabulary from the researcher (Linneberg and Korsgaard, 2019). This is often called grounded theory by (Anselm and Cerniglia, 2008). Mayring, (2022) stated that striking a balance between a workable number of codes and capturing complexity is a difficult process in inductive category development. Despite the CIDP development guideline framework guiding the CIDP contents, there was need to code the CIDPs for the content they had as opposed to the content that should be included. This would also help in identification of the gaps of information that is missing from the CIDPs. The two main categories were climate and water and the subcategories were developed as the coding progressed, with the categories changing over time as more documents were coding. The step process used in coding was adopted from (Mayring, 2022) as shown in the document below.

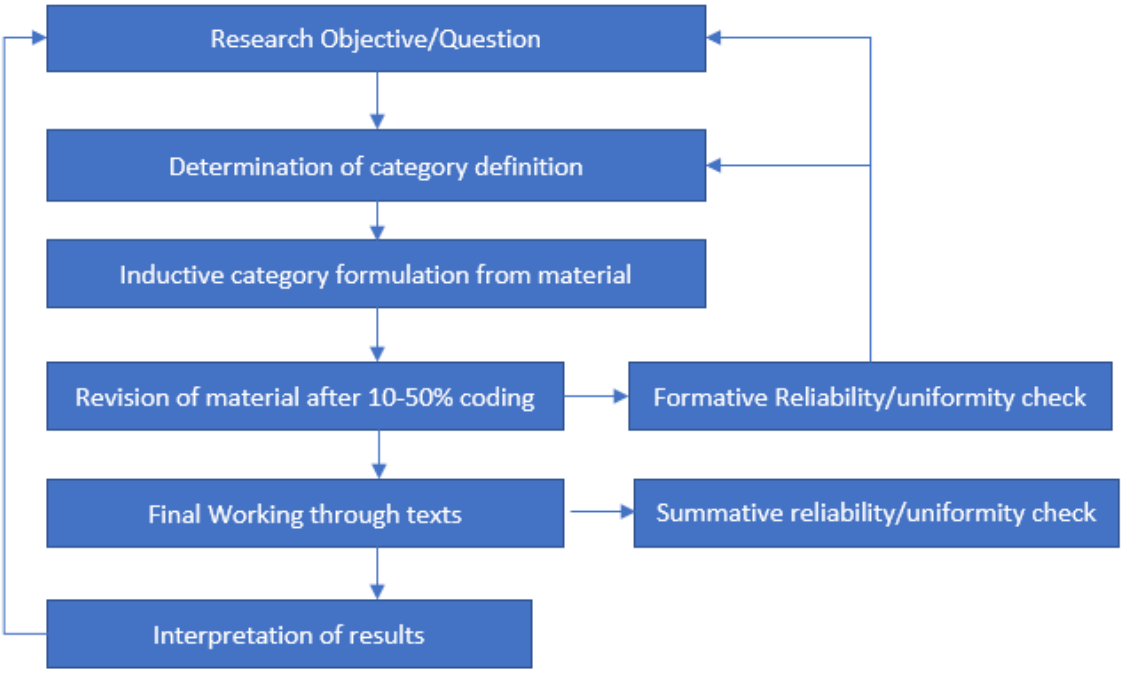

Figure 3: Step model of Inductive Category Development (Adapted from

Borrowing from the research questions, the coding process started with climate and weather as the two main categories. Subcategories developed during the process of coding included; climate information, Climate, Rainfall information, climate risks, main sources of water, water resources available, water development priorities, document linkages and disaster risk management. Some of these categories had further subcategories in them to capture the complexity of the information contained in the documents. During this process, the codes were added as more documents were reviewed.

Inductive coding was an exercise in making sure that no information that would be useful for the analysis of the different plans was left out. During this process, everything that was seemingly useful was coded into the different and independent categories. Qualitative coding is an iterative process and the developed codes were reviewed to determine uniformity of the codes. This led to the formation of higher-level categories from the initial categories and reduction of the code categories. This was done by merging code categories that were too

similar and splitting up the categories which had elements that were distinctly different enough to enable a deeper analysis. This process was repeated until the codes were deemed concrete enough to be used for analysis.

Deductive category development

In deductive coding, a predefined list of codes is created in a coding frame and used. Miles and Huberman (1994) say that coding is a form of analysis as it allows for final conclusions to be drawn and verified. This stage of coding overlapped with both the data collection and analysis part of the study as it was used as a way to collect data, but also as a way of analysing the same data collected from the inductive process. This process worked with previously formulated, aspects of data collection and analysis connecting them with the theory. Deductive code development was done on information that had been coded under the climate information code that needed to be further classified based on available literature following the step process illustrated in the figure below from Marrying 2020.

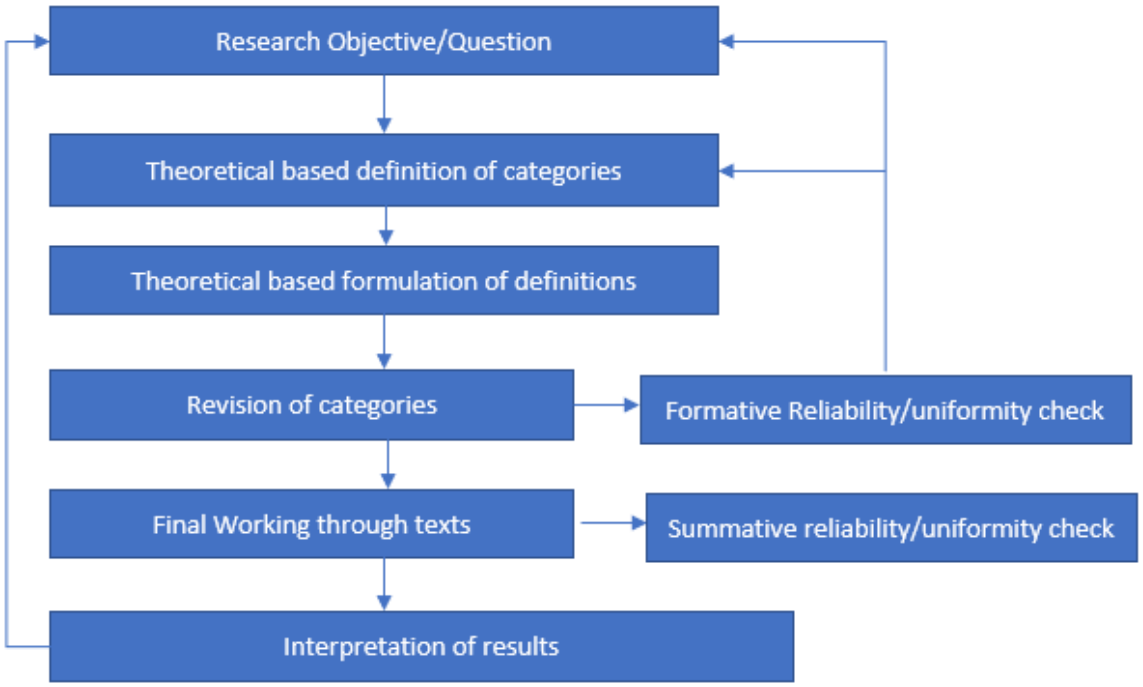

Figure 4: Step Model of deductive category development. adapted from Marying, 2000)

Rules for qualifying the different kind of information into the different categories were then developed to guide the coding process. The climate information category elements were then reviewed line by line and placed into the different identified categories for analysis purposes.

Data Cleaning and analysis

After the inductive coding process was done, the code elements were reviewed for uniformity and redundancies. This helped to reduce codes to a number that was easier for analysis purposes. Cleaning also involved identification and deletion of irrelevant codes that would not be useful for coding purposes. From this process, the codes were used in the analysis and eventually discussion sections of this study. The codes were then exported from NVivo into an excel sheet that had the various counties and the different codes that were in each document. The data in excel format was used to understand what the development priorities of the counties were, what the climate information distribution in the CIDPs was and what the counties perceived as their climate risks. This information was later visualized to answer the research objectives.

Ethical considerations

The MSc in Water Science Policy and Management delivered training on research ethics while the University of Oxford Central University Research Ethics Committee (CUREC) gave this research ethical clearance and approved the research checklist for Social Sciences and Humanities. Consent for interviews was provided by the interview participants and the participants were informed in clear terms what the research was about and what their data would be used for. The results from the interviews were anonymized as per the interviewees requests for those who requested to stay anonymous. Publicly available data used in any part of this research was properly cited and referenced.

Limitations

3.5.1 Nature of research

The subjective nature of qualitative research as the judgement and the formation of the codes is entirely based on the researcher (Linneberg, 2019) is in itself a limitation of this study, and the biases of the researcher need to be stated. One way of offsetting the bias of having one researcher is to have more than one person do the coding and comparison of the codes, but the nature of this study does not allow for more than one researcher doing coding. Bias and subjectivity were instead offset by reading literature and documents that would highlight what might have been missed and reviewing the code line by line after the initial coding process to align the codes. Creating of multiple data points to be used was also one of the ways that the biases of qualitative research was addressed as advised by (Marying, 2000).

3.5.2 Non-Uniformity of data

The CIDPs were the main data source in this study. Despite there being a framework that guides what needs to be added into the CIDPs and how it should be done, the county governments are free to write the CIDPs as they see fit. The guidelines provided are just a framework, not binding. This means that there are 47 possible ways that the documents could be formulated. While most of the documents followed the exact same format, some of the documents did not follow the provided format, making the review process tedious. Some information was also missing in some of the documents, and this led to data gaps when coding the information that would eventually be used for data analysis. Some of the information missing was the organizations that had contributed to the development of the CIDPs and the climate information, which was information that would have been used in the subsequent parts of this study. The lack of uniformity made the coding process tedious, in addition to creating information. This was offset by identifying all possible sections in the CIDPs that the required information could be obtained from.

4.0 Study Results

The 47 CIDPs were coded through two coding steps as outlined in the methodology with instances in the documents coded for information on the perceived climate risks of the counties, water development priorities, and any climate information that had been used in the document. (Vaismoradi et al., 2016) suggests that to increase rigour and reduce the ambiguity associated with qualitative analysis, it is best practice to illustrate the development of coded categories from abstract to concrete categories. The general results from the analysis suggest that out of 35 counties that had listed climate risks, floods (n=25) and droughts (n=28) are the most highly anticipated hazards across the whole country compared to natural resource conflict (n=2), increase of invasive species (n=3), and desertification (n=3) being the least anticipated hazards. 46 counties had information on their water development priorities in the plans. Out of these, about 80% of the counties have exploration of ground water resources (n=36), development of water harvesting and storage infrastructure (n=36), and catchment protection and management (n=37) as the main water development priorities. Ranking even higher at 91%, development of water supply and sewerage infrastructure (n=43) was the most common water development action across all the plans. Under the climate information category 39 of the development plans had any kind of climate information. Information on climate related disasters (n=21) and observational data (n=17) were the most common kind of climate information use by the different counties compared to only 15% of the counties using information from scientific models and projections (n=6) and only one county using local climate knowledge.

This chapter has different sections with the first section giving a breakdown of the coding categories and the final coding categories that were used in the discussion part of this study. The rest of the chapter breaks down and illustrated the results obtained by visualizing the instances of perceived climate risks, water development priorities, climate information, partner

organizations in development of the plans, climate initiatives and the main water sources as detailed in the CIDPs.

4.1 Coding Process

4.1.1 Coding phase I

As outlined in the methodology section, the first phase of category development was exclusively inductive. Starting with two main categories of water and climate, the CIDPs were scanned for climate information, water development priorities, climate change adaptation and mitigation initiatives, climatic conditions of the counties, water service level and water resources conditions of the counties and other categories of information as outlined in the table below. Under each of these categories, sans the climate information category, different sub-categories were created and the information fitting into the various categories was coded. Information that was a bit ambiguous and could not immediately fit into a specific category but was still considered to fit in the category was put in the main category for further evaluation. For the climate information code, anything considered climate information was coded into the climate information category to be re-analysed later and categorized deductively later. The codes identified from this initial coding activity were as listed in the table below:

Main Category	Subcategories	Specifics	Files	Instances
Climate	Climatic Conditions		1	1
		Arid/Semi-Arid	19	20
		Equatorial	8	8
		Humid	3	3
		Temperate	2	2
		Tropical	4	4
	Climate information		38	84
	Climate risks		3	3

		Desertification	1	1
		Droughts	25	35
		Erratic weather conditions	9	9
		Floods	28	41
		Heatwaves	1	1
		High rainfall variability	13	14
		Human and animal diseases	12	14
		Landslides and mudslides	10	12
		Natural resource conflict	1	2
		Rising temperatures	1	1
		Sea level rise	1	1
	Rainfall		0	0
		+1000mm	22	22
		-500mm	8	8
		501-999mm	12	12
		Bimodal Rainfall	37	38
		One Rainfall season	2	2
	Climate initiatives		17	25
		Afforestation	36	44
		Capacity building	2	2
		Increased monitoring and reporting	13	20
		Infrastructure building	3	4
		Integrating of indigenous and local knowledge	1	1
		Mainstreaming climate change	10	11
		Nature based enterprises	1	1
		Policies and legislations	26	41
		Sensitization campaigns	26	37

		Wetland rehabilitation	8	8
Disaster Risks Management			8	9
	Fire stations and Engines		8	9
	HYOGO Framework		1	1
	Policy and legislations		1	1
	Sendai Framework		9	12
Distance to nearest water source			1	1
	0-2km		19	19
	10+ km		2	2
	3-5km		9	10
	5-7km		3	3
	7-10km		1	1
Main Water source			0	0
	Boreholes		26	27
	Dams		25	26
	Lakes		3	3
	Rainwater		9	9
	Rivers		23	25
	Springs		21	21
	Streams		5	5
	Piped water		8	9
	Water pans		22	26
	Wells		26	27
Partner Organizations			6	8
	Adventist relief services (ADRS)		1	1
	CARE International		1	1
	CARITAS		1	2

	Centre for Innovation and Open Governance		1	1
	CHRCE		0	0
	Council of Governors		1	1
	Export Promotion Council		1	1
	Food and Agricultural Organization		7	7
	GIZ		2	2
	I Choose Life (ICL)		1	1
	JICA		1	1
	Kenya Devolution Support Programme		2	2
	Local Universities		2	2
	National Council for Population and Development		1	1
	National commission of churches of Kenya		1	1
	National Drought Management Authority		6	6
	NRT		1	1
	Red cross		1	1
	SNV		1	1
	UNDP		11	11
	UNHCR		1	1
	UNICEF		2	2
	WFP		4	4
	World Bank		3	3

	World Vision		4	4
Water Development Priorities			2	2
	Catchment management plans		3	3
	Catchment protection		34	49
	Dams		19	23
	Desalination plants		3	4
	Flood control		11	11
	Ground water exploitation		36	43
	Harvesting and storage		36	50
	Increased piped water coverage		1	1
	Institutional development		20	29
	Irrigation infrastructure		20	27
	Mega dams		8	12
	Mini dams		1	2
	Riparian protection		9	12
	River abstraction		2	2
	Supply infrastructure		43	59
	SW harvesting structures		4	5
	Upstream protection		1	1
	Water pans		15	18
Water Resources			0	0
	Dams		8	8
	Ground water		29	32
	Lakes		7	9
	Rivers		35	39

Table 3: Preliminary coding results

The climate risks category to give an understanding of what the different counties perceive as climate risks. The listed climatic conditions definitions are as obtained in the CIDPs, not scientific, as is in line with the inductive coding process. Climate initiatives in the county were also listed from either the water resources, environment, or climate change sections of the CIDPs. To understand the water service level in the county, the distance to the nearest water source, a recurring metric in the documents to describe water services in the counties was coded and the main sources of water in the counties was also coded. It is one of the metrics used in the SDGs, in measuring progress made in providing improved water services. Under water resources, the water resources available in the county was coded from the documents along with the 5-year water development priorities.

4.1.2 Coding Phase II

Qualitative analysis is a highly iterative process (Hsieh and Shannon, 2005). After the first list of codes was generated, every item that had been coded was reviewed for the second phase of coding. Each item was reviewed for uniformity and assessed on its suitability to belong to the code. Instances of code that were repeated were eliminated, while instances that were deemed to not fit into the code category or subcategory were put into new coding categories. Some coding categories were also merged if the information in both codes were deemed too similar. This process was carried out to ensure that under each category, the instances that were included had the highest possible level of uniformity. This also led to a reduction of the total number of categories that were to be used to simplify the discussion part of this dissertation.

Under the climate information category, deductive coding was used to classify the different codes into categories that were informed by the literature review carried out and through immersive reading of the coded items to understand the possible realistic number of categories that could be derived from the items. The 91 items under this code were classified into categories that were based on the type of information, the timescale of the information used, or

the geographical span of the information used. This process helped in compressing the categories to fewer categories that would help in analysis while also increasing the data points needed to answer the research objectives of this study. The final list of codes obtained from this process are as listed in the table below.

Main Category	Subcategories	Specifics		Files	Instances
Climate				1	1
	Climate conditions			0	0
		Arid/ Semi-Arid		19	20
		Equatorial		8	8
		Humid		3	3
		Temperate		2	2
		Tropical		4	4
	Climate information			39	91
		Information about Climate hazards		21	38
		Climate models and projections		6	6
		Climate Science		4	4
		General		14	14
		Historical data		11	14
		Observational informational		17	27
		Scale of climate information		0	0
			Global Climate Information	4	4
			Localized	1	2
			National	2	3
			Regional Climate information	4	4
		Timespan of climate information		0	0

			Interannual	1	1
			Seasonal	1	1
	Climate risks			0	0
		Climate Variability		5	5
		Desertification		3	3
		Droughts		25	36
		Floods		28	42
		Heat stress		4	4
		High Rainfall Variability		14	17
		Human Diseases		13	16
		Invasive Species		3	3
		Landslides and mudslides		10	12
		Natural Resource conflict		2	3
		Other		9	11
	Rainfall			0	0
		+1000mm		22	22
		-500mm		8	8
		501-999mm		12	12
		Bimodal Rainfall		37	38
		One Rainfall season		2	2
	Climate initiatives			13	17
		Afforestation		36	44
		Agricultural Initiatives		8	8
		Capacity building		6	7
		Increased monitoring		14	21
		Policies and Legislations		26	41
		Sensitization campaigns		28	45
				8	9

Disaster Risks Management	Fire stations and Engines			8	9
	HYOGO Framework			1	1
	Policy and legislations			1	1
	Sendai Framework			9	12
Distance to nearest water source				1	1
	0-2km			19	19
	10+ km			2	2
	3-5km			9	10
	5-7km			3	3
	7-10km			1	1
Main Water source				34	178
	Built Infrastructure			31	61
	Dams			25	26
	Piped Water			8	9
	Water Pans			22	26
	Ground Water			31	54
	Boreholes			26	27
	Wells			26	27
	Rainwater			9	9
	Surface Water			29	54
	Lakes			3	3
	Rivers			23	25
	Springs			21	21
	Streams			5	5

Partner Organizations				6	23
	BI/Multilateral organizations			0	0
		GIZ		2	2
		JICA		1	1
		SNV		1	1
	Institutions University			1	2
		Local Universities		2	2
	International Organizations			4	8
		CARE Intl		2	2
		Centre for Innovation and Open Governance		1	1
		FAO		7	8
		ICL		1	1
		Red cross		1	1
		UNDP		11	11
		UNHCR		1	1
		UNICEF		2	2
		WFP		4	4
		World Bank		3	3
		World Vision		4	4
	Local organizations			5	7
	National Organizations			2	2
		CHRCE		0	0
		Council of Governors		1	1
		Export Promotion Council		1	1
		Kenya Devolution Support Programme		2	2

		National Council for Population and Development		1	1
		NCCK		1	1
		NDMA		6	6
		NRT		1	1
	Religious organization			2	4
		ADRS		1	1
		CARITAS		1	2
Water Development Priorities				2	2
	Catchment protection			36	64
	Riparian protection			10	14
	Dams			20	26
	Mega Dams			8	12
	Desal plants			3	4
	Flood control			11	11
	GW Exploitation			36	43
	Harvesting and storage			36	50
	Institutional Development			20	29
	NRW Reduction			6	7
	Irrigation Infrastructure			21	28
	Supply infrastructure			43	60

	Rural Water Supply			6	8
	SW harvesting structures			5	7
	Water Pans			15	18
Water Resources				42	88
	Dams			8	8
	Ground Water			29	32
	Lakes			7	9
	Rivers			35	39

Table 4: Final Coding Results

After this process, the results that were to be used in the discussion part were exported to an excel file and analysed. One limitation of this study is the lack of standardization in the kind of information that goes into the CIDPs. While most of the counties seemingly have almost similar kind of information, the counties are free to change this information as they deem fit. This means that using the CIDPs as the main data source might mean occasionally dealing with incomplete data. It is for this reason that not all the data points that were coded were used in the discussion section of this study.

4.2 Climatic conditions

Out of the 47 counties, 15 of them do not have any information on the climatic conditions in the counties, despite this being a requirement of the CIDPs from the CIDP guidelines framework. Of the 32 that listed the climatic conditions in the county, the distribution of the stated climatic conditions is as shown in the figure below. 19 counties state their climatic conditions as arid or semi-arid with the most common terms used to describe climatic conditions being Equatorial, Tropical, Humid and temperate.

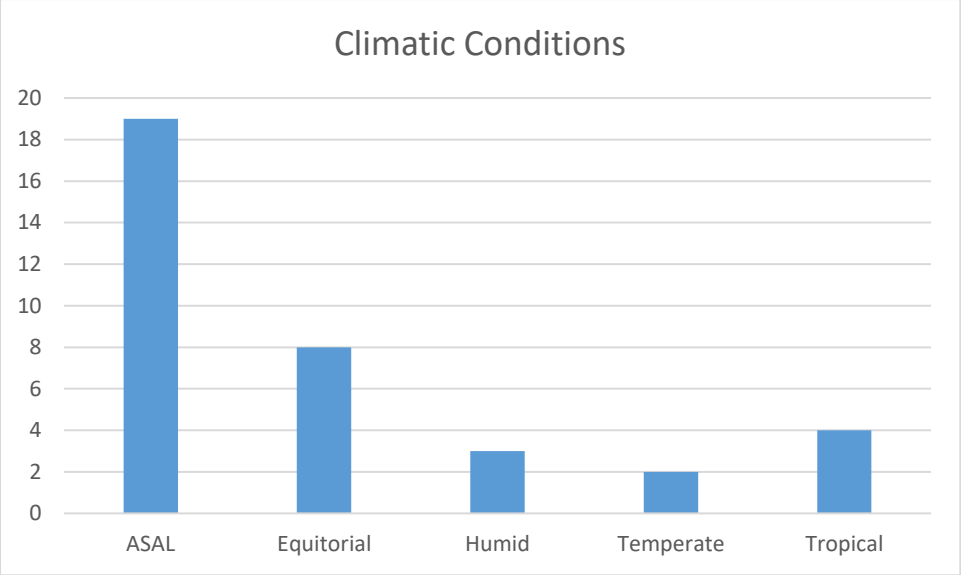

Figure 5: Definition of Climatic Conditions in the CIDPs

Compared to the nationally known climatic conditions, the counties that do not consider themselves ASAL are as shown in the map below. The information generated from the CIDPs compared to the annual dry spell length mapping across the country as shown in Figure 6 and Figure 7 below:

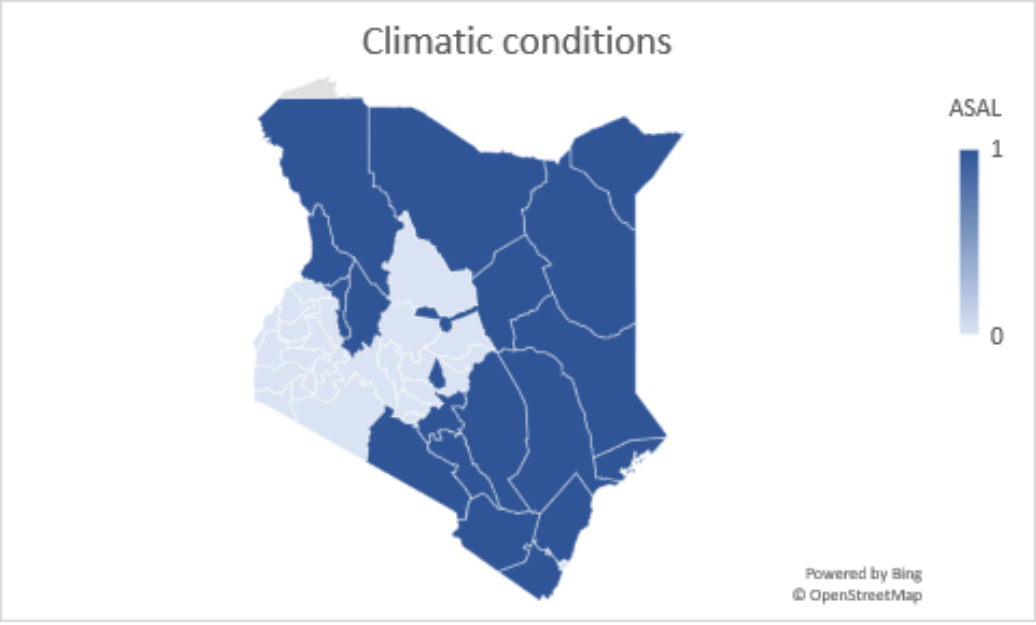

Figure 6: Listed ASAL Counties in the CIDPs

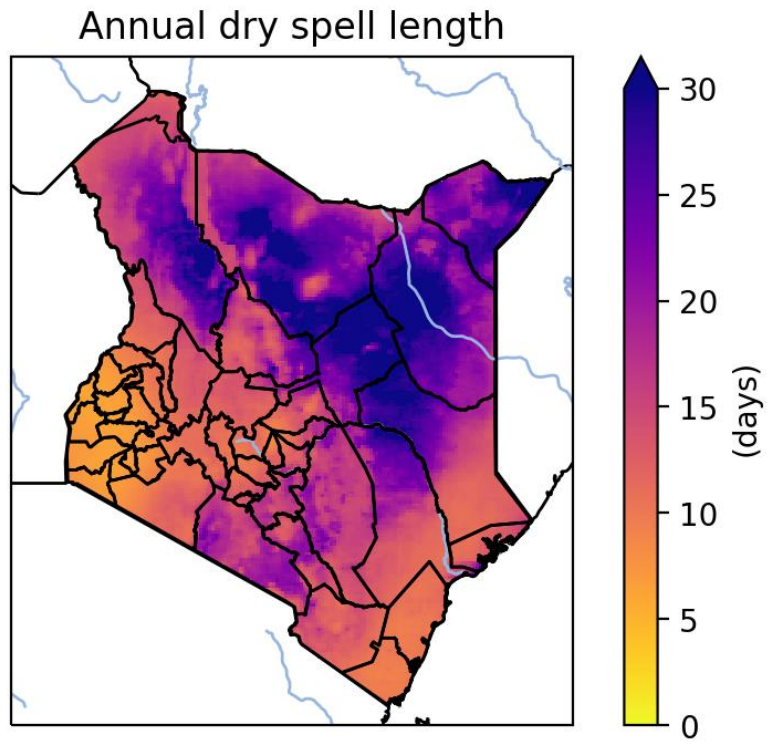

Figure 7: Annual dry spell length across Kenya

4.3 Partner organizations

Identifying the partner organizations was based off the hypothesis that involvement of more organizations in the development of the CIDPs besides the county government might have led to documents that better present the climate situation in the different counties. Despite the CIDP preparation guideline mandating that the counties acknowledge the partner organizations that were instrumental in developing the plan, 55% of the counties did not acknowledge their partners. A list of all the organizations were identified and the organizations categorized into six categories that covered all institutions. Some organizations like GIZ and Food and Agricultural organization had footprint in more than four counties each. From the figure below, international organizations and Non-Governmental Organizations were the biggest category of partners. Interestingly, only two counties partnered with institutions whose main mandate was research.

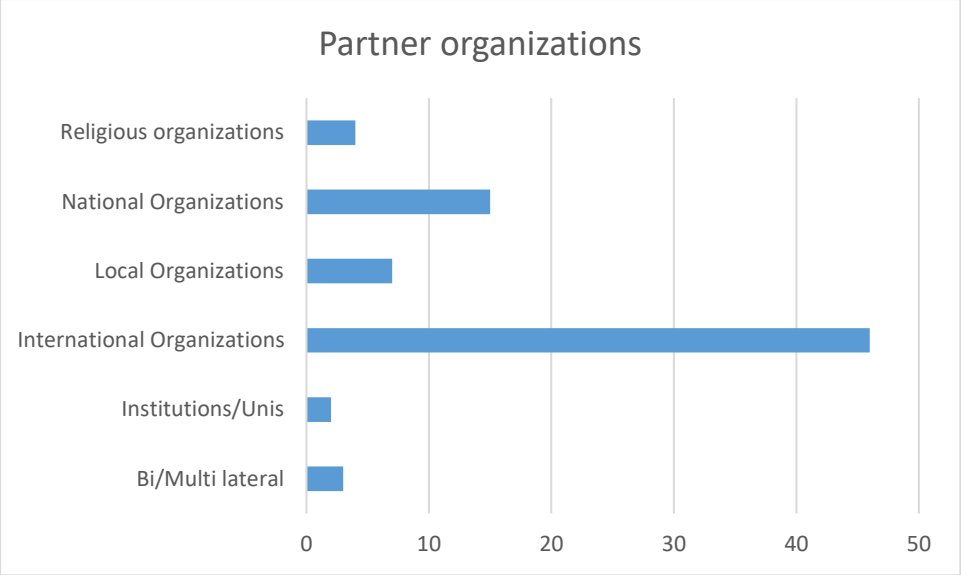

Figure 8: Mapping of partner organizations in CIDP development

Turkana, Kilifi, Narok and West Pokot counties had the highest number of listed partner organizations as shown below.

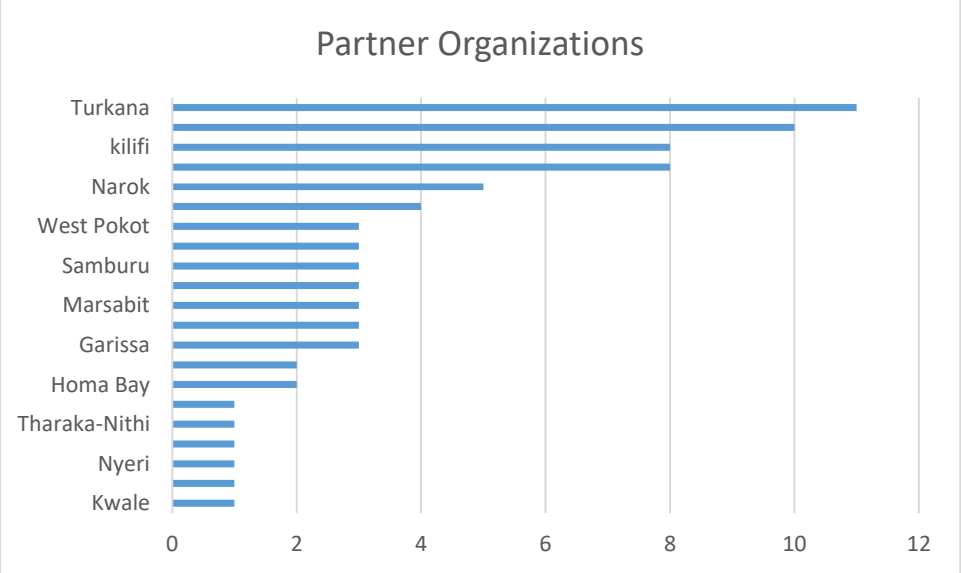

Figure 9: Number of listed partner organizations per county

Of the 21 counties that listed out partner organizations, 19 of them are classified as ASAL counties. This can be attributed to the presence of these organizations in these counties aiding the county governments in service provision. The lack of standardization in the CIDPs however make this category a less than reliable data source for this dissertation.

4.4 Available water Sources

This code examines the water resources that are available in the county. This was grouped into four categories: Ground water sources, surface water sources, Rainwater and built infrastructure. The build infrastructure category included both piped water and water from infrastructure like dams. From this, ground water is the most utilized source of water for more than thirty counties followed by surface water. Built infrastructure when broken down to its individual components is not as high as the other categories. Rainwater was only reported as the main water source in 13 counties, something that can be attributed to the changing weather patterns that has made rainfall much less reliable over the years.

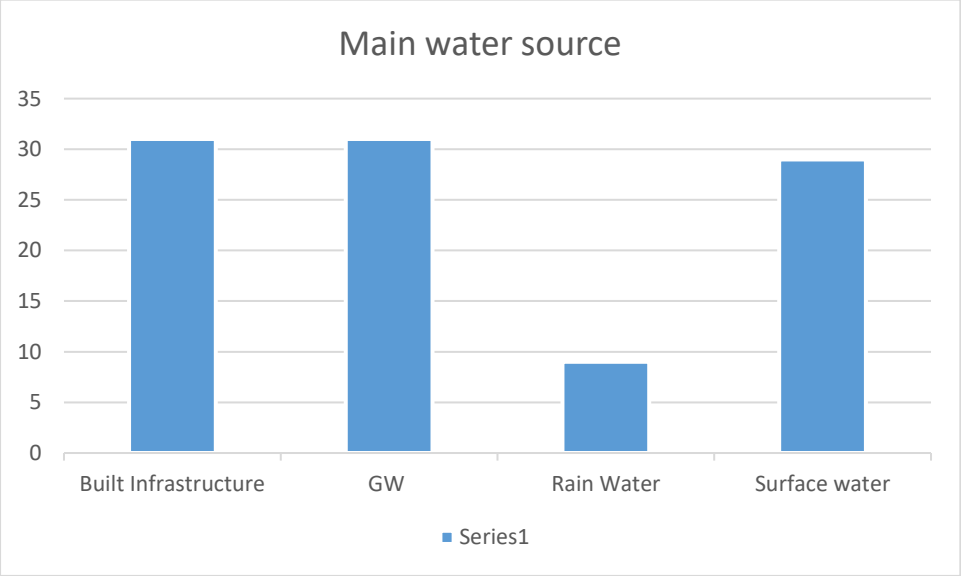

Figure 10: Main water sources across the CIDPs

4.5 Climate Risks

The perceived climate risks by the county should ideally inform the water development priorities of the county. The risks associated with water, either directly or indirectly, were coded into the different subcategories of this code. The direct risks/hazards include changing rainfall patterns, erratic weather, and flooding while the indirect risks include water borne diseases and destruction of infrastructure. Of all the plans, 7 counties had no mention of any perceived climate risk with one county saying that while climate change is a real risk, the

current government “hopes that the current climatic conditions will stay in place until the end of the current CIDP”. This implies that while the CIDP is supposed to be a medium-term plan, there was no planning put in place for a future where climate change has impacted the county.

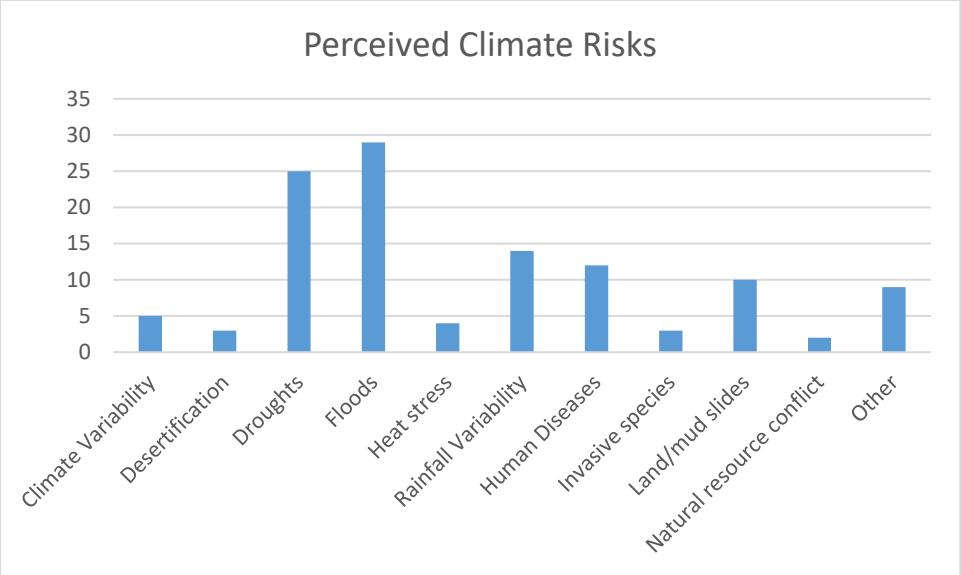

Figure 11: Perceived climate risks across the counties

In contrast, Baringo county had the highest number of climate risks listed in the CIDP, an indication that the plan might have had more consideration put in place for climate change adaptation and mitigation. While drought and floods are the most listed climate risks with more than 25 counties listing the two risks, natural resource conflict, invasive species and desertification were the least listed climate risks.

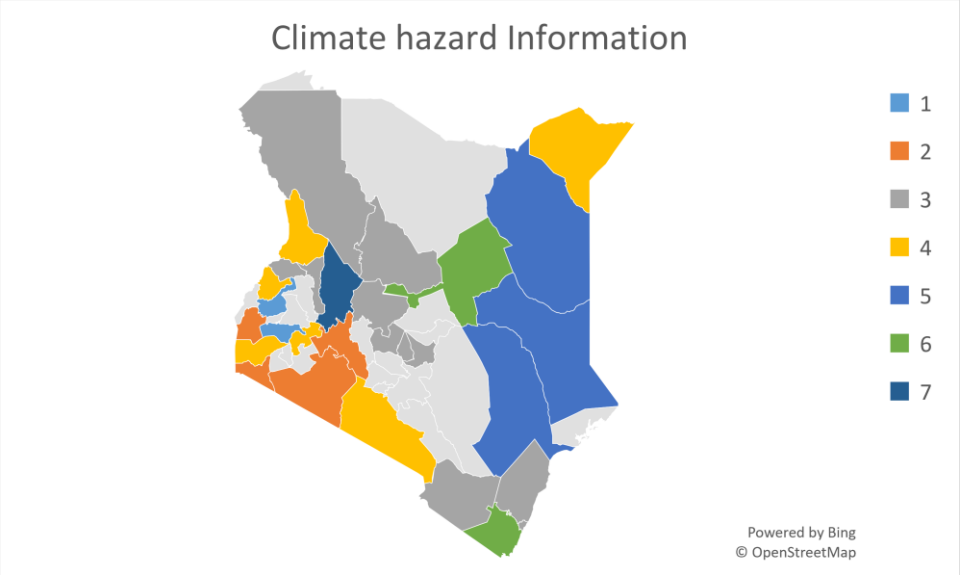

Figure 12: Use of information about climate hazards

4.6 Water Development Priorities

This was coded from the development priorities section of the CIDPs under the water, environment, natural resources, climate change, and in some instances, agricultural/irrigation sections of the plans. Only one county, Tharaka Nithi had no mention of what its water development priorities were. 43 counties had development of supply infrastructure as one of the development priorities, with only 6 of these focusing on rural water supply. Catchment protection and management including wetland rehabilitation was the second most popular development priority. Some of the initiatives under this included wetland rehabilitation, development of catchment management plans and enforcing of laws and regulations against riparian farming and encroachment of riparian land. Other unique initiatives under this were the reduction of the population of the blue gum tree which is not good for water sources.

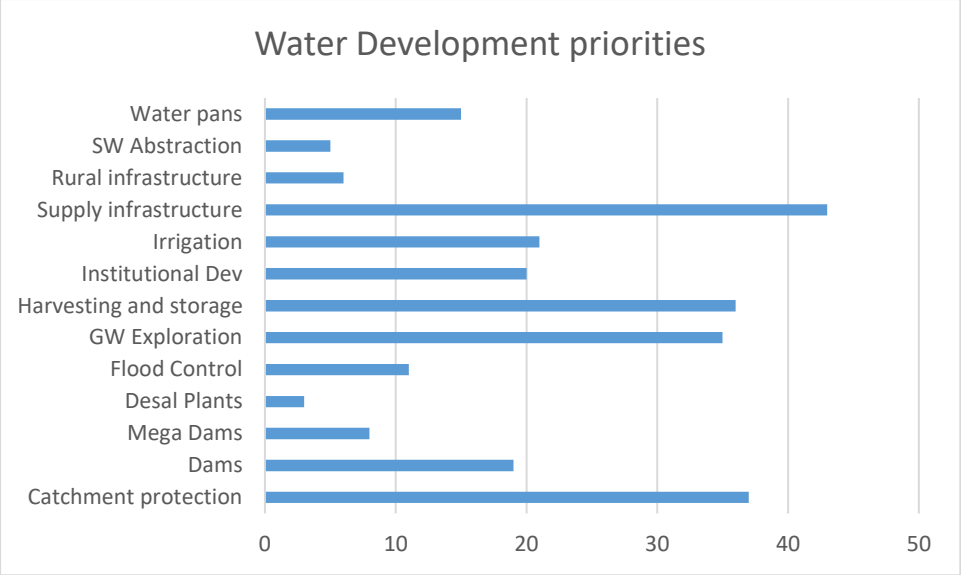

Figure 13: Water development priorities

Under available water resources, most counties depend on ground water sources to meet demand. Interestingly, ground water development was also one of the most popular water development priorities. This has been expressed in the plan through drilling, servicing and rehabilitation of more boreholes and digging of wells. Of all the counties mentioning ground water, there is no mention of ground water recharge, and commissioning of studies to understand aquifer characteristics for any of the counties. The fourth most popular priority was setting up of infrastructure to harvest and store water, which would perhaps increase dependence on rain as a source of water.

Despite the knowledge that water resources are dwindling, only three counties had mentions of setting up of desalination plans under water development priorities. The common factor among these counties is however that their available sources of water is minimal/ Wajir is an arid county with minimal surface water resources and little ground water resources while Lamu and Mombasa are coastal counties which have ground water resources that are at high risk from salty water inundation from the ocean. The focus desalination as a technology is facing could also be attributed to the high costs associated with setting up and running a desalination plant which would dissuade counties from considering it as a viable option.

4.7 Climate Initiatives

All the climate initiatives were coded and categorized into seven categories. Capacity building includes initiatives targeted at upskilling human resource at a county level to enable the counties to access climate funding and implement activities and policies targeted towards climate change adaptation and mitigation. These include trainings and increasing staff looking into climate change. Agricultural initiatives were mainly focused at introduction of drought and heat resistant crop and seed varieties and mainstreaming of climate smart agricultural practices to build farmers resilience towards climate change. Under monitoring, the counties were increasing weather stations and improving on development and utilization of early warning systems. One county had allocation for increased research into the impacts of climate change. Under legislation, most of the counties are working towards development of county climate change policies with some looking at setting up of county climate change funds. Sensitization of climate change included activities aimed at mainstreaming climate change in development plans, conducting of awareness creation campaigns and trainings aimed at sensitizing masses about the effects of climate change. Afforestation was the most highly mentioned climate initiative with 37 counties aiming to increase the forest cover through tree planting, establishment of tree nurseries and introduction of laws against deforestation.

Climate change and water management are intertwined, and this meant that some of the climate change initiatives fell under the water development priorities category. During the second review process, some of the codes that were merged were the categories that were cross cutting in the different categories. To this effect, catchment protection and management were listed under water development in some plans and under climate change in some plans. As the instances that it appeared under water development were more (n=35) compared to the instances under climate change (n=8), the code elements were merged under the water development priorities. The other category included climate change initiatives that could not

be classified under water related and did not have enough instances to warrant formulation of their own code category. Some of the initiatives under this include adaptation of clean cooking options and increasing the use of solar energy and setting up of green enterprises.

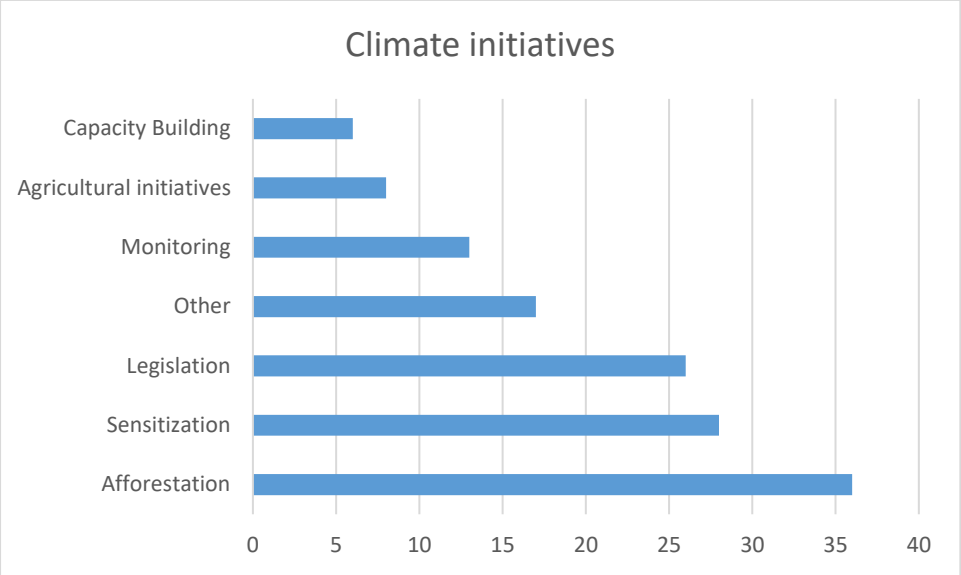

Figure 14: Climate initiatives listed in the CIDPs

4.8 Climate Information

The climate information, as described in the methodology was coded into different categories: Information on climate hazards such as floods and drought; information from climate models and projections which tends to address future climate; Climate science information which is scientific information for why certain physical phenomenon occurs; General information which is information on climate change that is general and not targeted at any county or incident in particular; information from historical data which mainly includes observation of historical data and the deviation from the trends and patterns; Observational data which mainly comes from lived experience such as the change in the onset and length of rainy seasons which has affected cropping and agriculture; and Global, regional, national and localized information which is mainly the scientific climate information at different scales of application. Out of 47, 11 counties had no kind of climate information at all in the documents. In some instances, climate change was lumped under environmental degradation or not mentioned at all. Of the

11 counties with no climate information, five of them are considered ASAL. This oversight might be explained by the fact that these counties face the hardships attributed to climate change on a normal and so conditions like droughts and drying water sources were not necessarily attributed to climate change as it is considered the norm.

Information on climate hazards was the most used type of climate information in the documents closely followed by observational information. Most of the instances mentioning observed information addressed the change in rainfall patterns from the historical norm and an increase in either flooding or drought incidences. In some instances, an increase in water borne diseases such as malaria caused by increasing temperature was mentioned. Interestingly but not surprisingly, climate science and information from models and projections were the least used type of data in the various documents.

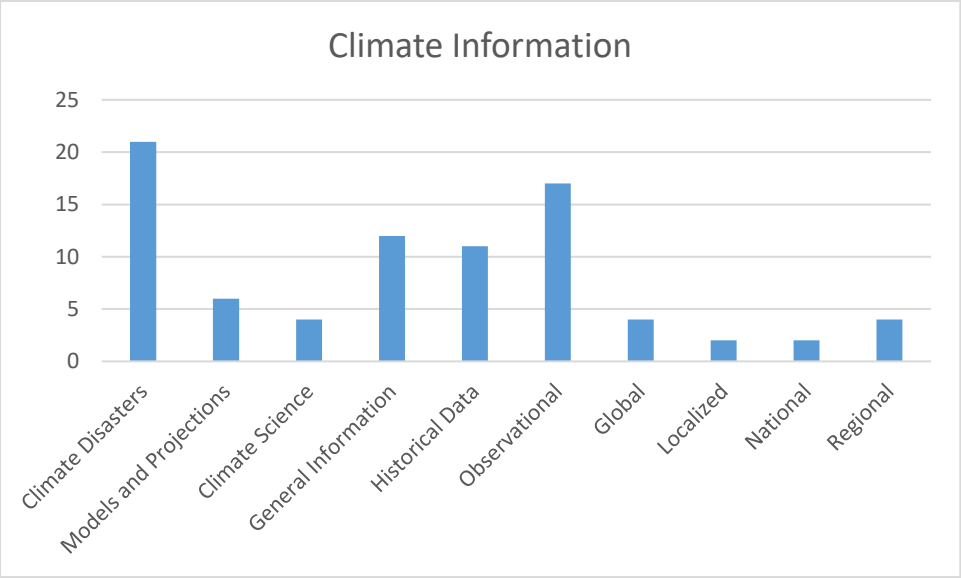

Figure 15: Climate information used in the CIDPs

Narok and Homabay had the highest variation in the type of climate change information included in the CIDPs with both having 6 different types of climate information. Embu and Kakamega followed closely with five different types of climate information while most of the counties had just one or two types of climate information. Of all the counties that used information from climate models and projections, only Homabay used information that was

localized to the Homabay region while the rest of the counties were using information that explained climate change for Kenya, East Africa, Africa, or the world. Only Marsabit county mentioned incorporation of indigenous knowledge for the future planning and one county used local knowledge on past historical patterns. This is interesting to note as incorporation of indigenous and local knowledge into climate adaptation and mitigation has been pegged as key to achieving the objectives of mitigation and adaptation.

5.0 Discussion

5.1 Research objective 1

The first research objective of this study seeks to investigate the integration of climate information in County Integrated Development Plans (CIDPs) for all counties in Kenya through comparative document analysis to highlight key themes in how climate information was used to inform development plans. There are a total of 83 instances of climate information used in all 47 CIDPs distributed across the different counties as shown below:

County	CI Instances
Kiambu, Kisii, Kisumu, Kitui, Laikipia, Makueni, Mandera, Nakuru, Samburu, Uasin-Gishu, Vihiga (11)	0
Baringo, Garissa, Isiolo, Kericho, Kirinyaga, Lamu, Machakos, Meru, Migori, Mombasa, Nairobi, Nyeri, Siaya, Tana River, West Pokot (15)	1
Bomet, Busia, Murang'a, Nyandarua, Tharaka-Nithi, Wajir (6)	2
Bungoma, Elgeyo-Marakwet, Kajiado, Kilifi, Kwale, Marsabit, Nandi, Nyamira, Taita-Taveta (9)	3
Turkana (1)	4
Embu, Kakamega (2)	5
Narok, Homabay (2)	6

Table 5: Instances of climate information per CIDP across the counties

The instances of climate information across the country are as shown in the map below:

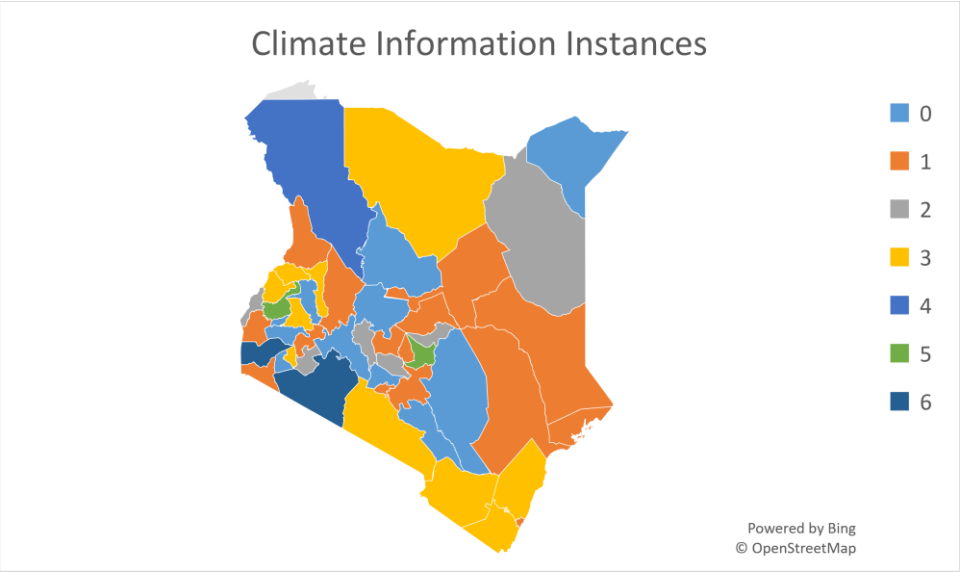

Figure 16: Map of instances of climate information per CIDP across the counties

The nature of the climate information used is varied throughout the different documents. While a framework exists for the development of these plans, counties are not mandated to follow the guideline on what the plans should look like and so the climate information was obtained from different parts of the plans. Few counties that had the information under the ecological condition's topic in the CIDPs were mostly explaining changing weather trends and patterns. While all the plans apart from three had a chapter on environment and climate change, some of them had this merely as a topic, but nothing on climate change was mentioned. Most of the counties however focused on environmental degradation and threats. Degraded water sources being the most common form of environmental degradation followed by land degradation due to either erosion, poor farming practices, or deforestation. Most of the information on climate and climate change was mentioned in the natural resources, water, and environment sections. In most of the development priorities sections, the risks faced by various resources, including climate change were mentioned. Most counties did not however have a dedicated climate change section. Climate change was mainly mentioned by some counties as a cross cutting issue in some of the sectors with the most being Kisumu which addressed climate change as a cross cutting issue in the health care sector, but no mention in other parts of the plan.

Information on climate hazards that have either been experienced in the counties, in other parts of the country or hazards that are anticipated due to the impacts of climate change was the most used type of climate information. This corroborates (Rao et al., 2011) when they say that negative climatic events are usually given higher significance as they are perceived to occur more frequently. Some of the information is general on the hazards the country faces like "Adverse impacts of climate change will significantly inhibit the sustainable development of Kenya in Key priority areas leading to shift in rainfall patterns, prolonged droughts, and flash floods…" (County Government of Garissa, 2018). Some of the information is general but modified to the context of the county such as "Climate change will increase the frequency and

intensity of natural events like droughts, wildfires, heat waves and rainstorms in Homabay" (County Government of Homabay, 2018) Some of the climate information focused on incidences that have already occurred and are attributed to climate change. The top reported incidents were crop failure due to changing rainfall patterns, increased incidences of flash floods as is the case for Narok county and frequent and prolonged drought episodes compared to historical trends as is the case for Nyandarua county. Decline of traditionally available animal species such as fish populations decline in Lake Victoria due to changing climatic conditions was mentioned in the Siaya County plan. A note in the drying up of water sources such as springs and reduction in the size of lakes was mentioned in several plans.

Observational climate information used in the development plans was mainly based off a change in the onset of the rainy season and increased variability of rainfall. This can be attributed to the earlier stated fact that about 72% of Kenyans depend on rain fed agriculture and so rainy seasons are of paramount importance for livelihood. Of the 22 instances of information that is categorized as observational, 17 instances mention either rainfall variability or a change in rainy seasons. Baringo also mentions an increase in flood incidents in the county while only two counties mentioned a significant observed difference in general weather patterns. Of all the 27 instances of this category, only Marsabit uses local knowledge on traditional weather patterns in the plan. The Marsabit plan states "…evidence of narrative of many older people agrees that there is tremendous change in weather patterns" (County Government of Marsabit, 2018). Taita-Taveta and Meru counties mention an observational decline in the ice caps/glaciers on the mountains attributing this to a changing climate.

Climate information based of scientific models and projections was varied for all the different counties. Of the 6 instances where model and projection information is mentioned, three counties use information based on Representative Concentration Pathways (RCPs) with Elgeyo-Marakwet and Nandi counties using information based of RCP 8.5, the business-as-

usual pathway while West Pokot does not mention what RCP the information is but keeps the statement General. The West Pokot plan states "…climate projections based on two RCPs 10 model indicate that there is significant rise in drought and stress and an expectation of reduced rainfall amounts…". The models and projections from which this climate information used varied timelines as well with two of the three counties using projections from 2021-2065 while one county uses model for the period 2021-2050. The remaining three counties in this use general statements on models and scenarios, noted in statements such as "Further projections on rainfall and temperature by 2030s indicate Narok County is among the few counties in Kenya that will observe slight increase in rainfall…", "Current projections indicate increase in temperature…" and "Based on climate change scenarios, it's estimated that the arid zones of the county will experience significant changes in precipitation and temperatures, with some places being wetter and other places being drier".

Climate information based on historical data is more widely used (n=32) compared to climate information that informs the future (n=6). This can be attributed to the fact that historical climate information is more easily available and easier to use and understand as compared to information about the future. Several studies have found that water managers tend to favour using climate information they are familiar with when it comes to decision making while they tend to shy away from using long term climate information in decision making (Rice, Woodhouse and Lukas, 2009; Abtew et al., 2010). This is because future climate information is considered unreliable and uncertain, so most managers tend to shy away from using climate information. The disconnect between producers of climate information and the users of climate information has also led to the information being unusable by policy makers and water managers as it is considered too complicated (Kiem and Austin, 2013). This was seen to change when the information users had an established relationship with the information producers which enabled customization of climate information to suit the needs of the users of the

information (Kirchhoff, 2013). These reasons, among others could be attributed to the low use of available future climate information in the development plans.

5.2 Research objective 2

There is increased risk of maladaptation in the long run when the wrong kind of climate information is used for planning. The second objective of this research thus sought to evaluate the suitability of the climate information in the CIDPs based on the understood climate risks and water development priorities of the different counties. The kind of climate information used in planning will determine the success of climate change adaptation and mitigation, and subsequently resilience built from this.

On the timeline of the information used, 59% of the climate information used in the documents covers either historical or current timelines while only 7% of the information is based on future timelines. Historical information is important for understanding climate patterns but also for understanding perceptions towards weather and climate as failing to include historical climate data raises questions over suitability of interventions (Dorward et al., 2019). The problem with historical CI is that given the climate variability being experienced globally, the information is no longer dependable for planning and there is need to use information that helps pre-empt the future. While previously past climate information has been successfully used in planning due to the consistency in trends and predictability, this is no longer the case(Kirchhoff, 2013). A proactive approach is needed to make sure that plans are made with data that includes information on future possible trends.

On the geographical scale of the information used, only one county used climate information that was localized to the county and its environs. In the Homabay CIDP, the plan states, “Different climate models for the great lake’s region predict that lake levels will decline over the next century…” and “Climate change projections indicate that the county of Homabay should expect an increase in rainfall along Lake Victoria”. Homabay borders Lake Victoria

and has its climate highly influenced by the water body making use of this kind of information appropriate. Of the 6 counties that had used climate information that could be coded into the geographical scale of the information, four of the counties used information from a global scale. Elgeyo-Marakwet uses general climate information on how climate is expected to change based on climate projections based on two RCPs that then indicate an increase in drought conditions. Nandi also uses the same information but not necessarily adopted to a local scale using projections covering the time range between 2021-2065. Embu, a county that cannot be classified as arid states "Based on climate change scenarios, it is estimated that the arid zones of the country will experience significant changes in precipitation and temperatures, with some places becoming wetter and others drier". Narok uses similar information, but being an ASAL county, the climate information is more suitable and applicable to majority of Narok county. On a regional level, Turkana states "In Eastern Africa, changes in the Indian Ocean temperature also affect atmospheric temperature and rainfall…contribute to drought in the region."

A lot of the plans however mention climate science information and general information on climate change in a more informative or educative way as opposed doing so in a way that implies that the information applies to the counties. Most of the counties that use climate information in this way seem to distance themselves from the information, as opposed to speaking about how climate change would impact the counties. Of the 39 counties that had more than one type of climate information, 18 had what can be considered general climate information. General climate information is merely descriptive of either what climate change is, or what the effects of climate change are. Some of the information coded to the general information code also includes plans that were just stating what the climatic conditions have been in the county. An example is Kwale, an ASAL county that states "Climate change is a global issue, and a lot needs to be done to address the challenges it does pose". The plan then goes ahead to mention national level efforts to address climate change including Kenya being

a signatory to international treaties related to climate like the Kyoto protocol and states that "A lot more needs to be done at a local level". The Nairobi plan states "GHGs disrupt atmospheric balance and global warming therefore heating the earth surface", without further mention of climate change in the plan.

Understanding the science behind climate change is important especially for adaptation, mitigation, and planning purposes (Jennings, 2011). Understanding a situation better enables planning for it better. For most of the CIDPs however, this information is used as an informative bit of information with most counties separating themselves from the information, almost like the information does not apply to the counties. This approach to climate change can be attributed to the fact that devolution in Kenya is still new and these plans were created by the second set of governments that were assuming power under the 2010 constitution of Kenya. This means that the counties were probably still understanding better the roles that they are expected to play and what their roles and responsibilities were compared to the national government.

5.3 Research objective 3

The general expectation is that use of climate information informs the development priorities that are in the CIDPs. In line with this, the third objective of this research sought to understand how the water development priorities align with the perceived climate risks in the various counties and how climate-informed the priorities are. This section looks at the drought risk, flood risk, rainfall variability and human and animal diseases risk and compares the water development priorities of the counties that have stated these as the main risks faced by the counties.

5.3.1 Drought Risk

For the counties that perceive droughts as a risk, the water development priorities were as follows:

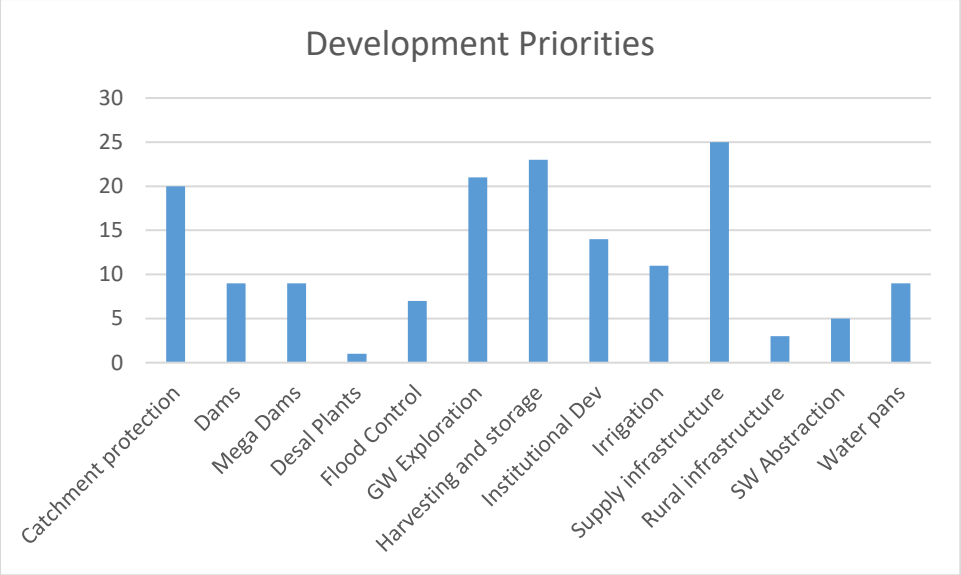

Figure 17: Development priorities of counties facing drought risk

The top four priorities that the counties that perceive drought as one of their climate risks are building of supply infrastructure, building of harvesting and storage infrastructure, ground water exploration and catchment and wetland protection. The least prioritized interventions were building of desalination plants, building of rural infrastructure to improve access abstraction of surface water resources, and building of dams. 18 counties plan to build dams or mega dams in the counties despite the increased risk of drought. Increased temperatures have previously affected and rendered dams unusable so a focus on building more dams in the face of climate change might not look like the right focus for the various counties. A focus on ground water exploration and building of water storage and harvesting infrastructure is however in line with the perceived risks that these counties face.

5.3.2 Flood risk

29 counties listed floods as one of the climate risks. This is compared to only 9 counties that stated building of flood infrastructure as one of the water development priorities, with one county exclusively mentioning the building of dykes to help controlling overflowing rivers during rainy seasons. Among these counties, the main 4 water development priorities that were the general priorities for all the 47 counties combined were the leading priorities as shown

below. For these counties, building of water harvesting and storage infrastructure might however be in the right direction as this could be a way of harnessing flood water for use in during water scarce periods.

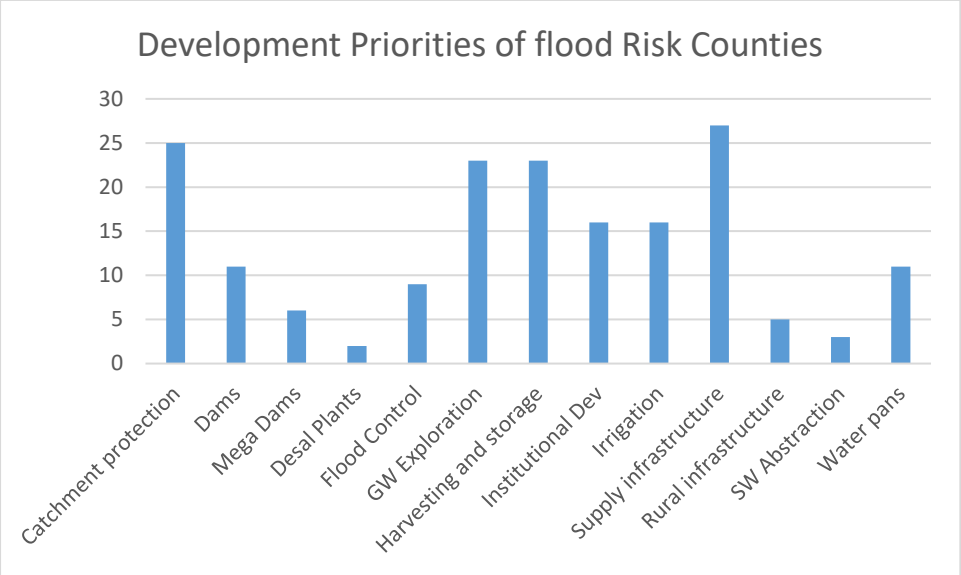

Figure 18: Development priorities of counties facing flood risk

5.3.3 Rainfall variability

14 counties stated high rainfall variability as one of the main climate risks that they face. Considering the dependence on rainfall for agriculture and other livelihood purposes, it would be expected that development in these counties would be agriculturally based and focusing on interventions like ground water exploration. The focus of these counties however remain the same with the counties that face both flood and drought risks, with development of supply and sewerage infrastructure remaining the top priority.

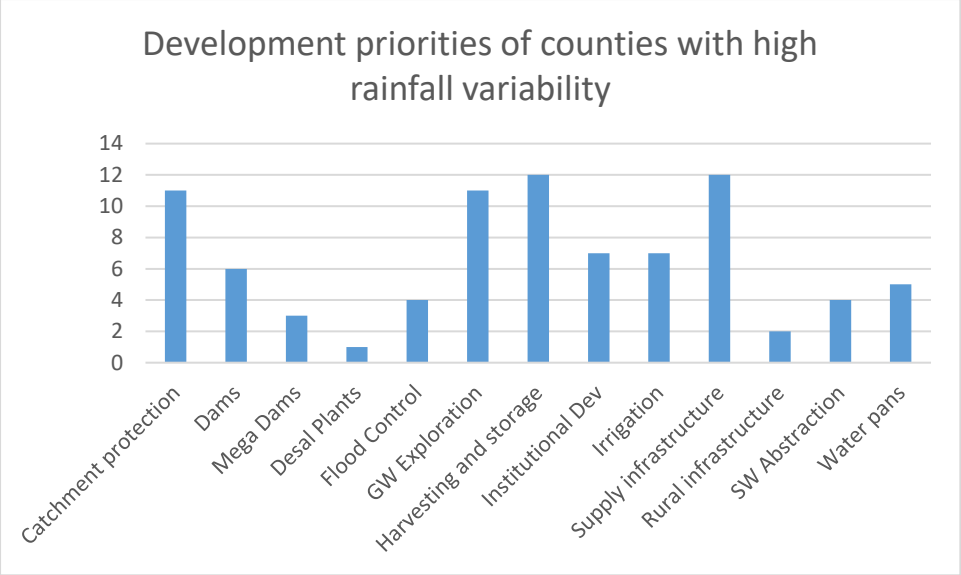

Figure 19: Water development priorities of counties with high rainfall variability

5.3.4 Human Diseases

Notably, for the 14 counties that are facing human and animal diseases as one of the climate risks, institutional and capacity development comes up as one of the main development priorities compared to the three risks discussed earlier. This could possibly be attributed to the fact that dealing with the health impacts of climate change will require strong institutions that are able to pre-empt the risks that are coming and put in place measures that will prevent this from being a full-blown disaster. Apart from institutional and capacity development, the priorities associated with this risk do not fully align with the risk. The plan to build dams and mega dams might cause an increase in water borne diseases, but development of human infrastructure is a positive step towards mitigating the health risks of climate change (Haines et al., 2014).

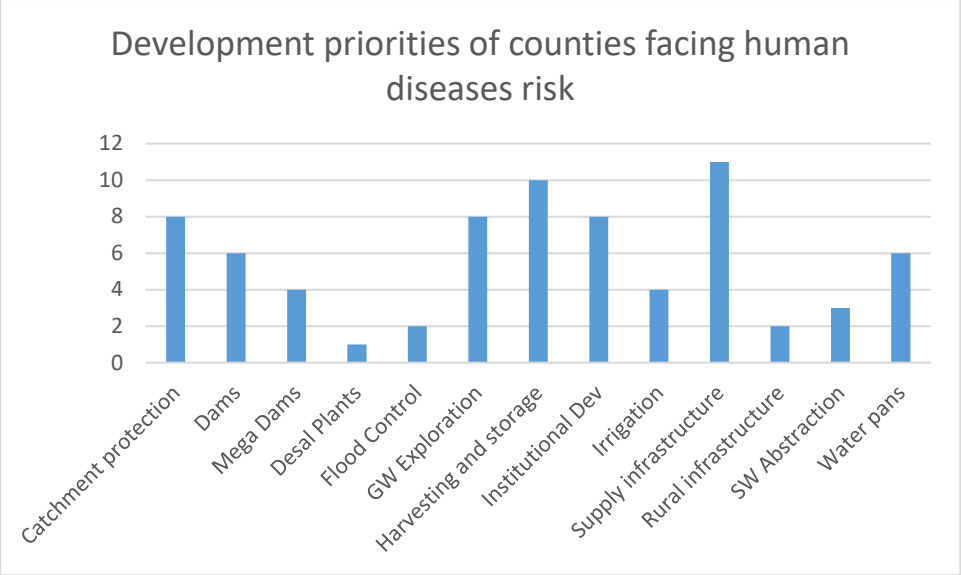

Figure 20: Water development priorities of counties facing human and animal diseases risk

5.4 Recommendations

This study gives a clear understanding of what the different counties perceive to be their climate risks, the water development priorities of the different counties and the type of climate information that has been used in the development plans. Climate change, the term, is not addressed in detail in all the plans as some plans simply do not talk about climate change with some counties acknowledging climate change but mentioning that there is hope that this does not affect the implementation of the plan. The climate information used in the documents is also diverse and varied giving the implication that there is no harmonization in the kind of climate information that is used, and the counties are free to use any information that they deem fit for use. From this review, the water development priorities of the counties have been understood better against the climate risks that are faced by the counties. From this process, various recommendations have been identified on how to make the next generation of CIDPs and future planning documents better in the context of building resilience towards climate change.

There is general optimism about the use of ground water resources to meet the current water demands of the counties. 36 out of the 47 counties have development plans that focus on

abstraction of ground water either through sinking and servicing of boreholes or building more wells to increase access to water. None of these counties however mention anything to do with recharge of ground water resources despite all the counties agreeing that there has been reduced rainfall and increased temperatures in the recent years. Increased overreliance on ground water resources comes with its own problems that needs to be addressed before hand to avoid future crisis(MacDonald et al., 2009). From various studies, increased reliance on ground water without sufficient recharge could lead to an increase in the costs of abstraction of ground water, making it necessary to consider the increased costs in this plan. This also leads to reduction in the amount of water available for everyone as ground water is a common resource pool. Ground water being a common pool resource means that there is need for better communication and joint management between all the parties using shared water resources. This would ensure that the ground water is utilized in a sustainable manner that ensures that there is enough for all people depending on the water.

Increased reliance on ground water necessitates the need to carry out comprehensive studies to better understand the nature of the ground water resources. The physical and chemical properties of aquifers are also important to understand before embarking on increased abstraction of ground water to ensure that abstraction of ground water is done in a sustainable manner that avoids the hazards associated with increased ground water abstraction such as reduction in quality, pollution of ground water resources and land subsidence. The focus towards ground water resources also necessitates understanding and implementation of plans that seek to either increase the rate of recharge of ground water resources and protection of sources of ground water to ensure its continued availability. With climate change and anthropogenic factors greatly affecting the availability and quality of surface water resources, the legislation around ground water resources needs to be strengthened as it is fast becoming a vital resource for building resilience to climate change.

A review of the climate information used in the plans and the plans themselves showed the varied nature of the information used in developing the plans. There is significant risk of maladaptation when the wrong kind of climate information is used in planning. Of all the counties that mentioned their partner organizations, only two counties had partnered with institutions that focus on research as the main discipline. There is need to have the counties partner with organizations that provide reliable climate information that can be used for planning. One such organization is the Kenyan Meteorological Department that would play an instrumental role in providing the kind of information that would go into these documents. Consider the climate risk that Kenya faces overall, there is need for better streamlined coordination of the climate information that the different counties have, customized to the context of the counties to avoid using general information. While there exist guidelines on what the counties should include in the CIDPs, there is need to have the information included in the CIDPs be better aligned to one another for monitoring and reporting purposes, especially if the CIDPs are going to be the main documents guiding development in the counties for the foreseeable future (National Treasury and Planning, 2020).

21 out of 47 counties have irrigation as one of the water development priorities but only one county mentions increasing the efficiency of the irrigation techniques used. All the other counties seek to either rehabilitate irrigation schemes, set up new irrigation schemes or increase the amount of land currently under irrigation. Increased irrigation will likely impact the amount of water available for use more significantly that even population increase (Riediger et al., 2014). With the amount of rainfall decreasing from the observed trends and plans to significantly increase the amount of land under irrigation, there is need to carry out a water resources assessment and incorporate integrated management of these resources. Increased irrigation will improve the food security situation, but this should not be done at the expense of the people and livestock that also need the water for basic, household, and agricultural use.

Decision makers have often been seen to prioritize water resources supply and exploration without paying attention to the complex relationship that this has with the environment and related ecosystems (Bedelian, 2019). There is a need to carry out an assessment of what water resources are available to Kenya and realistically allocate these resources prioritizing the most pressing needs and allocating the rest to the most profitable need. Promotion of more efficient irrigation techniques to reduce the amount of water used in agriculture while increasing the yield should also be prioritized to ensure available water is used in the most efficient way possible. Haphazard setting up of irrigation schemes and increased irrigation will increase water insecurity in some parts of the country, making adaptation if integrated water resources management an urgent task.

5.5 Study limitations and areas for further research

The main methodological limitation faced during this study was using the CIDPs as the sole data source due to the lack of uniformity in how the documents are developed. The uniformity in the information put in the document is not guaranteed and it is up to the researcher to determine what counts as relevant data and what does. Most of the development plans are about 500 pages long and this presents a risk of some information being missed as it does not fit in the conventional categories that were being reviewed. Given the time limitations of this study, the documents could not be reviewed page by page to go through all the information. This means that the study might be considered highly subjective, and some information might be missed from the documents, a common limitation of qualitative studies(Higgs, 2010; Hsieh and Shannon, 2016). The impact of this to the study was offset by determining as many sections of the different documents as possible that could be reviewed and doing an overview of the whole document while coding for the parts that were not to be reviewed in detail.

Studies have shown that despite the existence of robust policy and legal frameworks, at times these policies do not translate to implementation(Ogendi and Ong'oa, 2009; Jennings, 2011;

Avidar, 2019). Understanding the integration of climate and water requires one to go beyond the counties and engage with the various bodies and stakeholders in the water sector, which was beyond the scope of this dissertation. Due to the timing of this dissertation, interviews were not feasible. For future studies, including interviews into the methodology would help understand how the plans translate into actual development carried out in the counties for the five years that they are supposed to be implemented. The background information from interviews would be beneficial when analysing the plans. An area of study emanating from this research would be an analysis of how the CIDP compared to the development initiatives carried out in the different counties over a five-year period, and an assessment of how the county fared in the face of climate change emergencies that occurred over the implementation period of the CIDPs. This would help in understanding if the plans do affect what happens and increases readiness for climate hazards or are just documents that are developed and not used afterwards.

6.0 Conclusion

This thesis explores the Kenya's CIDPs to understand the integration of climate information, the perceived climate risks of the counties and the water development priorities. The information from the CIDPs was obtained through comparative document analysis and the data obtained analysed qualitatively. While there is climate information used, most of the information is historical and the information used for future projections is not well adapted to the local scale of the counties. The most used category of climate information was found to be information explaining climate hazards that had either occurred in the past, were occurring at the time, or were rejected to happen in the future. 88% of all the counties used this as the most common type of climate information. Other types of climate information used include historical data, observational data, and information from projections and models. Of all the instance of climate information obtained from the documents, local knowledge was the least used type of climate information with only one instance of such information being used in all the CIDPs.

Despite mentioning of the climate risks faced by the counties, the water development priorities do not align for some of the risks as is the case for flood risks where the counties do not have building of flood management infrastructure as one of the top development priorities. There however seems to be a heavy focus on development of supply infrastructure, exploration of ground water, irrigation and building of water harvesting and storage facilities.

While there exists a guidelines framework on how the CIDPs should be developed, a review of all the 47 CIDPs show that this is not legally enforced as not all the CIDPs followed these guidelines. There needs to be standardization in how the CIDPs are developed especially if they should be used for monitoring and reporting purposes, being the main guiding documents for development at the county level. The kind of climate information used in the CIDPs and subsequently in planning needs to be coordinated at a national level to ensure that the counties

and policy makers have access to the right kind of climate information. This would avoid maladaptation in the long term, which is a risk when the wrong kind of climate information is used. There also needs to be an increase in collaboration between various organizations and the county governments when planning for development. Some of these organizations include the Kenya Met Department, the National Drought Management Authority, research institutions and universities. The integration of climate information in the CIDPs can be improved incorporating climate science to the development priorities and explaining the impact to the climate of the current development initiatives. This would change focus of the counties from just the immediate and ensure that sustainable futures are incorporated into the plans.

Considering the imminent and already felt impacts of climate change, there is need to have climate change incorporated into development plans. For water management, this would help in ensuring the available water resources are utilized and developed in a sustainable manner, increasing water security. The findings from this study is a first step towards understanding how the different counties are approaching the issue of climate change. These findings can be used to either inform the 3rd generation of CIDPs that are currently being developed by the new county governments from the 2022 elections or could be used as a way of gauging how counties have over time integrated climate information into the future development plans. Using this as a guide could help policy makers understand what to look out for when making development plans that should guide development in the counties for future use. It could also serve as a guide to the producers of climate information of how they can better work with the county governments to ensure that the county governments are more climate change ready based off the available information.

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