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Urban Risk Management and Building Resilience: Effective Disaster Risk Management Strategies in Narok County, Kenya

Timothy Earl Mateo Castillon

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Master's thesis submitted in partial fulfilment of the requirements for the degree of European Interdisciplinary Master African Studies, supervised by Professor Amélia Maria Polónia da Silva and mentored by Rui Miguel Santos and Jackson Kago.

Faculdade de Letras da Universidade do Porto | Faculty of Arts and Humanities of the University of Porto

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Professor (name of the Professor)

Faculty (name of the Faculty) - University (name of the University)

Professor (name of the Professor)

Faculty (name of the Faculty) - University (name of the University)

Professor (name of the Professor)

Faculty (name of the Faculty) - University (name of the University)

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“Disasters amplify the inequitable aspects of the world we live in”

- *Mami Mizutori (UNDRR, 2021)*

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Declaration of Honour

I hereby declare that I am the author of this thesis Urban Risk Management and Building Resilience: Effective Disaster Risk Management Strategies in Narok County, Kenya, which has never been used in other course units or subjects at this or any other institution. All references to authors (statements, ideas, thoughts, quotes) have scrupulously met the applicable citation rules and are, therefore, referenced in the text and in the bibliographical references, in accordance with the referencing rules. I am aware that plagiarism and self-plagiarism is an academic offence.

Porto, July 2022

Timothy Earl Mateo Castillon

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Resumo

Nos últimos anos, o condado de Narok, no Quênia, foi fortemente afetado por desastres. Isso causou doenças graves, interrupção dos meios de subsistência, danos à infraestrutura, mortes, ferimentos e escassez de alimentos. A gestão de desastres tem sido avaliada tendo como foco as causas, efeitos e medidas de mitigação. No entanto, inundações perenes e secas extremas persistem. Este estudo examina as causas, efeitos, disposições institucionais e outros aspectos do DRM em Narok. Durante o trabalho de campo, de Fevereiro a Maio 2022, foram utilizadas, para a coleta de dados, entrevistas, observação participante e análise de documentos oficiais.

Chuvas intensas e infraestruturas desatualizadas e ineficientes são fatores que impulsionam os desastres na cidade de Narok. Uma inundação é caracterizada principalmente pela erosão do solo, ao mesmo tempo que pela perda de vidas e propriedades, perdas de meios de subsistência e deslocamentos. Organizações estatais e não estatais contribuem para o DRM através de políticas, legislação, estratégias e planos, treino e coordenação de parcerias. A estratégia de DRM é, no entanto, limitada pela falta de políticas claras e estruturas legislativas, por um financiamento inadequado, e pela falta de equipamentos e pessoal em organizações relevantes. Este estudo recomenda uma avaliação abrangente das causas e efeitos dos desastres; a valorização da construção de parcerias; e uma abordagem integrada de DRM. As evidências científicas derivadas deste estudo podem ser usadas para informar e dar apoio a políticas de implementação de uma estratégia integrada e sustentável de DRM no Condado de Narok.

Palavras-chave: Disaster Risk Management, Narok County, Africa

Abstract

In recent years, Narok County in Kenya has been heavily affected by disasters. It has caused severe illness, livelihood disruption, infrastructure damage, deaths, injuries, and food shortages. Disaster management has been assessed with a focus on causes, effects, and mitigation measures. Nevertheless, perennial flooding and extreme droughts persist. The study examines the causes, effects, institutional arrangements, and other aspects of DRM in Narok. During the fieldwork from February to May 2022, interviews, participant observation, and official document analysis were utilised for data collection.

Rainfall and outdated and inefficient infrastructure are significant factors driving disasters in Narok town. A flood is mainly characterised by soil erosion, while it is also characterised by loss of life and property, livelihood losses, and displacement. State and non-state organisations contribute to DRM through policies, legislation, strategies and plans, training and partnership coordination. DRM strategy is however limited by a lack of clear policies and legislative structures, inadequate funding, equipment, and qualified personnel in relevant organisations. This study recommends a comprehensive assessment of the root causes and effects of disasters; enhancement of building partnerships; and integrated DRM approach. Scientific evidence derived from this study may be used to inform policy and support the implementation of an integrated and sustainable DRM strategy in Narok County.

Keywords: Disaster Risk Management, Narok County, Africa

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List of Abbreviations and Acronyms

CIDPs	COUNTY INTEGRATED DEVELOPMENT PLAN
CDRMC	COUNTY DISASTER RISK MANAGEMENT COMMITTEES
CRED	CENTRE FOR RESEARCH AND ECONOMIC DEVELOPMENT
DM	DISASTER MANAGEMENT
DMU	DISASTER MANAGEMENT UNIT
DRM	DISASTER RISK MANAGEMENT
DRR	DISASTER RISK REDUCTION
EM-DAT	INTERNATIONAL EMERGENCY EVENTS DATABASE
ENSDA	EWASO NYIRO SOUTH DEVELOPMENT AUTHORITY
FAO	FOOD AND AGRICULTURE ORGANISATIONS OF THE UNITED NATIONS
IPCC	INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE
GDP	GROSS DOMESTIC PRODUCT
GoK	GOVERNMENT OF KENYA
JICA	JAPAN INTERNATIONAL COOPERATION AGENCY
MI&C	MINISTRY OF INTERIOR AND COORDINATION
NARWASCO	NAROK WATER AND SANITATION COMPANY
NCG	NAROK COUNTY GOVERNMENT
NDOC	NATIONAL DISASTER OPERATIONS CENTRE
NEMA	NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY
NDMA	NATIONAL DISASTER MANAGEMENT AUTHORITY
NDRMC	NATIONAL DISASTER RISK MANAGEMENT COMMITTEE
PDNAs	POST DISASTER NEEDS ASSESSMENTS
KRC	KENYA RED CROSS
SCDRMC	SUB-COUNTY DISASTER RISK MANAGEMENT COMMITTEES
SDGs	SUSTAINABLE DEVELOPMENT GOALS
SSA	SUB-SAHARAN AFRICA
UNDESA	UNITED NATIONS DEPARTMENT OF ECONOMICS AND SOCIAL AFFAIRS

UNDP	UNITED NATIONS DEVELOPMENT PROGRAMME
UNDRR	UNITED NATIONS OFFICE FOR DISASTER RISK REDUCTION
UNISDR	UNITED NATIONS INTERNATIONAL STRATEGY FOR DISASTER REDUCTION
UNOCHA	UNITED NATIONS OFFICE FOR THE COORDINATION OF HUMAN RIGHTS

1. INTRODUCTION

Over the past decades, the frequency incidence of natural disasters has grown significantly worldwide. Disasters, despite their forms, affect socio-economic, health, political, and environmental wellbeing. As the United Nations Office for Disaster Risk Reduction (UNDRR) (2022) reports, increasing technology, economic development, and sophistication, as well as population growth and risks, are contributing to an increase in disasters. People's sources of livelihood are disrupted, their infrastructure is destroyed, resources are diverted from their plans, economic activities are interrupted, and development is retarded. The disasters escalated human and economic losses worldwide, which claimed approximately 1.2 million lives and affected more than 4.03 billion people (Center for Research and Economic Development [CRED], 2019; Shikangalah, 2020; UNDRR, 2022). The International Emergency Events Database (EM-DAT) recorded losses totalling US$ 27 billion from recorded disasters between 2000 and 2019 in the African region; however, this figure is an underestimation given the under-reporting of casualties worldwide (UNDRR, 2020). In this context, most emerging African countries bear the burden of loss of human lives, and the proportion of gross domestic product lost due to disasters. One of the most vulnerable countries in Sub-Saharan Africa (SSA) is Kenya, which ranks among the most affected by natural disasters (CRED/UNDRR, 2019; UNDRR, 2022).

The impact of natural disasters still poses a significant threat to Kenya, even though it has been a regional hub for humanitarian efforts and a growing economy. Malnutrition, food insecurity, and disease outbreaks are primarily caused by the recent droughts and floods they have experienced. The most affected areas are the arid and semi-arid lands that cover 23 of the 47 counties and comprise about 89% of Kenya's landmass (United Nations Office for the Coordination of Humanitarian Affairs [UNOCHA], 2021). The most recent flooding was the El Niño event in 2015. By the end of that year, floods had affected an estimated 35565 households, with 12398 forced into displacement. The floods also resulted in the loss of animals and crops (Kenya Red Cross, 2015).

Moreover, the threat of climate change presents an even more worrying outlook. In the last two decades, the situation has resulted in international and national organisations giving increased attention to Disaster Risk Management (DRM), primarily within emergency relief. In recent years,

a greater emphasis has been placed on the need to reduce disaster risk through development work to achieve sustainable poverty reduction. Towards achieving the Sustainable Development Goals (SDGs) Goal 1[1], target 1.5 aims to make a significant improvement in people's lives by enhancing resilience among the poor and vulnerable, as well as reducing their vulnerability to climate-related extreme events (UN, 2022). In line with it, the Sendai Framework for Disaster Risk Reduction 2015-2030 urges governments to address the issue of disaster risk in their sector development programming. However, little attention has been given to urban settlement development compared to other development sectors.

Consequently, national and local organisations working in urban development struggle to effectively tackle disaster risk through their everyday work because of the lack of related knowledge and tools. Although local government planners and others involved in urban development are responsible for developing safe and sustainable settlements. The extent and severity of the impacts caused by a disaster are partly influenced by the coping capacity of a vulnerable human settlement. Disaster risk factored into investment decisions in urban development also have a decisive influence on the future of disaster risk reduction (Bello, Bustamante, and Pizarro, 2021). Hence, related programs need to be urgently re-evaluated to provide better solutions. With disasters being a product of past developments, responding and adapting effectively to disaster risk is inherently complex. It is just one of many issues that must be addressed to ensure safer houses and infrastructure. This conventionally recognized need for better knowledge is a basis for settlement development programming. To effectively secure urban development, it is necessary to improve our understanding of the interplay between disasters and urban settlement development and to create holistic approaches and strategies that can be implemented to integrate disaster risk management into settlement development programming effectively.

1.1. Background of the Study

Climate change is causing various adverse climate events. Many of these are attributed to anthropogenic causes, including melting glaciers, warming oceans, animal and plant species

[1] Sustainable Development Goal 1 aims to "*End Poverty in all its forms everywhere"*. See the UN, 2022 for more information.

extinction, drought, and disease outbreaks. The effects of disasters have been devastating worldwide, with many lives lost and many properties destroyed. The Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) (2021) reveals that extreme droughts and flooding significantly impact people, property, economies, and ecosystems in urban areas. Consequently, it is not surprising that Deryugina (2022) asserts that natural disasters, such as flooding and weather extremes harm households by destroying physical and human assets. Many countries face the challenges of reducing disaster risks and fostering resilient communities capable of recovering quickly from or avoiding disasters. In the wake of disasters, people have suffered and have been impacted negatively by the damage and disruption to their everyday lives. Such groups find it challenging to cope with the consequences of such events.

In a study of the impact of a disaster on macroeconomic performance in a developing economy, Noy and Vu (2010) found that disaster events have a detrimental impact on macroeconomic growth. The developing countries bear the heaviest burden in terms of lost human lives and detrimental economic output. Poor urban communities are particularly vulnerable to many natural disasters. Africa's vulnerability is worsened by its state of economic development and low adaptive capacity (IPCC, 2021). The Post Disaster Needs Assessments (PDNAs) conducted in Dakar, Ouagadougou, and Bangui City in Africa showed that urban floods affect many cities throughout Africa. This is attributed to weak urban governance and limited infrastructure (World Bank, 2017). Engaging in DRM globally is crucial because it aims to reduce the negative impact of such occurrences when they happen (Wilson et al., 2008). Diverse actors act swiftly to mitigate the damage that a disaster has already done. While poverty heightens people's vulnerability to natural disasters, disasters also worsen their precarious circumstances. The result could be a poverty trap created by these circumstances.

Most DRM initiatives in Africa tend to focus on national and, to a lesser extent, sub-regional levels. Most of these disaster preparedness efforts in Africa have focused on reparative responses instead of mitigation (Carbon & Piiroinen, 2012). Disaster preparedness and management is a vital tool in saving the lives of individuals involved in various disasters and other risky situations. The Kenya Disaster Management Draft Policy 2009 recognized the importance of disaster preparedness. It underscored the need for proactive and preventative approaches to addressing disaster circumstances gained from the experiences and lessons learned while managing previous

hazards and disasters (Government of Kenya [GoK], 2010). The Kenyan disaster profile comprises fire, droughts, terrorism, floods, diseases, technological accidents, and epidemics that disrupt and, in some instances, destroy livelihoods and infrastructure, leading to diversion from the planned use of resources and interruption of economic activities and eventually end up destroying development (Murage, 2012). In the last two decades, Kenya has also been on the scene of various construction disasters which have caused many deaths and the destruction of properties. The disasters have brought out the need for Kenya to create more awareness of the threats posed by poorly done construction projects.

Although numerous efforts have been made to manage disasters in Kenya, poor communities are still highly vulnerable when disasters strike. Disaster relief is temporary, with few supportive measures in place. As a practical matter, the national government has the ultimate authority to prevent disasters and craft strategies for their mitigation and response. Increasing attention has been given to reducing disaster risk through development work to lead to sustainable poverty reduction. However, little attention has been paid to the local county government. Consequently, urban development actors (including donor and implementing organisations) struggle to effectively tackle disaster risk through everyday work (Murage, 2012).

Narok is among parts of Kenya prone to heavy floods and extreme droughts (Narok County Government [NCG], 2018a). The deforestation and land degradation upstream in Kenya has resulted in excess surface runoff downstream. In addition, several El Nino events have been recorded in the past. Narok County often fails to prevent and mitigate the impact of disasters and emergencies because of the absence of local disaster management frameworks, policies, and lack of implementation of the plans mandated by the National Policy for Disaster Management in 2009. It needs sustained systematic strategies for disaster prevention, preparedness, mitigation, response, recovery, and rehabilitation, reducing the risk of emergencies and disasters to people and property. To implement effective and efficient disaster contingency plans, international experience in strategies and models in response to emergencies and disasters is required within Narok County, mainly for disaster reduction to curb the costs associated with the implications of disasters.

1.2. Statement of the Problem

Numerous studies over the past few years have shown that Narok Town has been severely affected by perennial flooding associated with the long rainy season but attributed to other factors, including extreme droughts in the recent past. These findings have been confirmed by the 2020 Flood Emergency Warning Communication Strategy Report by the NCG (2018b), as well as the GoK's drought situation report (2022). It is also one of the counties in Kenya that were severely affected by the floods in 2019. There was extensive damage, many deaths, and negative press coverage resulting from floods in Narok recently (Mireille et al., 2019). A growing number of urban floods occur due to increased urbanisation, environmental degradation, and climate change. Narok had short rains from October to December 2021, marking the third consecutive year of below-average rainfall in eastern and northern Kenya's pastoral and marginal agricultural areas (GoK, 2022). It mainly affected the pastoral regions, resulting in very low pasture and water resources that have driven atypical livestock migration, rapid livestock health and productivity decline, and excess livestock deaths (GoK, 2022). Despite Narok being exposed to recurrent flood hazards, the disaster response and management remain reactive, with weak coordination mechanisms (World Bank, 2010). In addition to a lack of strategy, the town lacks the resources to support core functions such as coordination, formulation, and implementation of risk reduction policies.

This study aims to assess the root causes, impacts, existing DRM strategies, institutional arrangements, and other potential DRM measures in Narok County. This study aims to inform strategic and sustainable measures that can be integrated into a national disaster management strategy.

1.3. Research Question

This study aims to determine how disaster risk management strategies can be implemented effectively in Narok County to minimise the adverse effects of disasters.

This research examines it further to answer better the overall research question, which entails addressing: (a) underlying causes and effects of disasters in Narok County; (b) institutional

arrangement of DRM in Narok County; and (c) current DRM initiatives implemented in Narok County.

1.4. Relevance of the Study

Narok County was chosen as the base of the study because of its economic and social high vulnerability to natural and man-made disasters and its poor implementation of disaster management strategies based on sound policy and legislation (Bello, Bustamante, and Pizarro, 2021). This reactive approach means that millions of shillings for development are spent on emergency responses and reconstruction, which impedes development progress. In addition to the reactive approach, flood management strategies and resources are inadequate. This limits the capacity of Narok County to execute core functions of coordination, formulation, and implementation of risk reduction policies. A lack of strategy and inadequate resources limit Narok County's ability to perform its core functions of coordination, formulation, and implementation of risk reduction policies. Additionally, it has been chosen based on the following broad rationalisations:

Currently, the disaster management system of Narok County is not based on a coordinated policy framework. In its CIDP 2018-2023, the county acknowledges a lack of priority and legislative structures (NCG, 2018). What exists is partly an automatic system, which has assisted the county government and its development partners, such as the United Nations Office for Disaster Risk Reduction. This system has assisted in responding to disasters in the county. Initially developed in 1999, the most recent version of the Kenyan National Disaster Management Policy was written in 2010. Nonetheless, the National Disaster Management Policy has not yet been finalised as it is still under development.

There is an insufficient budget allocation and conditional donor support amounting to less than 2% of its overall budget (NCG, 2018; Owino, 2019), resulting in the amount of money available for the Disaster Management Program far less than needed to handle the disasters. In addition, the lack of specialised equipment hampers effective disaster management in the country.

Although specific sub-sectors have large amounts of data and relevant information available for dissemination, there are inadequacies in collecting, analysing, and storing data. As a result,

insufficient data and knowledge lead to poor planning, a lack of institutional memory, and improvement towards best practices. This leads to inadequate monitoring and evaluation of disaster risk trends and forecasts.

Policymakers in Narok County may use the study outcomes to develop relevant policies for curbing and mitigating losses caused by disasters in the country. Research of this nature contributes to disaster management at all levels of government. In addition, it plays a valuable role at the executive level by providing an independent and impartial analysis of disaster preparedness capabilities and recommending areas for improvement. The expected product of this endeavour will aid in developing a more proactive and consistent approach to disaster preparedness and management. The government now has access to the facts of the situation and the available equipment to check disaster incidences. Additionally, future studies may use the findings as the basis for their research in this area. The study provides ready data for future reference by scholars and policymakers.

Lastly, there is an absence of links between poor urban communities and the district and national levels regarding disaster management capabilities. As a result of the general degradation of traditional African socialism, conventional coping strategies are also gradually being eroded. As a result of inadequate awareness of disaster management in Narok County, particularly related to preparedness and coping mechanisms, the Narok community is more vulnerable and faced with potential impacts.

1.5. Conceptual Framework

The conceptual framework developed is informed by the theoretical framework adopted for this study, which is the Emergency Management Theory. The theory seeks to promote safer, less vulnerable communities with the capacity to cope with hazards and disasters (Haddow, Bullock, Coppola, 2017). Consequently, it investigates how human and institutional responses to hazards, vulnerabilities, and resulting events are accomplished, primarily through preparedness, response, recovery, and mitigation activities (Drabek & Hoetmer, 1991). This can be achieved through a scientific, policy-guided, and evidence-based decision-making process. The above theory and concepts regarding implementing effective disaster risk management strategies were taken into

consideration in developing the conceptual framework. The issues and challenges of implementing effective Disaster Risk Management Strategies in Narok County are the dependent variables (Y) of the study. In contrast, several factors of implementing effective Disaster Risk Management Strategies were identified as independent variables (X1-Xn), as shown in Figure 1.

Figure 1: Conceptual Model for Effective DRM Strategies in Narok County

Source: Developed by Author (2022)

Three variables were used to identify the issues and challenges of implementing effective Disaster Risk Management Strategies in Narok County. The first implies evaluating the causes and effects of disasters in Narok County. The second is mapping institutional arrangements for DRM in Narok County, by examining the links between national and local disaster management organisations involved in disaster risk management, their strengths and weaknesses in capacity, and policy formulation and implementation. Lastly, the evaluation of the disaster management initiatives in Narok County is based on its current disaster risk management intervention.

1.6. Scope and Limitation

The research will focus on hydro-meteorological disasters, emphasising drought and floods. The government of Kenya has realised that disasters threaten sustainable development, and various

measures have been undertaken. However, gaps still need to be addressed to strengthen DRM strategies in Kenya.

The research on DRM at a county government level is led within the jurisdiction of Narok County. This amalgamates diversity, with the dominant ethnic groups being the Maasai and Kalenjin communities, creating a vibrant cosmopolitan society. The county is characterised by increasing climate variability, an increase in temperature and extreme events, such as droughts and floods that affect livestock and agriculture production, incomes, and the community's food security (GoK, 2022).

2. LITERATURE REVIEW

A review of literature related to DRM is presented in this chapter. An investigation of this review is conducted at three (3) levels. A brief overview of disasters in Africa, with particular attention to the causes and impacts of disasters in Kenya, has been provided. The second part of the chapter discusses DRM and its cycle. Lastly, the institutional arrangement in Kenya has been reviewed. Case studies were included in the detailed literature review.

2.1. Overview of disasters

Literature on disaster studies and their management is extensive. This has been required by recent disastrous events of global magnitudes, such as: (1) the eruption of Mount Nyiragongo that forced 300,000 citizens of the Democratic Republic of Congo to flee their homes in May 2021; (2) the Cyclones Idai and Kenneth that took the lives of more than 1000 people and devastated millions more who were left destitute without food or essential services across Zimbabwe, Malawi, and Mozambique in April 2019; and (3) the severe droughts in 2011, 2017 and 2019 that have repeatedly wiped out crops and livestock and have left 15 million people in Ethiopia, Kenya and Somalia in need of aid. Consequently, this study can assume that its theoretical basis is now being established. Nevertheless, there are gaps, and some concepts have been superseded. Experiences and descriptions can be added to a rich spectrum of understanding of relationships with disasters.

White et al. (2001) explained that the term disasters was first used to describe acts of God retributive to human misdeeds. Bentzen (2019) also confirmed that disasters remain in many people's view as acts of God, as a result of crimes committed against them. By adopting this view, one accepts the negative consequences of events as part of life and believes human efforts to mitigate disasters are beyond their reach. Yari et al. (2019) and Baytiyeh et al. (2016) stated that such fatalistic attitudes could be one of the reasons for the lack of disaster preparedness and barriers to implementing better land use planning and disaster mitigation measures around the world. Nevertheless, it is interesting that the DRM community has moved away from disaster theories since the 18th century.

In the aftermath of the Renaissance, science and knowledge made significant progress in overhauling the perspective of disasters from a supernatural to a natural basis. The Lisbon earthquake of 1755 is probably regarded as the first natural disaster that influenced the notion that natural phenomena play a role in disasters. A study by Dynes (1997) suggests that the Lisbon earthquake can be gleaned as a turning point in human history when such physical events were considered supernatural signals and turned into secular, proto-scientific events. After the industrial revolution began in the late 18th century, much progress was made in understanding the origin, physical causes, and future predictions of natural hazards (Smith, 2013). Natural disasters caused continuously increasing human and economic losses during the first half of the 20th century, despite the adoption of these engineered solutions, leading to the recognition that natural phenomena alone were not the cause of the disasters, and complex scientific and engineering methods could not be adequate solutions.

Carr (1932) proposed that disaster occurrences can be attributed to the complicated interactions between natural and human systems. Without one or the other, disasters would not occur. A 1936 paper published by White in response to flood protection challenges in the US proposed that disasters have a societal element beyond the presence of a geophysical hazard agent and the human-use system. According to the report, a reliance on engineered flood protection solutions led to short-term economic gain through the development of flood-prone lands. In his view, Barrows' theory of human ecology (1923) should be endorsed to promote judicious land use planning and connections between natural and human systems to benefit the environment and society. Similarly, McHarg (1969) advocated ecological design as a tool for urban planning, which called for the adaptation of the natural face of the Earth for human use while considering the ecosystem. In his opinion, urban public planning can help mitigate the impact of natural disasters on human settlements.

Several challenges are associated with implementing capacity building and disaster vulnerability mitigation measures when confronted with cultural issues, political instability, lack of will, civil unrest, and other anthropological aspects (Weichselgartner, 2001). McEntire (2001) asserted that natural disasters had been the subject of many attempts to mitigate them, including holistic approaches that seek to integrate the varying causes of natural disasters, their engineering solutions, and social, economic, political, and cultural dilemmas. Through irrational human

exploitation of natural resources, climate change, inefficient political and economic systems, and a contribution to climate change, humans are increasingly not seen as victims of natural disasters but as contributors to the misery caused by a hazardous natural process (Wisner et al., 2004). For this complex paradigm to be addressed, long-term focus is needed on capacity building that supports an equitable distribution of economic resources, the reduction of poverty, and community involvement in incorporating local knowledge into natural hazards mitigation strategies.

2.1.1. Causes in disasters

Flooding is prevalent in many parts of SSA, with East, South, and Central regions experiencing the most flooding, followed by West Africa (Ngoran et al., 2015). There is a direct correlation between SSA's disaster profile, the vulnerability of its people and economy, and their often limited ability to cope with natural disasters. Kenya has experienced the most floods in its history, making it the leading hydro-meteorological disaster in the region. Several flood disasters have occurred in Kenya over the past few decades, causing significant disturbances, destruction of property, and loss of life. A flash flood, a river flood, or a coastal flood are some of the natural factors that cause floods. In some cases, even when average rain falls, Kenya is affected by floods as a result of deforestation and land degradation upstream. (United Nations Development Programme [UNDP], 2009).

Countries on the horn of Africa are also prone to droughts due to climate change. Muller (2014) and Maity et al. (2016) explain that this extreme weather event was caused by a lack of or inadequate precipitation, leading to water shortages for plants, humans, and animals. Scientific evidence has linked its occurrence to climate change, as increased human activities have been associated with global climate change shocks like droughts and floods (IPCC, 2021). According to UNDP (2015), more than 70 percent of natural disasters in Kenya are related to extreme climate events, which are critical causal factors for some emergencies that lead to disasters. Climate change impacts water balance, agriculture, forestry, coastal ecology, biodiversity, and human and animal health. Due to climate change, floods and droughts are expected to increase frequency

and intensity. Adopting synergies in our approach and ways of dealing with climate change adaptation and disaster risk reduction will be critical to effectively addressing these challenges.

Government long-term development programs did not include disaster planning and response in the past. According to Nabutola (2011), general weaknesses at the government's policy, planning, and legislative level are seen as an impediment to disaster management. When a disaster strikes, the priority of the relief effort is to provide emergency provisions, including food, water, medical care, rescue, and evacuation services, and assist in the recovery process. Kenya's disaster management lacks a definitive planning structure or approach without a clear policy framework. Baudoin et al. (2014) affirmed this by stating that Kenya has failed to put in place a comprehensive disaster preparedness policy means its response to high-risk events such as bombings, cave-ins, droughts, floods, epidemics, and significant accidents tends to be slow, poorly coordinated and unnecessarily expensive. The criteria for declaring a disaster or a disaster area are not clear. Historically, cases were judged on their merits rather than on a defined set of criteria. In addition, recent and past disaster experiences underscore a lack of preparedness among the population. A public awareness campaign is typically launched after disaster measures have been taken. Due to language and other problems, the most vulnerable sectors of our society, such as pastoralists and small-scale farmers, do not have easy access to information.

2.1.2. Effects of disasters

The damage is extensive and practically incalculable in an unnatural or man-made disaster. In the aftermath of natural disasters, people are killed and displaced, houses and other infrastructure are destroyed, and vast areas of the country are isolated due to the destruction of essential infrastructures, such as bridges, roads, power stations, water systems, hospitals, and schools. Dunne and Mhone (2003) state that disasters contribute to the retardation of development in affected areas. Dunne and Mhone (2003) describe tragedies at the household level as disrupting everyday living, displacing families, destroying infrastructure, and disrupting social and community networks. Syed (2008) points out that disasters can severely disrupt development efforts, including loss of resources, interruption of programs, impact on investment climate, impact on the non-formal sector, and political instability. Therefore, the development budget for

housing construction may be diverted to other areas affected by disasters. In addition, disaster impacts can lead to social activism and political unrest, mainly when disaster recovery is interminable.

In their study, Huigen and Jens (2006) identified three types of economic effects of a disaster: direct, indirect, and secondary. Direct effects are economic losses and property damage resulting from an event. Depending on the severity of the attack, production sites such as factories or farms may be destroyed. The direct effects include loss of capital, such as loss of homes and farmland, loss of stocks, costs of emergency relief and repair, and production losses, such as poor harvests, destruction of crops, and loss of livestock. A decline in production and services can result in indirect economic effects, for example, a reduction in supplier activity. In addition, direct and indirect effects can have a secondary impact that appears years after the disaster. Huigen & Jens (2006) state that secondary products include income inequality, ecological change, and a negative balance of payments. Rasmussen (2004) asserts that the above impacts can lead to macroeconomic spillovers due to fiscal and external pressures leading to imbalances that spark economic crises. An increase in poverty can cause social unrest. Syed (2008) argues that secondary effects include inflation, balance-of-payment problems, increased fiscal expenditure, and decreased monetary reserves.

Disasters are detrimental to the economic development of developing countries because they may result in a reduction in Gross Domestic Product (GDP), an increase in imports, and deterioration of fiscal balances. Food and Agriculture Organisations of the United Nations (FAO) (2015) found that 21 major natural disasters in East African countries contributed to an average worsening of the trade balance due to an increase in imports and, to a lesser extent, a reduction in exports. Approximately 40 000 head of cattle were washed away, and over 10% of Mozambique's fertile fields and crops were damaged (FAO, 2015). Rapidly unfolding catastrophes like floods have an exceptionally high price tag, both human and financial. Syed (2008) suggests that repeated disasters reduce the incentive to invest further, especially if repeated over a short period. A climate of stability and certainty is needed to encourage investors to take risks.

There seems to be a connection between this conclusion and human activity locations. In many cases, it is possible to choose between a dangerous site and a less dangerous one. It is possible to encourage or even impose such a choice through measures whose cost is negligible in the long

run. Including vulnerability analyses of affected regions in development projects is crucial in ensuring the best choices are made. A study of this nature is less expensive than an effective development program.

Nonetheless, such a step can have an enormous multiplier effect, saving lives, preventing damage, and preventing the need for assistance. As developing countries are experiencing rapid demographic expansion and urbanisation during a time of disaster vulnerability, this strategy is predominantly justified. The cost of correcting errors made now will be substantially higher later on. Investing in the infrastructure of human settlements requires massive investments that can be protected by planning and prevention based on vulnerability analyses (United Nations Department of Economic and Social Affairs [UNDESA], 2021).

A prominent view holds that development is deterministic and leads to disasters and vulnerability. On the other hand, development is viewed as the necessary, inevitable, and appropriate vehicle to reduce vulnerability and disasters (Lewis, 1999). Increasing population and advancing economic and social welfare have paradoxical effects on a community's vulnerability to disaster. Building construction and urban development can benefit from advanced techniques and technology in several ways, making them more resilient against disasters. Developing a safer environment is more prominent, and better communication and information systems make emergency disaster prevention measures more effective. As a result of the increasing population, cities are undergoing rapid urbanisation and accumulating buildings and activities. As a result, man-made disasters have a greater chance of occurring and are more apparent targets for disaster phenomena. Losses in property and lives are more likely to occur. Therefore, the likelihood of disasters increases globally even as the ability to protect communities improves (UNDRR, 2020).

Although detailed statistical data on disaster damage is still very scarce, it is known that the damage caused by disasters dramatically exceeds the total amount of bilateral and multilateral assistance that disaster-prone developing countries receive from abroad. Regarding the percentage of their gross national product, many countries' losses caused by disasters more than cancel out any real economic growth.

When income levels group nations, EM-DAT data (UNDRR, 2020) shows that disaster impacts differ considerably across income levels (*See Figure 2*), compared to the distribution of the population by income groups, the distribution of disasters appears to be relatively even. It is also noteworthy that the distribution of deaths, total number of people affected, and economic damage differs significantly across income groups. In high-income countries, the number of people affected and killed by disasters is lower. However, they suffer more significant economic losses, while low-income countries endure relatively small economic losses and high death tolls per disaster event. In general, low- and middle-income countries account for disaster events, deaths, and total people affected; however, they also contain many of the world's population.

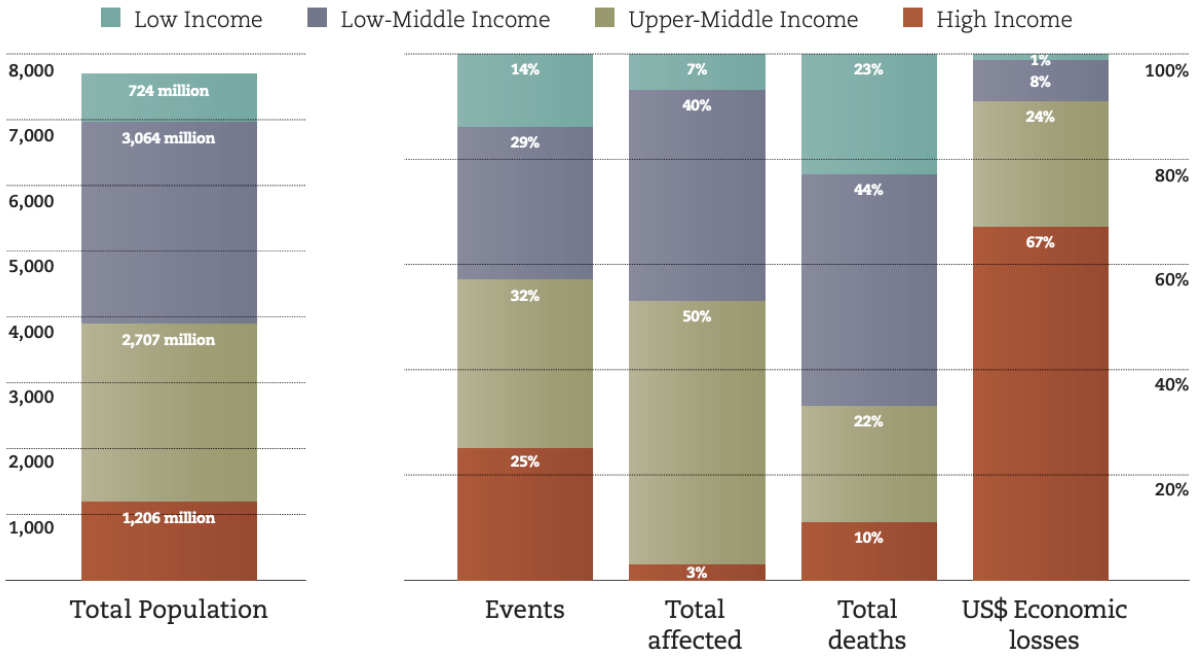

Figure 2: Global Proportion by income group (millions) and its proportion of various types of impacts on countries/territories by income group (2000-2019)

Source: UNDRR, 2020

Accordingly, disasters cannot only be regarded as humanitarian and social problems. These factors should be considered as potential problems for economic development. Concerted action at the national planning level is the only way to resolve them systematically.

2.2. DRM

It has been demonstrated that disaster can be defined in four ways in English (Brown, 2013; Chaudhary & Pirarcha, 2021).

1. An event that causes a disaster is often referred to as a disaster agent, for instance, a hurricane or an earthquake.
2. Often, the word disaster refers to the physical impact of the agent, for instance, damage to property or loss of life.
3. Disaster can mean evaluating the physical event: in other words, evidence of physical damage is considered disastrous.
4. Last, disaster can also refer to the resulting socioeconomic disruption.

The definition of disaster adopted in a practical context depends on the perspectives of those involved in the disaster. DRM refers to the conceptual framework of elements considered with the possibilities to minimise vulnerabilities and disaster risks and the adverse impacts of hazards within the broad context of sustainable development through avoidance or by limiting its occurrence and subsequent impacts (Buchenrieder, Brandl, & Balgah, 2021; UNDRR 2020). According to Twigg (2015), DRM refers to developing and applying policies, strategies, and practices to reduce vulnerability and disaster risks. DRM is a systematic approach to identifying, assessing, and reducing risks. DRM goes beyond disaster reduction to include capacities, operational skills, policies, strategies, and processes that combine prevention, mitigation, and preparedness with a response, to reduce or cope with the impacts of hazards or disasters (Baas, Ramasamy, De Pryck, & Battista, 2008; UNDRR, 2020). Past approaches to managing disaster risk have focused on four primary areas for intervention (*see Figure 3*).

With the completion of each cycle, new lessons are learned, adequate measures are adopted, and people are better prepared for future disasters. The description of disaster considers both extreme physical events and the state of human society. This includes preparations and adaptations organisations make to cope with the possibility of disasters. Disasters result from a convergence of extreme natural phenomena and vulnerable settlement patterns. Disaster is not merely a physical event but rather a social one (Lewis, 1999). Other definitions specify that a

disaster incident is an event triggered by a natural or human-induced threat that, combined with underlying vulnerabilities, exceeds the ability of a household, community, or nation to cope without external assistance (Nomdo & Coetzee, 2002; Stewart et al., 2012).

Figure 3- DRM Cycle

Source: UNDRR (2020)

In light of the existing literature, DRM seems to have emerged and is evolving based not on theory and science but different working experiences. Several other management approaches have been under development by humanitarian, environmental, and climate change communities (Buchenrieder, Brandl, & Balgah, 2021; UNDRR, 2022). The construction industry has a strong connection with disaster preparedness and management. A DRM effort is a set of activities directed at maintaining control over disasters and emergencies and providing a framework for helping people at risk to evade or recover from disasters. In disaster areas, most of

the destruction is caused by engineering-related facilities, such as roads, bridges, buildings, communications infrastructure, water supply plants, electric lines, and harbours. DRM activities aim to develop and implement formalised disaster plans and agreements that facilitate coordinated response activities and require multi-organizational disaster response systems. For DRM to be effective, it must have materials, personnel, funds, equipment, and techniques for delivering emergency assistance, especially during emergencies. In this regard, disaster risk management agencies must act within seconds to ensure that the resources needed to meet an emergency's needs are found and made available as soon as possible (Haigh & Amaratunga, 2008).

The DRM concept has been defined as encompassing both Disaster Management (DM) and Disaster Risk Reduction (DRR), although the dividing line between the two terms is acceptable. The DRR component of DRM is devoted to the situation pre-disaster, whereas the DM portion focuses heavily on post-disaster management. Although the two elements are somewhat fluid, DM can stimulate identifying options for DRR and vice versa (Muttarak & Pothisiri, 2013). Therefore, disaster risk management refers to all activities, including structural and non-structural measures to reduce the incidence of natural disasters and associated disasters to the environment and technology. In DRR, vulnerabilities to hazards and disasters are minimised or lessened to ensure sustainable development, whereas in DM, resources are coordinated, disasters are responded to, and reconstruction occurs after a disaster (UNDRR, 2022).

Successful implementation of the DRM model requires (1) collaborative and coordinated decision-making for all aspects of DRR (prevention and mitigation) and DM (preparedness, response, and recovery) across all levels and all sectors of government; (2) integrated DRM arrangements; (3) understanding of roles and responsibilities of all actors; (4) clearly defined and prioritised Hazard Mitigation Plans; (5) appropriate hazard analysis and vulnerability assessments; and (6) developed and tested Emergency Hazard Response Plans (CRED/UNDRR, 2019; UNDRR, 2020). Other drivers include command, control, and coordination protocols and standard operating procedures; practical early warning and communication systems; formal and informal capacity building; functioning relief and recovery programs; and multi-stakeholder collaboration and coordination.

DRM focuses on life safety and property protection. This includes assembling disaster supplies kits and performing structural mitigation activities, such as ensuring good roof condition, retrofitting structures, and removing combustible materials. Non-structural mitigation activities include ensuring the walls are firm, storing heavy materials on lower shelves, and establishing secure maintenance schedules for all equipment and items (Chmutina et al., 2014). By generating new structures, streamlining the old ones, and making financial resources available for the required facilities, equipment, supplies, and personnel, institutions can better prepare for disasters.

Rural disaster risk management has contributed to developing the conceptual framework described above. According to Davis et al. (2004), the concepts and tools were developed based on their experience in related fields and were modified to fit rural settings. Recent years have increased interest in translating these tools and concepts into urban environments. Researchers like Moser et al. (1996), who have attributed a higher vulnerability to the urban poor than the rural poor, have recognized this need. Urbanisation is likely to prefigure disaster risk in the medium and long term as one of the driving factors and contexts of social change and development (Pelling, 2003). A vital component of the development failure to mainstream disaster risk management is the absence of urban disaster risk management (Pelling, 2003). The problem is exacerbated by the lack of research on the interface between disaster risk management and urban settlement development (Woiwode, 2007).

By establishing policies, strategies, and practices that eliminate or minimise the adverse impacts of hazards, disaster risk reduction minimises disaster risks throughout society (Holloway, 2003). The various aspects of preparedness, mitigation, response, rehabilitation, and recovery can be addressed with improved national disaster management capacity to prevent and minimise some disasters. Risk mitigation, emergency preparedness, and recovery preparedness practices reduce losses (Haddow et al., 2017). Techniques that reduce hazards and prepare for emergencies lessen a disaster's physical and social effects. Planning for disaster recovery directly reduces the social implications of a disaster. Mitigation differs from other emergency management disciplines because it focuses on long-term solutions to minimise risk instead of preparing for hazards, responding to an emergency, or recovering from emergencies (Haddow et al., 2017).

2.3. Institutional arrangements of DRM

DRM is considered to be the primary responsibility of the government. To build the capacity of the country's social sectors to manage risks, the government needs legal and policy-related tools (UNDRR, 2020; United Nations International Strategy for Disaster Reduction [UNISDR], 2012). For DRM to be effective within a given jurisdiction, adequate institutional arrangements must be in place (Davis et al., 2014). The numerous disasters in the last few decades have drastically modified the legal and institutional framework for disaster risk management (Pelling & Holloway, 2009). DRM systems are constantly being strengthened in many countries due to lessons learned from disasters both within and outside their borders (UNDRR, 2022). A global framework for DRR, the Hyogo Framework for Action (HFA), 2005-2015, and the Sendai Framework for Disaster Risk Reduction 2015-2030 played a fundamental role in introducing a strategic and systematic approach for nations and communities to build resilience. Specifically, the HFA strategic goal-2 emphasises "building resilience to hazards through developing institutions, mechanisms, and capacities at all levels, particularly at the community level" and emphasises the importance of setting DRM as a priority on a national and local scale with strong institutional bases (UNISDR, 2012). Kenya is one of the East African Community members committed to implementing the Sendai Framework for DRR in their region (UNDRR, 2020). The country is vulnerable to natural disasters such as cyclones, droughts, earthquakes, floods, landslides, and human-induced hazards such as industrial accidents, civil conflicts, and urban or forest fires (UNDP, 2015).

A shift in the disaster paradigm characterised by a constellation of values, assumptions, methods, and examples shared by vulnerable communities has influenced the legislative and institutional arrangements in disaster resolution over the years (Owino, 2019). The risk reduction dimension of disasters has been neglected by many countries worldwide for years. DRM has, however, become part of the national and local priorities of both developed and developing economies in recent years (Kellett & Caravani, 2014). To strengthen its national DRM Framework, the national governments in different parts of the world enacted laws, formulated policies, and created agencies at national and subnational levels (Kellett & Caravani, 2014). As a result of these legal mandates and policy initiatives, the DRM mechanism can be pursued with minimal legal objection. The legal instrument is therefore considered the most overarching document that guides the development and implementation of all other DRM policies, plans, and decisions.

Public and private sector agencies at national, county, and local levels must collaborate disaster management in Kenya (GoK, 2022). As the Kenyan Constitution (2010) outlined, the national and county governments jointly formulate and implement policies and projects applicable to disaster risk management and rescue activities (GoK, 2010). At the national and county levels, it became the guiding principle for mapping organisations involved in policy formulation.

A large part of disaster risk policy formulation in Kenya is done by the Ministry of Interior & Coordination (MI&C) of the national government (GoK, 2014, 2017). As the lead ministry in disaster risk reduction at the national level, MI&C gets support from other key ministries, including the Ministry of Environment Sector, Ministry of Planning, and Ministry Treasury, which are the lead ministries in climate change SDGs, and disaster finance. As part of their mandate, MI&C has two agencies responsible for managing disaster risks at the national level. In addition, they provide assistance to county governments to manage disaster risks at the county level. The National Disaster Operations Centre (NDOC) and the National Disaster Management Authority (NDMA) at MI&C are the lead implementing entities for disaster risk management at the national and county levels (GoK, 2009). The NDMA mobilises national resources to deal with emergencies on a 24-hour basis since it was established after the El Nino-induced floods of 1998 (GoK, 2010). National Disaster Operations Centre (NDOC) coordinates national emergency operations and coordinates with county governments (GoK, 2017).

However, the failure to finalise the Disaster Risk Management Bill (2016) and the National Disaster Management Bill (2018) make it difficult for the relevant national ministries and departments to coordinate holistic and sustained efforts toward integrated flood management in the country. The national government will also not make it possible to sufficiently build the capacity of the county governments to manage disasters as provided for in the Constitution. This is evident in the low capacity of the county to manage floods in Narok.

At the County Government level, Governors prepare disaster risk policy and implement disaster risk projects working closely with other sectors, directorates, departments, and stakeholders in disaster risk management (GoK, 2019). County governments deal with disasters occurring in urban areas with support from the national government and relevant stakeholders operating across the country. A multi-agency approach coordinated by NODC and NDMA is used by the national and local governments and other local disaster response organisations, like the police,

military, and hospitals, in response to floods in rural and urban areas (Corsel et al., 2017). There is also a growing presence of international organisations supporting local organisations dealing with DRM. These include United Nations Humanitarian Assistance Response, Médecins Sans Frontière, United Kingdom's Oxfam GB, and other international humanitarian agencies (Corsel et al., 2017; Niekerk et al., 2020).

The county government of Narok has implemented policy measures to reduce the impacts of floods. These measures are integrated with flood management and conservation measures in the Narok County Environment Management Bill 2017. The other relevant county legislation formulated to reduce environmental destruction is the Narok County Charcoal Production 2017. The county government has developed an administration, decentralised services, a disaster management department, a disaster management unit, and a committee to manage disasters, including floods. Through its county integrated development plans (CIDPs), the county government has also captured the organisational arrangement, policy recommendations, and budgetary allocation to support flood management in the strategic period between 2018 to 2022.

As stipulated in the Constitution of Kenya (2010) and the other relevant policies and laws on devolution functions, non-governmental organisations collaborate with national and county governments to develop and implement policies and projects. Development agencies, academic institutions, civil society organisations, the private sector, and think tanks contribute to the formulation of disaster risk policies. In their capacity as non-state actors, they assist in developing government-led policies and projects. On a national and county level, they play a significant role in policy formulation and project implementation.

Assisting in mobilising resources for humanitarian aid and other technical assistance, auxiliary agencies, the private sector, and development agencies contribute largely. At the same time, local community organisations play more significant roles in advocacy, community mobilisation, and relief distribution under county disaster risk management committees (CDRMC) and sub-county disaster management committees (SCDRMC)(GoK, 2017; NCG, 2018a). Using research evidence, resource mobilisation, capacity building, academia, and think tanks play an essential role in translating policy provisions. Ad hoc committees are associated with disaster risk at the village and ward levels.

During emergency and recovery operations, humanitarian agencies dominate disaster risk response, followed by government agencies that implement public policies and the private sector that supports investments in disaster risk management (Drummond & Crawford, 2014). Nevertheless, the literature analysis suggests that disaster risk governance remained largely emergency-driven and siloed. At the national level, disaster risk management and emergency response are still coordinated by the national agencies, but there are no defined roles for the national and county governments. For integrated and institutionalised disaster risk governance, sectors, governments, and non-governmental organisations need to map their strengths and weaknesses at the county level.

3. METHODOLOGY

This chapter presents the study area, the research design, and the research map. A description of the research instruments and data collection techniques is also presented. As a final point, the chapter presents the methods used for data analysis and logistical and ethical considerations.

3.1. Study Area

The study occurred in Narok County (See Figure 4), located 146 km west of Nairobi, Kenya's capital. Narok County has an efficient and well-maintained road network, with most roads paved, making it easy to get around using motorbikes, passenger service vehicles, bicycles, and even big trucks (NCG, 2018a). Besides electricity and water connections, Narok town also has telephone and fibre optic connectivity, and the network coverage is reliable (NCG, 2018a).

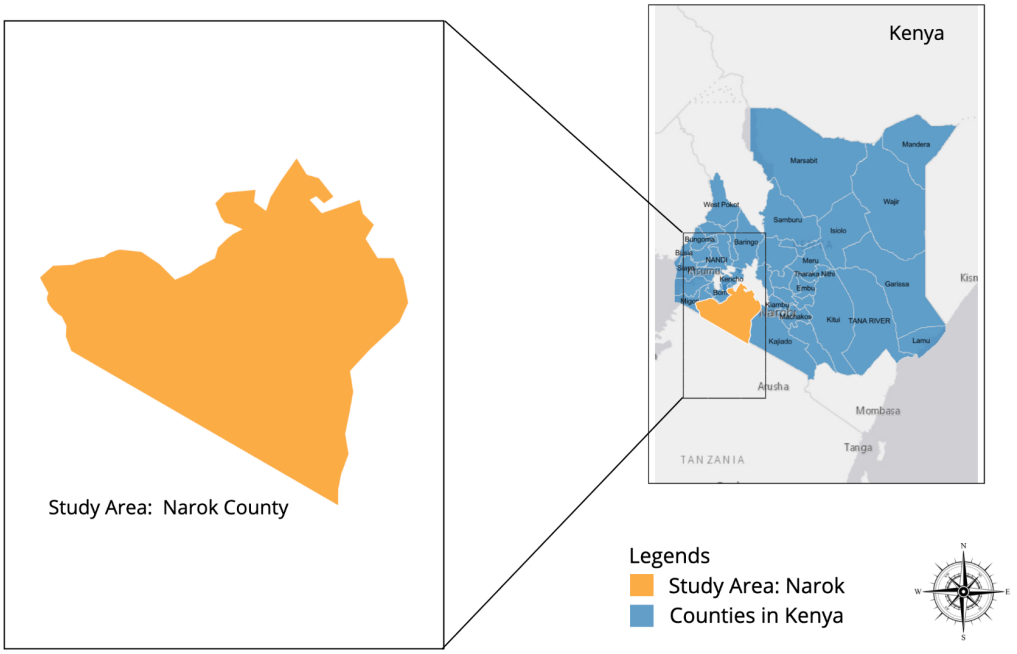

Figure 4: Study Area

Source: Map generated through ActGis

Among the notable characteristics of Narok county are its rivers, arid and rugged terrain, and volcanic landforms with prominent geothermal activity areas. Narok County's topography is divided mainly into highlands and lowlands (Japan International Cooperation Agency [JICA], 2012). Lowlands range between 900 and 1,400 metres above sea level, whereas highlands range between 3,000 and 3,000 metres. Flooding may occur in low-lying areas due to the varied topographical scenario. Throughout Narok County, soil types range from loamy soils in the higher highlands to sandy soils in the lower lowlands (NCG, 2018a).

Narok's altitude and physical characteristics significantly impact the climatic conditions (NCG, 2018a). CIDP (2018) identifies five agro-climatic zones in the county, including humid, sub-humid, semi-humid, arid, and semi-arid. During the long rainy season, from mid-March to June, Narok County experiences two rainy seasons, one in September and one in November (NCG, 2018b). A wet season can bring 2,500mm of rain, while a dry season can bring 500mm. NCG (2018b) reports a wide range of temperatures during the year, ranging from 200C in January to 100C from June to September. A year's minimum temperature is experienced between July and August, while the maximum temperature is felt between December and February.

According to the county's land use classification, there are six categories: residential, industrial, educational, recreational, commercial, and public utility. Tourism is one of the major land use types in the county, along with livestock farming, agriculture, forestry, and ranching. The dominant land use in agriculture is mixed farming, where grazing land and fallow land are used for growing crops, while tree and cash crops are planted on other portions of the farm (NCG, 2018a).

Among Kenya's 15 Vision 2030 towns, Narok town is among those prioritised for water service development (JICA, 2014). A river runs through Narok town from south to north, providing running water for the town (JICA, 2012). Each service tank provides treated water to nearby locations through the primary distribution pipe, which distributes treated water to the town's seven service tanks. Getting water into the town used to be difficult as people were required to fetch it from the river and transport it using a variety of modes, including donkey carts, bicycles, motorcycles, vans, water boozers, and hand jerry cans carried on shoulders, heads, or lifted by hand.

In Narok County, some tourists travel to see the wildlife and heritage, benefitting the town's economy (NCG, 2018a). Due to the county's rich wildlife heritage, tourism is a prominent industry here. The tourism industry in the county brings in approximately 10 billion Kenya Shillings annually, as does wheat farming, both large and small scale (NCG, 2018a).

The 2019 Kenya National Population and Housing Census population in the county stands at 1,157,836 (Kenya National Bureau of Statistics [KNBS], 2019). This is an increase of 306,916 persons from the census data of 2009. Table 1 shows population in 2009 and 2019, and projected number of persons for the years 2020 and 2022.

Age Cohort	2009 (census)	2019 (census)	2020 (projections)	2022 (projections)
0-9 years	312,605	386,933	379,299	401,258
10-19 years	202,613	304,240	308,211	318,033
20-29 years	143,367	183,568	208,631	228,018
30-39 years	86,317	121,989	143,212	153,529
40-49 years	49,414	76,822	84,244	93,599
50-59 years	25,794	41,855	46,035	49,759
60-69 years	15,224	24,016	21,742	24,937
70-79 years	8,237	12,268	9,436	9,848
80+ years	7,349	6,145	3,387	3,116
Total	**850,920**	**1,157,836**	**1,204,197**	**1,282,097**

Table 1: County Population

Source: Generated from data provided in NCPD (2017) and KNBS (2019)

3.2. Research Design

The design serves as a framework to strategize how to get questions initially posed to the conclusions of the posed questions. This step further links the study's theoretical framework and practical application by adapting it to the specific research context and setting.

The overall design of this research is based on qualitative case studies and context analysis of various complexities. By analysing the cases' broader context at international, national, and

county levels, this type of multi-perspective analysis permitted the inclusion of voices and perspectives of the various stakeholders. Feagin et al. (1991) point out that case studies are valuable for analysing various perspectives.

This research setting is ideally suited to the case study approach. A scientific problem in its entirety is examined for important characteristics and regularities to construct a holistic and realistic model of the world (Lamnek, 2005). Case studies were also appropriate for this study since they provide insight into the setting of related problems and understand the underlying causes of emerging trends (Maxwell, 2005). From the point of view of studies on causal relationships, case studies were conducted primarily to isolate causal relationships.

3.3. Research Map

A logical step-by-step research plan was developed to respond to the challenges (See Figure 5). It describes the results and rationale for each phase and under the phase of the overall research program. It guided a rigorous and transparent research process. A rigorous process in such a context would not be possible without propositions or preconceptions (Yin, 2014). Instead of Yin's (2014) discussion regarding how to induce theory from case study research, Eisenhardt (1989) presents his road map for obtaining theory from case study research by analysing empirical data in qualitative and grounded theory.

The roadmap's logic and coherence were continually revised during the evaluation based on the research results. In the roadmap, the main phases of research are summarised as follows:

Phase 1 of research involves setting up and designing the research. Accordingly, pre-studies on the causes and impacts of disasters in Kenya were included in the research plan, which went well beyond regional comparisons and local experiences.

Phase 2 involves analysing the institutional arrangements of DRM in Kenya. A global understanding of the research's environment inspired empirical research at this level. Hence, the general scope of the research field was given.

Phase 3 is the context analysis and case studies in Narok County and validation of the preliminary research. An iterative analysis method was used to understand the selected cases and their

context at the local level. By applying knowledge from academic analysis to real-life situations, the research was successful. The research outcomes were tested and validated through participant observation with the Narok community.

Phase 4 is the generalisation of results and closure. Using valid results from multiple levels of analysis, results were analysed and checked for applicability beyond the study's geographical, disciplinary, and sectoral boundaries.

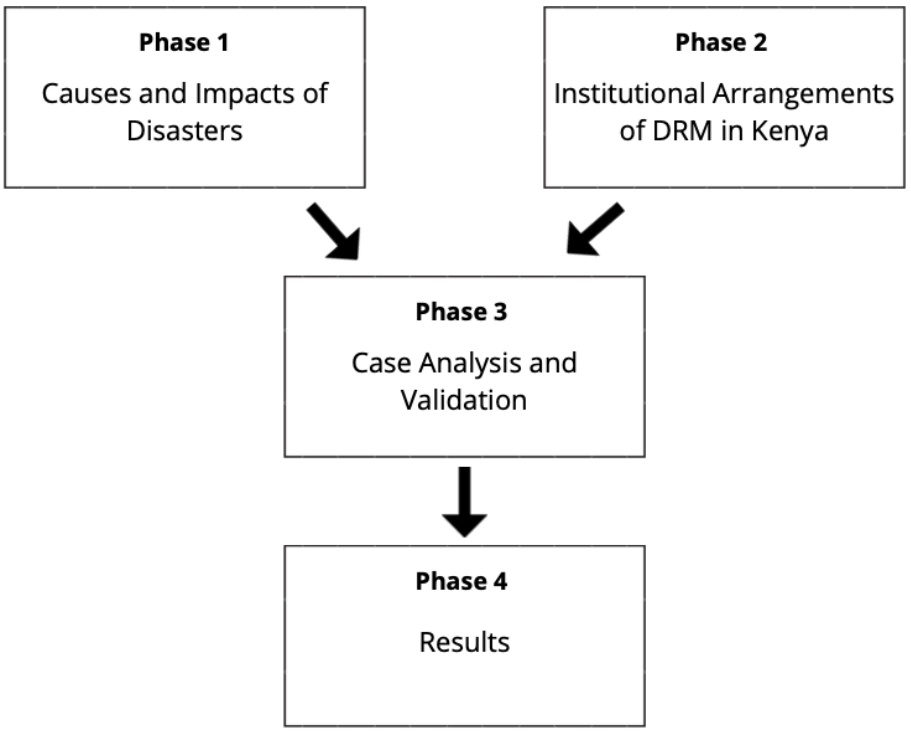

Figure 5: Research Map Summary

Source: Developed by Author (2022)

3.4. Methods of Data Collection

The research is designed around case studies and has the advantage that various methods of gathering and analysing empirical data can be employed. A significant determinant of the particular methods selected was the setting, theoretical positioning, design of the study, and the necessary data. The data collection methods selected for this research are described in the

following sections. They include interviews, participant observations, and text reviews. These methods were all applied to discover the interlinks between disasters and planning development, specifically, between disasters and the building and planning practices related to county development, and the opportunities for overcoming existing challenges and gaps to increase the potential of development programming to reduce development programming and transfer or share risk.

3.4.1. Interviews

In most cases, interviews provide the most helpful information for case studies, considering how well they work for illuminating obscure phenomena, opinions, and beliefs in more minor well-known research fields (Hastings & Chad, 2000). Furthermore, since there was little literature on the matter of this study, and it incorporated multiple perspectives, interviews were the key to its success. Interviews were conducted in various forms and levels, so their importance is apparent.

The interviews were conducted in several areas in Narok and Nairobi, Kenya. They included county planners, government, and members of the academia knowledgeable on the subject matter. The interviews at the national, municipal, and local household levels in Narok County were held between March and April 2022. These aimed to analyse the different-level perspectives and practices of the three aspects investigated. After the first field study trip, the research-related organisations, programs, and geographical areas were screened, and the most important/relevant ones were identified. In addition, the CIDP 2018-2022, particularly its DRM strategies, was analysed in terms of driving forces, convergences, divergences, and results. During the second field study trip, the initial interviews were followed up and further directed at evaluating and validating preliminary research outcomes and the perspectives, needs, capacities, and efforts of people, households, and communities living at risk.

The interviews were semi-structured, as this is the type of interview recommended for case study research (Yin, 2003). Semi-structured interviews are embedded in the contradictory context between qualitative and structured interviews and are based on the assumption that 'relation-free' interviews do not exist. The interviews were based on interview protocols

elaborated based on the research questions. These protocols were adapted for different purposes, such as the different research levels of this study. They were further adapted to the respective interviewees and, when needed, updated with new findings.

3.4.2. Participant Observation

Case studies based on observation were essential. Various aspects vital to research were observable during the visits to case study locations. The framework comprises several aspects, such as the actual context of the cases or programs, how they were implemented, the quality of the structural mitigation measures, the success and failure factors, the relevance and acceptance of the program measures, and any existing risk factors. As a result of the observation, information obtained from other sources, such as interviewees who overemphasised the programs' merits and strengths or dismissed them as lacking, could be cross-checked or triangulated.

Observable aspects were, among other things, the interviewees' behaviour, how accessible and available information was, how physically related departments were, and how many people worked in each one. The data gathered by observation was stored in field notes and supported by photographs found in the annex.

Photography was used to capture data and information, which people in Narok County permit to be shared by the public at different levels. Smartphones were used to capture digital photographic data for this study. The data capture includes water streams in Narok County.

3.4.3. Text Review

The literature review was conducted continuously throughout the research process to identify relevant recent and past studies, theories related to the research-, and expert opinions on the subject of study. This approach also served an essential purpose in determining opinions or preconceptions, developing interview protocols, and triangulating information obtained through other research methods. Reviewing the available literature was challenging at the beginning of the research because most publications did not fit the established research criteria. While there was an immense, even overwhelming, amount of literature on the structural aspects of

reconstruction, little could be found with a focus on pre-disaster settlement development programming that tackled aspects related to Kenyan disaster risk management and its causal relationship to development planning.

As part of the documentation review, program documentation, institutional and national policies, regulations, interview notes, transcripts, observation memos, and field notes have been collected and analysed. In the case of a disaster risk management integration operational framework, a literature review was crucial once the first research outcomes were obtained for their theoretical validation and systematisation. The tools, models, and frameworks evaluated in this context were critically analysed based on their scope, target group, structure, format, and indicators. A couple of these frameworks addressed disaster risk management, designing interventions on climate change, and designing development programs.

3.5. Validity, Reliability, and Research Ethics

In order to obtain a good approximation of reality and, therefore, reliability, data triangulation was employed. Thus, bias in selecting cases and programs and self-reported bias by interviewees could be dealt with without compromising the validity of the conclusions. The authors could find the most relevant information by triangulating the information or comparing information from different research methods or even the same methods. Cross-checking the information collected using one method with other methods of collecting data was considered methodological triangulation. Hence, information collected from interviewees, such as their beliefs and perceptions, was regarded as accurate unless contradictory information provided by the same interviewee or from other interviewees or data sources presented discrepancies.

The journals, books, and working paper series selected for distributing the outcomes of this research were selected to accommodate the readerships of their respective sectors. The findings were distributed within the various disciplines relevant to this research. Regarding research ethics, the primary concern is if research might cause harm.

Regarding its general nature, objectives, and methodology, the Faculty of Letters, University of Porto's Ethics Committee, raised no objections to the proposal submitted. The data collection process also encompassed various aspects. In the interviews, participants could choose if they

wanted the information treated anonymously. Obtaining accurate responses to the questions was also improved because of this decision. Their identities were generally kept anonymous to safeguard the program beneficiaries' identities. Much effort has been made to ensure that the research does not create unrealistic expectations among stakeholders.

4. FINDINGS AND DISCUSSION

This chapter details the findings and discussions based on the study's objectives. The chapter presents the Risk Profile of Narok County, focusing on the causes and effects of disasters, mainly droughts and floods. Secondly, the chapter presents the institutional arrangements for DRM in Narok County. Thirdly, the chapter presents the DRM initiatives and approaches implemented in Narok County. Finally, the chapter presents factors for consideration in an effective DRM strategy, which include the elevation and socio-economic activities at different locations in Narok County.

The research findings are discussed in light of the literature review presented on disaster management and its inter-related issues. These findings are based on what was gathered from the fieldwork, participant observation with the key informants, and interviews with the county government officers.

4.1. Risk Profile of Narok County

The study sought specific issues regarding disaster experiences in Narok County. Through the three participant observations conducted among the residents of Narok, they were initially asked to identify the various types and nature of disasters they had experienced. The majority identified floods as the most common, which are said to be a recurrent disaster during the rainy season. A drought was also indicated as the most frequent, which is considered to have been the most severe in at least the last 70 years (Nash, 2022).

4.1.1. Causes of disasters

Several factors account for the disasters in Narok County, and they are all interrelated. The purpose of this section is to discuss the causes of the disasters and examine the relationship between them. Based on the responses from the fieldwork, there are three (3) main factors that contribute to the disaster situation. Several factors contribute to this problem, including (1) rainfall, (2) soil type, and (3) inefficient and outdated infrastructure.

According to the participant observation conducted in Narok County, rainfall caused flooding. A further interview with the County Environmental Office revealed that this intense precipitation overwhelms the carrying capacity of Kakiya and Esampurmpur streams, causing overflows and flooding in some parts of Narok. According to a resident of Narok who has lived there for more than ten years, the influx of people has led to buildings being built along waterways and drains that were not intended for human settlement. Additionally, he pointed out that global climate change has altered weather patterns, resulting in prolonged rainfall.

“Since I have lived here for the past ten years, the type of rainfall has been different from the current one” (Personal Interview, IR01). Floods are caused by excessive rainfall over an extended period exceeding the channel's capacity. In Narok County's CIDP, long-term rainfall averages 2500mm, exceeding rivers' drainage capability (CoG, 2018a).

As indicated by another respondent, climate change contributes to the current weather situation. He said the rains generally started around May and came a bit earlier than they should in 2019. Therefore, seasonal rains now begin earlier and end later. In these communities, most flood victims indirectly referred to rainfall when they said, *"We have never experienced such weather before"* (Personal Interview, IR02).

“I came to this community when I was young. It was here in Narok Town that I married and had my children. My children are all young adults, but I have never seen these rains before!" (Personal Interview, IR03).

Heavy rainfall has been cited as a contributing factor in flooding in Narok County in zones where clay soils form (Opere & Ogallo, 2006). Maize farmers who participated in the observation highlighted that the poorly drained soil found in places surrounding Narok town has low soil infiltration capacity. In Narok, the National Environment Management Authority (NEMA) (2009) confirmed that most soils are deep and well-drained, but shallow and poorly drained soils are found in some spots in the eastern part. During the rainy season, Narok's rangelands, agricultural lands, and built-up areas have low soil hydraulic conductivity due to livestock compaction, farm machinery, and concrete floors, causing an increase in flooding (Mireille et al., 2019).

One of the respondents who has been living in Narok County for more than twenty years has said that flooded areas in the North and Western parts of Narok usually affect communities located

within low-lying areas. *"The communities located south are never really affected,"* he said (Personal interview, IR04).

Lastly, the participants cited an inefficient and outdated disaster mitigation system coupled with unchecked development and poor drainage as contributing factors to flooding in Narok. Most participants agree that adequate drainage and disaster mitigation facilities would have reduced the severity of floods and droughts. One participant elaborated that Narok Town's flood drainage system could not handle the high volume of water that resulted in the blockage of Nairobi-Narok-Bornet highways on February 21, 2022, as a result of the flood.

A respondent complained that corruption may be involved in the yearly renovation of the dam across Narok Town, making it inefficient and can be a contributing factor to flooding. *"Every year, they are renovating that same dam. They normally begin at the end of the dry season and will stop during the rainy season, affecting the equipment bought that was not used. They will repurchase the same equipment upon construction",* he said (Personal Interview, IR03). Despite the fact that construction of the dam began in 2019, the respondent claims that the project is still under construction. He said that county planners do not have the power to enforce appropriate building policies, which is a significant setback to benefit the county.

A critical issue for Narok County's CIDP 2018-2023 is inadequate infrastructure, particularly stormwater drainage. During one of the interviews, the county officials confirmed that stormwater drainage is of particular concern, as it has caused flash floods in the lower parts of town, resulting in deaths.

4.1.2. Effects of disasters

The purpose of this section is to discuss the disasters' effects and examine the relationship between them. It is divided into two parts. Based on the responses from the fieldwork and observation, there are three (2) main effects of the disasters, which are the (1) physical effects of disasters and the (2) socio-economic effects of the disasters.

4.1.2.1. Physical effects of disasters

Sheet soil erosion is observed in farmlands in the peri-urban area, streets, and along the riparian zones of Enkare River (See Figures 6 & 7). The soil cover is rapidly taken by removing vegetation, resulting in soil erosion (Mandych, 2015). Moreover, powerful water flow removes loose soil material, which is most active in the middle part of a slope (Mandych, 2015). Therefore, disasters catalyse soil erosion because of heavy forest clearance and the mechanisation of agriculture in the peri-urban areas near Narok County (Ewaso Nyiro South Development Authority (ENSDA), 2015). In streams and the Enkare River, soil erosion and silt deposits cause water pollution and increased turbidity (NEMA, 2009). Narok town's floods are one of the most significant causes of soil erosion.

Figures 6 & 7**:** Kakiya Stream, Narok Town

Source: Photograph by the Author - Field Survey, 2022

As shown in Figures 6 & 7, the Kakiya stream fills up with silt and soil that washes downstream and erodes the riparian vegetation. As a result of plantation and deforestation, the soil surface is

exposed during rainfall in the peninsula and detaches, resulting in soil erosion and sediment transport into the rivers. As a result, there is a close link between soil erosion and siltation, with soil erosion in Narok town resulting in the siltation of rivers and drainage systems.

Another physical impact of the disaster in Narok town is the pollution of the Narok River and Kakiya and Esampurmpur streams. According to the County Water Office of Narok, water supply pollution is another physical impact of flooding in the town. As a result of the perennial floods, soil and other solid waste are washed down from upstream and the affected sections of Narok town, which increases water pollution (ENSDA, 2015). In Narok River, Kakiya, and Esampurmpur streams, soil and sediment eroded by floods pollute the water by eroding, thus polluting water.

Figure 8 & 9: Destruction of vegetation on the riverbank of Kakiya stream

Source: Photograph by the Author - Field Survey, 2022

Residents have indicated that flooding has resulted in the loss of vegetation along the Narok River and Kakiya and Esampurmpur streams. Due to eroding factors, which uproot small plants and sweep seeds away, flash floods make it difficult for vegetation to regenerate on land and

along streams and rivers (Konana et al., 2017). In areas that receive ample precipitation, plants growing in regularly flooded riparian areas are more resilient to flooding than those in areas that receive little precipitation (Larcher, 2003). In Narok town, floods have resulted in the loss of vegetation along the Narok River and Kakiya streams (See Figures 8 & 9). The destruction of crops and farming led to disruption and loss of livelihoods rendering victims of floods to lose income.

4.1.2.2. Social effects of disasters

The County Environment Office confirms that the social effects of disasters in Narok have occurred. A recent case of natural disaster with severe negative social effects is the flash flood that hit Narok town on 22 February 2022. Within seven hours of the storm beginning, Narok was ravaged by floodwaters that obstructed the Nairobi-Narok-Bomet roads, leading to casualties, displacement, damage to infrastructure and property, and interruption of service delivery.

The loss of life and property is a social effect of disasters. In Narok town, floods have resulted in the death of multiple citizens (ENSDA, 2015; NCG, 2018a; NEMA, 2009). In 2012 and 2015, floods across the country and Nyanza/Western region accounted for 15 and 84 deaths, respectively (Huho et al., 2016). ENSDA estimated 11 fatalities and 11 injuries due to the floods in Narok town in April 2015 (ENSDA, 2019). Observations from residents indicate that Narok town has lost lives to floods in the past. One of the participants mentioned that just a month ago, February 2022, a heavy flood caused an older woman to be swept away as she attempted to cross a flooded road in the town. *"After every flood, we are hearing deaths and injuries, while property worth millions was being destroyed,*" he said (Personal Interview, IR05).

Narok town has also been affected by the disaster that has resulted in the loss of livelihoods. When livelihoods are destroyed during flood seasons in Narok County, they directly contribute to food insecurity and limited purchasing power, leading to famine (ENSDA, 2015). One of the participants shared that the county government failed to help them during the flooding disaster two years ago that caused their livestock to be washed away by floods - their only source of livelihood. "*We depend on the sheep and goats to buy food and even pay school fees for our children,*" he said (Personal Interview, IR05).

In Narok Town, street vending structures were built along the streams as locals' primary source of livelihood (See Figure 10). This reduces the vulnerability of communities by providing them with cheap goods. Nevertheless, they are popular because they provide the urban population with much-needed services that neither the municipalities nor the more prominent retailing outlets can provide. In a natural disaster, these areas are likely to be the first to be hit and most vulnerable to a disastrous chain of events. One of the participants, who has a stall in the town, mentioned that they do not open their stores whenever there is heavy rain. "*Because of poverty, we cannot afford to rent in a safer location. We only get enough income from selling to cover our daily needs*", she said (Personal Interview, IR06).

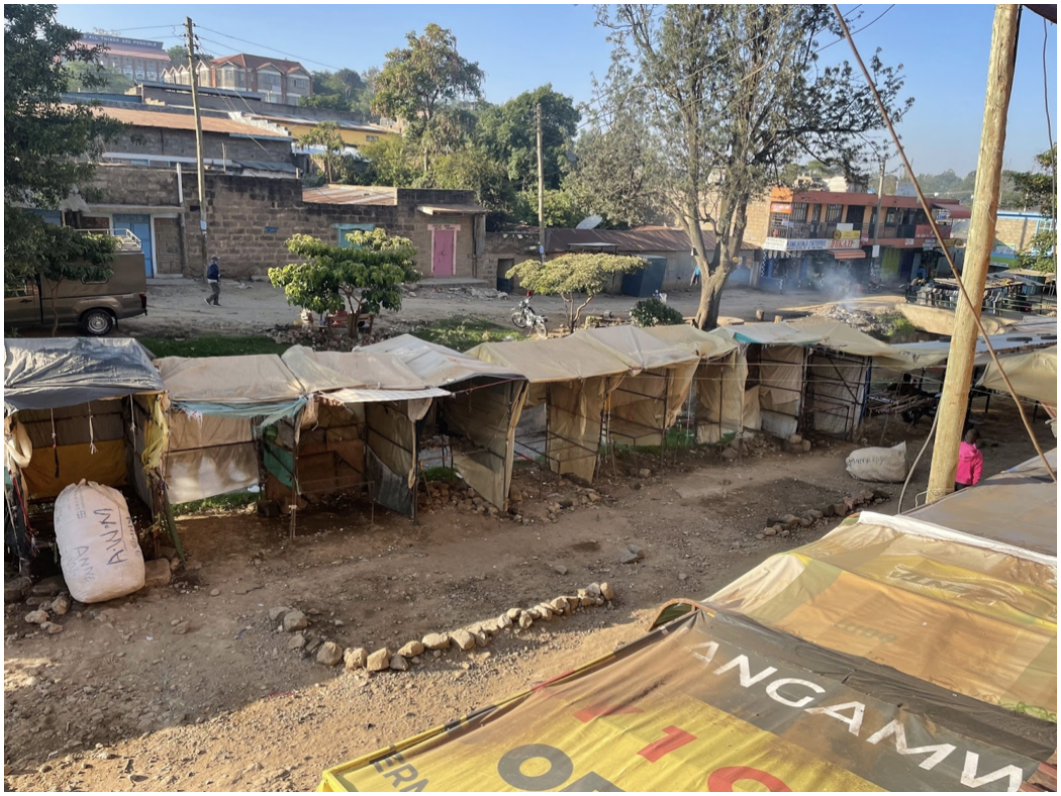

Figure 10: Shop Stalls near the stream in Narok Town

Source: Photograph by the Author - Field Survey, 2022

Disasters in Narok also caused the displacement of people during the heavy rainy season. It is well documented that flood disasters in Kenya are associated with displacement because they

disrupt education, water supplies, health care, transportation, communication, wastewater treatment, and electricity (ENSDA, 2015). In this past assessment, ENSDA and the county government confirmed the results of the observations conducted among residents. It has been reported that flooding in Narok town has caused the displacement of residents in the past.

People who are living in rural areas are more vulnerable than the ones who are living in the urban areas. Individuals from these groups may be integral community members, such as the very old. However, they may differ from the community regarding settlement, ethnicity, or religion. Poverty and vulnerability are inextricably linked. In addition to poverty causing vulnerability, being powerless to address vulnerability caused by more affluent and, therefore, more influential groups may also create vulnerability (Lewis, 1999). Individuals or households can gain social capital when they organise themselves into a large social entity, whether it is an ongoing association or a temporary one (Nomdo, 2002).

There has also been damage to infrastructure in Narok town due to floods. In April 2015, the floods in Narok town contributed to the collapse of a building, the destruction of dozens of small shops, the destruction of water distribution lines, the destruction of properties worth millions of shillings, the silting of roads, the clogging of culverts, and inundation of several streets in the CBD according to ENSDA (Maloba et al., 2015). It is estimated that the 2007/2008 Nyando basin floods affected agriculture, health, education, infrastructure, water and sanitation, housing, and property and assets of the people and livelihoods (Masese et al., 2016). Based on observations among residents, it was confirmed that floods have caused infrastructure damage in Narok town in the past.

Several water-borne and insect-borne diseases have also been linked to disasters in Narok town in the past (CDMO, 2019). The severity of a flood can have many impacts on physical and mental health, such as injury and death, and several diseases related to flooding, such as vector-borne diseases, rodent-borne diseases, and mental health effects (Hammond et al., 2015). Residents have observed that floods contribute to the prevalence of diseases in Narok town, which is supported by the literature.

4.2. Institutional arrangements for DRM in Narok County

Policy frameworks are critical instruments that can shape the choices societies can make. Kenya has a range of robust legal and policy frameworks shaping the DRR landscape, such as the constitution, Vision 2030, Kenya's Climate Change Response Strategy, the National Disaster Risk Management policy, and other sectoral acts of parliament. These frameworks shape the choices individuals and communities make and, therefore, can turn a potential catastrophe from being a disaster to just an event with minor damage, if any (IFRC, 2012). For instance, a society may not stop an earthquake from occurring, but the choices society makes can determine the damage or loss of lives.

The DRM policy is the critical instrument shaping the DRM and resilience agenda at national and county levels in Kenya. The DRM policy 2018a is aligned to the global Sendai Framework, which has four priority areas of action, seven targets, and several indicators to help countries monitor progress in its implementation. Kenya's DRM policy framework, which focuses on disaster resilience with a multi-hazard approach, has continuously evolved for the last 15 years culminating in cabinet endorsement in 2017 but has no accompanying legislation. The policy requires decentralisation of the DRR functions up to the lowest administrative unit and fully engaging all relevant stakeholders, including the vulnerable populations.

DRM in Kenya is perceived to be fragmented, with the country often better at reactive rather than proactive action. It has not been easy to determine where agencies' mandates begin and end. However, many different organisations and government agencies handle different disaster preparedness and response elements. Each organisation has its own political and institutional interests and allegiances, which may be more potent than the incentives for collaboration and partnerships. An interview with a county planner said, "*We seem to be well-prepared on paper, but in practice, this is not the case*" (Personal Interview, IR07). It is perceived that coordination was better before devolution when DRM was managed at the national level. This would trickle down to the county level through the county disaster committees.

Based on the interview with a county official, she confirmed that five (5) central agencies contribute to the effectiveness of DRM in Narok County. It comprises the (1) Disaster Management Unit (DMU) that facilitates the preparation of county disaster preparedness and

mitigation plan, policy, and strategy; (2) The Department of Lands, Housing, and Physical Planning is responsible for the coordination of integrated urban planning in urban areas; (3) The Department of Water Services, Energy, Environment and Natural Resources implement environment, water and forestry policies, projects and programs at the county level; (4) The Department of Agriculture, Livestock Development and Fisheries is responsible for crop, fisheries and animal husbandry using Climate Smart Agriculture (CSA) approach; And lastly, (5) The Narok Water and Sanitation Company (NARWASCO) facilitates the installation of water infrastructures and water supply. In Narok, the lead organisations are the governments and their departments with support from other relevant stakeholders. The MI&C at the national level is the leading ministry in national emergency response and disaster risk management policy formulation and implementation. The MI&C at the national level is the leading ministry in national emergency response and DRM policy formulation and implementation (See Figure 11). Narok's organisational arrangement was mapped and presented using Figure 11, developed using the interplay and policy coherence framework from the national to the local level.

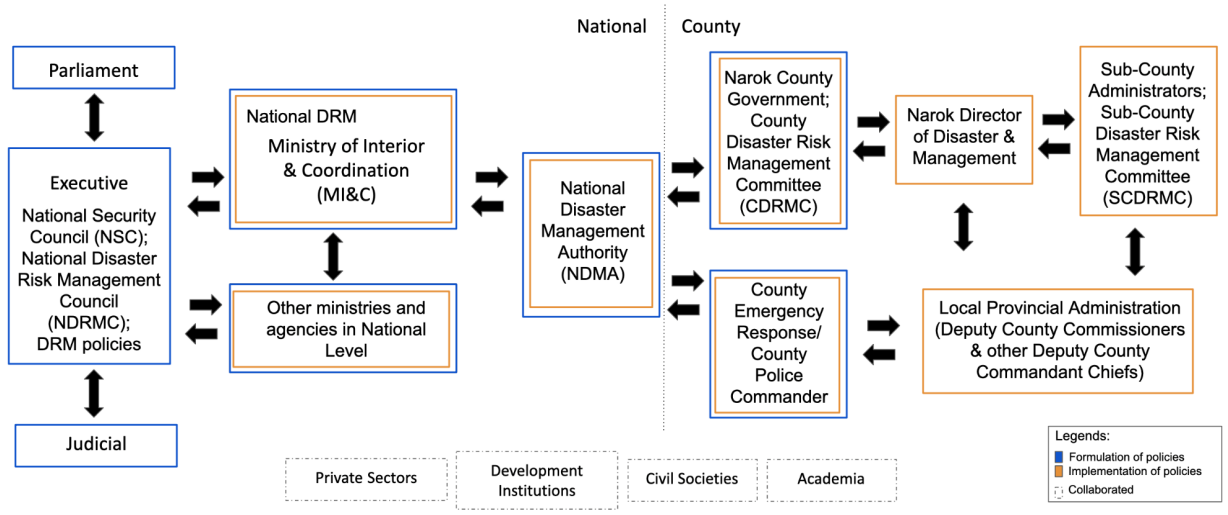

Figure 11: Institutional Arrangement for DRM in Narok County

Source: Developed by the Author generated from the text reviews and fieldwork (2022)

The following agencies, such as the NDRMC, CDRMC, and SCDRMC, have been established under the Kenya national emergency operations plan (GoK, 2020). These committees have a multi-agency and multi-sectoral coordinating mandate. Representatives of ministries, departments, and agencies at national and county governments, international agencies, non-governmental organisations, and private sector operators may be appointed as core members to join the Unified Command committee or assist in providing secretariat support staff (GoK, 2020).

As part of county-based emergency response and disaster risk management, MI&C liaises with county governments. Despite providing the overall leadership at the national level, MI&CNG receives support from other key ministries, including the Ministry of Environment, the Ministry of Planning, and the Ministry Treasury, which are responsible for climate change, the SDGs, and climate and disaster finance. The two MI&C agencies, the National Disaster Operations Centre (NDOC) and the National Disaster Management Authority (NDMA) lead implementing national agencies in emergency response and management, respectively. NDOC and NDMA support national and county governments through their national, county, sub-county, ward, and village representatives. NDOC and NDMA are multi-agency agencies that bring together security and paramilitary agencies (such as police) and other relevant ministries, agencies, and organisations like the KRC.

The disaster risk stakeholders include responsible municipal authorities, river basin organisations, regional development authorities, academic organisations, the private sector, NGOs, and concerned citizens and communities (Tingsanchali, 2012). In Narok, the lead organisations are the governments and their departments with support from other relevant stakeholders. NCG's disaster management and firefighting unit collaborate with Kenya Red Cross (KRC) disaster risk management and policy formulation divisions to coordinate multi-sector and multi- stakeholder emergency responses. The NCG chairs the CDRMC. KRC is among the members of the CDRMC. The county-based representatives of the MI&C seat in the CDRMC. NCG disaster management and firefighting unit liaise with the other Narok county sectors, directorates, and departments in mobilising relevant stakeholders to contribute under the CDRMC and SCDRMC. Emergency response is co-led by KRC, an auxiliary agency that works at all levels of government, from the national to the county and village.

Private sectors, development agencies, civil society, and academia significantly implement national and county-based disaster risk activities. It is becoming more common for non-state actors to participate in disaster risk management and emergency response (Kellett & Caravani, 2014). As shown in Figure 10, the non-state actors collaborate with the national and county governments through CDRMC and SCDRMC at the national, county and local level. However, at the county level, they support the implementation majorly, unlike at the national level. The private sector, development agencies, and civil society contribute largely through resource mobilisation for humanitarian and other technical support. In contrast, the civil society and the local community-based organisations play more roles in advocacy, local community mobilisation, and relief distribution.

The international organisations, UN agencies, and academia, such as Maasai Mara University, contribute significantly to translating the policy provisions using researched evidence, resource mobilisation, and capacity building toward policy implementation. In an interview with Humphrey Omele, the Current Student Union President of Maasai Mara University, he said that academia and student advocates have been very active in supporting and helping the Narok County government implement DRM county strategies. *"There is an active consultation with the members from academia on how they can solve the crisis of flooding in Narok,"* he said (Personal Interview, IR08). However, there is a persistent silo approach and limited technical capacity on disaster risk among the county government sectors and county stakeholders, which continue to weaken partnerships and build synergies toward developing county-based flood risk strategies and implementing flood and emergency management strategies response.

The organisations identified in Narok town have strengths in flood management in Narok town. The strengths of the government organisations are the coordination and facilitation role in preparing disaster management plans, programs, policies, legislations, and national and county-level strategies. The non-state organisations contribute to flood management through mobilisation of funds for selected conservation projects and provide humanitarian, training, and technical support in policy and legislation making, program, and strategic planning.

The organisations in Narok town experience weaknesses. The national and county government agencies, departments, and committees experience a lack of clear policy and legislative structures for disaster management, extensive decision-making due to bureaucratic processes,

and insufficient funding, equipment, and staffing. Despite clear policies in DRM strategies, one participant said the county has failed to implement them properly, resulting in many adverse effects among residents. *"The National Government has a clear strategy to minimise flooding damages, but our county government has not implemented it effectively,"* she said (Personal Interview, IR09). This shows that even though organisations have clear mandates, roles, and strengths, they experience weaknesses that must be addressed to contribute effectively toward sustained flood management.

CMDR guides community preparedness, planning, and response at the sub-county level. It comprises political and religious leaders and has a gender representation requirement for 30% of participants to be women (NCG, 2018). An elder who participated in the discussion shared that whenever action is needed, the NGOs are requested to take action through the DRR Committee, backed by the County Steering Group. "Our role as leaders of the church is to help the sub-county disaster management team to identify risks and make contingency plans," he said (Personal Interview, IR10). The agencies have used these plans to support the communities to address their risks. While many agencies are providing relief supplies, they are not adequately coordinated, according to some residents (Personal Interview, IR10).

A further interview with the County Environmental Office confirmed that communities are also trained on livelihood initiatives such as hay production and storage to build resilience. "*There are some initiatives that we did not measure the effectiveness of, but at present, they seem to work well for the stakeholders*" she said (Personal Interview: 08.03.2022). However, she added that the county should strengthen its knowledge of disaster and resilience measurement, climate change dynamics, modelling, and disaster response thresholds.

Except for the KRC, interactions between other implementing agencies and the county government on preparedness and response are minimal. Except for the KRC, interactions between other implementing agencies and the county government on preparedness and response are minimal. Table 2 summarised the strengths, weaknesses, opportunities and threats of the institutional arrangements of DRM in Narok County.

Strengths	Weaknesses
• Presence of robust legal and policy DRM frameworks • Continuously evolving DRM framework	• poor implementation of strategies by county government • High bureaucracy • Insufficient funds, equipment, and staffing
Opportunities	**Threats**
• Active support of NGOs, private and development sectors, and academic institutions • Implementation of non-structural measures to DRM, such as, livelihood initiative trainings	• Lack of support from the national cabinet • Lack of county policy organisation

Table 2: SWOT Analysis of institutional arrangements of DRM in Narok County

Source: Developed by the Author (2022)

4.3. Current DRM initiatives in Narok County

A county official confirmed (Personal Interview: 15.03.2022) that the county has constructed dams and water ponds and has improved sewerage and sanitation systems. This was confirmed in the document report for Narok County Development Plan 2021-2022 (NCG, 2022). In order to provide domestic and livestock water, the county has been building water reservoirs, water pans, dams, shallow wells, and boreholes, especially in the lowlands and denser settlements of Narok town, Kilgoris, Lolgorian, E/Enkare, and Ololulunga. Inefficiency and ineffectiveness from the contractors hired have delayed launching the projects, as stressed by the county official.

The County Environmental Officer discussed the sprawling and congested informal settlements that make it difficult and impractical to obtain water pipes to extinguish fires. A plan was implemented to provide metal to residents to construct shelters in places like Narok Town to minimise damages in flooding. When there are floods in informal settlements, the officer indicated they have a link with the committee members, who contact the SCDRMC directly and respond immediately. One participant confirmed that the sub-county disaster team has been

responsive. "*Recently, we had terrible flooding, and some officials have been effective in helping us and providing temporary shelter,*" she said (Personal Interview, IR12). The officer argued that if they build formal houses in these settlements, they are bound by housing regulations, and larger space is needed for one house, while some of the land occupied by the shack dwellers is privately owned.

The County official, through an interview, confirmed that a disaster management department does exist. However, it is improperly used as its function. It is most effective for post-disaster, such as providing supplies like blankets and food parcels after an emergency or disaster. "*CDRMC is being strengthened. We are designing an organogram and appointing different specialists, such as a Geographic Information Systems specialist, in the future*", he said (Personal Interview, IR13).

According to the county official, the county is upgrading and extending the DRM, which is of some interest in the subject. He further argued that the CDRMC of Narok should adopt an already drafted disaster management framework. Furthermore, a consultant should be appointed to undertake risk assessment throughout Narok County to develop a disaster management policy document. After that, a disaster management plan can be crafted. While the officer indicated the county's compliance with the Disaster Management Act, the high staff turnover without being replaced is a challenge and aggravated by the fragmented organogram, which does not respond to the unit's needs. The officer argued that the CDRMC should consider the kind and number of projects that need to be planned and implemented.

5. SUMMARY OF FINDINGS, CONCLUSION, AND RECOMMENDATIONS

The purpose of this chapter is to present a summary of the research findings and discuss how they answer the study's objectives. It raises many thought-provoking questions to draw out the complex issues related to natural disasters and disaster management in the communities under review: Narok County. This discussion is presented in the light of the study's objectives and existing literature on the theory of emergency management and disaster management earlier raised in the conceptual framework.

5.1. Summary of Findings

Following a literature review and the results of the fieldwork, the following research sub-questions guided the study:

1. Underlying causes and effects of disasters in Narok County,
2. Institutional arrangement of DRM in Narok County, and
3. Current DRM initiatives implemented in Narok County.

1. Underlying causes and effects of disasters in Narok County

Taking into consideration the first objective, this study concluded that (1) rainfall, (2) soil type, and (3) inefficient and outdated infrastructure all have an effect on flood occurrence in Narok County.

The first objective also covered the effects of floods in Narok County. Findings from the study indicate that floods had negative physical and social impacts on Narok County. The physical effects identified are soil erosion and water pollution. The social impacts identified are loss of life and property, loss of livelihood, displacement of people, infrastructure destruction, and water-borne and insect-borne diseases.

2. Institutional arrangement of DRM in Narok County

In the second objective, assessing the institutional arrangement of DRM in Narok County, this study finds relationships between national and local government, non-governmental organisations, academic institutions, the private and development sectors, and humanitarian

organisations. The key strength of the DRM in Narok County is that it has a growing presence of robust legal and policy frameworks. The Kenyan Government and the NCG mandate for DRM Narok County are to formulate policies, legislations, strategies, and plans, provide funding, and coordinate DRM's participatory process and decision-making. Maasai Mara University is supporting research on flood management in Narok County. The KRC is the leading humanitarian organisation with strong ties with the national and county governments in response to floods and other disasters in Narok town.

The weaknesses identified include poor implementation of strategies by county governments and non-state actors. There are two flood management committees led by ENSDA & NCG, respectively. The two committees have roles and structures not clearly defined as to who should lead flood management in Narok town and at the county level. The lack of clarity in roles is attributed to the unspecified role of the levels of government in the Constitution of Kenya 2010.

The opportunities that can contribute to DRM in Narok County include active support of NGOs (such as KRC) and the private sectors in managing disasters. The opportunities can be enhanced if organisations are grouped based on their nature of services, as recommended by Kellett & Caravani (2014). It is also noteworthy to consider that although the order of relationship in dealing with DRM in Narok County has been provided in Figure 10, there might be other potential stakeholders in Narok town that need to be brought on board as there are actors outside the government like the insurance sector and the level of involvement of citizens. This is because they can build synergy to eliminate the weaknesses, which include a lack of clear policy and legislative structures for disaster management, extensive decision-making period due to government bureaucratic process, inadequate funds, equipment, and skilled personnel for floods management.

A major threat in the effective DRM strategy in Narok County is the lack of political will, both at the national and county level.

3. Current DRM initiatives in Narok County

In the third objective, assessing the current DRM initiatives by Narok County, these study findings highlight projects being implemented to improve DRM strategy. They also highlight an early

warning system, effective response during disasters, and awareness that there is room for improvement in the county-level DRM strategies.

5.2. Conclusion

A. The main causes of flooding in Narok County are rainfall, soil types, and an outdated and inefficient infrastructure, based on the findings 1. Narok County experiences an average rainfall range of 2,500mm during long rains, coupled with inadequate or poorly maintained local drainage systems. Additionally, some areas around Narok County have clay soil, which makes soil infiltration difficult. Ineffective and outdated disaster mitigation measures, unchecked development, and poor drainage contribute to flooding in Narok. The interrelationship among these factors is not explicit in Narok County, and they need to be studied further to ascertain their synergies in contributing to floods.

B. Floods can cause significant effects physically, based on the findings 1. As a result of floods, soil erosion resulted in sediment deposition downstream, contributing to water pollution along Narok River and Kakiya stream. Soil erosion was also catalysed by heavy forest clearance and the mechanisation of farming upstream. The floods uprooted small plants, swept away seeds, and reduced riparian plant species richness, which is noticeable in the riparian of Narok River and Kakiya (See Figures 7 & 8). This made the regeneration of vegetation on the riparian difficult, altering the habitat of wild animals and pasture for domestic animals.

C. Floods can cause significant effects socially, based on the findings 1. Social effects of disasters include the loss of livelihoods, which directly contributes to food insecurity and limited purchasing power. Floods destroyed food crops and disrupted food distribution rendering people vulnerable to prolonged food insecurity, potentially resulting in famine when rains fail to support food production. Lastly, floods damaged infrastructure, causing impacts such as disruption of people's movement, education, clean water supplies, health care, transport, communication, wastewater treatment, and electricity.

D. A key objective of the Emergency Management Theory, as discussed in the conceptual framework, is to promote safer communities that are less vulnerable to hazards and disasters, with the capacity to cope with such incidents in the event of an emergency. A lack of political will and a lack of effective strategic implementation can contribute to ineffective mitigation of a community's exposure to disasters, based on the findings 2. Narok County has a lack of clarity in roles that contribute to implementing DRM strategies. The response to disasters is disjointed due to poor implementation of strategies and the lack of clear policy and legislative structures between the national and county government and non-state stakeholders on DRM strategies. Among the government and non-governmental organisations working in Narok County, a lack of skilled staff, inadequate funds, and inadequate equipment further exacerbate the disjointed response to disasters.

E. Based on the findings 3**,** there are current projects and programs being implemented by the county government to improve DRM strategy in Narok County. The implementation of the construction of dams and ponds is designed to be integrated with gabions, bridges, and detention ponds to reduce silt and regulate water flow from the catchment to downstream. There may be slow but steady progress toward effective DRM strategies in Narok County. However, it depends upon the gradual transformation towards an integrated DRM strategy that can be more effective. Effective communication, innovation, governance, and partnership support are essential to ensure sustainability as part of an effective DRM strategy.

5.3. Recommendations

In light of the results of this study, it is recommended to conduct a comprehensive assessment of the causes and effects of disasters in Narok County; partnerships should be strengthened between government agencies, non-government organisations, development sectors, and other stakeholders in the county to contribute to the strengthening of governance and the development of a comprehensive disaster management plan, strategy, and policy.

I. Conduct of comprehensive assessment of the causes and effects of Disaster Risk Management in Narok County, based on conclusions A, B, and C.

In order to effectively implement DRM strategies in Narok County, there needs to be a comprehensive assessment of the root causes and the effects of disasters. In order to understand the interrelatedness of the factors that affect disaster occurrences, it is essential to assess how those factors are related. In this study, it was found that many factors combine to contribute to the occurrence of disasters in Narok town by contributing to another factor. For example, watershed clearing and vegetation degradation have an impact on rainfall throughout the year. Because water flow and soil erosion are high on the mid-slope, topography influences surface run-off.

II. The county and national governments must involve a wide range of stakeholders to strengthen the multi-agency approach to effective DRM strategy, based on conclusions C and D.

Governments and non-state organisations face numerous challenges, including unclear roles and mandates, poor coordination, and a shortage of resources in terms of materials and people; they continue to face many challenges each year. These deficiencies result from the lack of a clear disaster policy guide in the county, a natural consequence of the lack of a disaster policy guide. There should be a need to review the current DRM policies and dismantle the hierarchy in DRM involvement. The result of these initiatives will be that non-state actors and a more significant portion of the population will be motivated to support and volunteer for projects involving integrated DRM, and these efforts will succeed.

III. Holistic DRM initiatives, based on conclusion D.

A significant finding of this study is that the DRM institutional arrangement in Narok County is mainly structural. For DRM to be integrated into the current strategic framework, both traditional and scientific knowledge must be incorporated into a holistic approach for the strategy to be successful in reaching and influencing the population. Local community members in Narok

County have a strong sense of support for disaster preparedness and response. However, mitigation measures that have already been implemented do not reflect this historical memory. The county and national government agencies need a sufficient level of policy and legislative support for the non-state actors, including private companies and residents of local towns. In addition to building synergy, it will foster enhanced partnerships and facilitate the formulation of disaster management policies, plans, and strategies that will facilitate a sustainable integrated approach to address the causes and effects of disasters in the Narok area and facilitate a sustainable integrated response to disasters.

IV. Develop integrated county DRM strategy, based on conclusion D and E.

The CDRMC must develop a county-based DRM strategy. The strategy incorporates recommendations from all relevant sectors into their respective sector plans, policies, and strategies, providing the needed resources and integrating the recommendations. NCG will typically benefit from an integrated DRM strategy to provide a sense of direction and outline measurable goals. Besides guiding daily decisions, the strategy is also helpful in evaluating progress and changing approaches. The strategy encourages creative, collaborative, and innovative ideas, which promotes openness and embraces out-of-the-box thinking as part of addressing emergencies, uncertainties, and surprises.

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Annexes

Annex 1: Confirmation Letter from the University of Porto

U.PORTO
FLUP FACULDADE DE LETRAS
UNIVERSIDADE DO PORTO

EIMAS
EUROPEAN INTERDISCIPLINARY MASTER AFRICAN STUDIES

LETTER OF CONFIRMATION

To Whom It May Concern

Within the framework of the Erasmus Mundus Master 'EIMAS – European Interdisciplinary Master African Studies', funded by the European Commission through the Erasmus+ Programme, we hereby declare that:

Name: **TIMOTHY EARL MATEO CASTILLON**
Country of nationality: Philippines
Date of birth: 09/07/1996
Passport number: P5230298B
Date of expiry: 16/06/2030

Has been awarded an Erasmus+ scholarship to carry out a full Master's degree for a total of 24 months, which started on the 1st October 2020. Within this programme, of which the University of Porto is a partner institution, the selected student has undertaken an academic mobility path as follows:

- 1st semester 2020/2021 (October 2020 to March 2021): University of Porto, Portugal;
- 2nd semester 2020/2021 (April to August 2021): University of Bayreuth, Germany;
- 3rd semester 2021/2022 (September to December 2021): Bordeaux Montaigne University, France;
- 4th semester 2021/2022 (January to August 2022): In one of the partner institutions, according to thesis topic and appointed supervisors.

Following the abovementioned student's request, we hereby confirm that he has been accepted for thesis research and preparation at the Faculty of Arts and Humanities of the University of Porto (FLUP), for the 4th semester, from January to August 2022. The research will be conducted under the supervision of Professor Amélia Polónia, Porto Coordinator for the EIMAS programme and Full Professor of the Department of History, Political and International Studies at this Faculty.

For his thesis, Mr. Castillon is currently working on research under the working title, "Urban Risk Management and Building Resilience: Integration of Disaster Risk Management strategies into development planning for vulnerable communities in Narok County, Kenya". He has proposed an internship for research and fieldwork in Kenya, and he has requested research affiliation from the Narok County Government. We are pleased to confirm that Mr. Castillon is authorised to conduct this internship in Kenya, which is taking place from 7th February to 10th April 2022.

All expenses related with this internship and fieldwork in Kenya is the responsibility of the student, who is funded through the EIMAS programme. The student also has full insurance coverage (including health care, travel, personal accidents, repatriation, etc.), valid for the total period of studies at the different host universities and countries, and internships abroad.

Date: 23rd February 2022
Signature:

Assinado por: **CÂNDIDA FERNANDA ANTUNES RIBEIRO**
Num. de Identificação: 035973471
Data: 2022.02.23 17:12:42+00'00'
Certificado por: **Diário da República Eletrónico.**
Atributos certificados: **Diretora da Faculdade de Letras da Universidade do Porto - Universidade do Porto.**
CARTÃO DE CIDADÃO

Name: Fernanda Ribeiro (Full Professor)
Position: Dean of the Faculty of Arts and Humanities of the University of Porto

U.PORTO · UNIVERSITÄT BAYREUTH · Université BORDEAUX MONTAIGNE

With the support of the Erasmus+ Programme of the European Union

FLUP | Via Panorâmica s/n 4150-564 Porto | Tlf. +351 226 077 100 | Fax. 226 077 101 | flup@letras.up.pt | www.letras.up.pt
SRI: Serviço de Relações Internacionais I International Office | Tel.: +351.226077140 | sri@letras.up.pt

Annex 2: Support Letter to conduct fieldwork from IFRA

Nairobi
IFRA
Institut Français de Recherche en Afrique
French Institute for Research in Africa

Laikipia Road, Kileleshwa P.O. Box 58480, 00200 City Square; Nairobi, Kenya
Tel: 254 (0)708 237 268; Website: https://ifranairobi.hypotheses.org

January 16, 2022

TO WHOM IT MAY CONCERN

I wish to confirm that the French Institute for Research in Africa will host Timothy Earl Mateo Castillon, a European Interdisciplinary Master African Studie fellow from 1st February 2022 to 20th April 2022. Mr Castillon will do some fieldwork as part of his research on "Urban Risk Management and Building Resilience: Integration of Disaster Risk Management strategies into development planning for vulnerable communities in Narok County, Kenya."

During his research stay, Timothy Earl Mateo Castillon will be encouraged to present his work in a seminar or through a short article (Mambo) distributed in the IFRA network.

Kind regards,

INSTITUT FRANÇAIS DE RECHERCHE EN AFRIQUE
MA. FOUERE
Directrice

Marie-Aude Fouéré
Director

Annex 3: Comprehensive Personal Information of Interview Respondents

Interview Respondents	Date of Interview	Interview Duration	Interview Venue	Conditions
IR01	March 7, 2022	25 minutes	Peniel Complex, Narok	Community resident, 10 years of residence in Narok
IR02	March 8, 2022	30 minutes	Kibandaski (food kiosk), Narok	Community resident
IR03	March 8, 2022	50 minutes	In front of the respondent's house, Narok	Community resident, pastor in church, 30 years of residence in Narok
IR04	March 8, 2022	30 minutes	Kibandaski (food kiosk), Narok	Community resident, 20 years of residence in Narok
IR05	March 9, 2022	60 minutes	Living room of respondent, Narok	Community resident
IR06	March 9, 2022	30 minutes	Public Market, Narok	Store Owner, 3 years of operation
IR07	March 11, 2022	80 minutes	County Government of Narok Office, Narok	County Planner
IR08	March 8, 2022	30 minutes	Maasai Mara University, Narok	Humphrey Omele, the Current Student Union President of Maasai Mara University,

IR09	March 11, 2022	20 minutes	Kibandaski (food kiosk), Narok	Community resident
IR10	March 11, 2022	40 minutes	Kibandaski (food kiosk), Narok	Community resident, elder
IR11	March 8, 2022	30 minutes	County Government of Narok Office, Narok	County Environmental Officer
IR12	March 11, 2022	20 minutes	Kibandaski (food kiosk), Narok	Community resident
IR13	March 15, 2022	40 minutes	County Government of Narok Office, Narok	County official

Annex 4: Semi-structured interview questions for Narok County Officials

Q1. What is your role and mandate in DRM in Narok?

Q2. What challenges do you face in executing your role and mandate?

Q3. What initiatives have been put in place to address DRM in Narok?

Q4. In your opinion, how does the local community perceive DRM initiatives?

Q5. What are the current DRM initiatives being implemented?

Annex 5: Semi-structured interview questions for Narok County residents

Q1. What are the causes and effects of disasters in Narok County?

Q2. In your observation, what intervention measures have been put in place to mitigate disasters in Narok?

Q3. What initiatives have been put in place to address DRM in Narok?

Q4. In your opinion, how do you perceive the current DRM initiatives implemented?