EARLY WARNING COMMUNICATION FOR FLOOD DISASTER PREPAREDNESS AND RESPONSE IN TANA RIVER COUNTY, KENYA: THE CASE OF TANA DELTA

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DECLARATION

Declaration by Candidate

This Thesis is my original work and has not been presented for a degree in any other University. No part of this thesis may be reproduced without the prior written permission of the author and/or Moi University.

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DEDICATION

I dedicate this research to all the flood victims in Kenya with the hope that lives can be saved and losses minimised with the establishment of effective communication strategies of future flood warning messages.

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ABSTRACT

Early warning communication is a branch of crisis communication that has been adopted into community knowledge and practice for disaster preparedness. There is, however, a concern that in many cases, early warning on impending disasters has not translated into appropriate and timely actions towards saving lives and livelihoods. While early warning has been noted to be necessary for reducing disaster losses, studies indicate that early warning communication does not necessarily lead to early and appropriate response from the target communities.The main objective of the study was to evaluate how early warning messages on floods in Tana River County were packaged and the dissemination strategies used to communicate the messages to the community. The questions that the study sought to answer were on the content of the flood warning messages, if the messages were understood by the community and the adequacy of the strategies used in communicating early warning to the community. The underpinning theory of the study was the Maslow's hierarchy of needs theory, which was key in identifying the motivating factors behind people's decisions when responding to early warning messages and the disasters when they occur. This study was undertaken in Tana Delta Sub-county in Tana River. The research adopted the qualitative approach, the research design was case study and data was generated using interviews and focus group discussions. A sample population of 25 was selected; three focus group discussions and seven key-informant interviews were carried out. Sampling procedures were purposive and snowball sampling. The data was transcribed and analysed for themes relevant to the topic. The summary of study findings is that there are considerable weaknesses in framing warning messages and dissemination strategy by institutions charged with the early warning communication, which reduces the effectiveness in enabling the community to take protective action to reduce the negative impact of floods. The study recommends that there is need for communicators of early warning messages to look at the design of the messages on flood warnings and to take into consideration the three elements of early warning communication, which are forecasting, dissemination and response. It is envisaged that the findings of the study will be helpful to the communicators of early warning messages to reconsider the message formulation and strategies of communication. The findings will also be useful in guiding the formulation of a disaster management policy.

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OPERATIONAL DEFINITION OF TERMS

Disaster: A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources.

Mitigation: The lessening or limitation of the adverse impacts of hazards and related disasters. Structural and non-structural measures undertaken to limit the adverse impact of natural hazards, environmental degradation, and technological hazards.

Early warning system: the provision of information on an emerging dangerous circumstance where that information can enable action in advance to reduce the risks involved.

Preparedness: The knowledge and capacities developed by governments, professional response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazardous events or conditions.

Prevention: The outright avoidance of adverse impacts of hazards and related disasters.

Public awareness: The extent of common knowledge about disaster risks, the factors that lead to disasters and the actions that can be taken individually and collectively to reduce exposure and vulnerability to hazards.

Response: The provision of emergency services and public assistance during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety and meet the basic subsistence needs of the people affected.

Recovery: The restoration, and improvement where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors.

Risk: The combination of the probability of an event and its negative consequences.

Hazards: A potentially damaging physical event, human activity or phenomenon with a potential to cause loss of life or injury, property damage, social and economic disruption of life, environmental degradation among other effects

Natural disasters: Natural process or phenomenon that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

ABBREVIATIONS AND ACRONYMS

ADPC	Asian Disaster Preparedness Center
ALRMP	Arid Lands Resource Management Project
CBO	Community Based Organisations
DCC	District County Commissioner
DDM	Directorate for Disaster Management
DRR	Disaster Risk Reduction
EDRP	Emergency Drought Recovery Project
EWS	Early Warning System
FGD	Focus Group Discussions
GoK	Government of Kenya
GPDRR	Global Platform for Disaster Risk Reduction
HFA	Hyogo Framework for Action
ICSU	International Council for Scientific Unions
IDNDR	International Decade for Natural Disaster Reduction
IFRC	International Federation of Red Cross and Red Crescent Societies
ISDR	International Strategy for Disaster Reduction
KMS	Kenya Meteorological Service
NACC	National Aids Control Council
NADIMA	National Disaster Management Authority
NDOC	National Disaster Operation Centre
NFS	National Food Security
NGO	Non Governmental Organisations
NPDMK	National Policy for Disaster Management for Kenya
NPDRM	National Policy for Disaster Risk Management

P-CEWS	People Centred Early Warning Systems
RRU	Relief and Rehabilitation Unit
UNDP	United Nations Development Plan
UNDRO	United Nations Disaster Relief Office
UNISDR	United Nations International Strategy for Disaster Reduction
VUSSC	Virtual University for Small States of the Commonwealth
WDR	World Disaster Report
WMO	World Meteorological Organization
WRMA	Water resource management Authority

CHAPTER ONE

BACKGROUND OF THE STUDY

1.1 Introduction

This chapter presents the background of the study, the statement of the problem, the objectives of the study, research questions that guided the study, the scope of the study and the significance of the study to the society and the body of knowledge.

Many global communities are victims of natural disasters. Kenya has also had its share of natural calamities. According to the NPDMK (2009), Kenya is disaster prone, with the most common disasters experienced triggered by hydro-meteorological, seismic and environmental processes leading to hazards such as floods, droughts, landslides, lightning and earthquakes. Some of these happenings could be prevented or mitigated if there was effective and accurate communication regarding the disasters (Pelling and Wisner, 2008; Opondo, 2013). Some of the disasters that have occurred in Kenya include the Sinai tragedy, Sachanguan Petrol Tanker tragedy, floods in Budalangi and Tana River and drought and famine in Turkana and Baringo among others. In all these disaster situations, people's livelihoods are disrupted, infrastructure destroyed, use of planned resources diverted and eventually retarded development (Mulugeta, Ayonghe, Daby, Dube, Gudyanga, Lucio, and Durrheim, 2011).

Risk communication is a component of disaster preparedness. Early warning communication is one of the methods used to manage disaster risk (Okada and Matsuda, 2005). Risk communication warnings should be people-centred comprising of four key elements: knowledge of the risks; monitoring, analysis and forecasting of the hazards; communication or dissemination of alerts and warnings; and people's capabilities to

respond to the warnings received (Basher, 2006). Ultimately the response to disasters is achieved when there is effective communication and dissemination of information on early warning to those at risk.

1.2 Background of the Study

Disasters are worldwide phenomena that should be communicated and relevant knowledge shared. The Hyogo Framework 2005–2015 (UNISDR, 2006) emphasises that disaster risk is increasingly of global concern and its impact and actions in one region can have an impact on risks in another, and vice versa. They occur rapidly, instantaneously and indiscriminately (Bouwer, Crompton, Faust, Hoppe, and Pielke, 2007). They result in catastrophic losses of property, lives and livelihoods (Khan and Khan, 2008). Nyondo (2006) argues that, if the process of communication is difficult in our ordinary and daily lives, it is far more so in times of disaster. The challenge remains to not only respond with accurate, understandable and complete information as quickly as possible during a disaster, but also to communicate in a proactive way that involves members of communities to reduce the potential risk of a disaster.

Shafiq and Ahsan (2013), define disasters as either man-made or natural hazards that disrupt the functioning of communities, causing widespread human, material or environmental losses that exceed the abilities of affected communities to cope with. While disasters are not new in man's history Khan and Khan (2008) project that the frequency of disasters will increase in coming years. They observe that changes in global weather patterns and the degrading of the environment mean that such calamities are increasing in terms of frequency, complexity, scope and destructive capacity. Disasters aggravate natural environmental processes such as sudden tectonic

movements leading to earthquake and volcanic eruptions, continued dry conditions that lead to prolonged floods, droughts, collision of celestial bodies, and atmospheric disturbances (Joshi, 2008).

Flooding is a recurrent problem. Floods are the rise in the amount of water discharge causing overflowing of a river or any other water body onto areas not normally submerged (UNEP, 2012). One of the major causes of floods is heavy rainfall that leads to the level of water in the river to rise above the banks and overflow. Other factors contributing to floods are overwhelmed dams as well as deforestation leading to exposure of soil to agents of erosion. Floods occur when widespread heavy rains last for a short period between hours and few days. Heavy seasonal rainfall activity or high water levels in rivers and other large water masses cause the seasonal flood events. When rain falls within a short period onto dry, hard ground such that water fails to penetrate; this causes flash floods. Floods become disastrous when they cause widespread human, material, or environmental losses beyond the ability of the affected community to withstand using its own resources (WMO, 2010).

Skinner and Rampersad (2014) opine that communication planning during disasters should occur in an institutional and organizational context with specific mandates. There are many institutions in Kenya that deal with disaster management. For example, in the Office of the President, there is the Relief and Rehabilitation Unit (RRU), National Aids Control Council (NACC) and National Food Security (NFS) as well as specialized organizations outside government. In 1993, a Relief Rehabilitation Unit was created as well as an Emergency Drought Recovery Project (EDRP) established to address frequent droughts in the country. In 1996, the Arid Lands Resource Management Project (ALRMP) was established to monitor and manage drought situations in Northern Kenya (NPDRM, 2013). At the height of El-Nino floods in 1998,

the GoK established the National Disaster Operation Centre (NDOC) to monitor the floods and assist affected communities (UNDP, 2012). Despite all those efforts, the country is not about to see the end of disasters.

Communication for disaster is a reciprocal process where different stakeholders listen to each other and form a common understanding about risks, their acceptability and actions to reduce those risks. Despite the many organizations established to deal with disasters, the activities of these institutions seem to be uncoordinated. In my opinion, the critical element of communication is lacking in the various efforts, policy papers and post-disaster reports since communication is one of the critical requirements of coordination.

Floods in Africa during the years 1998, 2000 and 2001 caused considerable damage to property and infrastructure, mostly road and rail network damage and people lost their lives and thousands were displaced from their homes (Desanker, 2001). Examples of floods in Africa include floods in Mozambique in 2000 that displaced people and crippled transport networks, the floods in Algiers in 2001 that led to loss of lives, heavy rains in East Africa in 2002 that caused floods and mudslides resulting into many people being displaced, flooding in Gambia led to the destruction of property (Pelling and Wisner, 2008).

In Kenya, heavy rainfalls are the main natural causes of floods. The floods mostly occur in Western, Nyanza and coastal regions. In urban areas like in Nairobi, people dwelling within informal structures are the most affected by the urban floods. Tana River experiences seasonal river floods with the most affected areas being in the lower reaches of Tana River (UNEP, 2008).

Every year, disasters cause a lot of destruction all over the world, resulting in direct economic losses, damage to historical and cultural values and ecosystems. Floods disasters can be deadly, particularly when they arrive without warning (Grasso and Singh, 2011). Among the impacts of floods are loss of lives and livelihoods, destruction of settlements and houses, destruction of infrastructure mainly roads, telecommunication lines and power lines, erosion of productive layers of the soil rendering the soil less productive and loss of food reserves resulting in food insecurity and spread of diseases.

Warnings issued well before a disaster strikes could result into timely action to protect lives and property. Effective early warning systems have substantially reduced deaths and injuries from severe weather events. For example, mortality in the USA declined by 45% and injuries by 40% from 1986 to 1999 as a result of timely early warning that enabled people to take shelter (Teisberg and Weiher 2009). Early warnings of flooding risk is effective in reducing flood related deaths as evidenced by only seven people losing their lives in five successive hurricanes in 2008 in Cuba, as compared to hundreds of lives in previous years (Malilay,1997). Early warning communication enabled people at risk to evacuate quickly to emergency shelters. Ineffective communication leads to lack of adequate information on hazards and results into disasters if not prevented or controlled with the ultimate consequence being losses of lives and livelihood.

According to Grasso and Singh, (2011), there is inadequate communication of flood warning, especially in developing or least developed countries. They further argue that flood monitoring systems are more developed than flood early warning systems. Although comprehensive coverage of early warning systems for floods is available,

recent disasters such as Hurricane Katrina of 2005 have highlighted inadequacies in early warning communication for enabling effective and timely response (Grasso and Singh, 2011). This point to a need to improve communication between the sectors involved by strengthening the links between scientific research, organizations responsible for issuing warnings, and authorities in charge of responding to these warnings.

1.3 Statement of the Problem

Flood early warning communication aims at providing improved flood forecasting and warning services to empower vulnerable people at grass-roots level to cope more effectively with flood disasters. Effective strategic communication is integral to the success of early warning systems as it results into disaster risk reduction. Communication of early warning information on disasters will result in reduced severity of disaster impacts (Hossain, 2003). Such information increases flood awareness and enables the community to take action to protect lives and properties and reduce people's suffering and economic losses caused by the event that people are being warned about. Handmer states that "*if people at risk are to take action, then warning messages must mean something to them*" (Handmer, 2001:7). While the Hyogo Framework for Action (2010 – 2015) emphasizes the importance of early warning in preventing disasters (UNISDR, 2005), studies indicate that early warning does not always lead to early and appropriate action. Despite considerable effort to communicate early warnings, the levels of disaster preparedness still remain low as evidenced by late responses when the actual disaster occurs (UNISDR, 2005).

Impacts of floods in Kenya are felt across various sectors of the economy including agriculture, livestock, transport, housing, public health, industrial processing, and tourism. Particularly floods have a great impact on the agricultural sector due to flooding of farmland, including the destruction of crops due for harvesting as well as crops newly harvested and stored, which later results into drought disaster. Flood forecast and warning information needs to be provided to end users such as farmers, businesses and other groups affected by floods in a timely and understandable format so that they can take action to reduce the negative impacts of floods. The impacts have severe socio-economic and political implications. The prevalence rates of floods in Kenya stands at 27% and affects 5% of the population affected by disasters, while floods related fatalities constitute 60% of disaster victims in Kenya (UNEP, 2012).

The repetitive nature of full-blown disasters in Kenya is an indication that there may be a problem in packaging of flood warning messages and modes of dissemination may not be effective for local communities to respond to disasters appropriately. Some studies argue that the affected areas may not have gotten early warning information on hazards before they became disasters, as should have been the case. Mulugeta, Ayonghe, Daby, Dube, Gudyanga, Lucio, and Durrheim, (2011) observe that the uncertainty inherent in scientific information where the language is technical and the format used may not be easily understood therefore such information does not fulfill the need of flood affected people regarding taking actions based on flood warning messages.

Various studies have been undertaken in the Tana Delta, however, most of them are environmental studies (Nakaegawa, Wachana and Kakushin (2012); Maingi and Marsh, (2002); & Oludhe (2011). It is notable that there are no studies on early warning

communication of floods in the Tana Delta. The present system of government-issued flood warnings is presented in both a context and a format that are poorly understood by the Tana Delta inhabitants and also channels of communication are not affordable by all. It is in view of this that this study aims at assessing the communication of early warning in flood prone Tana Delta. The study aimed at examining the content of flood early warning message, establishing the strategies used to communicate early warning messages, examining the community understood the information on an impending flood disaster, and the adequacy of the strategies used to communicate early warnings on floods.

1.4 Research Objectives

The overall objective of the study was to determine the effectiveness of communication of early warning in disaster preparedness and response in Kenya. Specifically, the study sought to evaluate the communities' understanding of existing flood warning messages in Tana River County.

1.5 Research Questions

The study sought to answer the following questions:

1) What is the content of early warning messages to the stakeholders and the residents of Tana River County?
2) How is the community's and stakeholders' understanding of the flood warning?
3) What strategies are used in conveying flood disaster early warning to the residents of Tana River?
4) How adequate are the strategies used in communicating early warning to the residents of Tana River County?

1.6 Justification of the Study

Communication of early warning forms an integral part of disaster preparedness. Disaster preparedness is an essential component of the disaster management plan and many disasters can be avoided or at least their impact minimized if early warnings are effectively communicated. Communities in the flood prone areas need to be informed to remain prepared for flood eventualities. In the absence of early warning information on impeding disasters, those at risk may be hampered from taking preemptive action to enhance their preparedness for reasons such as past experiences of floods, ambiguity of the information provided, and the lack of credibility of the sources of flood warnings. Part of the role of communication is to enhance this credibility.

According to the Global Survey of Early Warning Systems (Basher, 2006), early warning systems for natural hazards are an integral component of disaster risk reduction programmes. One of the themes that have featured strongly during the Natural Disaster conferences over the years is dissemination of warning information. This was emphasized by the International Decade for Natural Disaster Reduction (IDNDR, 1990) and its crucial importance acknowledged in the Yokohama Strategy for a Safer World, in 1994. It was in the follow-up of this that the World Conference on Disaster Reduction (UNISDR, 2006) adopted the Hyogo Framework for Action (2005-2015) that included early warning as one of the five themes of disaster reduction and countries called upon to develop people-centred early warning systems. During the World Conference on Disaster Reduction held in Sendai (2015), the emphasis was on dissemination of disaster information to the various stakeholders. Three international conferences on early warning, in 1998, 2003 and 2006, produced a set of internationally agreed guiding

principles for effective early warning systems. The conferences recommended the incorporation of early warning into policy and development frameworks of nations.

Further, information management and exchange was prioritized as an indicator among the 10-year Disaster Risk Reduction (DRR) strategy of the Hyogo Framework for Action (HFA). According to the HFA, disasters can be substantially reduced if people are well informed. There is need to "provide easily understandable information on disaster risks and response options to citizens in high-risk areas… the information should be tailored to different target audiences" (UNISDR, 2006, pg. 9). One of the strategies that feature prominently in the HFA is people-centred early warning system that comprises of four key elements: knowledge of the risks; monitoring, analysis and forecasting of the hazards; communication or dissemination of alerts and warnings; and local capabilities to respond to the warnings received (Basher, 2006). Ultimately an early warning system will only be effective if all components are effective. A weakness or failure in any of the part could result in failure of the whole system. Communication is the link between the elements. It is envisaged that many disasters can be avoided or at least their impact minimized if early warnings are effectively communicated. Preparing for a disaster can reduce the fear, anxiety and losses that it can cause. Everything that can be reasonably done to avoid or lessen the impact of disasters by planning ahead of time is certainly well worth the time, effort, and resources.

1.7 Scope of the Study

All of the activities to be carried out during the various phases of a disaster are dependent on communication. According to VUSSC (2009) the two aspects of communication are equipment and information management. The equipment that is

essential for information flow, such as radios, telephones, satellites and transmission lines. Information management is about the protocol of knowing who communicates what information to whom, what priority is given to it, and how it is disseminated and interpreted (VUSSC, 2009). Communication equipment was outside the scope of this study, the study focused on information management.

a) Geographical Scope: Although areas such as the lower Nzoia River at Budalang'i plains and the lower Nyando River at Kano Plains are affected by floods, the study was restricted to Tana River County and specifically Tana Delta Sub-county, which is one of the worst affected areas during the floods.
b) Context Scope: The study focused on natural disasters, specifically floods. This is because we can anticipate, prepare for and prevent natural disasters; or if they happen, they should cause minimal disruption because of prior warnings. Besides floods, there are other disasters that are experienced in Tana River such as insecurity, resource conflicts and drought; however, they will not form part of this study.
c) Content scope: The subject of risk communication is wide and includes sub-disciplines such as the psychology of risk, and social and cultural aspects of risk perception. While this subject is described in some detail at different stages in the study, a comprehensive analysis of the subject is outside the scope of the research.
d) Methodological scope: This study applied the qualitative approach. The nature of the information generated can be achieved better through interviews and focus group discussions, thus the choice of the qualitative approach.

1.8 Significance of the Study

Disasters are bad for the development of any nation (Basher, 2006), and it is important to have in place an effective disaster management policy. Effective communication strategies are integral to the success of any disaster management strategy. The results of this study will contribute to the body of knowledge on the role of effective communication processes and strategies in prevention and mitigation of disasters in Kenya.

This study adds value to the few studies on the subject communication for disaster management. It is hoped that this study will be of interest to the government and to major emergency planners and communication practitioners who are currently engaged in disaster management and planning functions. The results of this study will also be useful to scholars of communication and to practitioners in the areas of disaster, risk, crisis and emergency communication. I also believe that a study on the critical role of communication in disaster management will benefit governments and regions that experience natural calamities on a regular basis, and aid its residents in the pursuit of casualty-free results.

The GoK is in the process of formulating a disaster management policy; accordingly, this study will prove valuable in its quest to review and strengthen the policy in the area of disaster communication.

1.9 Limitations of the Study

This study was limited to communication issues in disaster management. There are many other issues such as provision of resources, government initiatives in disaster management, climate and topology of the research site; however, they did not form part of the study.

While the free flow of data through Information Communication Technologies systems is an extremely important factor for successful emergency communication during disasters, it was outside the scope of this research and mentioned in passing only. In this study, the term 'communication' does not refer to technical communication systems such as radio equipment and other Information Communication Technologies, but refers to the processes, strategies and channels of communication.

There were challenges encountered in the process of pursuing the study. Some officers were reluctant in providing information to a student for research purpose while others were busy with their normal work activities and it was difficult for me to arrange a meeting where the officials did not find any significance. I had to postpone some interviews severally and look for other people to interview. Another challenge related to cultural practices, during the FGDs, there were men who indicated that they cannot be interviewed by a woman.

1.10 Summary

Communication of early warning information on disasters results in reduced severity of disaster impacts. The study sought to establish the strategies used to communicate early warning messages; if the community understood the information on an impending flood disaster; and the adequacy of the strategies used to communicate early warnings

on floods. Indeed many disasters can be avoided or at least their impact minimized if early warnings are effectively communicated. Everything that can be reasonably done to avoid or lessen the impact of disasters by planning ahead of time is certainly well worth the time, effort, and resources. It is hoped that the study will add value to the few studies on the subject communication for disaster management.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview

This chapter contains a review of the literature which discusses communication management and specifically risk communication in relation to disaster management. Literature on the content of early warning messages, communication strategies used and the adequacy of the strategies are reviewed. Elements of flood early warning system are also addressed. The purpose of this review is to provide an understanding of the previous research in this area in relation to the research objectives.

2.2 Risk Communication as a Component of Disaster Management

Disasters are generally considered a subset of the risk communication literature (Selnow et al, 1998). Risk communication involves communicating with publics about things that might go wrong (Sandman, 2002). Ropeik (2008) defines risk communication as an interactive exchange of information and opinion amongst individuals, groups and institutions, with the goal of assessing, minimising and regulating risks. In essence, it is the sharing of information with the public or institutions about the probability and consequences of harmful events to enable the public to respond to the crisis and reduces the possibility of misinformation. For risk communication to be effective there need to be trust between the organisation and people communicating the risk and the audience receiving information. According to Skinner and Rampersad (2014) the aim of risk communication is to ensure agreement between stakeholders and various agencies on different risk management measures and to improve transparency of decisions and increase the potential acceptance of the outcome.

Risk communication includes actionable information. It can be analyzed in terms of who (source) says what (message), via what medium (channel), to whom (receiver), and directed at what kind of change (effect) – (Lindell and Perry, 2004). The aim of risk communication is to increase people's ability to understand the risk and be appropriately informed about outcomes (Okada and Matsuda, 2005). Therefore, risk communication aims at empowering people to take action.

Reynolds (2002) gives a more practical definition of risk communication as the provision of timely and credible information to the public in order that appropriate protective actions can be taken. The communicator hopes to provide the receiver with information about the expected type (good or bad), and magnitude (weak or strong), and probability of an outcome, from a behavior or exposure (Reynolds, 2002: 6). Other theorists have identified key pre-requisites for successful risk communication, including source credibility (Augustine, 1994), using understandable language (Nordlund, 1994), demonstrating openness and competence (Darrell, 2003) and being consistent in disseminated messages (Reynolds 2002: 11).

2.3 An Overview of Floods Globally

Disasters disrupt the functioning of the society causing environmental, economic, human and material losses. Changes in global weather patterns and the degrading of the environment mean that such disasters are increasing in terms of frequency, complexity, scope and destructive capacity (Schipper and Pelling, 2006). There is an increasing number of people affected by disaster, from 16,000 people in 1975 to 2.4 million people in 2011 (UNDP, 2012). Flooding is the single most destructive type of natural disaster that strikes humans and their livelihoods around the world (UNISDR, 2005).

According to the World Meteorological Organization (WMO), challenges such as shifting seasonal rainfall and rise in climate variability result in flood events and droughts (UNEP, 2012). Heavy rains that lead to floods cause devastation and kill many people worldwide compared to other natural disasters (WMO, 2010). The accompanying economic losses of these disasters are very high. Every year natural disasters claim about 100,000 lives (UNEP, 2012). In Homna district, Bangladesh, heavy monsoon rainfall results in floods nearly every year. These floods cause damages on houses, agricultural crops, and infrastructure (Bouwer, Crompton, Faust, Hoppe, and Pielke, 2007). In 2011, Brazil experienced flooding events that led to more than 850 deaths and affected almost 1.2 million people. The floods in the state of Rio de Janeiro caused disruption of local services of electricity, water and telecommunications. Communities within the flooded areas lost agricultural fields and houses (IFRC, 2011). In 2000, floods in Mozambique contributed to a fall in the GDP growth from 10 to 2, left about 700 people dead, close to 150,000 homes were washed away and numerous livelihoods affected (DFID, 2004). In 2010, flooding in Benin left at least 150,000 people without homes and destroyed about 55,000 houses and 133,047 hectares of crops; 12,000 tons of stored food were left under water and 81,000 heads of livestock lost; and about 500 schools and 90 health centres destroyed (CRED, 2011).

Flooding which is the most recurring disaster in Kenya comes in form of river floods, flash floods, urban floods, sewage floods, glacial lake outburst floods and coastal floods (Collins and Sampson, 2007). Collins and Sampson further observe that Kenya is caught unawares during disasters because it lacks efficient disaster management system in place and as such each time disasters strike, they result in significant human and economic losses. According to NADMA, in 2013, floods in the Tana River Delta left people displaced and caused destruction of property and livelihoods. Extreme flooding

events and temperatures have also been linked with El Nino (WMO, 2010). During the El Nino in 1997/98, Kenya experienced extreme rainfall and flooding events that resulted in the loss of life and property and destruction of infrastructure (WMO, 1998).

Flooding in the Tana Delta is a recurrent problem. As a result, thousands of people have been displaced and property either damaged or destroyed. According to the DesInventar, a UNISDR database for disaster information, between the year 2006 and 2013, 3,770 houses were destroyed and 101,772 people affected in Tana River County as a result of floods. According to The World Bank (2006), in 1997, 1998, and 2013 there were floods causing major displacement, water borne diseases, destruction of livelihood and structures along the riverine flood plains of the Tana River Delta. This flooding is a perennial problem in the delta taking at least one month for water to subside (The World Bank, 2006).

2.4 Communication for Disaster Management

There are endless definitions of the word communication. The word communication comes from the Latin word *communicare,* meaning 'to make common' or 'to share' (Pearson, Nelson, Titsworth, S. and Harter, 2006: 9). According to Gamble and Gamble (2005:7) communication is the deliberate or accidental transfer of meaning. Communication is a continuous process of coding, decoding and interpretation and a way of sharing objectives, attitudes, knowledge, information and opinions. It takes place in a social context and people take the roles of both source and recipient (Skinner and Rampersad, 2014). This study will operationally adopt Redmond's (2000:4) definition of communication as 'acting on information.' This definition brings to the fore the kind of communication needed for disaster mitigation; acting on information about early warning in order to bring about desired effect.

Communication management is the process of coordinating the interpretations or meanings construed by the people interacting (Kaye, 1994). According to Grunig and Hunt (1984: 6) communication management is the overall planning, execution, and evaluation of an organisation's communication with both external and internal publics. For communication to be effective it should be planned for and managed effectively; managing communication is important for disaster situations.

Disaster management is a systematic process of response and relief in a disaster situation. It is aimed at reducing the negative impact or consequences of adverse events. Even though disasters cannot always be prevented, the adverse effects can be minimized. Barrantes, et al (2009) argues that disaster management is based on the key management principles of planning, organising, and coordinating and controlling. According to Warfield (2008), disaster management aims to reduce, or avoid the potential losses from hazards, assure prompt and appropriate assistance to victims of disaster, and achieve rapid and effective recovery. It is therefore imperative that there is proper management to optimize efficiency of planning and response. Collaborative efforts at all levels (the governmental, private, the community and the media) are necessary. This level of collaboration requires coordinated and organized efforts to mitigate against, prepare for, respond to, and recover from emergencies and their effects in the shortest possible time.

Figure 2.1 Disaster Management Cycle.

Source: Warfield, 2008.

Rekers, Delaney and Wilson (2008) assert that communication is a large component of disaster management. It plays a part in all the four phases of the Disaster Management Cycle namely: mitigation, preparedness, response and recovery. Since the four are interconnected, communication is the nexus that anchors the relationships among them (Owolabi and Ekechi, 2014). The interconnectedness therefore calls for well-coordinated communication networking. The success of the four stages of disaster management process is dependent on efficient, clear and prompt dissemination of information not only among the disaster managers but more importantly to the disaster vulnerable people (VUSSC, 2009).

Mitigation is about measures put in place to minimize the impact of a hazard or disaster, while preparedness is planning how to respond through warning system, preparedness plans and emergency exercises/training. Response is all about initial actions taken as the event takes place, it involves efforts such as evacuation; search and rescue; emergency relief. During the response phase, for instance, there is a considerable increase in the volume and speed of upward and downward communication and controlling the information flow may be difficult. Recovery involves returning the

community to normal. Often the phases of the cycle overlap and the length of each phase greatly depends on the severity of the disaster. Appropriate actions at all points in the cycle include greater preparedness, better warnings, reduced vulnerability or the prevention of disasters during the next cycle (Warfield, 2008). Communication is a critical element in the disaster management cycle to ensure that there is clear information flow in the various stages in the cycle. In the absence of clear communication, chaos will prevail, disrupting the smooth responses at required levels (Warfield, 2008).

2.5 Content of Early Warning Messages

Effective communication management is a critical tool in the management of a disaster, as it provides the communities with the necessary advance knowledge or warnings to take mitigating actions (Marlow and Wilson 1997). For warning messages to be effective, Lindell and Perry (2004) posit that, they should have the five essential components of the communication process namely: source, message, channel, receiver (audience) and feedback.

For the warning message to be effective, it should have the five essential components, that is, there should be credible source, message clearly stated, a carefully selected channel for communicating the message, a clearly defined audience and a feedback channel for questions, comments and suggestions (Lindell and Perry, 2004).

2.5.1 Source of information

The source should be credible (Pearson, Nelson, Titsworth, S. and Harter, 2006), for example the Meteorological department or the National Disaster Management Unit

are credible sources because of their technical expertise in weather forecasting. The source should also be trustworthy. Trustworthiness refers to a source's ability and willingness to provide accurate information.

2.5.2 Message Content for flood warning messages

The message should be appropriately designed and clearly stated; they should be targeted to the specific audience and packaged in a way that is understandable for the selected audience (Pearson, Nelson, Titsworth, S. and Harter, 2006). For example, information about a hazard should give its impact, potential consequences and alternative protective/preventive actions. The message's style should be considered in terms of clarity and use of language. Technical or scientific information should be translated into a format and language that is understood by the intended audience (Lindell and Perry, 2004). This may include the message being translated into local languages used by the affected community.

2.5.3 Channels of communication for flood warning messages

The channel should be carefully selected for communicating the varying message. Communicators of early warning should consider the channels accessible to the recipients and the ability of the channel to accommodate the information processing activities of receivers. In as much as selecting an appropriate and trusted channel ensures that the intended audience receives the message, using existing channels in the community will be most effective (Redmond, 2000). This includes use of traditional methods such as oral narratives, songs and dance. The production and viewing of videos on past disasters can also be shown to communities to highlight important issues in preparation for or in response to disaster.

Similarly, community based theatre groups can dramatize disaster management awareness messages. These theatre groups will provide entertainment for the local community and simultaneously present issues that directly affect the people as themes for their drama. Community theatre groups from a disaster prone area can produce drama relevant to the kind of disaster their community is prone to. People watching gain a great deal of information and are made more aware of preparedness for and prevention of disaster in their community (VUSSC, 2009).

2.5.4 Audience Analysis in the context of disaster management

The audience should be clearly defined (Pearson, Nelson, Titsworth, S. and Harter, 2006). Audiences differ in many aspects; they differ in their beliefs about hazards, their perceptions of source credibility and so on. For example if a warning is issued on expected flash flood and an evacuation order is given, as a communicator it is important to know that the people in the path of the flash flood are not homogenous; they may speak different languages, they may include residents who know the landscape and transportation systems of the area and guests who do not know, people who lack the financial resources to heed an evacuation order, those with physical incapability etc. For all these audiences no one message or channel is going to effectively communicate the warning message. Therefore audience segmentation will be of essence.

2.5.5 Feedback and response to warning messages

Feedback is an important component of communication because some are unidirectional, whereas others are interactive. Whatever the channel used it should provide a feedback channel for questions, comments and suggestions.

2.6 Elements of Flood Early Warning System

Hossain (2009) outlines three elements of flood early warning system as forecasting, dissemination and response:

i) Forecasting comprises of provision of data and preparation of flood forecasts and warnings. The data should be accurate and available in real-time for it to be useful for forecasting and so that end users have confidence in their reliability. In addition, forecast and warnings should be understood by end-users, and available in time for end users to be able to take actions to mitigate the effects of floods. Forecasting is a technical and scientific process that requires the information to be interpreted to the users/receivers.

ii) Dissemination is the process of relaying the forecast and warning information to end users such as disaster managers, farmers, local government leaders, municipalities, householders and infrastructure managers. Of importance in dissemination is packaging of information into forms that are understandable and usable by end-users as well as the speed at which information can be communicated to end- users.

iii) Response to forecasts and warnings requires an understanding of the forecast and warning information by the agencies and communities at risk to enable them to take action to mitigate the impact of floods.

An early warning strategy should combine all three elements for it to be effective. ISDR (2006) proposes a checklist for dissemination and communication of early warning that includes recognition and understanding of warning messages. ISDR (2006) proposes a checklist in regard to recognition and understanding of warning messages. Firstly, warning alerts and messages should be tailored to the specific needs of those at risk, such as diverse cultural, social, gender, linguistic and educational backgrounds. Secondly, they should be geographically-specific to ensure warnings are targeted to those at risk only. Thirdly, the warning messages should incorporate the understanding of the values, concerns and interests of those who will need to take action. Fourthly, warning messages alerts should be clearly recognizable and consistent over time and include follow-up actions when required. Similarly, the messages should be specific about the nature of the threat and its impacts. Additionally, there is need to study how people access and interpret early warning messages and lessons learnt incorporated into message formats and dissemination processes. Finally, there is need to ensure that early warning information is consistent across different departments, agencies, society and individuals to avoid ambiguities and uncertainties.

In order to achieve the aspects in the above check list, each of them needs to have different types of communication media depending on the nature and contexts and people.

2.7 Communication Strategies for Disaster Management

A communication strategy is "a well-planned series of actions aimed at achieving certain objectives through the use of communication methods, techniques and approaches" (Mefalopulos and Kamlongera 2004, p. 8). This definition implies that the basic element to strategy is planning. A communication project, especially one in which

the success of the project can mean the difference between life and death for another person, for example, in a flood situation, is not absolved of this necessity. Communication of climatologically, geological and technological hazards, risk and disaster information and warnings to the public are better communicated through the application of specific strategies that take into account the human psychology and trigger public response to warnings of disasters (Mefalopulos and Kamlongera, 2004).

2.7.1 Flood Warning Effectiveness and Human Psychology

There are many situations when flood warnings often fail to be effective and for many reasons including, inhabitants unwillingness to leave their property, belongings and livestock out of fear of looting and vandalism; the actions of neighbours or weather may contradict the official warning; some people do not follow the dictates of authority and may ignore official advice; some people cannot heed warnings because they may lack the physical or mental capacity to respond, or they may be absent from their dwellings; some of those at risk may not be worried about flooding until they suffer a loss; and populations at risk being very diverse, which mean that they have different priorities, languages and levels of understanding of the flood warning (Plate, 2002). Therefore, dissemination methods and in particular, warning delivery, receipt and response need to be reviewed to so that they are appropriate to trigger action. The messages should focus on educating individuals about the threats or risks that will be brought by the flood, including the likelihood of the disaster occurring, the severity of the disaster and the consequences.

Effective early warning communication is based on the understanding of the processes that individuals go through when they make decisions about modifying their personal

behaviour. Warning communication specialists need to understand human behaviour in order to design and implement effective warning messages. Such messages should be intended to increase people's knowledge about the chances of the disaster happening and its potential impact on health, well-being and quality of life, in order to change their attitudes so that they feel a sense of urgency and personal responsibility associated with protecting themselves.

2.7.2 The Persuasive Communication Continuum Model

People's reaction to warnings of an impending disaster is not well characterized by a stimulus response model. However, communication models that lead to behaviour change can be applied. Such a model is the continuum of persuasive communication.

The success of a warning rests in the individual's awareness, understanding, and acceptance of their risk (Lindell and Perry, 2004). Effective public awareness programs are based on understanding the process that individuals go through when they make decisions about modifying their personal behavior (Redmond, 2000). This can be seen through the stages of persuasive communication that leads to behavior change. Figure 2 below shows the stages of persuasive communications

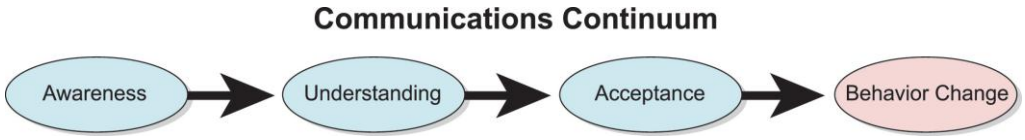

Figure 2.2 Stages of Persuasive Communications

Source: (Redmond, 2000).

Redmond, (2000) asserts that for individuals to heed evacuation warnings, they need to first be aware of the risk. Secondly, they should understand the impacts of the hazard on themselves and their family/community. Thirdly, they need to accept the idea that failure to follow the warning message can result in losses of all kinds. Finally, they need to take action and heed the warning to evacuate. Therefore the communicator should know the intention of the message. If the intent is action (behavior change), then public warnings messages are to focus on moving the public through the initial stages of awareness, understanding, and acceptance in order to achieve behaviour change (Lindell and Perry, 2004).

Redmond (2000) asserts that human beings will not respond to flood warnings unless their denial of threat is overcome by sufficiently persuasive evidence of threat. This can be achieved when the messages aim at eliciting a specific response from the public, other than merely raise awareness or provide knowledge. The messages should possibly describe actions that can be taken to mitigate the negative consequences of the threat.

2.7.3 People Centred Early Warning (P-CEWS)

Early warning should be people centred and its objective is to empower people and communities threatened by hazards to act in sufficient time and in an appropriate manner to reduce the possibility of personal injury, loss of life and damage to property and the environment (UNISDR, 2006). Effective early warning should have clear messages and information dissemination systems that reach those at risk (León and Bogardi, 2006). The elements of P-CEWS are illustrated in figure 2.3 below.

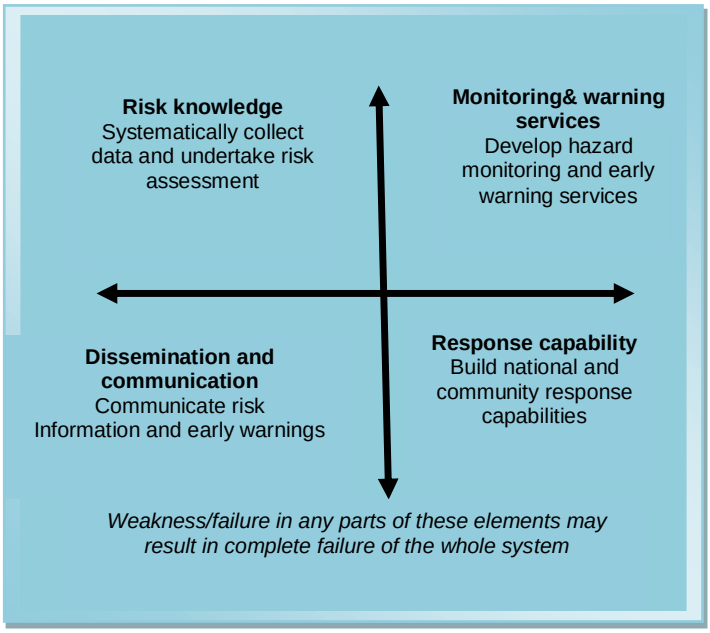

Figure 2.3: Elements of People-Centred Early Warning Systems

***Source*:** (ISDR, 2006)

A people-centred early warning system is comprised of four key elements: knowledge of the risks; monitoring, analysis and forecasting of the hazards; communication or dissemination of alerts and warnings; and local capabilities to respond to the warnings received (Basher, 2006). Ultimately an early warning system will only be effective if all components are effective. It is worth noting that every element of the P-CEWS requires its own type(s) of communication strategies and message content to achieve the desired outcome.

Various communication types act as linkages of all the elements and play a critical role not only in dissemination of information but also in risk knowledge. Risk assessment may be based on historical experience, which when shared enable individuals to not only know the hazards but also to understand the patterns and trends (León and Bogardi, 2006). This can be achieved through oral narratives that are passed down from

generation to generation. For instance, at Simeulue community in Indonesia, the story of what happens to the sea before a tsunami and how the buffaloes rush towards the hills has been shared by families for years and this played a role in early action for the community (*Ibid*, 2006). As a result, during the Tsunami in 2004 Simeulue community lost only seven people whereas other areas lost thousands of lives.

On dissemination and communication, UNISDR (2006) emphasizes that warnings need to reach those at risk; they should be clear messages containing simple and useful information to enable proper responses that will help safeguard lives and livelihoods. Multiple communication channels are necessary to ensure as many people as possible are warned and to reinforce the warning message. However, Basher (2006) argues that communication and dissemination component has been recognised as the component which lacks sufficient attention and results in a huge gap between the information produced by national level forecasting agencies and the information that is actually received and acted upon by the flood affected communities.

A problem, however, arises from the weak linkage between the technical capacity to issue an early warning and the public's capacity to respond effectively to the warning (León and Bogardi, 2006). This is mostly in regard to understanding of the warning by the individuals and community at large. This may be as a result of uncertainty inherent in scientific information such as the language and format used not being easily understood by the public.

Therefore, Benetiz (2004) contends that message construction is critical in influencing public response to disaster warning systems. The construction of effective flood warning messages is a complex task. Message need to be short, informative and prompt a response from recipients. Construction of warning messages should have

characteristics such as specificity, repetition, consistency, legitimacy of the warning's source and timeliness (Lindell and Perry, 2004). Benetiz (2004) asserts that public confidence and safety depend on timely, clear and coordinated information management.

2.8 Disaster Preparedness and Mitigation

Although disasters are as old as human history, the damage caused by them is a cause of concern. Disaster preparedness is a term used to refer to capacities and knowledge or activities and measures developed by governments, organisations, communities and individuals in order to anticipate and respond effectively to the impact of likely, imminent or current hazard events or conditions (UNISDR, 2008), including the issuance of timely and effective early warnings and the temporary removal of people and property from a threatened location (WRI, 2003). Basically, preparedness is having plans in place to respond properly to an early warning. Disaster preparedness is the most important phase especially for natural disasters such as floods because flood preparedness measures or forecasting, warning and response are more feasible solutions as they are readily implementable and would entail less cost (UNISDR, 2011). In preparedness phase, all reliable and accessible communication and information systems should be utilized (Cate, 1994).

Thus, when a communication strategy for disaster preparedness is formulated, it should involve a communication mix that encourages and enables knowledge exchange and the empowerment of the members of communities to take action in preparing for and reducing the risk of disasters. Also, in determining the communication strategy to use, differences amongst the various media (radio vs. television, print vs. broadcast,

domestic vs. international) should be taken into account in order to recognize each one's distinct and potential characteristics (Cate 1994).

The process of disaster prevention, management and mitigation depends, among other things, on the effective exchange of information among the main stakeholders, namely, the community, the media, the technocrats, and public authorities (Krishna et al, 1998). Once vulnerabilities for disaster are identified, the public requires immediate and clear warnings and alarms to allow them to take adequate precautions. Insufficient communication in disasters situations contributes to communities' late response for early action that may spare many lives and livelihoods. Communication about disaster risks and vulnerabilities is a critical component of helping individuals to prepare for, respond to, and recover from emergencies.

2.9 Communication of Early Warning Systems

Early warning refers to the process of generating and disseminating warning messages that give individuals, communities and organizations sufficient time to react and protect themselves against harm or loss caused by certain hazards (UNISDR, 2008). Human community is daily susceptible to danger and hazardous situations but according to Samarajiva et al (2005), this may not necessarily result in disaster if adequate disaster warning signals are promptly sent to the vulnerable population. Early warning systems, coupled with better preparedness and response mechanisms, have proved to be very effective at reducing disaster risks (UNISDR, 2005). However, the continued occurrence of large scale disasters like the Indian Ocean tsunami in 2004 is an indication of lack of sufficient or effective early warning system in place (UNDP, 2005).

Early Warning System is about the capacities needed to generate and disseminate timely and meaningful warning information to enable those threatened by a hazard to prepare and to act appropriately and in time to reduce the possibility of damage or loss (ADPC, 2007). Rogers and Tsirkunov (2011) assert that a warning system should empower individuals, communities and businesses to respond timely and appropriately to hazards in order to reduce the risk of death, injury, property loss and damage. Hence, warnings are aimed at getting the message across and stimulating those at risk to take action (*Ibid*, 2011,). Gunasekera (2004) argues that warnings should be precise, clear, and consistent; they should be in simple language and be delivered in time for the recipient to take necessary action. In communicating early warning, Rogers and Tsirkunov (2011) emphasizes on the need to reduce false alarms by providing accurate information.

Lindell and Perry (2004) argue that if a community receives and understands advance information or warning on hazards, the adverse effects associated with the disaster can be minimized. Since effective early warning empowers people to respond appropriately to threat in order to reduce the associated adverse effects such as risks of death, injury and property loss and damage. Therefore, early warning is a critical element of disaster risk reduction. Integrating early warning into disaster risk reduction strategies prevents loss of life and reduces the economic and material impact of disasters (Dudrey, Enahoro, Kunathansak, and Xiao, 2009). To be effective, early warning systems should effectively disseminate messages and warnings and ensure public awareness to achieve constant state of preparedness (Shafiq, and Ahsan, 2013).

2.10 Adequacy of the Messages Communicated

Handmer (2001) and Glantz (2009) argue that for warning systems to be adequate they should satisfy among others the technical and communication attributes of informative, accuracy, timeliness, trustworthy and appropriateness to the audience:

In regard to being informative, warning messages should indicate what the threat is, what action should be taken, by whom and when, in understandable, unambiguous and consistent language. Accuracy refers to the truthfulness or veracity of a given statement by having the facts right. Since warnings are predictions about the future, there is inevitably some uncertainty. However, uncertainties can also arise from the construction and wording of warning messages themselves. Therefore, messages should be constructed in such a way that they reduce uncertainties and inaccuracies to reduce chances of future warnings being ignored.

Handmer (2001) and Glantz (2009) further argue that warnings messages should allow enough time for appropriate action. This is particularly a challenge for many disasters but mostly flash floods. Similarly, warnings are more likely to be heeded if they come from trusted and reliable sources. The credibility of the source is paramount. Additionally, a consideration should be given to the appropriateness of the audiences. The target audience for a warning consists of many sub-groups, each with its own needs and expectations, preferred way of receiving warnings and own ways of interpreting messages. No one warning source will reach or be understood by everyone. Therefore, warning messages should be designed with the needs and expectations of the ultimate users in mind.

2.11 Identified Gaps in Early Warning Communication

Cumiskey, Werner, Meijer, Fakhruddin and Hassan (2015) argue that communication and dissemination component has been recognised as the component which lacks sufficient attention and results in a huge gap between the information produced by national level forecasting agencies and the information that is actually received and acted upon by the flood affected communities.

According to the Global Survey of Early Warning Systems (Basher, 2006), there are many gaps and shortcomings in early warning communication. One of the gaps identified by the survey is lack of clarity and completeness of warnings issued. The survey identifies concerns that warnings are incomplete because they do not meet essential requirements for effective communication which include brevity, clarity, uncluttered presentation, use of non-technical language, identification of areas affected, explanation of potential losses and inability to clarify whether the information is a forecast or a warning. Warnings may fail to induce the desired response because the language of the warnings is too technical or in an inappropriate format to be understood by those at risk.

Similarly warning communication fails as a result of weak inter-personal and inter-agency communication, including between early warning service providers, response units and other sectors. This results into a disconnection between key technical agencies and the authorities for effective exchange of technical information and hazard warnings (Basher, 2006).

Another gap identified by the survey is the proliferation of communication technologies that have resulted in the loss of source credibility (Basher, 2006). The use of the new information and communication technologies, particularly the Internet in disseminating

warnings though useful for expanding the coverage and reducing time lags in warning dissemination, yet it is also creating problems of untargeted messages that induce wrong responses due to misinterpretation depending on the type of hazard under consideration. For example, while the Internet is a useful communication tool for hurricane warning dissemination in America, its use in disseminating warnings on El Niño floods in Tana River may prompt no response.

According to Auf der Heide (1989) one of the most consistent observations about disasters is that communication is inadequate. Owolabi and Ekechi (2014) argue that the yearly recurrence of flooding in Nigeria with disastrous consequences serves to illustrate the country's ill-preparedness and lack of efficient disaster management plan; particularly, communication is observed to be inefficient.

Betts (2003) posits that in disaster management there are both official and unofficial sources of warning messages in the chain of communication. He however argues that the communication chain is full of gaps and breakages resulting into disconnection and fragmentation of the communication network due to limited understanding of communication strategies for disaster management.

Benetiz (2004) argues that in order to facilitate natural disaster mitigation there is need to utilize various communication strategies in designing and evaluating effective channels and mechanisms of interaction between local and national governments and other organizations. It is in view of this that this study seeks to assess the communication of early warning Kenya and particularly flood prone Tana River County.

2.12 Maslow's Hierarchy of Needs Theory

The underpinning theory of this study is the Maslow's hierarchy of needs theory. The theory aids in identifying the motivating factors behind people's decisions when responding to early warning messages and the disasters when they occur.

There are five sets of human needs that motivate human behaviour, that is, physiological, safety, social needs, self esteem and self-actualization. Certain human needs are more fundamental than others and it is argued that satisfaction of these basic needs is necessary before higher needs can be addressed (Joseph and Linley, 2005). In the case of disaster management Donahue, Cunnion, Balaban, and Sochats (2012) argue that in order to better choose communication strategies there is need to understand the system of human needs. Donahue et al. (2012) assert that human needs are critical to defining emergency strategies because they determine both individual behaviour in emergencies and effective response. They further argue that needs affect factors that influence the response of individuals and communities and can in turn either reduce or increase barriers to preparedness behaviours and compliance with recommendations.

The Maslow's hierarchy of needs theory supposes that people behave as rational beings when making decisions to meet their perceived needs. However, disasters are likely to realign needs' hierarchy due to the change in needs and priorities wrought by a disaster. It is assumed that in a disaster situation a person will overlook physiological needs for safety and may demean self-esteem to acquire shelter even by begging. However, Donahue et al (2012) argue that generally actions of individuals in a disaster are typically consistent with the hierarchy of goals in Maslow's motivation theory. Therefore, there is need for communicators during disaster management to identifying the motivating goals and their relative values in order to decide on the communication

strategy to be used. There are other considerations that may alter the order of needs in the hierarchy. For example, a parent will risk his or her own safety for a child.

In peaceful societies, safety needs are relatively easy to satisfy. They become highly important during natural disasters, fires, accidents, and other life threatening situation (Joseph and Linley, 2005). In an emergency context especially for natural disasters such as floods and drought, one naturally thinks first of survival needs as the physiological needs that are necessary to sustain life, such as food, water and shelter. However, at such times perceived basic survival needs are fluid and sometimes difficult to define because they can include amenities related to items that are not essential for basic survival. According to Donahue et al. (2012), self actualization is well beyond the practicality for emergency response, while self esteem needs do not need to be addressed except that any emergency response must be respectful of the individuals they are helping.

2.13 Summary

An effective early warning system needs an effective communication system. Consequently communication infrastructure hardware should be accompanied by appropriate and effective interactions among the main actors of the early warning process, such as the scientific community, stakeholders, decision makers, the public, and the media. Disaster risk reduction measures require long term plans and early warning should be seen as a strategy to effectively reduce the growing vulnerability of communities and assets. The information provided by early warning systems enables authorities and institutions at various levels to immediately and effectively respond to a disaster.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 An Overview

This chapter presents the methods that were used in collecting and analyzing the data. The chapter outlines research design, target population, sample and sampling techniques, data collection procedure and data analysis techniques. The methodology for this study was mainly based on key informant's interview, community focus group discussions and secondary data.

3.2 Study Area

Tana River County is divided into three sub counties namely, Tana Delta, Tana River and Tana North sub counties. The study was carried out in Tana Delta Sub-county. The Tana Delta is the name loosely given to the floodplain ecosystem of the lower Tana River, a vast wetland complex on the Kenyan coast.

Tana River County is situated in a semi-arid area. Based on the 2009 Kenya Population and Housing Census, the county has a population of 240,075 with the number of households estimated at 47, 414.1. The County is generally dry and prone to droughts. The Tana River basin experiences a bi-modal rainfall pattern; the long rains are experienced from March–May and short-rains from October–December. It receives annual relief rainfall varying between 400mm and 750mm with mean annual temperature ranging between 30C and 33C. Flooding happens during these rainy seasons not as a result of local precipitation, but due to heavy rains in the catchment areas of Mount Kenya and the Aberdare Mountains. The local population is

predominantly from the Pokomo and Orma others include Somali, Wardei and Wata communities (Republic of Kenya, 2010). The main economic activities are farming, fishing and livestock-keeping for their subsistence (Leauthaud, 2009). Interestingly, livelihoods act as a form of local identity, for example, the Pokomo are associated with farming and fishing while the Orma practice pastoral herding. Charcoal burning is also practiced in the area, and the loss of vegetation cover caused by human activities may be a contributory factor to the flooding problem.

Besides floods, there are other disasters that are experienced in Tana River such as insecurity, resource conflicts and drought of which this research may draw lessons from.

3.3 Research Paradigms

The choice of research paradigm guides and sets down the intent, motivation and expectations for the research (Mackenzie and Knipe, 2006). There are three basic research paradigms, namely, positivism, interpretivism and pragmatic paradigms.

3.3.1 Positivist paradigm

Positivists aim to test a theory or describe an experience through observation and measurement in order to predict and control forces that surround us (O'Leary, 2004). Positivists research is most commonly aligned with quantitative methods of data collection and analysis.

3.3.2 Interpretivist/constructivist paradigm

Interpretivism or constructivist seeks to understand social experiences. Interpretivists approach to research have the intention of understanding human experiences (Cohen & Manion, 1994), suggesting that reality is socially constructed (Mertens, 2005). The interpretivist researcher tends to rely on the participants' views of the situation under study (Creswell, 2003). In Interpretivism, qualitative methods (interviews, observation, document review, visual data analysis) predominate although quantitative methods may also be utilised to support or expand upon qualitative data and effectively deepen the description (Mackenzie and Knipe, 2006).

3.3.3 Pragmatic paradigm

Pragmatism is not committed to any one system of philosophy or reality. Pragmatist researchers focus on the 'what' and 'how' of the research problem (Creswell, 2003); they apply mixed-methods research. Creswell further argues that the pragmatic paradigm places the research problem as central and applies all approaches to understanding the problem and the data collection and analysis methods are chosen as those most likely to provide insights into the question. According to Mackenzie and Knipe (2006) the paradigm and research question should determine which research data collection and analysis methods (qualitative/quantitative or mixed methods) will be most appropriate for a study.

This study used the inteprevists paradigm where the qualitative approach was applied. The data was from direct fieldwork observations, in-depth, open-ended interviews, and focus group discussions. The analysis yielded patterns and themes of qualitative

research (Patton, 2005). Interpretivists have the intention of understanding human experiences. I approached this study as an interpretivist, whose objective was to determine the effectiveness of early warning communication for disaster preparedness and to evaluate the community's understanding of existing flood warning messages in Tana River County.

3.4 Research Approach

This study employed the qualitative approach. According to Phillips (2005), qualitative research is a well established tradition in disaster research. Mileti, as quoted in Phillips (2005) argues that qualitative disaster research is appropriate for preparedness and response phases of the disaster cycle. Qualitative research involves concurrent data collection, usually, interviews, observations, documents, and/or visual records with data analysis, generally described as the process of searching for themes in data (Phillips, 2005).While the quantitative approach determines the researcher's choice and action, the qualitative research approach does not usually provide the research with a fixed recipe to follow. It allows the researcher to apply a research strategy best suited to the research. Interviews were carried out with key stakeholders and focus group discussions carried out with community members at the Tana Delta to compare the information given by the stakeholders concerning the community.

3.5 Research Design

Given the interpretive position adopted in this research and the nature of the research question, the case study methodology was considered the most appropriate approach to employ because of its advantages in revealing in detail the unique perceptions and

concerns of individual participants in a real-life situation. More specifically it provided a variety of participant perspectives. Yin (2003) defines a case study as an inquiry that investigates a contemporary phenomenon within its real-life context. Case studies are a strategy of inquiry in which the researcher explores in depth an event, activity, process, or one or more individuals (Mertens, 2005), as a result the researcher may gain a sharpened understanding of why the instance happened as it did (Somekh & Lewin, 2005).

Wisner, 2006 argues that case studies contribute more focused analyses which, in the context of human loss and damage, demonstrate the effectiveness of response strategies and prevention measures and identify lessons about success in disaster risk reduction. The case study approach makes use of multiple methods of data collection such as interviews, document reviews, archival records, and direct and participant observations of the phenomena under study (Yin, 2003).

3.6 Target Population

The target population for the study included all the people living in Tana Delta County, male and female. Communication Officers of government agencies that deal with disaster operations, disaster response officers in NGOs, administrative officers at the county, community leaders, women group leaders and religious leaders.

3.7 Sample Size

A sample is a selected group of a target population that can make a logical or representative statement about that population. My sample was drawn from the early warning communicators at the Meteorological Department, disaster response officers

in NGOs as well County officials, administrative and political officers at the county, community leaders, women group leaders, religious leaders and coordinators at the DMU in Tana Delta Sub-county. Seven (7) in-depth interviews and three (3) focus group discussion were conducted. The key informants were selected and interviewed from the headquarters and the coordinating offices in Tana Delta Sub-County. They included the early warning officer at the Kenya Meteorological Department, Water Resources Management Authority and the National Disaster Operation Centre headquarters in Nairobi. The Tana Delta Coordinators for Red Cross and Water Department, the Deputy County Commissioner and the Chief. Participants for the interviews were key informants chosen because of their relevance to the research topic, profession and length of stay at study area. The three FGDs were conducted in Tana Delta Sub-county. Each focus group consisted of six people. The FGDS were for men, women and the youth. The people that were included in the focus group discussion were heads of households, village elders, religious leaders, women leaders and youth leaders. The length of the FGDs was 60-90 minutes.

3.8 Sampling Procedures

In selecting research location and participants, the study made use of a combination of purposive and snowball sampling techniques (Patton, 2002). According to Strydom, Fouche and Delport (2005), purposive sampling is entirely based on the judgment of the researcher, in that a sample is composed of elements that contain the most characteristics, representative or typical attributes of the population. Purposeful sampling increases in-depth understanding by selecting information rich participants who have experienced and lived disaster situations (Patton, 2002).

Purposive sampling was used to select the study site. Tana Delta sub-county was selected conveniently because it is prone to flooding. The Meteorological Department was purposively selected because it is the source of early warning on weather and forecasting and the officers from Kenya Red Cross, WARMA and NDOC were chosen because of their role in coordinating disaster management activities at the grassroots level. Key informants were conveniently selected through snowball sampling so as to easily identify informants who could potentially participate in or contribute to the study.

3.9 Data Generation Procedures

Data generation methods used to gather information were specific to key informant interviews and focus group discussions.

3.9.1 Interviews

The primary method of data generation was interviews with experts who were involved in disaster management efforts and especially communication of early warning. Semi-structured interviews are preferred because of their flexibility to allow new questions to arise during the interviews, they are also appropriate in obtaining primary information from a limited set of experts in the study areas (Stallings, 2003). The interviews provided deeper insights on the experiences of those affected. Some of the questions asked were about the format in which the warnings on an impending flood were received, the channels used to communicate early warning messages to the community, and the adequacy of the strategies used to communicate early warning messages to the community. The questions were aimed at establishing the channels used to communicate early warning messages, people's understanding of the messages and the adequacy of the strategies used.

The composition of key informants comprised of the people that have a role to play in communication of early warning on floods. At community level, the interviewees were representatives of the community such as the area chief. The interviews were conducted at a venue organized within the community, mostly in the offices of the interviewees. An interview schedule was developed to loosely structure main topic areas derived from the objectives of the study and the research questions. Semi-structured interviews were conducted with the key informant; this is because they gave me the flexibility of retaining the structure of the questions but occasionally varying the order of questions depending on how the interviewees were responding. Permission was sought from the interviewees to use an audio recorder. I recorded the interviews using an audio recorder and transcribed soon after the interviews. All forms of recording were checked for accuracy by comparing with the notes taken during the interviews. The interviews were open-ended and clarification sought for unclear responses.

3.9.2 Focus Group Discussions

Focus Group Discussions are used when you need to understand an issue at a deeper level. They are helpful for adding meaning and understanding to existing knowledge. Three focus group discussions were held; one for women, men and the youth aged. Each focus group had six people; the youth's focus group had 4 male and 2 female. The key informant interviews had work experience of between 4 to 18 years in their various fields. The FGDs were used to verify the findings from the interviews with key informants, to establish if the community received warning messages and the community's understanding of those warning messages. The participants included

heads of households, village elders, religious leaders, women leaders and youth leaders. They were included on the basis of their availability.

The youth's FGD was held at the Red Cross Conference Room during the mid morning. The women's FGD was held at the Tana Delta Market in the early afternoon, this was the preferred time because it was after they had completed their house chores and before they got busy selling their goods at the market. The men's FGD was held in the evening at a venue where they meet for their men talk forum commonly known as '*gumzo la wazee*'.

The FGDs questions were open-ended and clarification sought for unclear responses. They all lasted between 60 and 90 minutes. Certain questions asked were similar in meaning to those asked during the key informant interviews so as to identify any similarity and difference in their answers. Permission was sought from the interviewees to use an audio recorder. To ensure that the nuances of the dialogue are not lost in the course of time, I transcribed the FGD a day after the FGDs had taken place.

3.10 Data Presentation and Analysis

According to Strydom, Fouche and Delport (2005), data analysis means finding answers by way of interpreting the data and results. Interpretation is to explain and find meaning, while, analysis is the categorization, ordering, manipulating and summarizing data to obtain answers to research questions.

For this study, qualitative data was analysed for themes relevant to the topic in line with the objectives and research questions of the study. Research scholars assert that data collection and analysis should be a simultaneous process in qualitative research (Merriam, 1998; Marshall and Rossman, 1989); therefore, data analysis begun in the

field during the interviews. Interviews were transcribed for analysis. They were then read and marked for common themes evident in disaster management. The common themes were clustered together in an effort to answer the research questions of the study. Emerging themes and recurring patterns from the interviews were noted and their relation to the study indicated. Some significant excerpts from the interviews were extracted to be employed in analysis and illustration of the various findings. Other themes unrelated to the research questions that emerged were also noted. Data presentation was done in form of coding and narration as indicated in the next chapter.

3.11 Trustworthiness

Qualitative validity is done to check for the accuracy of the findings. For this study, validity was determined through trustworthiness (Creswell and Miller, 2000). According to (Lincoln and Guba, 1985) trustworthiness in qualitative research is aimed at sustaining the argument that the research's findings are "worth paying attention to" (p.290). Trustworthiness can be determined through credibility, transferability, dependability and confirmability. Credibility is an assessment of whether or not the research findings accurately depict a credible interpretation of the data collected (*Ibid*, 1985). In this study, the primary data collected is a fair reflection of the problem being studied. The interview method of data collection gave me an opportunity to ask probing questions and seek clarifications where necessary.

Transferability is the extent to which the findings of the study can be applied to other situations. According to Strydom, Fouche and Delport (2005:346), transferability is alternative to generalization. From the interviews and FGDs I sought to establish some uniformity and consistency in people's responses.

Dependability is an evaluation of the quality of the processes of data collection and data analysis. Confirmability is a measure of how well the inquiry's findings are supported by the data collected (Lincoln and Guba, 1985). The study provides that if it were to be repeated with the same or similar respondents (subjects) in the same (or similar) context, its findings would be similar. In this study, the information obtained KMS and NDOC was triangulated with that obtained from FGDs and Interviews at the County level to establish consistency of the data generated.

In this study, trustworthiness was achieved through triangulation. Two data generation techniques namely, interviews and FGDs were used. The intention was to compensate for their individual limitations and make use of their benefits. Similarly, an examination of any documents referred to by the informants during the actual interviews and FGDs were used to verify particular details that are supplied by participants.

3.12 Ethical Issues

According to Creswell (2009), researchers should anticipate ethical issues to arise during a qualitative research process. Since research involves collecting data from people and about people (Punch, 2005), researchers should protect the research participants by ensuring that participants are not harmed, their privacy is maintained, and the participants have provided informed consent as this promotes the integrity of the research (Creswell, 2009). The following ethical issues were considered.

In regard to informed Consent, individuals participating in a research were informed about the nature of the study and the voluntary nature of their participation in order to choose whether or not to participate. They were given the option to withdraw from the study at any time without penalty as well as declining to answer any question during the process. Therefore, they were not coerced into participating. During the men's FGD,

two elderly men withdrew from the interview due to the fact that they cannot be interviewed by a woman, more so, a young woman. The interview was postponed until when I got others who were willing to participate in the FGD. According to Phillips (2005) researchers should accurately and honestly present their findings. Therefore data was analysed in a manner that avoids falsified analysis, misinterpretations or misstatements. Prior to starting data collection, I sought institutional approval to conduct the study from Moi University and from the National Council of Science and Technology (NACOSTI). I did not have to seek further clearance from the respective institutions as the letter from NACOSTI was sufficient.

3.13. Summary

In conclusion, the qualitative approach was employed for the study. Open-ended interviews were used to collect primary data while the analysis took into account both primary and secondary data.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter discussed the study's findings. The overall scope will be to assess the communication of early warning in flood prone Tana Delta by looking at the messages communicated, the strategies used to communicate early warning messages, the community understanding of existing flood warning messages and the response to warning messages.

The study sought to look into the communication of early warning for disaster preparedness by answering the following questions:

1) What is the content of early warning messages to the stakeholders and the residents of Tana River County?
2) How is the community's and stakeholders' understanding of the flood warning?
3) What strategies are used in conveying flood disaster early warning to the residents of Tana River?
4) How adequate are the strategies used in communicating early warning to the residents of Tana River County

4.2 Content of Early Warning Messages

The study sought to assess the content of the early warning messages as received by the community. From the key informants, the study established that the information communicated varied depending on their line of duty. For example the Kenya Red Cross (KRD) office were informed of an impending flood, however the details of the

information was related to offering relief and evacuation services. KRD prepared to respond after the disaster has occurred. WRMA headquarters and the Water Department in Tana Delta got information that indicated the water level, time of the flood, duration of floods and level of distraction. This was however for the departments own planning. The District County Commissioner at Garsen also got detailed information through a government circular that there was an impending flood; the circular had details of the coordination efforts to be put in place, the people and agencies to contact for response.

However one of the respondents indicated that the information was scanty especially because it was received through an SMS followed by a telephone call. The SMS was as follows:

> "Information from the national govt indicates that TD is likely to experience floods in coming days, inform your people to be ready and prepare to respond" (KI07).

From the FGDs it was established that the information was not clear. The community was informed to relocate for relief to higher grounds away from river banks; however the exact place where they were to relocate to was not mentioned. Most of the residents were not aware of the location because they had relocated to different locations during previous flooding incidents. In case they are submerged by water before they relocated they are to move immediately, however safer routes for evacuation were not indicated, yet the means and resources were not provided. They were to buy/store food stuffs, acquire nets and be aware of disease breakout. This study established that in terms of content, therefore there was sufficient information to the stakeholders but not to the community at risk.

4.3 Understanding of the flood warning messages and adequacy

The study sought to establish the community's understanding of the flood warning messages. It was established that there was generally good understanding of the messages among the key informants. However, when sent through SMS information was not understood because it was considered not sufficient. One of the respondents commented that

> "An SMS cannot deliver detailed information and the language used in an SMS is sometimes personal" (KI07).

On the other hand, the circulars from government are detailed thus well understood. NGOs and CBOs coordinators were trained in their areas of operation so they understood well the kind of information from the headquarters. The Kenya Red Cross volunteers understood the flood warning messages since they had been sensitized. However, they indicated that they needed further training on how to interpret messages from KMD and WMO websites, which they had access to but was technical.

Communication to the community regarding impending floods required them to relocate to higher grounds, build dykes, buy and/or store food stuffs and to be aware of disease breakout. However they felt that the warnings were not very clear and warning information was not adequate. One of the respondents commented.

> 'when we are told those who are down to move up, we do not know how far down (they need to specify), when you say move to higher grounds you are not told the exact location, how and when, we are not told which areas will be affected most and how long the rains will last' (FG01).

Another one remarked that,

> ‘sometimes we are totally in the dark, like now our farms in Bura are flooded and no one told us, we do not know if there is rain anywhere’ (FG01).

Most participants in the focus group discussions echoed that the content of the information was not sufficient in that it should indicate when the floods are expected, the water levels, the impact, the duration the actions to be taken and the resources required/provided.

The community had general understanding of floods; they indicated that they generally knew what to do through experience and some received the information through television and radio. Some of that respondents indicated that the warning messages are not easily understood due to the technical language used by the media houses and websites; and the limited vocabulary of the respondents. However, it was not established if what they know to do before, during and after flood events is appropriate and in line with agreed flood disaster preparedness and response strategy within the national draft policy on Disaster Management, since they indicate that they have know it through experience.

4.4 Strategies Used to Communicate Early Warning Messages

The study also sought to assess the strategies used to communicate early warning messages. Reception and dissemination of flood warning is a technical process involving different disciplines, stakeholders and decision-making levels. Most of the people identified word of mouth, radio and television as their main source of information. Only a few used newspapers as a source of regular information. This

might be due to the low levels of literacy of the people. None of them from the FGDS had received any form of publication being distributed to them pertaining to flood awareness.

4.4.1 Reception of flood related warning messages

The warning messages were received and disseminated through a range of mediums. In Kenya, a number of national and local level agencies are involved in generating and disseminating flood-related information. At the national level, KMD is responsible for producing forecast related information and for disseminating it to national and/or government agencies and to non-governmental and local level agencies. KMD received this information from their FEWS and other organizations such as the WMO. Telephones calls, email and SMS are the main channels of dissemination among the stakeholders; however, traditional methods such as printed hard copies are still used by the government in form of government circulars.

The KMD disseminates the forecast information through radio, television and their website to the public and other relevant agencies at the national and local levels. The NDOC receives official communication on flood related information from the KDM. However they also access it from the KDM website and have a signal from the FEWS.

The Kenya Red Cross in Tana Delta receives communication from the head office and county office. This communication is done through emails and SMS and sometimes face-to-face meetings. WRMA indicated that the flood warning messages are not generally availed to them until they collect it for their own use from the KMD and the WMO websites and hold consultation with KMD. However, WRMA plays a limited role in the overall National Disaster Risk Management Cycle. WRMA shares the

information with the Water Department. The County government (DCC) received communication from the National government through circulars.

The community had various sources of information on flood warning. The information was received from NGO/CBOs, chief/village baraza and sometimes from schools and government's social and health centres. The elderly observed that local knowledge was used to determine the onset of the rains for example certain birds singing, the movement of clouds in a certain direction and when the weather becomes extremely hot. However, this information was shared among themselves through their evening forums commonly referred to as '*gumzo la wazee*'. The young people did not believe in those indigenous forecasting messages, and would not take them seriously as a form of early warning regarding floods. The youth who volunteer at the Kenya Red Cross indicated that they were on various social media platforms such as Facebook and twitter where they could access information regarding impending floods.

4.4.2 Strategies used to communicate flood early warning messages

There were no documented strategies in place for most stakeholders. However the following channels were generally used broadcast media (TV, radio and newspapers); government circulars which were used by government officials, SMS, phone calls, and meetings were used. It was observed that only a few of the respondents received information regarding flood occurrences from television and radio. Other respondents were only aware that the television advertisements exist and were unaware that other media forms such as the Internet could be used to access information on weather conditions in their area. Those who used television and radio as sources of information acknowledged that standard weather forecasts during the news on radio were their main

source of weather information and not TV interviews and radio talk shows that were used by NDOC and KMD. One of the responded observed that:

> The weather segment on TV looks like an afterthought, as it is aired at the very end of the news and there are no interpretations of what it means to a lay man (GF01)

The MEWNR had an established communication strategy, which WRMA was implementing. WRMA communicated through an email platform, which they referred to as trending mail, SMS, telephone calls, Open Data Kit (ODK), Integrated Flood Management Committee (IFMC), Water Resource User Association (WRUA) and other media campaigns. However, this communication from WRMA was between the headquarters and the regional offices and a few selected people.

The national government did not have documented procedures for communicating but a practice that communication flows downwards to the County Disaster Management Committees. Therefore the County commissioner received the information through the government circular and further communicated to the disaster operation agencies, administrative officers and other CBOs.

As much as the NDOC engaged in media campaigns through talk shows on TV and radio to sensitize the public on an impending flood, the community did not have access to these channels of communication. The information was received by those who are in urban areas. Chiefs used *barazas* and asked the village elders and those who attended the *barazas* to spread the message through the word of mouth. However, not everyone attended the chief's *barazas.* Some respondents argued that at that time people are trying to salvage the little they have from the farms, and they have no time to attend the barazas. The women for example would receive the warning messages through the Women's meeting (*Maendeleo ya Wanawake*), however, some of them viewed

Maendeleo ya Wanawake meeting as a political group. One of the respondent one of them commented that

> ‘mikutano ya Maendeleo ya Wanawake ina siasa tupu na mimi si mtu wa siasa’ (FG01).

Respondents asserted that there was no formal warning given on flooding before it occurred, which they could refer to specifically.

4.4.3 Community’s preferred channels of communication

The study sought to establish the preferred channels of communication by the community. The preferred channels by the community included, use of public loudspeakers and other local means such as announcements from local churches and mosques; use of mobile boats and vans and broadcast from the high towers. For example, one quipped that;

> “if churches and mosques announced the information on expected floods through microphone and loudspeakers as they do when they are preaching, we will hear even if we do not belong to their religions (FG02).

They also indicated that frequent meeting should be held, because the monthly Chief barazas were not sufficient when there is an impending flood. The elderly preferred the traditional methods of drum beating at public places to draw the attention of people about the incidence of flood, hoisting of red flags to identify the areas that will be submerged and cultural events with flood warning messages as an underlying theme. One of the old men observed that

> “in our days we would beat drums to announce the onset of heavy rains that are likely to cause floods, and the drums were unique to various events and when floods begun we used handmade microphones and loudspeakers to tell people to move. We did so without any financial benefit… ” (FG02).

For example, a unique traditional drum was beaten or a horn blown to bring together people for a meeting. In this way, more people were gathered because they were all familiar with the traditional signal. This ensured the success of awareness campaigns because more people were aware of the unique signal. During such meetings a local theatre group highlighted the event through drama with important messages.

During the focus group discussion, the importance of indigenous knowledge systems in preparation for or in response to a disaster was emphasized. However it was observed that the traditional methods are almost becoming extinct, as the young people prefers the main stream and social media,

> "now days, the youth no longer sit with the elderly men to lean of the traditional ways of doing things… therefore we have no one to pass the traditional methods for future generation " (FG02).

Oral traditions strategies like folklores ensured that indigenous knowledge on various issues was passed on from one generation to the next and this ensured its preservation for years on end. The preservation and handing down of these knowledge systems should be stressed and encouraged.

Some of the key informants in Tana Delta indicated that besides telephone calls there should be meetings with experts where they can ask questions for clarity. They also suggested the establishment of a community radio to broadcast in the local languages (Pokomo and Orma). The women noted that the children should be told in schools, one of the commented that

> "…even though I'm not educated enough to hear what is being said on the radio, but if my child is told in school he will tell me" (FG02).

It was also observed that there was need for NGOs and CBOs to include flood warning dissemination as one of their core activities not just evacuation.

4.5 Adequacy of the Strategies Used in Communicating Early Warning

The study also assessed the adequacy of the communication strategies used. From the interviews with the key it was revealed that the channels used were generally adequate. They included the broadcast media (TV, radio and newspapers), government circulars, SMS, phone calls, meetings email platform, trending mail, SMS, Open Data Kit (ODK), through the Integrated Flood Management Committee (IFMC), Water Resource User Association (WRUA) and other media campaigns. The DCC indicated that the circulars from the national government were very elaborate.

However, the chief who received communication through SMS and telephone calls felt that it was not adequate; he indicated that the SMS could not carry much information and the language used was personal. The Chief in turn communicated through the Chief's baraza, however not everyone attends the baraza. And the information is therefore passed down by word of mouth where the probability of either losing its original meaning or not being shared was high.

From interviews with officers from the Meteorological Department and WRMA it was established that they hold different understandings and perceptions regarding the adequacy of early warning communication. They argued that the current systems are adequate but they also believe that they could be further improved. The Meteorological Department indicated that flood affected villagers are informed through websites, television and radio and by local authorities about an impending flood, however, most of the people in the community do not have access to this channels of communication. An officer from Red Cross, for example acknowledged that even though they had detailed information on an impending flood and logistical information such as evacuation procedure, that information was not available for the villagers to consume

in a way that they can understand better and with a wider reach. It was also observed that this information on flooding and actions to be taken had not been translated into physical tools such as brochures or pamphlets that can be distributed to the affected communities as part of the ongoing flood warning campaigns.

4.5.1 Credibility of the information sources, timeliness and accuracy

The study also looked at credibility of information sources, timeliness and accuracy as aspects that enhance the adequacy of warning messages. The study considered the credibility of the warning messages because for the messages to be acted upon effectively the information should be credible. It was revealed that the general warning messages on an impending flood come in early - about two months before the onset of the rains and subsequent floods. Water department/WRMA however indicated that the actual information on the onset of floods comes 2-3 days to the floods and it is accurate. For example if it rains heavily in Garissa, it will take three days for Hola to experience floods and six days for Garsen to experience the floods.

The Red Cross volunteers indicated that the warning came early because they were selected and trained two months before the floods occurred. Although the real communication on the occurrence of the floods came 1-2 days before the onset of the floods from Red Cross offices in Hola. They felt that the information was credible because it was communicated from the Red Cross headquarters. However, since Red Cross deals with evacuation, most of the information they receive is used to prepare for evacuation.

The community indicated that there were rumours that there will be floods. If they considered the information as rumours that meant that they were not sure of the sources of their information and hence the sources were not credible. For them, the real warning comes 1-2 days to the flood, which is not sufficient enough to relocate and save property because their homes were submerged by floods and property destroyed.

The response from the FGDs was that they were not sure because they received information from everywhere and some sometimes it caused confusion. However, they indicated that they trust the Red Cross because they also give the relief aid. Yet Red Cross did not consider their role as communication of flood warning messages but to deal with evacuation after the flood.

The Chief's barazas were thought to be credible because they represent the government. Radio and TV were not considered credible because

> "they sometimes reported conflicting information and sometimes they report there is going to be a flood and it does not occur" (FG01).

One of them asked.

> 'who owns the radio, TV and newspaper and who gives them information?
> (FG01).

The women indicated that sometimes they get the information ('*rumours*') from the market place and they do not know who started it or how true it is, but when they get from their school going children they knew it was credible because teachers are government representatives. As indicated earlier women for example would receive the warning messages through the *Maendeleo ya Wanawake* meetings, however, some of

them viewed *Maendeleo ya Wanawake* meeting as a political group and according to them information from politicians is not credible but for individuals' political mileage. There is therefore a perceived challenge in accepting the warning messages depending on who is communicating and the channels of communication.

4.6 Community's Response to Warning Messages

The study also considered the community's response to warning messages. It was revealed that a number of people did not respond as expected. They indicated that

> 'for most of us floods found us in our homes and destroyed our property' (FG01).

Some did not relocate because they expected relief from Red Cross and CBOs. Another one said that

> "I did not want Red Cross to come with relief food and find that I have moved, I will miss out" (FG02).

Others did not move due to lack of resources; they did not have money to buy tents so they waited for Red Cross to distribute, however, the Red Cross responds after the floods. The pastoralists (Orma) did not to relocate because they were in the forests seeking pasture for their animals and did not get information on an impending flood while others did not want to leave their livestock in the fields. One of them said that;

> "I would rather die with my animals and save a few than leave them to go without pasture" (FG02).

The farmers (Pokomo) did not relocate because it was about harvesting time and they were trying to harvest and store their food crops. Others indicated they did not relocate because of lack of clarity on what exactly should be done, for example when they're

told to move to higher grounds they are not told where they were to relocate to, how, when and for how long. However, others did not relocate because they did not believe in the information communicated; one indicated that

> "I did not move because I did not think the information was true" (FG02).

4.7 Losses as a result of flooding

Generally all respondents stated that loss of property and lives were their main concern. That means that flooding affects their daily lives. However this was a concern more from the female respondents. This is most probably because most of the women were married with children and culturally their family is their main concern. When asked them about what type of loss they encountered most of them agreed that loss of life, their houses and loss of crops affected them strongly. For men their major concern was about loss livestock.

During the flooding in November-December 2015, one life was lost. Other losses experienced included loss of livestock, damage to crops and farm products, houses, infrastructure and there was an outbreak of water related diseases such as cholera which is as a result of destruction of pit latrines and contamination of drinking water. Some losses came from how they responded, for example one remarked that,

> 'I bought a lot of dry foods but my home was not affected by floods, hence the food was spoiled and that money I would have used it for other purposes'(FG01).

Loss of crop produce due to floods led to food shortages and sudden rise in commodity prices.

4.8 Limitations of Methodology

Some institutions such as the NDOC were reluctant in providing information to a student for research purpose. They seemed more enthusiastic with survey/study from where they will get financial benefit. At the KMD the concerned officials were busy with their normal activities and it was difficult for me to arrange a meeting where the officials do not find any significance. I had to postpone an interview with the KMD official thrice. Another limitation was related to cultural practices. During the FGDs, there were men who indicated that they cannot be interviewed by a woman especially the elderly men.

4.9 Summary

The study revealed that as much as stakeholders seemed to have adequate early warning information, the information provided to the affected community is not sufficient enough to help them take proper action within appropriate time frames. Early warning messages in printed and physical forms such as brochures and pamphlets were not available. These could help the affected people to act more appropriately in the event of flooding. It was also observed that the lack of wider coverage by a variety of media in disseminating the information resulted in limited penetration of the warning messages to the community. As a result the early warning communication in Tana Delta appears to be inadequate and does not result into early response in order to save lives and livelihoods.

CHAPTER FIVE

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 An Overview

This chapter provides a summary of the main findings, conclusions and recommendations drawn from the study. It also suggests areas for further research.

5.2 Discussions

From the study, my view is that although natural disasters cannot be prevented but their social and economic impacts on lives and property can be considerably minimised with adequate communication of early warning that will result to appropriate response. This study reveals that members of the community in Tana Delta are affected by floods. The floods are disastrous to the community by way of loss of livelihoods (crop and livestock) and damage to property. In this study, the community members knew about floods and there were various sources of conveying flood information.

It came out from the study that the community was not organized to participate in flood management initiatives. Unlike in other flood prone areas like Nyando where there are Community Flood Management Organizations (CFMOs), which are voluntary self-help groups established in the flood prone areas for the purpose of managing flood hazard. There are rain gauges where the CFMOs get information on real-time water levels during the rainy seasons and are able to alert the community. However, such a project is yet to be established in Tana Delta. There is no indication of any real-time water level or rain gauges that can disseminate this information to the community in Tana Delta. From the interview with the Officer at WRMA, I established that, in the Nyanza region

there is the Gucha-Migori Flood Management project. The members of this project are empowered to a point that they can read the gauges and interpret the impact; they have capacity to do data analysis and can tell, for example, if the water level is at a given level what number of people will be submerged and affected. Such organized grouping provide structural platform upon which preparedness practices are realized, through rolling-out local flood management initiatives (Mulwa, 1998).

The study also established that there is considerable weakness in framing warning messages and dissemination procedure to the community which reduces the effectiveness in enabling the community members to take protective action to reduce the negative impact of floods. The existing modes of dissemination were not coordinated.

It was observed that there was no mutual information sharing among the government, disaster management agencies, non-governmental organisations, the private sectors, vulnerable communities and the media hence the frequency at which disaster strikes with its destructive impacts. Yet, Warfield (2008) asserts that communication is the link that ensures collaborative efforts at all levels in order to mitigate against, prepare for, respond to disasters and their effects when a they occur. This therefore calls for regular pre-disaster contact among concerned stakeholders for proper management to optimize efficiency of planning and response.

The Tana Delta is dominated by a floodplain, at the upper section of the River there is the Masinga Dam that serves as a water reservoir, while the others Seven Folks dams are hydro-electric stations (UNEP, 2012). From my observation, one of the factors contributing to flooding is the overwhelmed dams as well as deforestation leading to exposure of soil to agents of erosion. For example while in Tana Delta, the Bura farms

were flooded as a result of overflow from the Dams. From my observation there was no indication of any type of physical warning system in place that directly connects to the community to show that the dams are almost full and the water is likely to overflow into the nearby farms. In my opinion such a warning will communicate and alert the community to respond accordingly.

Generally the communication Officer at the Kenya Meteorology Department and the officer from the Water Department at Tana Delta agree that they are part of a systematic structure that can effectively report early warning messages and other weather occurrences for early response. However, from the community, in the flood prone Tana Delta, they are not aware of any communication from KMD or the water department; according to residents KMD and the water department are almost non-existent.

5.3. Flood Warning Strategies

Warning messages according to Pearson, Nelson, Titsworth, S. and Harter, (2006) should be appropriately designed and clearly stated for a specific audience. According to the findings in this study, there are gaps that exist in the current communication strategies between the community and the organizations involved in disaster management initiatives. Mefalopulos and Kamlongera (2004) argue that disaster information and warnings to the public are better communicated through the application of specific strategies that trigger public response to warnings of disasters. Redmond, (2000) recommends using channels of communication that exist in the community. Therefore there is need for the National and County Governments and the agencies that deal with disaster management to identify or design appropriate information and communication tools or channels that might help to bring the early warning messages to the communities at risk. The warning messages should be designed such that they

match information users and information needs through the process of audience analysis. Audiences differ in many aspects, consequently they should be clearly defined (Pearson, Nelson, Titsworth, S. and Harter, 2006). Traditionally, the forecasts or warning messages mainly target national and county level decision makers. However, when floods are approaching severe conditions, warning messages should be produced for the use by those at risk. This study reveals that the traditional forecasts and warning message did not fully correspond to the needs of those at risk in Tana Delta, but to the stakeholders.

5.3.1 Persuasive Warning Messages

Assessing the efficiency of warning messages will enable communicators to employ communication strategies that trigger a response. Redmond (2000) argues that people will not respond to flood warnings unless the messages elicit a specific response other than merely raising awareness or provide knowledge, while Handmer (2001) asserts that if people at risk are to take action, then warning messages must mean something to them. The objectives of flood forecasting and warning are to enable and persuade people and organizations to be prepared for the flood and take action to increase safety and reduce damage. Flood warning can be seen as a social construct, since the warning message usually serves as a starting point for individuals and groups to make decisions and take protective actions when confronting the flood threat. For those residents who would generally not take action even after the warning messages have been communicated like the pastoralists who indicated they would rather die with their animals, the warnings should focus on actionable messages that residents can quickly understand the risk. The receivers should understand the meaning and relevance of warnings, how they relate to their lives in order to respond appropriately.

To address the receiver's apathy, Mileti (1995) argues that those designing warning messages should take into account the social psychology process of the receivers in order to foster pre-disaster protective actions. In this case the perceptions of the farmers and the pastoralists should be put into consideration. The social psychology process is divided into several phases as follows, hearing a warning; forming a personal understanding of what was meant by the warning; developing a level of belief in the risk information conveyed in the warning; personalizing the risk or perceiving it to be someone else's problem; and deciding on what to do and responding in ways thought to be appropriate for the risk personally faced (Mileti, 1995). Since people respond to warnings through a social psychological process, planning for effective public response to disasters means that this social and psychological process need to be understood and addressed by those who disseminate warnings to those at risk.

Similarly, the communicators should also consider the warning factors that influence public response. These factors include warning sources, warning message consistency, message accuracy, warning clarity, certainty of the message, sufficiency of the information, guidance on action(s) to be taken, warning frequency, risk location information and the communication channel (Mileti, 1995).

5.4. Credibility of Warning Messages

Credibility of the warning message is a product of the forecasting organization, in this case the KMD and by extension the National Government. Therefore there is need for the early warning users to have confidence in the early warning authors. Basher (2006) noted that the proliferation of communication technologies results in loss of source credibility. For example, the KMD has most of its warning on their website, however internet is still a strategy that is yet to be explored by the Tana Delta residents and its

use may prompt no response. Betts (2003) posits that there is need to identify both official and unofficial sources of warning messages in the chain of communication in order for the early warning messages not to be considered as 'rumours' as was established from the FGDs in Tana Delta. It is therefore recommended that the KMD and NDOC find a means of directly communicating to those at risk in order to enhance the credibility of the sources of early warning information. This could be achieved by having an office or contact in Tana Delta.

5.5 Dissemination

The methods of dissemination that can be utilized in a disaster situation are varied and depend on the needs of those at risk. To effectively reach those at risk, Redmond (2000) recommends using existing channels in the community. From this study, forecasts or flood warnings messages are first disseminated to the stakeholders who pass it on to the community. The study established that a number of national and local level agencies are involved in generating and disseminating flood-related information. They include Kenya Meteorological Department, National Disaster Operation Centre and Disaster Management Committees at both national and county levels.

According to Basher (2006) dissemination component of communication lacks sufficient attention and results in a huge gap between the information produced by national level forecasting agencies and the information that is actually received and acted upon by the communities at risk. This may be as a result of uncertainty inherent in scientific information, such as the language and format used, such as Internet, not being either easily understood or accessed by the public.

The study also revealed that that the performance of the present flood warning dissemination system serves well the government officials, disaster managers, policy

maker, NGO's, print and electronic media that have access to the internet and telecommunication system - they get the flood warning information in time. Yet the flood victims and those at the grassroots level who do not have access to all modern telecommunication and information technology facilities do not receive flood early warnings in time to enable them respond accordingly.

According to VUSSC (2009), there is a need for coordination among all the stakeholders. The parameters for participation by each of the stakeholders need to be clearly outlined to avoid overlap and confusion but the focus for all of the stakeholders should be the local people, who are at risk of being potential victims.

5.6 Channels of Communication

The flood early warning messages are received and disseminated through a range of mediums while a number of national and local level agencies are involved in generating and disseminating flood-related information. Emails, Internet, telephone calls and SMS, radio, TV and Newspapers are the main dissemination routes of flood early warning messages. Traditional methods such as, chiefs' and/or village elders' barazas and announcements in social gatherings and public notices are also in use in Tana Delta. This agrees with UNISDR (2006) assertion that multiple communication channels are necessary to ensure as many people as possible are warned. However from the key informant interviews, it was established that as much as different methods such as media broadcasting, information on websites, mobile technology and social media have been used to disseminate information in recent disasters in the urban areas, those channels are not easily accessible to the residents of Tana Delta.

Risk assessment as an element of People Centred Early Warning system requires that warning messages to be based on historical experience, which when shared enable

individuals to not only know the hazards but also to understand the patterns and trends (León and Bogardi, 2006). Therefore traditional communication strategies such as oral narratives that are passed down from generation to generation may be used for the communities in the rural areas such as Tana Delta.

The KMD acknowledged that their main point of delivery is through their website, radio and the TV. However majority of the community do not have access to the internet and even those with internet access do not browse through the KMD websites. This study concluded that internet access is not widely available for use by the community and therefore not accessed for information. Redmond (2000) argues that there is need to consider the channels of communication that are accessible to the recipients. In my opinion internet as a channel of communication specifically for Tana Delta residents is currently inadequate and should be promoted as part of the flood warning channels that needs to be introduced.

Other initiatives such as Radio Internet Project (RANET) for Dissemination of Information to Rural communities can be established in Tana Delta. RANET is an initiative of the African Meteorological Applications for Development (ACMAD) that offers an opportunity for disseminating flood forecasts to vulnerable rural communities in the flood prone areas of Kenya. Currently, there are 15 RANET information stations established in Rift Valley, Western and Nyanza. However, such an initiative is yet to be established in Tana River county despite this project having been initiated in 2001 (Otiende, 2009). The Communicators of early warning communication should consider using alternative methods such as radio broadcast in indigenous languages of Pokomo, Orma or Swahili, pamphlets and brochures, which are currently not available; if provided, they could help the affected communities to respond appropriately not only in the event of flooding but also during other disasters.

5.7 Application of Maslow's Hierarchy of Needs Theory

Donahue, Cunnion, Balaban and Sochats (2012) noted that in order to better choose communication strategies there is need to understand the system of human needs because they determine both individual behaviour in emergencies and effective response. For example in Tana Delta, there were people who did not relocate because they were awaiting help from the Kenya Red Cross, yet the KRD only comes in after the disaster has occurred to evacuate. They would rather get immersed as long as they had the assurance that KRD will give relief aid once the flood occurred. Others viewed the intrinsic value of the property (the pastoralists) as essential to their long term survival, that is, the animals were worth protecting even while placing themselves in danger. For such residents, safety needs were not their first priority survival needs which are physiological needs were more important to sustain life. This is in line with Donahue et al (2012) argument that actions of individuals in a disaster are characteristically consistent with the hierarchy of needs in Maslow's motivation theory.

Communicators of early warning messages need to identify the motivating factors behind the people's decisions in order to decide on the communication strategy to be used and in this case it would either be physical or emotional persuasive strategies. Another way would be proactive civic education of individuals and community leaders, combined with appropriate messaging strategies to engage the basis of psychological resilience in response to disasters.

From the interviews it was also revealed that in a flood situation people make decisions with respect to evacuation based on availability of physiological needs versus their safety needs. For example, they would shelter in a place if they believe they have adequate resources for their projected basic survival needs rather than safety. This study

concluded that people do not necessarily behave rationally when making decisions to meet their perceived needs especially during disasters therefore persuasive strategies should be applied.

5.8 Conclusions

Today, every nation is at risk of exposure to some type of disaster, whether natural or man-made. To prepare for those disasters, citizens and especially those at risk need to be informed about the impending disasters and how they can effectively prepare to mitigate the potential impacts of a disaster. Therefore empowering the people through dissemination of disaster related information about the various types of disasters and their potential risks enables them to act appropriately when a disaster happens.

From this study, it is acknowledge that dissemination of flood warning is a challenge to both flood forecasting authorities and flood prone communities. The whole process of dissemination can be addressed by four main considerations, that is, identifying the target audience; construction/designing of warning messages; distribution of the warnings to the people (channel) and assessing warning efficiency (impact and feedback assessment)

5.8.1 Identifying of target audience

The audience should be clearly defined because they differ in many aspects. In identifying the target audience one should consider the communities at risk of the flood disaster. Factors to consider include location, cultures, language, and accessible channels of communication. It is important to note that no one message or channel is going to effectively communicate to all the audiences (Pearson, Nelson, Titsworth, S. and Harter, 2006). Therefore audience segmentation will be of essence. According to

the American Integrated Public Alert and Warning System (2005), effective and reliable alerts and warnings should be send over multiple communication pathways to the entire community, including those with disabilities, the elderly, children, individuals with access and functional needs, and limited language proficiency, before, during, and after an emergency.

5.8.2 Construction of warning messages

This is the process of formulating the warning message in a way that communicates something to the receivers to prompt them to take action. Many factors are put into consideration; they include the audience, channel, cultures and language. According to Handmer (2001) and Glantz (2009) for warning systems to be adequate they should be informative, accurate, trustworthy and timely. For example, flood forecast and warning should contain information on type of flooding, time of flooding, duration of flooding level of flooding, severity of flooding and areas to be inundated by the flood. If available, information related to possibility of evacuation to safe places and suggestions on how to handle the situation should be included.

5.8.3 Distribution of the warnings

I concur with Randy (2012) who argued that, to believe that it is sufficient to centralize the issuance of warnings and relevant information by using radio, television, and the new social media is to assume that the message and its implications for action are uniformly understood. Communicators should know that information is filtered by people's own experiences and perspectives. This argument corresponds with that of Pearson, Nelson, Titsworth and Harter (2006) that audiences differ in many aspects; they differ in their beliefs about hazards, their perceptions of information sources and credibility, therefore no one message or channel can effectively communicate the

warning message they require. Thus audience segmentation will be of essence. Kenya being a multi-ethnic and multilingual society with about 42 languages it requires more than print and electronic media to effectively carry disaster messages to the rural communities many of which are the most vulnerable in times of ecological disasters. To reach the rural communities like in Tana Delta, there is also need to consider the use of indigenous media such as, opinion leaders, churches and mosque, theatre and drama groups among others.

5.8.4 Assessing warning efficiency

(impact and feedback assessment): This study acknowledges that in order to measure the adequacy and effectiveness of the messaging process, one need to not only study the source of the message but also consider what the receiver does once the information is delivered to them. This will enable those formulating messages to know how effective the information communicated was in delivering the intended message. For flood warnings dissemination system to be effective, the receivers should understand the meaning and relevance of warnings, how they relate to their lives, and what responses are appropriate according to the magnitude and characteristics of the flood that has been predicted.

5.8 Recommendations

In order to reduce the level of disaster occurrences, the communities ought to be adequately aware of an impending flood and ways of protecting themselves against the disastrous effects of a flood. This study recommends that warning messages should be detailed and clear. Different communication strategies should be used to disseminate flood related warning messages and the warnings should focus on actionable messages

that residents can quickly put in place. The messages should possibly be translated into local language.

There is also need to develop a strong governance framework through legislation and policies and mainstreaming disaster risk management into decision making at all community development plans

5.9.1 To Policy Makers

It is recommended that dissemination of information should be part of all preparedness initiatives.

5.9.2 Sendai Framework for Disaster Risk Reduction (DRR) 2015-2030

Early warning communication continues to be one of the priorities in World Conference on Disaster Reduction, (IDNDR, 1990; Yokohama, 1994; Hyogo, 2005) and it was no exception during the World Conference on Disaster Reduction held in Sendai (2015). One of the guiding principles of Sendai Framework for DRR is that disaster risk reduction and management depends on coordination mechanisms within and across sectors and with relevant stakeholders at all levels. Priority number one for Sendai Framework for DRR is understanding disaster risk. This is to be achieved through:

(a) Promotion, collection, analysis, management and use of relevant information and ensuring its dissemination, taking into account the needs of different categories of users, as appropriate.

(b) Developing, periodically updating and disseminating, as appropriate, location-based disaster risk information, including risk maps, to decision makers, the general public and communities at risk of exposure to disaster in an appropriate format.

(c) Enhancing collaboration among people at the local level to disseminate disaster risk information through the involvement of community-based organizations and non-governmental organizations

The key strategy in the Sendai framework is dissemination of disaster information to the various stakeholders.

5.9.3 Emerging knowledge from this study

There can be no zero casualty scenarios without the participation of those at risk. If those at risk are not identified in order to receive timely communication on an impending disaster any efforts made by other stakeholders will be worthless. Therefore, the findings of this study should guide the stakeholders to concentrate their efforts to all of the stakeholders especially the communities at risk rather than among the government officials, disaster managers, policy maker, NGO's, print and electronic media.

There is need to address the receiver's apathy by taking into account the social psychology process of the receivers in order to design persuasive messages that will foster pre-disaster protective actions. This can be achieved through appropriate audience segmentation.

5.9.4 Suggestions for future studies

This study looked at strategies used to communicate early warning messages for flood disasters and the people's understanding of the warning messages. There are two aspects that came up during my study but could not be deeply investigated. First, there are other disasters in Tana Delta such as insecurity, drought and conflict over limited resources, for which warnings systems could be useful; future studies should not be

limited to floods. Secondly, to address receivers' apathy, future studies can look into situational and personal characteristics of those who receive hazard warnings, such as recipients' social ties, social setting factors, socio-demographic characteristics of the receiver, psychological characteristics of the receiver and community's perception of flood warning message.

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APPENDICES

Appendix I: Interview Schedule

For Interview with the Communication Officer for Meteorological Services

Demographic Characteristics of Interviewee

1. Gender
2. Work experience in public service?
3. Work experience at Kenya Meteorological Department?

Early Warning Communication

1. In what format do you receive information/warnings about an impending El nino?
2. How do you communicate the warning to stakeholders in areas at risk of disasters?
3. Is information about flood occurrences available to the communities at risk?
4. If yes, at what level e.g. national, regional, county, administrative etc
5. Is there any specific communication strategy used to communicate early warning messages to stakeholders in areas at risk of disasters?
6. How do you communicate the warning messages to communities at risk?
7. Were there early warnings communicated to communities in Tana Delta during the 2015/2016 El nino related floods?
8. How were early warnings on 2015/2016 El nino related floods communicated to members communities in Tana Delta?
9. Were there early warnings on 2015/2016 El nino related floods communicated to stakeholders operating in Tana Delta?
10. If yes, how were the early warnings communicated to stakeholders operating in Tana Delta?
11. In your opinion, were the early warnings on 2015/2016 El nino related floods adequately communicated to members of the community?
12. What channels of communication/communication tools were used to communicate early warning on 2015/2016 El nino related floods to communities in Tana Delta?
13. What channels of communication/communication tools used to communicate early warning on 2015/2016 El nino related floods to stakeholders in Tana Delta?
14. What were the messages communicated to various groups regarding the 2015/2016 El nino?

15. In your opinion, did members of the communities in Tana Delta do what the early warning on 2015/2016 El nino had directed them to do to reduce harm from impending floods?
16. Were there any challenges experienced in disseminating early warning on 2015/2016 El nino to communities at risk?
17. If yes, what challenges were experienced by the KMS Department in communicating early warning information on 2015/2016 El nino related floods?
18. What measures need to be undertaken to ensure effective dissemination of early warning to vulnerable communities to reduce loss?

Appendix II: Interview with Tana County Coordinator for Drought Management

1. Gender.
2. Work experience in public service?
3. Work experience as County Drought Coordinator?
4. Work experience as County Drought Coordinator in Tana County?

Communication of El nino related flood warning

5. Did you receive early warnings of impending floods due to 2015/2016 El nino rains?
6. If yes, what was the main source of information about the early warning of impending floods due to 2015/2016 El nino in Tana Delta?
7. What channels of communication/communication tools were used to communicate to your office early warning on 2015/2016 El nino related floods?
8. Do you have access to the communication channels used?
9. In what medium would you prefer to receive information if there is another flood?
10. Were the warning on floods communicated at the right time?
11. If no, how early would you like the early warning messages to be communicated in future?
12. Did you understand the early warning messages communicated during the 2015/2016 El nino related floods?
13. What was the message in the early warnings on 2015/2016 El nino related floods?
14. Did the early warning on 2015/2016 El nino related floods which you received inform you clearly what to do to reduce harm from impending floods?
15. If no, what do you think was not communicated well?
16. How did you in turn communicate the warning to communities at risk in Tana Delta?
17. Is there any specific communication strategy you used to communicate the early warning messages to communities at risk of disasters?

18. What channels of communication/communication tools did you use to communicate early warning on 2015/2016 El nino related floods to communities in Tana Delta?
19. Did members of communities in Tana Delta do what the early warnings on 2015/2016 El nino related floods directed them to do to reduce harm from the floods?
20. Did El nino related floods in 2015/2016 cause loss of lives and livelihoods in Tana Delta?
21. If yes, what were the main losses?
22. Were there any challenges in disseminating early warning on 2015/2016 El nino related floods
23. If yes, what were the challenges you faced in disseminating early warning on 2015/2016 El nino related floods?
24. What needs to be done to ensure members of your community in Tana Delta do what early warnings direct them to do to reduce harm from floods?

Appendix III: Interview with Tana County Red Cross Coordinator

1. Gender
2. Work experience in public service?
3. Work experience as Red Cross Coordinator?
4. Work experience as Red Cross Coordinator in Tana River?

Communication of El nino related flood warning

5. Did you receive early warnings of impending floods due to 2015/2016 El nino rains?
6. If yes, what was the main source of information about the early warning of impending floods due to 2015/2016 El nino in Tana Delta?
7. What channels of communication/communication tools were used to communicate to your office early warning on 2015/2016 El nino related floods?
8. Do you have access to the communication channels used?
9. In what medium would you prefer to receive information if there is another flood?
10. Were the warning on floods communicated at the right time?
11. If no, how early would you like the early warning messages to be communicated in future?
12. Did you understand the early warning messages communicated during the 2015/2016 El nino related floods?
13. What was the message in the early warnings on 2015/2016 El nino related floods?
14. Did the early warning on 2015/2016 El nino related floods which you received inform you clearly what to do to reduce harm from impending floods?
15. If no, what do you think was not communicated well?
16. How did you in turn communicate the warning to communities at risk in Tana Delta?
17. Is there any specific communication strategy you used to communicate the early warning messages to communities at risk of disasters?

18. What channels of communication/communication tools did you use to communicate early warning on 2015/2016 El nino related floods to communities in Tana Delta?
19. Did members of communities in Tana Delta do what the early warnings on 2015/2016 El nino related floods directed them to do to reduce harm from the floods?
20. Did El nino related floods in 2015/2016 cause loss of lives and livelihoods in Tana Delta?
21. If yes, what were the main losses?
22. Were there any challenges in disseminating early warning on 2015/2016 El nino related floods
23. If yes, what were the challenges you faced in disseminating early warning on 2015/2016 El nino related floods?
24. What needs to be done to ensure members of your community in Tana Delta do what early warnings direct them to do to reduce harm from floods?

Appendix IV: Guide for Interview with Deputy County Commissioner Tana Delta

1. Gender.
2. Work experience in public service?
3. Work experience as Deputy County Commissioner?
4. Work experience as Deputy County Commissioner in Tana River?

Communication of El nino related flood warning

5. Did you receive early warnings of impending floods due to 2015/2016 El nino rains?
6. If yes, what was the main source of information about the early warning of impending floods due to 2015/2016 El nino in Tana Delta?
7. What channels of communication/communication tools were used to communicate to your office early warning on 2015/2016 El nino related floods?
8. Do you have access to the communication channels used?
9. In what medium would you prefer to receive information if there is another flood?
10. Were the warning on floods communicated at the right time?
11. If no, how early would you like the early warning messages to be communicated in future?
12. Did you understand the early warning messages communicated during the 2015/2016 El nino related floods?
13. What was the message in the early warnings on 2015/2016 El nino related floods?
14. Did the early warning on 2015/2016 El nino related floods which you received inform you clearly what to do to reduce harm from impending floods?
15. If no, what do you think was not communicated well?
16. How did you in turn communicate the warning to communities at risk in Tana Delta?

17. Is there any specific communication strategy you used to communicate the early warning messages to communities at risk of disasters?
18. What channels of communication/communication tools did you use to communicate early warning on 2015/2016 El nino related floods to communities in Tana Delta?
19. Did members of communities in Tana Delta do what the early warnings on 2015/2016 El nino related floods directed them to do to reduce harm from the floods?
20. Did El nino related floods in 2015/2016 cause loss of lives and livelihoods in Tana Delta?
21. If yes, what were the main losses?
22. Were there any challenges in disseminating early warning on 2015/2016 El nino related floods
23. If yes, what were the challenges you faced in disseminating early warning on 2015/2016 El nino related floods?
24. What needs to be done to ensure members of your community in Tana Delta do what early warnings direct them to do to reduce harm from floods?

Appendix V: Guide for Interview with DMU Coordinator

1. Gender.
2. Work experience in public service?
3. Work experience as DMU Coordinator?
4. Work experience as DMU Coordinator in Tana River?

Communication of El nino related flood warning

1. Were there early warnings communicated to members of Tana Delta on impending floods associated with rains caused by El nino floods in 2015/2016?
2. If yes, how were the warnings communicated to communities in Tana Delta?
3. Was the warning on floods communicated at the right time?
4. If no, how early would you like the early warning messages to be communicated in future?
5. Was the communication about warning on 2015/2016 el nino related floods adequately communicated to members of the community?
6. What were the main channels used to communicate warning about expected floods from El nino rains to communities in Tana County?
7. How did communities in Tana Delta respond to early warning of el nino floods in 2015/2016?
8. Do you think the members of communities in Tana Delta understood what communication was issued by Meteorological Department about el nino?
9. What was the message in the early warnings on 2015/2016 El nino related floods?
10. Did the early warning on 2015/2016 El nino related floods which you received inform you clearly what to do to reduce harm from impending floods?
11. If no, what do you think was not communicated well?
12. How did you in turn communicate the warning to communities at risk in Tana Delta?
13. Is there any specific communication strategy used to communicate early warning messages to communities at risk of disasters?

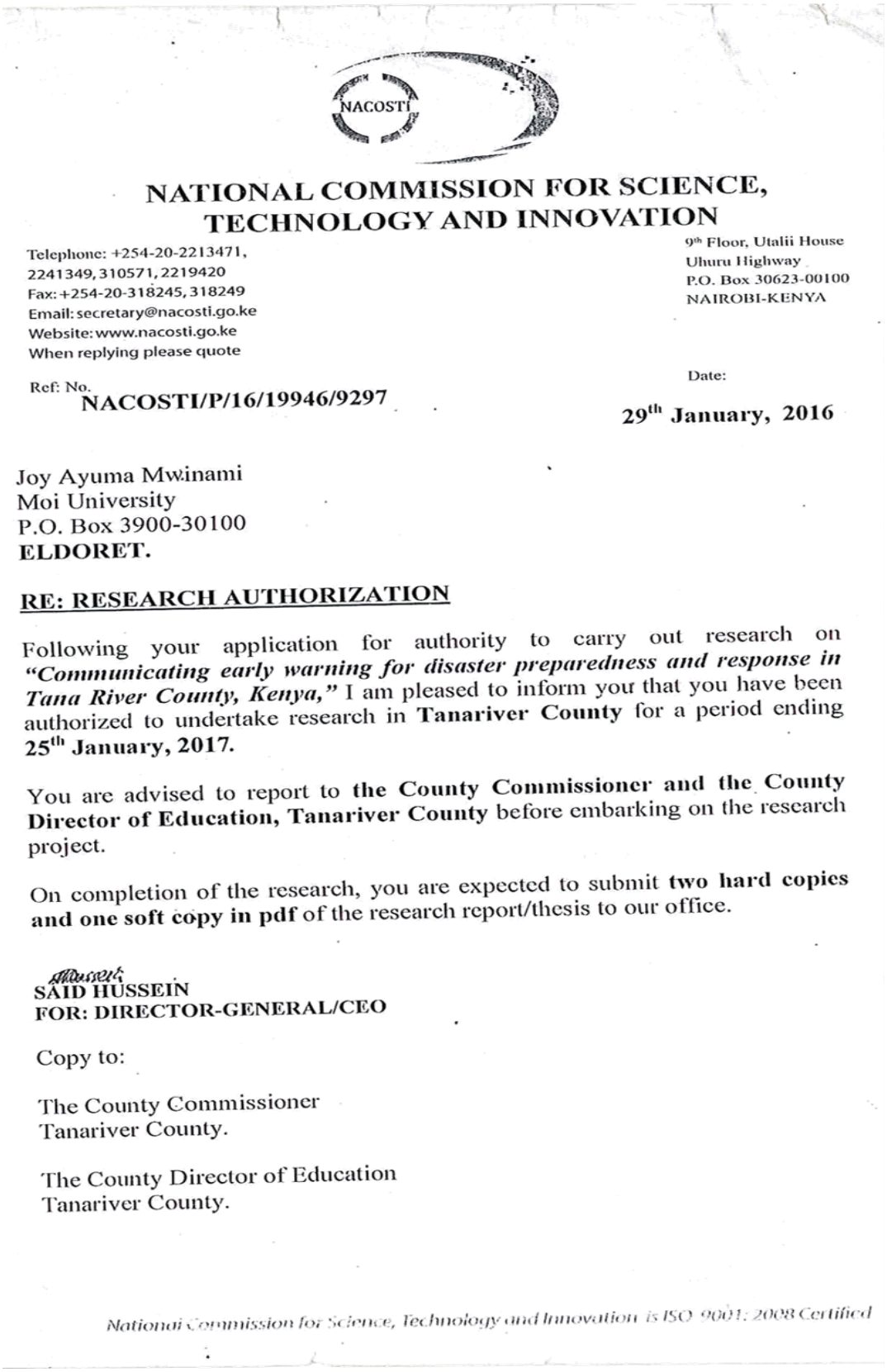
14. What channels of communication/communication tools did you use to communicate early warning on 2015/2016 El nino related floods to communities in Tana Delta?
15. Did members of communities in Tana Delta do what the early warnings on 2015/2016 El nino related floods directed them to do to reduce harm from the floods?
16. Did El nino related floods in 2015/2016 cause loss of lives and livelihoods in Tana Delta?
17. If yes, what were the main losses?
18. Were there any challenges in disseminating early warning on 2015/2016 El nino related floods
19. If yes, what were the challenges you faced in disseminating early warning on 2015/2016 El nino related floods?
20. What needs to be done to ensure members of your community in Tana Delta do what early warnings direct them to do to reduce harm from floods?

Appendix VI: Guidelines for Focus Group Discussions with Members of the Community

1. Did you receive any communication on early warnings about an impending floods associated with El nino related floods in 2015/2016?
2. If yes, what was the main source of information on early warning of 2015/2016 El nino related floods were received by communities in Tana Delta?
3. What channels of communication/communication tools were used to communicate early warning on 2015/2016 El nino related floods to your office?
4. Do you have access to the communication channels used?
5. In what medium would you prefer to receive information if there is another flood?
6. Was the warning on floods communicated at the right time?
7. If no, how early would you like the early warning messages to be communicated in future?
8. Did you understand the early warning communicated during the 2015/2016 El nino related floods?
9. What was the message in the early warnings on 2015/2016 El nino related floods?
10. Did the early warning on 2015/2016 El nino related floods which you received inform you clearly what to do to reduce harm from impending floods?
11. If no, what do you think was not communicated well?
12. Do you think the communication about warning on El Nino related floods was adequate?
13. Did you do what the warnings expected you to do to reduce harm from impending floods?
14. If No, why did you not do what the warning expected you to do to reduce harm from floods?
15. Did El nino related floods in 2015/2016 cause loss of lives and livelihoods in Tana Delta?
16. If yes, what were the main losses?

17. What challenges/constraints did you experience in receiving information early warning on 2015/2016 El nino related floods?
18. What measures need to be undertaken to ensure effective dissemination of early warning to vulnerable communities to reduce loss to disasters?
19. What needs to be undertaken to ensure appropriate response of vulnerable communities to early warning to reduce loss to disasters?

Appendix VII: NACOSTI Research Authorisation



NACOSTI

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

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When replying please quote

9th Floor, Utalii House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No. **NACOSTI/P/16/19946/9297**

Date: **29th January, 2016**

Joy Ayuma Mwinami
Moi University
P.O. Box 3900-30100
ELDORET.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Communicating early warning for disaster preparedness and response in Tana River County, Kenya,"*** I am pleased to inform you that you have been authorized to undertake research in **Tanariver County** for a period ending **25th January, 2017.**

You are advised to report to **the County Commissioner and the County Director of Education, Tanariver County** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.

SAID HUSSEIN
FOR: DIRECTOR-GENERAL/CEO

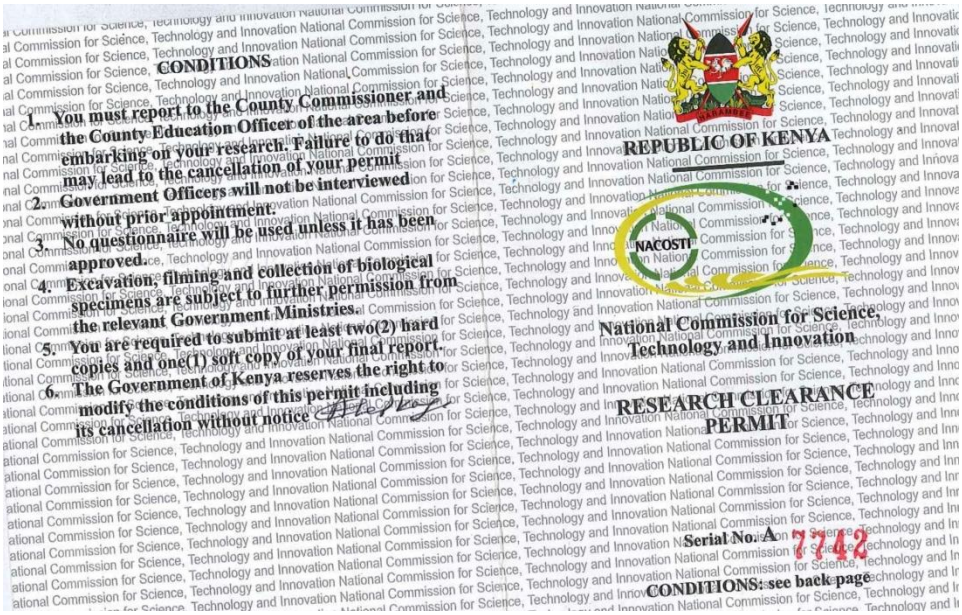
Copy to:

The County Commissioner
Tanariver County.

The County Director of Education
Tanariver County.

National Commission for Science, Technology and Innovation is ISO 9001: 2008 Certified

Appendix VIII: NACOSTI Research Permit



CONDITIONS

1. You must report to the County Commissioner and the County Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit
2. Government Officers will not be interviewed without prior appointment.
3. No questionnaire will be used unless it has been approved.
4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.
5. You are required to submit at least two(2) hard copies and one(1) soft copy of your final report.
6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice

REPUBLIC OF KENYA

National Commission for Science Technology and Innovation

RESEARCH CLEARANCE PERMIT

Serial No. A 7442

CONDITIONS: see back page

THIS IS TO CERTIFY THAT:
MS. JOY AYUMA MWINAMI
of MOI UNIVERSITY, 0-100 Nairobi,has been permitted to conduct research in Tanariver County
on the topic: COMMUNICATING EARLY WARNING FOR DISASTER PREPAREDNESS AND RESPONSE IN TANA RIVER COUNTY, KENYA
for the period ending:
25th January,2017

Permit No : NACOSTI/P/16/19946/9297
Date Of Issue : 29th January,2016
Fee Recieved :ksh 1000

Applicant's Signature

Director General
National Commission for Science, Technology & Innovation