Threats to Community Resilience for Floods Related Disasters in Kenya

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Abstract

Hazard events become disasters as a result of communities' vulnerability. Sometimes it may be difficult to reduce the scale, intensity, or frequency of hazards while it is possible to reduce vulnerability and its causes which are socially constructed. Communities which have strengths and resources available for mobilisation to reduce the level of risk are considered resilient. Resilient communities are therefore able to prevent, withstand or bounce back better from shocks of climate change related disasters. This is achieved through disaster risk reduction activities which aim at preventing new and reducing existing disaster risks, while strengthening preparedness for response and recovery, thus contributing to strengthening resillience. Most communities in Kenya have similar exposure to flood hazards and have developed ways to prevent or mitigate such flood hazards, adapt to and prepare for them using local materials and methods. The Kenya Red Cross Society along with other partners such as; CARE Kenya, Wetlands International and Cordaid have worked closely with communities at grassroots level to strengthen resilience to disasters, including floods. Despite communities' experiences to past disasters, they have not been able to enhance their coping capacity due to their limited adaptive capacity. Indigenous communities the world over have been recognised as being particularly vulnerable to the impacts of climate change due to the close connection between their livelihoods and the enironment. This group of people are believed to have specific Knowledge Systems about various aspects of diversity, which they rely on to create coping and adaptation strategies to the changing contexts and the high variability in climate factors, experienced in recent decades.This paper compares the resilience of communities in Kenya and uses past data in order to observe emerging patterns and trends to enhance predictions of flood hazards as part of disaster risk reduction initiatives. The paper also explores the role of traditional-Local-and Indigenous-Knowledge in responding to climate change.

Key Words: Community Resilience, Climate Change, Disaster Risk, Vulnerability, Disasters, Adaptative Capacity and Indigenous Knowledge

Introduction

Kenya is situated in East Africa within Latitudes 5°N and 5°S, and Longitude 34°E and 41.24°W (Akali, 2015) with a landmass of about 582,350 km^2 of which only 17 percent is arable while 83 percent consists of semi-arid and arid land (Mwangi and Mutua, 2014). Like other countries in the world, climate change and climate variability pose major threats to the environment, economic growth and sustainable development. The negative effects from climate change experienced in Kenya include reduced agricultural production, food insecurity, increased incidences of flooding and droughts, widespread disease epidemics, and increased risk of conflict over scarce land and water resources (Quandt and Kimathi, 2016). These impacts of climate change are further compounded by local environmental degradation caused by illegal encroachments, deforestation and unsustainable livestock grazing. Given the climatic, topographical and geological conditions of Kenya, flooding episodes and prolonged drought constitute normal hydrological phenomena with which the society has to live (Parry et al., 2012). Kenya's climate is influenced by global, regional and localised climate conditions (GoK, 2016).

Some of the vulnerability in the country's climate is due to the El Niño Southern Oscillation which has caused periods of droughts and flooding on the country over decades with consequences in the environment, society and the wider economy (GoK, 2016). Geographically as indicated in Figure 1, the western (Kano plains, Nyakach area, Rachuonyo, Migori, and Budalangi), coastal (Kilifi, Kwale and Tana river basin), north-eastern (Garissa, Wajir and Ijara), central and southeastern parts of the country, and urban centres such as Nairobi, Nakuru, Mombasa and Kisumu are quite susceptible to seasonal floods in the wet seasons of March-April-May and October-November-December (Senaratna et al., 2014; GoK, 2016).

Riverine floods are the most dominant floods in Kenya, although the Arid and Semi-Arid Lands (ASAL's) are particularly vulnerable to flash flooding (Marshall, 2011; GoK, 2016).

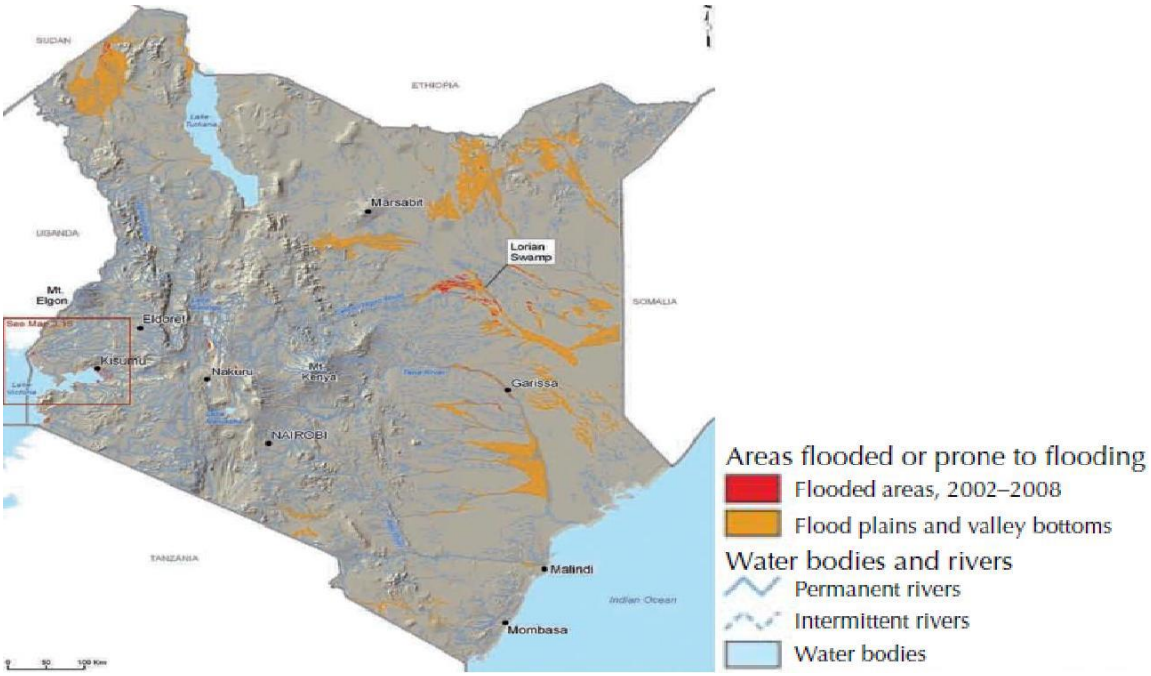

Figure 1: Flood prone areas in Kenya. Source: (Herrero et al., 2010)

Climate Change and Vulnerability in Kenya

Kenya is vulnerable to climate change, which according to Parry et al. (2007), refers to any change in climate over time, whether due to natural variability or as a result of human activity. The Intergovernmental Panel on Climate Change (IPCC) recommends indicators that can be used to detect climate change. Climate change can be detected through changes in the average patterns of climate parameters like rainfall, temperature, wind and pressure, among others.

Other indicators include the number of nights with temperature below or above certain threshold values, cold and warm spells indicators, the daily temperature range, extremely wet days, and the number of heavy precipitation days, among others (IPCC, 2012).

Vulnerability is the extent to which a natural or social system is susceptible to sustaining damage from climate change (Mitimba et al., 2010) and it is a function of the sensitivity of a system to changes in climate i.e. the degree to which a system will respond to a given change in climate, including beneficial and harmful effects, adaptive capacity i.e. the degree to which adjustments in practices, processes, or structures can moderate or off set the potential for damage or take advantage of opportunities created by a given change in climate, and the degree of exposure of the system to climatic hazards. A highly vulnerable system would therefore be a system that is very sensitive to modest changes in climate, where the sensitivity includes the potential for substantial harmful effects, and for which the ability to adapt is severely constrained (Wisner et al., 2004).

Hazard events become disasters because of communities vulnerability and many factors contribute to vulnerability. These factors act to undermine capacity for self-protection, blocks or diminish access to social protection, delays or complicate recovery, or expose some groups to greater or more frequent hazards than other groups. Communities in Kenya that are exposed to risk from climate change extremes and natural hazards and potentially at risk from climate change, are those with limited access to technological resources and with limited development of infrastructure (Coppola, 2012).

According to UNISDR (2004), social vulnerability include rapid population growth, poverty and hunger, poor health, low levels of education, gender inequalities, fragile and hazardous locations, and lack of access to resources and services including knowledge, technological means, disintegration of social patterns. Others include lack of access to information and knowledge, lack of public awareness, limited access to political power and representation. Economic vulnerability is related to a number of interacting elements, including its importance in the

overall national economy, trade and foreign exchange earnings. Environmental vulnerability concerns land degradation, water scarcity, deforestation, and other threats to biodiversity (Coppola, 2012).

Kenya experiences a number of natural hazards, the most common being weather related, including floods, droughts, landslides, lightning, thunderstorm, wildfires, strong winds and disease outbreak. The climate related natural hazards with the greatest impact in Kenya, affecting terrestrial areas causes the greatest losses to human life and property and there is high vulnerability to drought and moderate vulnerability to flooding (DARA, 2012).

The risks posed by climate change are legitimate but highly unpredictable. In many areas, rainfall has become irregular and unpredictable, extreme and harsh weather is now the norm, and some regions experience frequent droughts during the long rainy season while others experience severe floods (Figure 2), during the short rains (GoK, 2010),

Figure 2: Flooded Area. Source: (GoK, 2013)

Floods Vulnerability

Water is the key element in economic, social and cultural development of any society and throughout history people have settled next to waterways and in flood plains because of the

advantages they offer. Normal floods are expected and generally welcomed in many parts of the world as they provide rich soil, water and a means of transport, but flooding at an unexpected scale causes damage to life, livelihoods and the environment (IFRC, 2016). Flood is a condition that occurs when water overflows the natural or artificial confines of a stream or other body of water, or accumulated by drainage over low laying areas. Flood causes a temporary inundation of normally dry land with water, suspended matter, and or nibble caused by overflowing of rivers, precipitation, storm surge, tsunami, waves, mudflow, failure of water retaining structures, ground water seepages, and water backup in sewer systems (Opondo, 2013).

There are many different types of flooding including flooding caused by dam failure, riverine flooding, urban flooding, and shoreline flooding. Dam failure is the failure of an impoundment located in a river, stream, lake, or other waterway resulting in downstream flooding. Riverine flooding is the periodic occurrence of overbank flows of rivers and streams resulting in partial or complete inundation of the adjacent floodplain (UNISDR, 2004). Urban flooding is the overflow of storm, sewer systems and is usually caused by inadequate drainage following heavy rainfall or rapid snowmelt. Shoreline flooding and erosion hazards typically involve the loss of or damage to property as sand or soil is removed by water action and is carried away over time (Pomeroy, 2006).

Floods are considered the most common highly damaging of all hazards, and it has been predicted that they are likely to become more frequent, more prevalent and more serious in years to come (Muchar & Bahar, 2010). According to IFRC (2014), in 2013, floods accounted for 44% of deaths caused by natural hazards more than any other hazard. Almost 100 million people were affected by disasters and natural hazards caused losses estimated at 111.8 billion dollars (IFRC, 2014).

In 2016, heavy rainfall was observed in various parts of Kenya resulting in widespread flooding in many parts of the country (IFRC, 2016). The worst affected areas are low lying swampy tracks in Lake Victoria Basin namely Budalangi, Kano plains and the Tana River delta. Episodes of urban flooding have also been observed in Nairobi city, Mombasa town and Narok town.

Excessive flooding in Kenya occurs frequently on an average of every three to four years and is linked to El Niño or La Niña episodes that can lead to extreme weather in the country and region. Annual rainy seasons in Kenya are becoming progressively wetter, with sudden and or late onsets bringing with them floods and inundation (Huho, Mashara & Musyimi, 2016).

Effects of Floods on Communities

Human activities along waterways can increase flooding inadvertently. Paving and building on floodplains and surrounding areas decrease infiltration of rainwater into the soil and, as a consequence, increase runoff. Runoff also increases when forests are cleared or when wetlands are destroyed by construction or infilling. Agriculture decreases the ability of soil to retain water and therefore increases runoff causing soil erosion. Sediment-clogged streams cannot support normal levels of aquatic life, and wildlife habitats are destroyed. Sediment deposition in stream channels also leaves little room for water and leads to the likelihood of flooding (Herrero et al., 2010).

Under global warming, countries and communities are projected to experience changes in their hazard and risk profiles. These may include changes in the kind of disasters that are experienced, from no disasters in the past to more disaster events, changes in types of hazards, from floods to more droughts, and or change in hazard intensities and magnitude (Srinivasan et al., 2009). Such changes in disaster risks may arise from changes in one or more climatic conditions (Figure 3)

and may manifest themselves through multiple pathways, ultimately affecting human wellbeing (Lal, 2011).

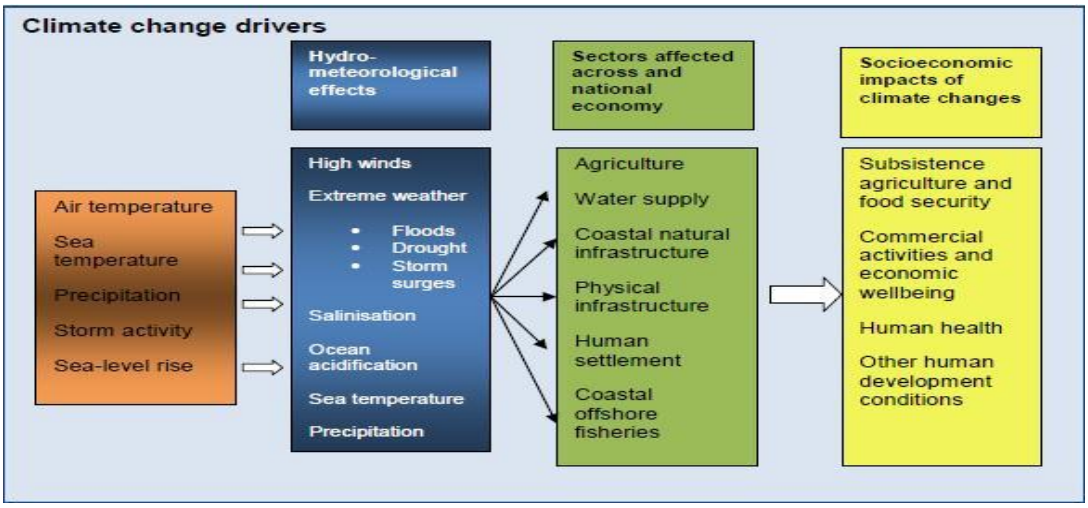

Figure 3: Climate change drivers. Source: (Lal, 2011).

Floods happen often in Kenya and, in some areas, according to a regular seasonal rhythm. Their location is predictable and there is usually some warning of their occurrence. Flooding is a highly manageable hazard where the flood risk can be defined and appropriate emergency preparedness and mitigation strategies developed. Often it is possible to determine who will be affected and what problems will be encountered as far as warning, evacuation, property protection, rescue, resupply and other functions are concerned. Much can therefore be known about a flood and its likely consequences before it occurs when the communities understand the disaster risk (UNISDR, 2015).

Despite the frequent early warning signs of floods in Kenya, various floods prone communities have suffered from the effects of floods. In March 2003, Budalangi was hit my floods causing the death of 47 people and over 60000 people displaced. Agricultural production in this region reduces by 50 percent every three years due to disasters (Otiende, 2009). The economic costs of

flooding to the country are very high, resulting to losses of 5.5 percent of GDP every seven years. Flood-related fatalities in the country constitute 60 percent of disaster victims.

During flood events there is often an upsurge in waterborne or sanitation-related diseases, such as typhoid, cholera, malaria and diarrhoeal diseases. Floods destroy crops and stored produce leading to food scarcity (Opondo, 2013).

Critical infrastructure that supports the national economy, such as roads, bridges, water pipelines and power lines are prone to flood damage. The 1997/98 El Niño floods seriously damaged water supply infrastructure and transport networks across the country, with dams, water pans and some pipelines in 22 counties in Kenya either destroyed or severely damaged. Urban flooding is also increasingly becoming an issue especially in big cities and towns in Kenya (Migosi, 2014). Flooding events are becoming frequent because of rapid urbanization, poor urban planning and loss of green spaces in cities such as Nairobi and Mombasa, leading to loss of infrastructure, loss of lives and destruction of property.

According to GoK (2016), climate change has adverse impacts on the country's economic development and threatens the realisation of vision 2030 goals of creating a competitive and prosperous nation with a high quality of life. A recent study by the Stockholm Environment Institute on the Economics of climate change in Kenya, revealed that the future economic costs of the impacts of climate change on market and non-market sectors might be close to 3 percent of GDP per year by 2030 and potentially more than 5 percent of GDP per year by 2050 (Stockholm Environment Institute, 2009).

Close to 60 percent of the households in flood affected areas of the lake region are dependent on fish either directly or indirectly as a source of food and income. Fish production decline during the flood period. This is further coupled with crop and asset losses. Crops are either washed away or are waterlogged and fail to mature, exacerbating food insecurity among the households. Livestock benefit greatly from short rains due to favourable pastoral conditions including widespread regeneration of pastires and recharged water sources. Unfortunately floods wash away many farms households poultry, adding to asset losses, large stock are generally able to migrate to highland areas and escape floods (Kenya Food Security Network, 2006). In some instances, however, flooding can have certain benefits, especially in ASAL areas. The benefits include silt deposited from flooding events being used for flood irrigation, increasing water table levels and replenishing aquifers. In the Merti area of Isiolo County, communities practice flood irrigation after a big flooding event from the Ewaso Nyiro which deposits fertile silt on flood plains (GoK, 2016).

According to Senaratna et al. (2014), floods have been widespread in Western and Coastal regions of the country, especially during the rainny season. Floods destroy crops in farms and stored produce leading to food scarcity. Flood events also precipate emergency rescue operations by public and private agencies and thus the government, Non Governmental Orgnisations, religious organisations and the Kenya Red Cross Society (KRCS) provide assistance to communities (Opondo, 2013).

Floods Mitigation for Community Resilience

Resilience is derived from latin word *resalire* meaning to spring back and as an attribute of the community it relates to the ability of systems and people to effectively respond and adapt to changing circumstances and to develop skills, capacities, behaviours and actions to deal with

adversity. It is the process of adaptation before, during and after an adverse event (US Environment Protection Agency, 2015).

Resilience can therefore be seen as the tendency to maintain integrity when subjected to disturbances (Alexander, 2013) and is thus defined as the ability of individuals, communnities, organisations, or countries exposed to disasters, crises, and underlying vulnerabilities to anticipate, prepare for, reduce the impact of, cope with and recover from the effects of shocks and stresses in order to reach and maintain an acceptable level of functioning and structure without compromising their long term prospects (Ellis & Abdi, 2017).

The definition of resilience however fall into two categories of outcome oriented and process oriented. Process oriented defines resilience in terms relative to an end result for example, time to recovery while process oriented, defines resilience as a progression towards a desired outcome for example ability to adapt. Resilience can therefore be observed and strenghtened at the individual, household, community, local government, national government, organisations, regional and global level. A resilient individual is healthy, has knowledge, skills, competencies and mind set to adapt to new situations and improve his or her life, and those of her or his family, friends and community and such a person is thus empowered (Alexander, 2013).

Whenever a community is faced with flooding, the community develops adaptive capacity. Adaptive capacity encompasses two dimensions i.e., recovery from shocks and response to changes. These two dimensions play an essential role towards resilience, both to recover from shocks and to adapt to change (FAO/OECD, 2012). Adaptive capacity can be impacted by shocks that are hurting, directly or indirectly (Figure 4), and the adaptive capacity has a long-term effect and are therefore one of the first concerns to ensure resilience.

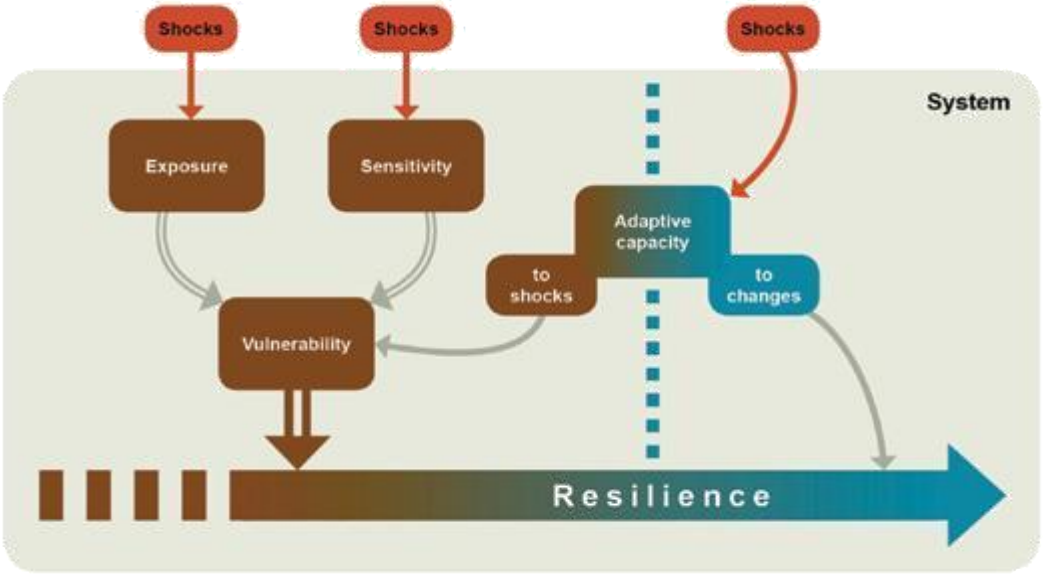

Figure 4: Vulnerability and resilience. Source: (FAO/OECD, 2012)

According to (Coppola, 2012), there are two main categories of floods risk reduction which are structural and non structural. Structural strategies are engineering works aimed to moderate the stream channels, while non structural strategies are laws, policies and regulations mainly aimed at loss reduction and loss sharing.

Preparing for floods through flood emergency planning, exercising and community engagement enables a proactive response to flooding to be developed. Without preparation, flood response would become primarily reactive, reducing the opportunities to respond in the optimal time frames and with maximum efficiency through warning, evacuation, rescue, property protection and other activities. Preparing properly for floods, therefore, is likely to result in increased public safety, reduced property damage and faster community recovery (Commonwealth of Australia, 2009).

In Kenya there are several organisations that make up consortiums in the management of disasters. For example in the upper Eastern region of the country, there is a consortium of organisations that work with communities to address climate change disasters namely the Netherlands Red Cross, Kenya Red Cross Society, CARE Kenya, Wetlands International and Cordaid. With the buy in of the community, a platform was established to bring together the local community based organizations and NGOs, where decisions on management of the water source were agreed on, to minimize the effects of drought and flooding (Gullet, 2016).

The National Water Conservation and Pipeline Corporation (NWCPC) has been the main agency in implementation of flood mitigation projects in Kenya. Since enactment of Water Act 2002, the Corporation has undertaken various projects geared towards mitigating the effects of floods. These include raising heights of existing and construction of new dykes along rivers, drainage channels on rivers, seepage control, river bank stabilization, construction of water pans for flood mitigation and drought intervention, construction of concrete check dams, to minimize effects of floods, etc. (NWCPC, 2017).

Flood Control

The basic methods of floods control have been practised since ancient times for example afforestation and construction of levees, dams, etc (UNISDR, 2004). Long term risk reduction measures are intended to minimise the adverse effects of a hazard by eliminating the vulnerabilities which hazards would otherwise expose (Mandyeh, 2007). People who live in hazard prone place device methods for protecting themselves and their livelihoods. These methods are based on their own skills and resources, as well as their knowledge of their local environments and experiences of hazard events in the past (Bankoff, Frerks and Hilhorst, 2004).

Floods control can be carried out in two ways namely by controlling the waters or by controlling floodplain development (Pomeroy, 2006). To minimize the effects of flooding, engineers build dams, levees, and floodwalls along rivers. Dams can store water during periods of heavy runoff and release it gradually during periods of low flow. Artificial levees and floodwalls are built along streams to confine floodwaters and to keep them from covering the floodplain. As more communities build levees, however, river levels rise because floodwaters cannot spread out. The river deposits its sediment in the channel instead of on the floodplain, raising the riverbed and displacing the water.

Levees are by no means a foolproof solution to flood prevention. Floodwaters occasionally overflow levees, burst through them, or go around their upstream ends. Whenever levees or floodwalls are built on only one side of a river, the towns on the other side experience higher flood levels than normal. Other methods of flood control include restoring vegetation, instituting soil conservation measures, constructing floodways to divert floodwaters, widening rivers to accommodate more water, and purposely flooding certain areas to prevent flooding in others. Within the flood prone regions, communities have adopted the flood control mechanism of sealing lower door entrance with mud, digging of trenches around homes, raising the floor of houses, planting of trees and in extreme cases evacuating to higher grounds.

Public Awareness

Raising public awareness as part of community preparedness to reduce the loss of lives and livelihoods has been enhanced in the flood prone regions. Early warning systems exist in the communities to give advance notice of an impending flood from the meteorology department and the many vernacular radio stations in the flood prone regions of the country, including national radio stations and television, allowing emergency plans to be put into action (Phaiju, et. al.,

2010). The early warnings have been used appropriately to save lives and reduce the adverse effects from floods since the communities are made aware of the impeding flood events and the appropriate coping mechanism in place.

Livelihood Diversification

The flood prone regions have diversified their livelihood systems and micro-financial services to help poor people survive disasters. According to Opondo (2013) households that may experience acute food shortage have had to modify their food consumption patterns such as reducing the number of meals per day and rationing the quantity of available food. They eat fewer meals per day, consume cheaper food portions and adults eat less. According to Quandt and Kimathi (2016), majority of Kenyans are resorting to highly modern non rain fed agriculture as an adaptation option. In other local communities, food crop farming, livestock keeping and horticulture, business ventures off farm and other non-farm activities have been adopted as strategies in response to climate variability with climate change related risks (Sorre, 2017). In most of the communities predominantly dependent on rain fed agriculture, women now engage in hairdressing, sewing, weaving and petty trades while men seek casual jobs and cultivation of farms on high grounds that are not prone to floods. In other areas planting of rice has become common due to persisted floods that sweep away other crops.

Response Agencies

The communities living in flood prone regions have benefited from the increased emergency rescue operations by public and private agencies. The government agencies and the NGO's have over the years increased their capacity to respond to the perennial floods in Kenya. Households have been evacuated to camps set up by public and private organisations, where they are

provided with relief. Programs that directly support communities and their local organisations have proved to work best for immediate reinforcement of coping and resilience capacities.

The community organisations have also kept the government authorities aware of their priorities and activities with the priority of flood management measures (Bhatt and Aysan, (2008). The management of disasters in Kenya has since been harmonized with the creation of the National Disaster Management Unit to coordinate all stakeholders in the country from the national to the county level. The unit works seamlessly with the National Disaster Operation Centre, the Kenya Defense Forces, the Kenya Red Cross Society and other stakeholders. This has in one way or the other ensured that there is effective and efficient coordination and collaboration before and during the disaster event.

Indigenous Knowledge as an Adaptation Strategy for Community Resilience

World Intellectual Property Organization defines traditional knowledge as the knowledge, know-how, skills, innovations or practices that are passed between generations in a traditional context that form part of the traditional lifestyle of indigenous and local communities who act as their guardian or custodian (Mafongoya, 2017). McLean (2010) describes traditional knowledge as innovations and practices of indigenous people. This is the critical knowledge used on a day today basis and it is the foundation of modern science.

When considering climate change, indigenous peoples and marginalized populations warrant particular attention since they are vulnerable to the impacts of climate change due to the close connection between their livelihoods, culture, spirituality and social systems and their environment.

At the same time, however, this deep and long-established relationship with the natural environment affords many indigenous peoples with knowledge that they have long used to adapt to environmental change, and are now using to respond to the impacts of climate change (Nakashima, 2013). The Intergovernmental Panel on Climate Change (IPCC) has acknowledged Indigenous knowledge in their Fourth assessment report (AR4) as an invaluable basis for developing adaptation and natural resource management strategies in response to environmental and other forms of change (IPCC, 2007).

According to Odero (2011), the best way cope with the negative impacts of climate change, is to have communities employ traditional, local and indigenous knowledge (TLIK) based practices. TLIK practices include: knowledge of indigenous plants, food preservation techniques, seed selection to avoid drought, disease control in livestock, among others. This knowledge is important because it is readily available to smallholder farmers, pastoralists, fishing communities and forest dwellers in Kenya.

Indigenous responses to climate variation typically involve changes to livelihood activities and maintaining a diversity of plant varieties and animal races which provide a low-risk buffer under uncertain weather and climate conditions. This ability to access multiple resources and rely on different ways of using the land, contributes to local capacities to manage for climate change (Naanyu, 2013). McLean (2010) states that, due to the close relationship, indigenous people have with the land, they have been observing and reporting the impacts of global warming for several decades and are trying to cope with and adapt to these changes, with varying degrees of success.

The International Development Research Centre carried out research linking traditional and modern forecasting in western Kenya and established that there are elders who hold mystical powers of weather forecasting. In some communities they are known as ‘rainmakers’ as some

believe that they not only foretell when the rains may come but they can make them happen. The Nganyi community in western Kenya is known to have such powers. This community has close observation and understanding of weather patterns and the behaviour of local plant and animal life. The changes in humidity and temperature can be observed in the flowering and leafing of shrubs and trees, the call of certain birds, the behaviour of ants, and even the croaking of frogs and toads. Within rainmaker families, this knowledge is guarded carefully, as both a sacred trust and a source of livelihood (IDRC, 2011).

Figure 5: Rainmaker' Mzee Osore Nganyi at work, Source: (IDRC, 2011)

Conclusion

Africa has contributed very little to global warming but it will be affected severly by climate change, and the major focus in the continent is on adaptation. The perception of disasters as purely natural events suggest that little can be done to avoid their negative impacts on the society. This notion fails to consider human capacity to understand risk and reduce impact on society. If human activities and choices influence hazard impacts on livelihoods and economic development, they can also contribute to reducing them. Communities posseses resilient properties when facing hazards including resistance and creativity i.e social resilience. It is evident that disaster resilience among communities in Kenya, affected by floods is low and hence the need to enhance it at the personal, household, community, county and national level through capacity building.

The Sendai framework notes that it is urgent and critical to anticipate, plan for and reduce disaster risk to cope with disaster. It requires the strengthening of disaster risk governance and coordination across various institutions and sectors, the full and meaningful participation of relevant stakeholders at different levels, investments in research and the use of technology to enhance multi-hazard management throughout the disaster management cycle.

Recommendations

A resilient community is knowledgeable, healthy and can meet its basic needs. It is socially cohesive, has economic opportunities, has a well maintained and accessible infrastructure and services, can manage its natural assets and is connected with other organisations that are exposed to the same threats and risks such as diseases, political, economic issues, natural hazards and disasters. Actions to improve climate resilience in the disaster preparedness programme within the flood regions of the country should include modernisation of meteorological systems, and an

early and appropriate response to emerging floods that includes a well maintained early warning system. Flood forecasting and warning is a prerequisite for successful mitigation of flood damage and its effectiveness depend on the level of preparedness and correct response. Therefore the responsible authorities should provide timely and reliable flood warning, flood forcasting and information. Measures should also be taken to create awareness about flood hazards in the communities by implementing education progams. The commnities should also obtain the political and public commitment to reduce the risk of flood disasters especially from the county government and global cooperation. This will also facilitate microfinance arrangements to empower individuals and communities to implement flood risk management solutions for themselves. As indicated in the Sendai framework for disaster risk reduction, in order to reduce disaster risk, there is a need to address existing challenges and prepare for future ones by focusing on monitoring, assessing, and understanding floods disaster risk and sharing such information.

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