

Economic and Social implications of Drought and Floods in Kenya

By Joshua Laichena

Overview

Changing weather patterns in Sub-Saharan Africa have resulted to more frequent and intense episodes of droughts and floods, which often culminate into emergencies.

In Kenya, more than 70 per cent of natural disasters that occur are as a result of extreme climatic events that include droughts and floods. The geographical position of the country makes it highly vulnerable to climate-induced hazards with over 80 per cent of the country being arid and semi-arid. Some parts of the country experience double hazards of drought and floods that occur in quick succession.

Prolonged dry weather spells are occasionally followed by episodes of floods either immediately or a few years later. For instance, immediately following the 1995/96 drought, the El Nino-related floods in 1997/98 struck with widespread devastating effects, destroying infrastructure and creating an epidemic that adversely affected Kenya's livestock. The Kenya Red Cross estimated that the the floods resulted in 300 deaths and damages worth US\$ 670 million and US\$ 236 million to infrastructure and the agricultural sector, respectively. During the 2003 floods, part of the earth embankments (dykes) constructed in the 1970s to control water flows on River Nzoia and Yala were destroyed and 25,000 people were displaced. Most recently in 2018, Kenya experienced heavy floods in most parts of the country following a prolonged drought of 2016/17 that destroyed roads and other infrastructure, and caused displacements.

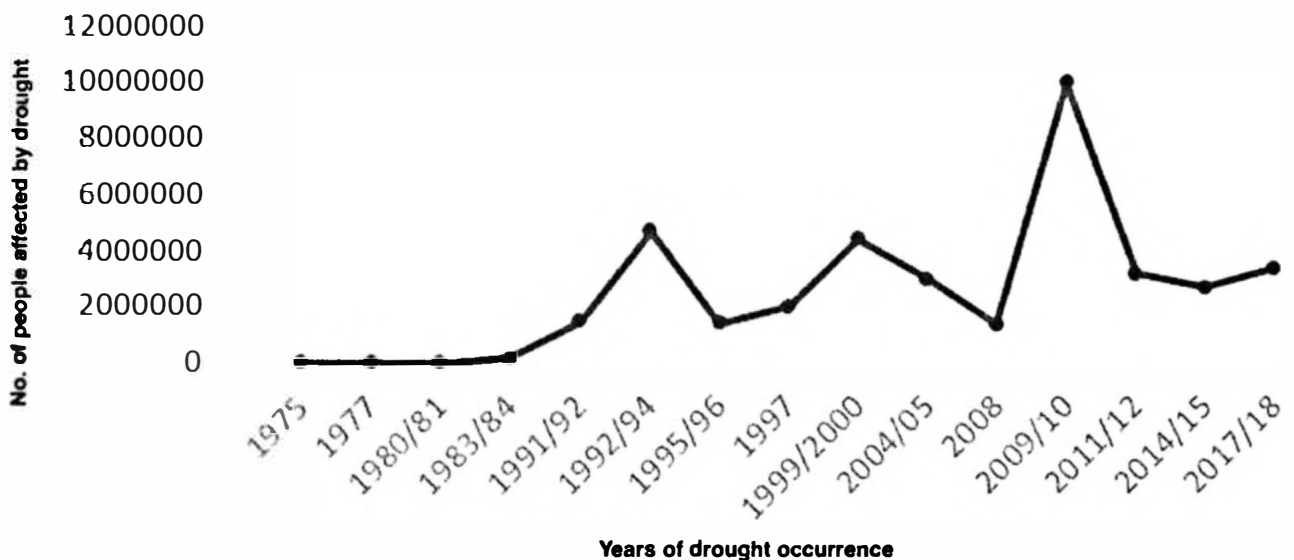
The coverage and devastating impacts of droughts and floods have persisted, raising concerns over the effectiveness of the resilience measures put in place over the years. There are also concerns that these impacts may further complicate the achievement of the Kenya Vision 2030 and the "Big Four" initiatives. Kenya is signatory to global agreements and frameworks towards building resilience to risks posed by drought and floods. These include the Sustainable Development Goals (SDGs), the United Nations Framework Convention on Climate Change (UNFCCC)

(Ratified in 1994), The Kyoto Protocol (2005) and the Sendai Framework for Disaster Risk Reduction (2015). Kenya is also in the process of updating the disaster risk reduction plan to align to the EAC Disaster Risk Reduction and Management Act (2016).

An estimated 3 to 4 million Kenyan's are affected by disasters annually. More than 70 per cent of these disasters are precipitated by extreme climatic events that include droughts and floods. Some of these disasters have slow-onset while others have rapid-onset characteristics, and when they occur, they cause extensive damage. For example, between 2008 and 2011, total loss from droughts amounted to Ksh 968.6 billion and resulted in reduction of Gross Domestic Product (GDP) growth rate from an average of 6.5 per cent in 2006/2007 to an average of 3.8 per cent between 2008 and 2012. On average, the economic costs of droughts and floods alone is estimated to be equivalent to 2.4 -2.8 per cent of GDP annually.

Drought has been the major disaster in Kenya. Figure 1 below shows the number of people affected by drought and needing assistance between 1975 (16,000) and 2018 (3.4 million). Drought is becoming more frequent and intense and widespread due to climate change and environmental degradation. The cycle has reduced over the years, from a cycle of ten years, down to five years, and further down to 2 years or almost on a yearly occurrence. While long cycles allowed farmers to recover and rebuild their livestock and crops before the next drought, this is no longer the case. The time for recovery, for rebuilding stocks of food and livestock

Figure 1: Trend of incidences of droughts occurrence in Kenya



is becoming shorter every year. Communities in arid lands had in the past developed drought coping and adaptation strategies, but these are no longer effective enough to cope and adapt to drought due to frequency and intensity.

What has been the response?

The frameworks and legislations to facilitate the coordination of disaster management activities from the National to County level have not been adequately institutionalized. The country has moved from one emergency to another without an effective disaster management system, although there has been a high level of support from the international community. The interventions are often expensive, and lead to diversion of resources from much needed social and economic development. In view of the experiences and lessons learnt during the management of various hazards and disasters over the years, the government in 1993 created a Relief and Rehabilitation Unit and an Emergency Drought Recovery Project to address the consequences of frequent droughts. The Drought Recovery Project was phased out in 1996, and in its place the Arid Lands Resource Management Project I was put in place to carry out drought monitoring and management activities in 10 arid districts in Northern Kenya. The Project (ALRMP II) was expanded in 2003 to cover 22 arid and semi-arid districts. In 1998, the government established the National Disaster Operations Centre at the height of El-Nino induced floods. The Centre was tasked with monitoring the floods and coordinating logistics to assist the communities in the flood areas. The Centre has been retained to monitor disaster incidents on a 24-hour basis and to mobilize responses in the areas affected. The government then established the National Drought Management Authority (NDMA) in 2011 to coordinate responses to natural or man-made disasters, and for capacity-building in disaster resilience and crisis response.

Currently, there are several agencies/institutions that are responsible for disaster preparedness/management in Kenya. These include the National Disaster Management Unit (NDMU), National Drought Management Authority (NDMA), the National Aids Control Council (NACC), the Kenya Meteorological Department (KMD) and the National Environmental Management Authority (NEMA). Except for the Kenya Meteorological Department, these institutions oversee disaster preparedness, response and coordination.

In 2009, the government formulated a draft National Disaster Management Policy to emphasize proactive and preventive strategies in addressing disaster situations. The Constitution of Kenya 2010 designates Disaster Risk Management (DRM) as a shared function between the national and the county governments. It integrates key provisions on DRM, including national level support to counties which are required to develop their respective DRM policies and programmes in line with the National Disaster Risk Management Policy (2018) and the National Disaster Risk Financing Strategy (2018) that emphasizes investment in prevention and preparedness at all levels (national, county, community, village and personal).

The country's long-term development blueprint, the Kenya Vision 2030, identifies as a priority the transition from an approach focused on emergency response, towards a comprehensive approach to risk management. The Vision is structured in five-year Medium-Term Plans (MTP). The First MTP (2008-2012) did not explicitly address the issue of natural hazards. The Second MTP (2013-2017) included provisions for addressing drought emergencies and food security by prioritizing implementation of the Ending Drought Emergencies (EDE) Strategic Plan. The Third MTP (2018-2022) aims to take an integrated approach to addressing climate change and disaster risk impacts. Recently, the government has established the National Drought Emergency Fund (NDEF) with an allocation of Ksh 2 billion from the Exchequer in 2018/2019 budget. To operationalize the NDEF, the National Treasury and Planning developed the National Drought Emergency Fund Regulations 2018. Resources to the NDEF will be allocated to various drought risk management components of resilience, preparedness, response and recovery.

As part of the transition to a more proactive approach to managing disaster and climate risks, Kenya has also developed a series of disaster-related laws and policies. These include the National Drought Management Authority (NDMA) Act (2013) which establishes NDMA, the Climate Change Act (2016), and the National Policy on Climate Finance (2018) aimed at strengthening the ability of both the national and the county governments to respond effectively to disasters and to climate change, the Water Act (2016) which redefines roles and responsibilities for the management, development and regulation of water resources, the National Land Use Policy and the National Spatial Plan 2015-2045 to ensure sustainable and equitable use of land and to address environmental degradation, soil erosion and pollution.

Other legislations aimed at addressing disaster risk reduction (DRR) include the Sessional Paper No. 8 of 2012 on the National Policy for the Sustainable Development of Northern Kenya and other Arid Lands; the EDE Common Programme Framework (2015); the National Climate Change Action Plan (2013); the National Urban Development Policy and the bill on Built Environment to implement Article 176 and 184 of the Constitution that deals with devolution and classification and management of urban areas to strengthen urban development planning and country's building regulatory framework; the National Disaster Risk Management Policy (2018), which will serve as the overarching framework on Disaster Risk Management for the country and aims to build a safe and disaster-resilient nation through establishment of a robust DRM system that contributes to and protects the achievement of Kenya's national development and seeks to substantially reduce natural and human induced disaster risks and associated losses in social, economic and environmental assets at National and County levels through the establishment of an integrated multi-hazards DRM approach; and now the National Disaster Risk Financing Strategy (2018) that emphasizes investment in prevention and preparedness at all levels (national, county, community, village and personal).

Various programmes have also been implemented during the first ten (10) years of the Kenya Vision 2030, including establishment of the National Drought Early Warning System (launch in 2016/17 of a web-based early warning information system database that uses mobile phones); Rapid Drought and Food Security Assessments; implementation of the Hunger Safety Net Programme (HSNP); Rapid Preparedness Infrastructure Programming; Adaption to Climate Change initiatives such as County Climate Change Finance (CCCF); and adaption to climate change programmes.

Despite the many important disaster management initiatives undertaken in Kenya over the past two decades, there are still challenges of implementation of drought disaster responses. Most of the response activities have focused on immediate emergency interventions such as water trucking and destocking and has given little attention for adequate emphasis on long-term measures such as adequate level of preparedness required to address significant risk profile and coordination of institutions dealing with disasters.

The government has drafted the Disaster Risk Management bill 2018 that has been approved by the Senate, which emphasizes proactive and preventive strategies in addressing disaster risk management in Kenya. It is envisaged that once the bill is enacted into law by the National Assembly, it will put in motion the process of streamlining disaster risk management in Kenya.

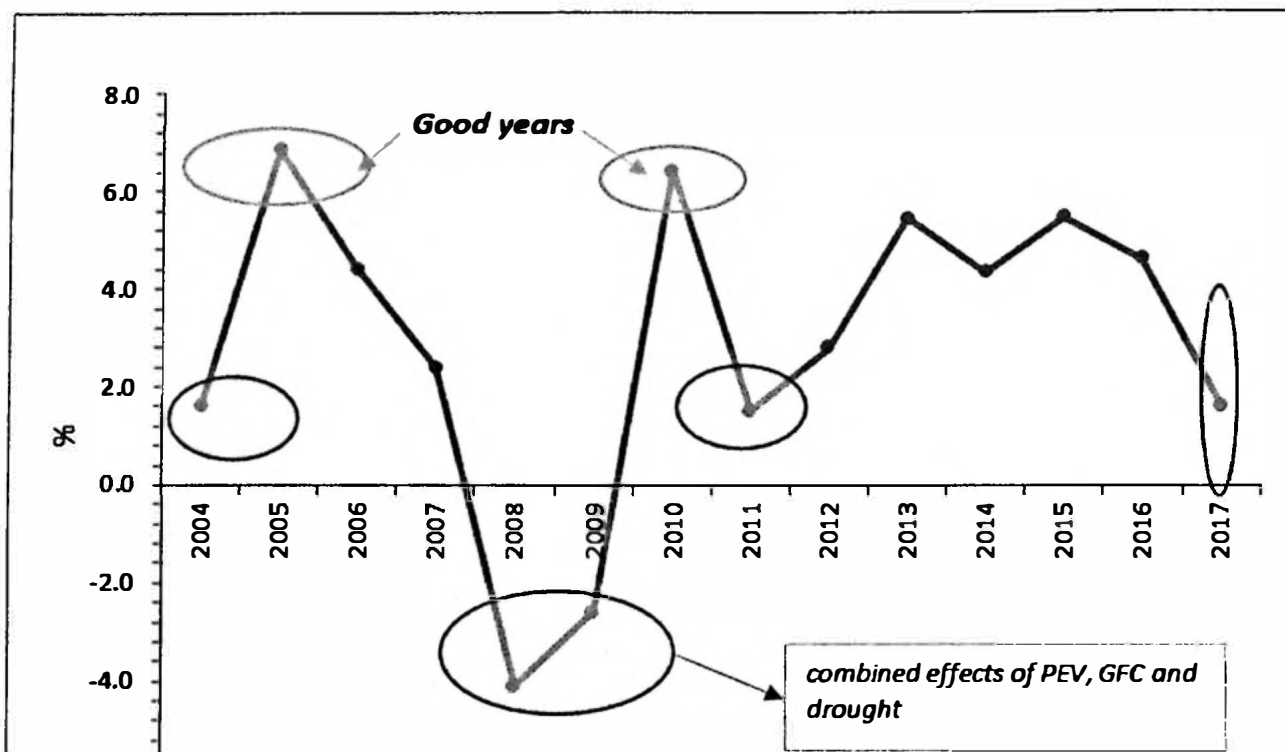
Economic Impacts of Drought and Floods

From an economic perspective, studies show that the economic cost of droughts and floods in Kenya contributes to long-term fiscal liability of about 2 - 2.8 per cent of GDP annually. Droughts alone are estimated to cost about 8 per cent of GDP every five (5) years, while costs arising out of floods are about 5.5 per cent of GDP every seven (7) years. The cost of recovery from droughts and floods is estimated to be seven times higher than the cost of preventing the negative effects.

The economic effects of droughts and floods manifest in the disruption of production, leading to production losses, income losses and increased costs of production which eventually culminate into reduced Gross Domestic Product (GDP). Agriculture is the sector most affected by droughts and floods, yet it is the mainstay of Kenya's economy, contributing on average 30 per cent of GDP. Trends in agricultural performance show depressed growth rates of the sector during periods of adverse weather conditions. Growth in agriculture slows down in times of drought and floods as observed in 2004, 2008/9, 2011 and most recently in 2016/17 (Figure 2).

Besides drought causing severe food shortages affecting millions of Kenyans, the livestock sector also suffers through livestock deaths because of scarcity of water and pasture. This also gives rise to competition for available pasture and water resources among communities that heavily rely on livestock for their livelihoods. Such competition in some cases gives rise to conflicts between communities resulting in deaths of people and livestock. Most of the counties that generally have less resources

Figure 2: Growth rate (%) of agriculture, forestry and fishing



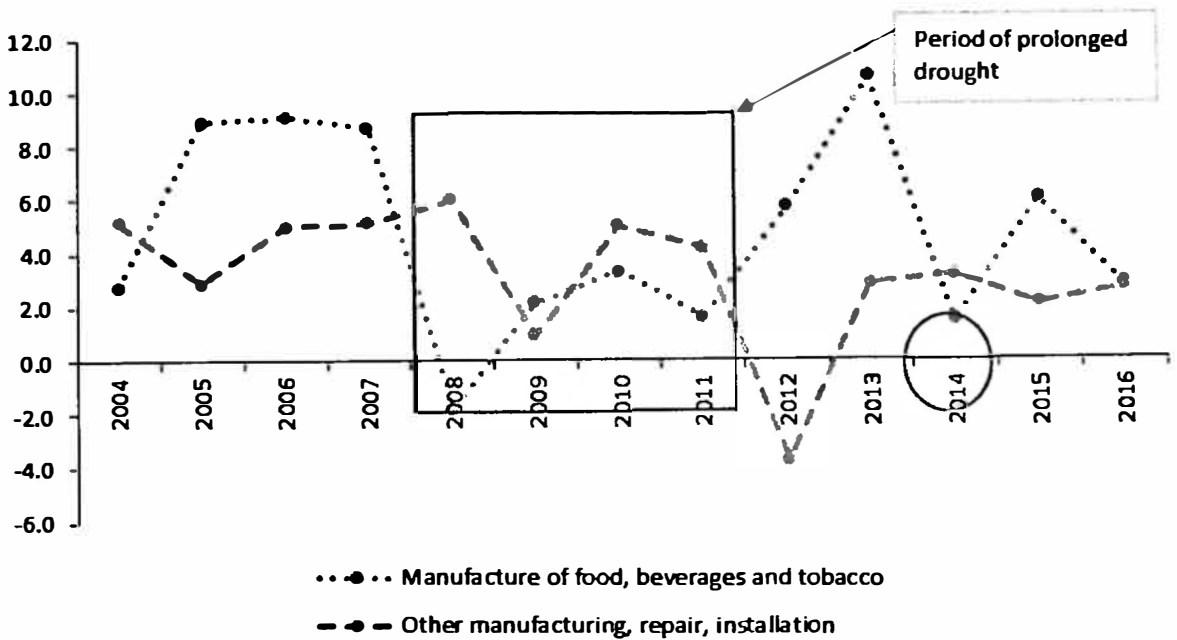
Data Source: Kenya National Bureau of Statistics

(water and pasture) such as Marsabit, Turkana, Samburu and Isiolo have in the past experienced conflicts of water and pasture. The overall effect is deprivation of livelihoods and threat to peace and security in these communities.

The manufacturing sector has linkages with the agricultural sector by way of provision of raw materials for the agro-processing industry. Depressed rainfall often leads to disruption of water supply and affects hydro-electricity power generation which relies heavily on water for energy generation. The net effects of the disruptions are widespread power shortages that affect both households and firms. High energy costs feed into the cost of doing business. Though it was not possible to isolate patterns in the disruption of production flows, decline in revenues, and higher operational costs typify disaster periods. The manufacturing sector experienced declining growth during the prolonged drought period of 2008-2011 compared to previous periods (Figure 3). Likewise, there was decline in 2016 especially for the manufacture of food, beverages and tobacco.

The macroeconomic effects of drought and floods at the national level are mainly manifested through reduction of GDP arising from productivity losses in other sectors. Such losses necessitate government intervention to cushion communities from further effects of droughts. The interventions often include increased expenditures that have fiscal implications. Drought and flood disasters also reduce government revenues from production taxes and import duty as the government often must import essential food stuffs such as maize, wheat, sugar and milk. Increased expenditures witnessed in the face of droughts and floods include food relief donations,

Figure 3: Growth rate (%) of the manufacturing sector, 2004 to 2016



Data Source: Kenya National Bureau of Statistics

evacuation for flood victims and restoration of infrastructure such as bridges that have been swept away by floods.

The magnitude of these effects reflect the importance of building capacities for the economy to be well cushioned from the negative effects of these disasters. This requires concerted efforts by national and county governments. At the national level, several strategies have been put in place, including building of mega dams across the country to collect water during rainy seasons, and allocation of funds to revive and modernize irrigation projects in Kenya, especially in the Tana Delta, to mitigate the negative effects of droughts. Other measures undertaken by the government include livestock off-take in ASALs, the Kenya Livestock Insurance Programme (KLIP) for insurance pay-outs to reduce livestock related losses, and the National Drought Contingency Fund to cater for national disasters.

The key message is that there is need to integrate research and development into drought management and response, including but not limited to research on fast-growing and drought-resistant crops that have higher productivity. Findings from such research will be key in ensuring a sustained supply of alternative food products. Energy diversification is also key especially with the vast renewable energy resources such as geo-thermal, wind and solar energy.

Social Impacts of Drought and Floods

From a social perspective, drought and floods disasters affect schooling and healthcare provision. These disasters, for example, destroy infrastructure such as roads and classrooms, making access to education facilities difficult. The destruction of health facilities by floods is often accompanied by a rise in the prevalence of water-borne diseases. Women and children

are often disproportionately vulnerable to the effects of drought and floods due to their limited social capacity to cope with such disasters. Other most vulnerable groups include the elderly, and persons with disabilities.

Women, men, girls and boys experience and are differently affected by natural disasters due to the asymmetrical power relations based on their gender. Women and girls are particularly exposed to climate-related disaster risks such as droughts and floods and are more likely to suffer higher rates of mortality, morbidity and economic damage. This is because women have unequal social, political and economic status in the society, which makes them more vulnerable to natural disasters. In the ASALs, though, young men are becoming more vulnerable.

The occurrence of droughts and floods has contributed to changing gender roles in disaster-prone counties as women seek alternative means of livelihoods that include running small businesses, casual labour, and selling of animals and farm produce. The communities have also come up with coping mechanisms that display gender differences. For example, during search for alternative livelihoods when drought strike, men leave their homes with the livestock while women, boys and girls are left behind. This means that the responsibility of taking care of the home during this time is left to the women. It also matters what time the disaster occurs. For example, if the disaster occurs at night, then women and children are more vulnerable. In the case of Solai Dam tragedy, for example, more women and children were affected. There are also some unique differences between men and women which should be considered during disaster management. Key among them is considerations on how well-equipped the responders are and whether adequate resources are available.

Some of other coping mechanisms adopted by communities include migration and human mobility due to lack of capacity to adapt to the adverse effects of climate change. However, some household dynamics make migration complex, hence different services that target women and children need to be considered. For example, it has been assumed that diversification can enhance resilience, but on the contrary, too much diversification of sources of livelihoods as strategies for adaptation can be overwhelming for some gender groups such as women, as more responsibilities are added to them. Communities are also changing their consumption patterns as a mitigation measure and distributing family members to their relatives who have more food. A few negative coping mechanisms are also emerging, where for example children are separated from their homes when parents leave them and go searching for food, leading to increase in street children escaping deprivations at home. Also, sale of households' property has future implications given that households are left without assets to cushion themselves from future eventualities.

The key messages is that vulnerable groups are not separated from the non-vulnerable groups when preparing for disasters. It is important to identify the differences in vulnerabilities even when designing preparedness measures, to build capacity among the vulnerable groups on how to be prepared for disasters and the response options available to them. Exploring if women bring unique experience and skills, that are often overlooked, not acknowledged or untapped during natural disasters is key and what ways can experience and skills be tapped to ensure

their contribution to disaster risk reduction and management. Also, given the changing roles of women in the society with some well-educated and holding senior positions, how can they empower others and make them aware of the coping mechanisms during natural disasters. Other considerations include identifying the most vulnerable and taking into consideration how vulnerabilities get transferred over time and across groups.

Implications of Drought and Flood on Agriculture and Trade

Drought also impacts heavily on agriculture and trade. Losses from droughts and floods and other weather-related events in Africa are estimated at 2 to 3 per cent of GDP. The annual adaption costs for Sub-Saharan Africa (SSA) are projected to be between US\$ 14-15 billion. In Africa, adaption costs are estimated at 0.5 per cent of Gross Domestic Product (GDP) and are expected to reach US\$ 70 million by 2045. At macro level, the costs of extreme weather events include costs of adaptation, infrastructure loss and damage, loss of production and trade flows (including food value chains) and impacts on national growth. At the micro level, the costs include entitlement failure, loss of property and livelihoods, direct costs of adaptation and loss of lives.

While the EAC region has a huge potential to produce enough food, the agricultural production system in the region has largely remained rain-fed, leading to high food and nutritional insecurity. Major adverse impacts on food production are expected to result from changes in temperature, moisture levels, ultraviolet radiation, carbon dioxide levels and pests and diseases. The EAC region remains a net importer of food products, a scenario attributable to challenges such as under-investment in agriculture, large share of informal cross border trade, deficits in physical and soft infrastructure, accelerating demands for food by the expanding regional population, and non-trade barriers (bans, standards, etc). In terms of the intra-EAC trade implications, Kenya is expected to remain a net importer of beans, maize, etc from EAC except wheat and millet. These dynamics imply welfare loss for Kenya over the forecast period because of adverse climate change.

The role of institutions to deepen agricultural technology cannot be overemphasized. For instance, KALRO is mandated to develop technologies in agriculture and livestock through extension services. However, extension officers are few and government funding has dwindled. The National Research Fund that was established to address the challenge of fragmented investments in science, innovation and technology is low on funding to make any impact. Enhancing the capacities of these institutions to support investment in science, innovation and technology to enhance agricultural productivity and introduce crops and livestock with enhanced resilience is fundamental. The role of county governments need to be capitalised on given that functions such as agriculture and extension services are devolved. A key challenge is the over-reliance on rain-fed agriculture, making the sector prone to the impact of droughts. The agricultural research expenditure is slowing down and is below the Maputo Declaration. Kenya faces weak policy implementation as

evidenced from experiences of other countries that have borrowed from policies in Kenya with better outcomes.

Policy Recommendations

- i) **Strengthening, Coordination and Adopting Comprehensive Approaches to Disaster Risk Management:** This is necessary given that both levels of government have a role to play in disaster management function as per the Fourth Schedule of the 2010 Constitution. Further, given the intertwined nature of drought and floods, an institution could be set up with the mandate to cover both drought and floods. At regional level, there will be need to build capacity to respond with multi-sectoral approaches and move quickly towards mainstreaming the management of risks from natural hazards into all aspects of development planning and in all sectors. A balanced approach that incorporates structural and community-based prevention measures, emergency preparation, insurance, and other non-structural measures such as education and training or land use regulation is needed.
- ii) **Scaling up the Early Warning System:** The impact of droughts and floods can be greatly avoided and or minimized if their occurrence were properly monitored, assessed and mitigated. Strengthening early warning system (EWS) should be a priority in planning for, responding to and recovery from the adverse impacts of weather-related hazards. The EWS network could be expanded to cover the country's diverse agro-climatic zones, and through use of remote sensing technologies and mobile phone applications.
- iii) **Strengthen Research and Development and Improve Knowledge Sharing:** Investments in disaster risk reduction research will be key while at the same time strengthening the link between research, policy and industry. Generation of localized data across the various agro-climatic zones will serve to specifically address the needs of local communities. Coupling this is a framework for data and knowledge sharing across various players.
- iv) **Enhancing Financing Mechanisms:** Adequate, predictable and timely financial resources are key in building resilience and adaptation in the medium to long term. Robust financing is required to deepen technology, build human capital and support extension services. At national level, the government has established a Contingencies Fund, National Drought Emergency Fund, and Climate Change Fund while some counties have created Climate Change Funds to address disasters. In view of the increasing frequency and severity of disasters, scaling up the capitalization of these funds while at the same time improving coordination will ensure better response. Deepening of financial instruments including insurance and credit will also help build robust coping mechanisms at household and firm level against impacts of drought and floods. Given the high-risk nature of weather-related insurance and credit, which is at infancy stage,

insurance and credit companies need support from government and development partners to increase participation in disaster risk financing. This will also enable application of satellite-based technology which is critical in the design of insurance and credit products.

- v) **Promoting Sustainable Environmental Management:** Environmental resources play a critical role in adaptation and mitigation of climate-related disasters through flood control and carbon sequestration. Rapid degradation of these resources particularly forest and wetlands across various parts of the country exposes communities to these disasters. Efforts to reclaim lost forests and wetlands can be expedited alongside programmes to increase the country's tree cover to enable them to perform their flood and drought mitigation functions. Geo-thermal, solar and wind power usage could be scaled up to increase their overall share in the country's energy mix and help diversify the sources of energy. To manage floods, more dams could be constructed downstream especially in the seven forks dams ecological zone where spillage of the dams has been associated with flooding.
- vi) **Investment in Infrastructure and Human Capital Development:** Investment in infrastructure and human capital development is key in developing the capacity for disaster preparedness, response and in recovery. Efforts need to be scaled up to revisit the design and building codes to ensure they are climate-proofed and that they can withstand extreme weather conditions, including disaster risk management in professional training to ensure that they are integrated in all aspects of economic planning. To reduce the impacts of drought, it is necessary for the national and county governments to improve infrastructure development (transport, storage and ICT) by upgrading the existing ones and expanding to areas with low coverage to allow for timely distribution of food from excess surplus to scarce areas and enhance access to the market. Quality communication networks are also key to supporting social support programmes such as cash transfers by the government and development partners. In addition, housing can act as a buffer to drought-floods disaster cycle in the ASALs. Community involvement in cost-effective planning for housing development especially in the ASALs will be extremely important. Focused attention is needed to integrate development of housing schemes as a resilience measure in mitigating the impacts of drought and floods.
- vii) **Leveraging on Technology:** Implementation of various pilot projects has demonstrated that technology can improve the resilience of affected communities, particularly those prone to droughts and floods. Opportunities exist in integrating satellite-based applications to support disaster reduction measures. This will require investments in research and development to enable identification of appropriate technologies while blending modern and traditional technologies to enhance their relevance and increase uptake.

- viii) **Mainstreaming Interventions for Vulnerable Groups and Designing Programmes that Promote Gender Empowerment in Building Resilience:** Special interest groups such as women and persons with disabilities (PWDs) are disproportionately affected by droughts and floods. Understanding the nature of vulnerability of these groups to disasters is needed to integrate their concerns into disaster management at all levels. Incidences of drought and floods worsen the burden for women because of challenges in accessing food, sanitation and health services, especially when households are far away from health facilities and other social amenities. The problem is more complex among pastoral communities that migrate with livestock in search for water and pasture, leaving women to take more male-related responsibilities. Mainstreaming gender interventions through collection of comprehensive information on most vulnerable groups is therefore imperative.

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KIPPRA Policy Briefs are aimed at a wide dissemination of the Institute's policy research findings. The findings are expected to stimulate discussion and also build capacity in the public policy making process in Kenya.

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For More Information Contact:

Kenya Institute for Public Policy Research and Analysis
Bishops Road, Bishops Garden Towers
P.O. Box 56445-00200, Nairobi
Tel: 2719933/4
Cell: 0736712724, 0724256078
Email: admin@kippra.or.ke
Twitter: @kipprakenya
Website: www.kippra.org