

CHAPTER 10

Status of Disaster Risk Management in Kenya

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10.1. Introduction

This chapter introduces the basic concepts of disaster risk management with specific lessons from Kenya. Disasters vary in their magnitude/impact, frequency, spatial coverage and duration from time to time and from place to place. Disasters may be caused by naturally occurring extreme events and/or by human induced ones. As natural phenomena, they are unevenly distributed over space and time. As human induced phenomena, they vary from society to society transcending a wide spectrum of cultural, social, political and economic differences. Disasters always imply the involvement of human beings as either causal factors, inducers, victims and or managers, all of which vary geographically and temporally.

In the last four decades, the frequency and magnitude of natural disasters have increased dramatically. Records of major disasters indicate that there were 113 disasters between 1960 and 1990 with 34,823 people being killed in the developed countries as compared to 793,616 in the developing countries (UNESCO/UNEP, 1988). In the last decade, the world has suffered an increasing number of "natural disasters affecting more than 2.5 billion people, killing 478,100 and causing economic losses estimated at US \$690 billion (Briceno, 2005). According to the World Disasters Report for 2004, the world is witnessing an ever-increasing number of natural disasters with a 68 % increase over the last 10 years. This illustrates the magnitude of the vulnerability of developing countries to the effects of natural hazards, which generally hit the poorest areas. The overall economic losses due to natural hazards increased world-wide and in the 1980s amounted to US\$ 9 billion as compared to US\$ 10 billion in the 1960s (Ibid, 1988). Indeed, population growth, industrialisation and environmental abuse have opened a Pandora's box of catastrophes across the globe. From the industrial accidents like Bhopal and Chernobyl to the horrors of drought in Africa and the extreme weather that battered Japan and USA in 2004. As such the world is more aware of man-made disasters (Topfer, 2005). The problem at hand is how to prevent them or respond to them when they strike.

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10.2. Definitions and Nature of Disasters

i The Concept of Disasters and Hazards

The terms; hazards, disasters, catastrophes, calamities and emergencies are used by many people to express unfortunate situations that have befallen them, communities or nations. All these terms describe the occurrence of extreme and unexpected events that disrupt normal functioning of society and inflict sudden and extraordinary losses in human life and property. They show situations that cannot be contained by established and readily available normal social response mechanisms. These situations call for extraordinary response and management mechanisms often known as emergency action. They usually imply the need for external interventions.

Definition of the term disaster, therefore, varies according to the person or authority that uses it, which in turn is dependent on their judgement of the criteria that need to be satisfied in order for an event to be termed a disaster. Different authorities have defined the concept variously. It is any occurrence which causes damage, ecological disruption, loss of human lives, deterioration of health and health services on a scale sufficient to warrant an extraordinary response from outside the affected community (WHO, 1999). Gunn (1990) links it with a vast ecological breakdown in relations between man and his environment leading to serious and sudden events (or slow, as in drought) on such a scale that the stricken community needs extraordinary efforts to cope with it, often with outside help or international aid. The UN Group of experts meeting held in 1989 to guide the International Decade for Natural Disaster Reduction (1990-2000) defined disaster as any disruption of the human ecology that exceeds the capacity of the community to function normally (Kaitilla & Yambui 1996).

It is clear, from the above definitions that the concept refers to any serious disruptions of the functioning of a society or community causing widespread human, animal, material or environmental losses, which exceed the ability of the affected society or community to cope without outside interventions. In this connection, disasters are, therefore, events that cause significant human and economic loss and demand a crisis response beyond the scope of any single agency or service such as fire or the police department.

There is a subtle link between the terms hazard and disaster. While many people have used the terms interchangeably, some authors make distinctions between them. Such authors view hazards as potentially harmful events that may not necessarily lead to disasters or catastrophes. In the Pacific Ocean, for example, many earthquakes that are frequent and measure very high in the Richter Scale have never been disastrous for they occur in remote areas where, under normal circumstances, human beings are not found. These events, however, may not necessarily result in disasters, even

if they are frequent and strong, unless they inflict damages on human life and property. The events, therefore, remain potentially harmful or hazardous. A hazard becomes a disaster when it affects vulnerable people. Equally, hazards become disasters when they cause serious damages to property and human life as has happened in densely settled areas and towns found at convergent plate margins. Some authors, like Cannon (1994), therefore, argue that disasters are not natural. It is human decisions and activities that create a condition for disaster events (ibid.). It, therefore, follows that human beings are direct or indirect triggers of disasters.

Nature presents human beings with opportunities and risks (Figure 1), which vary greatly in their spatial distribution. Opportunities include different ways in which people utilise nature for production of material wealth and provision of services. The risks inherent in nature consist of a wide range of hazards that may constrain production, destroy accumulated human and material resources and destabilise established social systems.

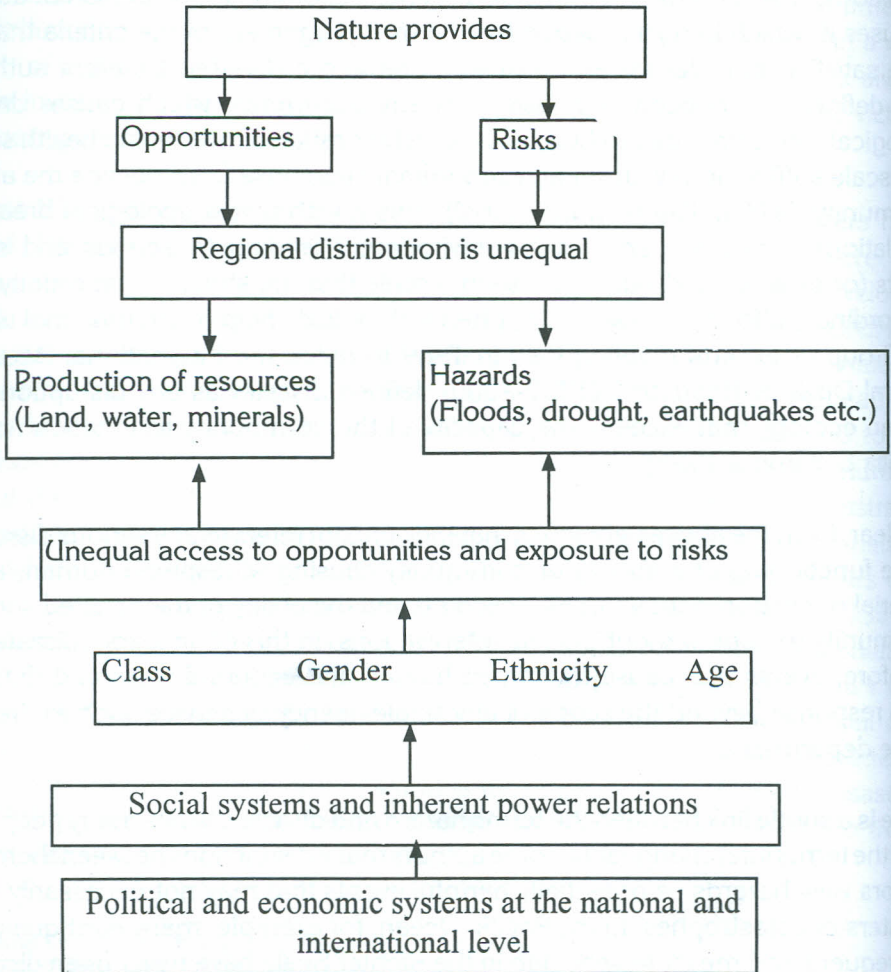


Figure. 1: Nature's Opportunities and Risks (Cannon, 1994)

The figure above summarises nature-related hazardous aspects. The hazards lead to disasters as a result of the decision-making (risk-taking) processes generated by man. Such disasters are not, therefore, natural but anthropogenic. In most cases, solutions to such disasters lie in the domain of human manipulation. Disasters, like hazards, can be broadly classified as natural and man-made. Both may result in many casualties, property damage, emergency actions, and civil strife or social and political instabilities.

ii. Disasters as Outcome of Cumulative of Events

Risks, Vulnerability, and Hazards

As earlier discussed, disasters are often associated with damaging effects to human beings, their physical infrastructure and also on other life forms. A hazard generally refers to danger from a natural event in this context, while vulnerability means the susceptibility of a population or systems to the effects of the hazards. The risk on the other hand is the probability that a particular system or population will be affected by the hazard. As such risk is a function of the vulnerability and hazard, generally expressed as:

$$\text{Risk} = \text{Vulnerability} \times \text{Hazard}.$$

Though all disasters are unique in that they affect areas with different levels of vulnerability and with distinct social, health, and economic conditions, some similarities between them still occur (PAHO, 2000). Disasters should not be viewed only as those short-lived extreme events such as earthquakes, volcanic eruptions, hurricanes, floods, landslides, etc. Hazards such as drought, poor disposal of toxic chemicals and environmental degradation are insidious and have cumulative effects that lead to widespread famine, outbreak of diseases, mass emigration (refugees), breakdown of families, mental illness, breach of social values and norms, violence, riots and demonstrations, and eventually wide spread human suffering, loss of lives and property.

Some individual events may seem non-hazardous (not harmful); but their cumulative effects can be far-reaching. For example; a low harvest because of inadequate rainfall in one season can be tolerated by a community. If it recurs once again, the community may still manage to contain the situation with some stress. If it occurs for the third time, the community will have become too weak (economically) to withstand the drought. The third drought event may be characterised by wide spread famine and mass emigration. The famine and mass emigration, therefore, are results of the cumulative effects of the successive droughts. This phenomenon is frequently witnessed in the arid and semi- arid and other marginal areas of the world, particularly the developing world. The people inhabiting marginal areas of Kenya, Ethiopia, Somalia, Sudan and many other Sahelian states of Africa also suffer from similar cumulative impacts of recurrent droughts.

iii. Types of Hazards

On the basis of causal agents, hazards are often at times classified as natural and human-made/human-induced. Natural hazards include extreme occurring events such as earthquakes, volcanic eruptions, hurricanes, tornadoes, etc. are part and parcel of the dynamics of the earth, and they will always occur. Human beings can do nothing about them, except to avoid or minimise the catastrophes (disasters) those extreme natural events (hazards) inflict. Human-made/human-induced extreme events emanate from war, technological advancement, human error and poor environmental management practices.

In some cases, it is difficult to distinguish natural from human-induced/human-made hazards. People, for example, clear upstream catchments and cause extreme variations in ground water levels and floods (very high in the rainy season and very low during the dry season). Both hydrological drought and floods are hazards, in this case, induced by human beings. Human beings also enhance mudflow and landslides through land degradation. The widely spoken global warming through the injection of Green House Gases (GHG) into the air is also a typical example of how atmospheric hazards can be classified as human induced. In general, human beings have been busy altering the natural ecosystems and creating new ones, which may have a chain of reactions, and hence making it difficult to classify some hazards as natural or human-induced/human-made.

The natural disasters are those triggered by natural phenomena and may be biological or geographical in origin. Common geographical hazards include droughts, floods and lightening, which are of climate and meteorological origin; earthquakes, landslides, tsunamis and volcanic eruptions that are of geological and geomorphic origin (Table 1). These hazards may occur at the local, national or international level. Approximately 90 per cent of the world's natural disasters originate from four Hazards as shown by table 2 below (Burton and Hewitt, 1973).

Hazard Identification

The central question of hazard identification is to do with what constitutes the threat. Further, in the interactions between environment and society, the products, processes, phenomena and persons that constitute environmental hazards, thus posing a threat to people and nature remain key questions. Hazard identification refers to the determination of hazards that may affect people in a community (WHO, 1999). Identifying a hazard is a difficult process because people differ in their perception of what constitutes a hazard. It is, therefore, essential to seek the views of a number of people in the community. Hazard identification, therefore, should be undertaken by a group of people (core planning group/team) with related hazard expertise and a commitment to the safety of that area. To ensure active

Table 1: Types of Natural Hazards and their Frequency

Hazard	Frequency (%)	Remarks
Floods	40	<ul style="list-style-type: none"> • Most frequent and cause greatest damage
Tropical cyclones	20	<ul style="list-style-type: none"> • Cause most fatalities
Earthquakes	15	<ul style="list-style-type: none"> • Easy to detect and probably overestimated
Drought	15	<ul style="list-style-type: none"> • Underestimated due to difficulties in timing, definition and sitting.
Other	10	

Source: Adopted from Hewitt and Burton (1973).

Table 2. Classification of natural human-induced hazards

Natural hazards	Human-induced hazards	Human-made hazards
a) Geophysical hazards Earthquake Volcanic eruption Mass wasting - mudflow - Land slide - Soil creep Tsunamis Fire b) Atmospheric hazards Cyclones - Hurricane - Tornadoes - Lightning Hailstorms Heat waves Cold waves Floods c) Biological hazards Locust invasion Malaria outbreak Insects and pests Army worms Stalk borers Fungal diseases	a) Mass wasting - mudflow - Land slide - Soil creep b) Soil erosion c) Eutrophication d) Fire e) Floods f) Drought g) Dust storms h) Disease outbreaks - schistosomiasis - Cholera - Typhoid - HIV/AIDS i) Famine, Pestilence j) Refugees(environmental)	a) War, other conflicts b) Technological hazards - Toxic agricultural effluents - Toxic industrial effluents - Hazardous wastes - Pollution(air, water, land) - Accidents(road, railway, water, ways and airways) c) Human error - Nuclear leakage - Mechanical failures d) Refugees (political, racial, religious)

participation of each group member, it is advisable to adopt the following procedure as suggested by the World Health Organisation.

- a. Ask each member to write down the 10 hazards in the area of investigation that are of most concern.
- b. While listing, identify hazards in terms of seriousness as: "high", "medium" and "low" using groups own definition of "seriousness".
- c. Each member should then report what he/she has written down (without ranking) and reports should be recorded on a blackboard, whiteboard or large sheet of paper. Do not record duplications. The group as a whole should refine what is meant by each hazard.
- d. When each person has contributed, the response should be tabulated as in table 3 below. The numbers in the table indicate how people in the planning group feel about the hazards in the community, and may reflect accurate knowledge on their part. They reflect the group's perception about the hazards in a given community. The higher the number, the more serious the disaster is in each category.

Other methods of identifying hazards include; researching the history of emergencies in the community by consulting old community members and relevant documents, inspecting the community for evidence of previous emergencies, existing hazards and the vulnerability of the community, and seeking information from provincial and national agencies. Similarly Kates (1978) suggested a method of hazard identification, thus:

- ⊙ Fundamental (pure) scientific research in hazards
- ⊙ Screening whereby a standardized procedure is applied to classify products, processes, phenomena or persons for their hazard potential
- ⊙ Monitoring for recurrent observation, recording and analysis of products, processes, phenomena or persons for hazardous events or consequences
- ⊙ A diagnosis as an assessment of their symptoms or consequences in relation to possible causes.

Hazard identification employs the following elements; suspecting causes, scrutinising and discerning effects, whose sequence is illustrated in figure 2 below. Hazards can also be ranked as shown in table 3 below.

v. Description of Hazards

Hazards can be described by their characteristics, thus:

- a. Intensity of hazards: This refers to how big and powerful (magnitude) a hazard is.

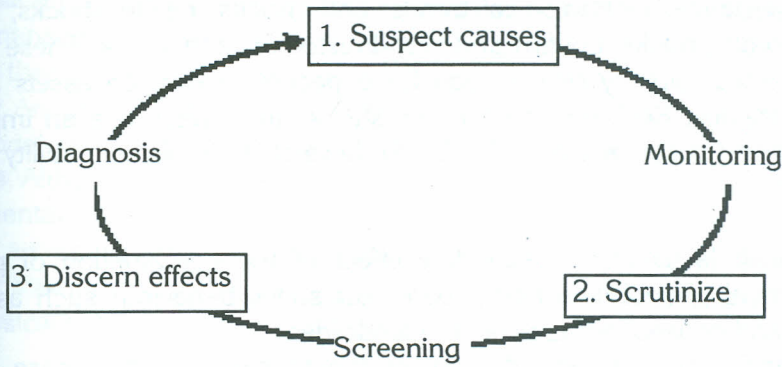


Figure 2 Sequence of hazard identification elements

Table 3. Hazard Ranking

Hazard	"Seriousness" of hazards		
	High	Medium	Low
Hazard "a"	2	3	0
Hazard "b"	0	0	1
Hazard "c"	4	0	1
Hazard "d"	0	2	0

Source: WHO (1999)

- b. Frequency: The likelihood of a hazard causing a specific damage to occur in a given period of time.
- c. Extent: The area a hazard may affect.
- d. Time frame: warning time, duration, time of day, week, year.
- e. Manageability: whether anything can be done about it.

These characteristics may mean different things for each hazard. For rainfall, for example intensity refers to the amount of rainfall in a given time (minutes, hours); whereas, for cyclones intensity refers to wind speed. For earthquakes, intensity refers to the number and strength of earth tremors (measured in Richter scale). Flood intensity may be described by height, depth, flow rate and speed of a river-water.

10.3 Disasters and Vulnerability

The vulnerability context is comprised of trends (long-term and large-scale) such as population trends, resource trends, national and international economic

trends in governance, technological trends, and shocks: health shocks, natural shocks, economic shocks, conflict and crop-livestock health shock. These shocks can destroy assets directly or they can force people to dispose assets as part of coping strategies. Resilience to external shocks and stresses is an important factor in livelihood sustainability (GTZ, 2005). Several kinds of vulnerability can be distinguished:

- ⊙ Ecological: Is usually a secondary effect of the combination of primary geophysical phenomena and a particular social behaviour such as heavy rainfall and consequent erosion and landslides.
- ⊙ Economic: Could be at individual or family level, in which case due to insufficiency of incomes, like is the case in many developing countries, some populations are unable to survive a year of bad harvest. Mortality associated with disasters is inversely proportional to revenue. Local economic vulnerability is a problem in geographic areas that are unfavourable to economic development, e.g. areas with traditionally poor soils for agriculture. National economic vulnerability is to do with poor governance that translates into increased vulnerability of the population at the end of the economic chain. International economic vulnerability is exemplified by price controls that influence the income of a large proportion of the rural population of developing countries, for instance the collapse of the Cocoa prices in Ghana.
- ⊙ Social vulnerability: This kind touches on people's social organisation and functioning. Essentially a community's degree of organisation and social cohesion is key in mechanism of response to disasters.
- ⊙ Political vulnerability could be driven by armed conflicts, which makes countries particularly susceptible to disasters. For instance armed conflict in Ethiopia aggravated the devastating effects of the 1984 drought by delaying and then limiting water delivery to affected areas (Perrin, 1996). The Darfur situation in the Sudan is another current example.

Addressing such vulnerabilities forms the basis of Capacity Vulnerability Assessment (CVA), which is the subject of the next section.

Conceptual and theoretical frameworks of vulnerability to disasters

Vulnerability is a potential state, which is often case-specific that is attributable to social, economic or environmental factors that activate it. Cannon (1994) defines vulnerability as a characteristic of individuals and groups of people who inhabit a given natural social and economic space within which they are differentiated according to their varying position in society into more or less vulnerable individuals and groups. The numbers of people at a level of vulnerability to a hazard of a given intensity will be a measure of the disastrous or non-disastrous impact of that hazard.

Theoretical models have been developed by several authors in an attempt to give disaster managers a framework for understanding vulnerability to disasters and how to reduce them. The most notable are the Capacity and Vulnerability Analysis (CVA) model by Anderson and Woodrow (1989) and the Pressure and Release-Access (PRA) model by Blaikie et al (1994). Both models have been used by disaster specialists. Although the CVA model was designed to make relief interventions more developmental, it is now used widely in disaster preparedness and mitigation. It is, therefore, a practical and diagnostic tool. The CVA framework is based on a simple matrix for viewing people's vulnerability and capacity in three broad interrelated areas: physical-material, social-organisational and motivational-attitudinal (Table 4).

Table 4: Capacity and Vulnerability Analysis (CVA) Matrix

Factors of capacity and Vulnerability	Vulnerabilities	Capacities
Physical-material: What productive resources, skills and hazards exist?		
Social-organisational: What are the relations and organisation among the people?		
Motivational-attitudinal: How does the community view its ability to create? change		

Source: Twigg (2001)

Each of the three areas covers a wide range of features. Physical-material vulnerability and capacity revolve around the concept and situation of poverty. It includes land, climate, health, skills and labour, infrastructure, housing, finance and technology. Poor people suffer from crises more often than those who are richer because the poor have little or no savings, little income or production options and limited resources. They are, therefore, more vulnerable and recovery is slower. Social-organisational vulnerability is influenced by how society's structure is. A society's organisation, its internal conflicts and how it manages them are as critical as the material dimension of vulnerability. This aspect includes formal political structures and the informal systems through which people get things done. Poor societies that are well organised and cohesive can withstand or recover from disasters faster than those with little or no organisation and cohesion. Race, religion, class, and caste among others may divide societies. Motivational-attitudinal vulnerability and capacity on the other hand, explains how people in a society view themselves and their ability to affect their environment. Groups that share strong ideologies have experience of

co-operating successfully help each other at times of disaster than groups without such shared beliefs or those who feel fatalistic or dependent. It should be noted here that crises could stimulate communities to make extraordinary efforts.

Blaikie et al (1994) also developed the Pressure and Release (PAR) (Table 5) and Access Model as part of a detailed study of human vulnerability to natural hazards. The two models are more conceptual than CVA and have some influence on the way vulnerability is perceived. PAR model recognises that disasters arise at the intersection of two opposing forces namely; the process generating vulnerability on one side and physical exposure to hazards. Increasing pressure can come from either side but to relieve the pressure, vulnerability has to be reduced.

The model proposes a progression of vulnerability with three main levels: root causes, dynamic pressures and unsafe conditions. The root causes are the most remote influences. They are economic, demographic and political processes within society. They reflect the distribution of power in a society and are connected to the functioning and power of the state. The dynamic pressures channel the root causes into particular forms of insecurity that have to be considered in relation to the types of hazards facing vulnerable people. These include access to resources as a result of the way regional or global pressures work through to localities. Unsafe conditions are the specific forms in which a population's vulnerability is expressed in time and space in connection to a hazard. For instance, people living in dangerous locations, inability to afford a safe building, engaging in dangerous livelihoods or having minimal food entitlement among other factors increases the level of vulnerability. All these factors change over time, sometimes rapidly. They also interact with each other in complex ways triggering unpredictable outcomes.

The second linked model is the Access Model, which shows that unsafe conditions arise in relation to the economic and political processes that allocate assets, income and other resources in society. The economic system and class structure of society usually allocates income and access to resources in that society. This influences people's ability to cope with hazards as manifested in their nutritional level, physical resilience and subsequent access to resources. It also determines the degree of disaster preparedness through the level of scientific concern, resource allocation and type and extent of technical preparation allocated within the society. The model sees livelihood strategies as the key to understanding the way people cope with hazards. Access involves the ability of an individual, family, group, class or communities to use the resources in order to secure livelihoods.

It is now evident that most disasters result from failures on the part of human systems. The physical and social infrastructures often fail to protect people from conditions, which threaten their well-being. At times, the infrastructure itself creates conditions, which result in extensive social disruption. To reduce people's vulnerability to disasters, social and technology systems must adapt to their changing physical

Table 5: The Procession of Vulnerability

Root Causes	Dynamic Pressure	Unsafe Conditions	Disaster	Hazard Earthquake
<p>Limited access to</p> <ul style="list-style-type: none"> • Power • Structures • Resources <p>Ideologies</p> <ul style="list-style-type: none"> • Political systems <p>Economic systems</p>	<p>Lack of</p> <ul style="list-style-type: none"> • Local institutions • Training • Appropriate skills • Local markets • Press freedom • Ethical standards <p>Macro-forces</p> <ul style="list-style-type: none"> • Rapid population growth • Rapid urbanisation • Arms expenditure • Debt repayment schedules • Deforestation • Decline in soil productivity 	<p>Fragile physical environment</p> <ul style="list-style-type: none"> • Dangerous locations • Unprotected buildings and infrastructure <p>Fragile local economy</p> <ul style="list-style-type: none"> • Livelihoods or risk • Low income levels <p>Vulnerable society</p> <ul style="list-style-type: none"> • Special groups at risk • Lack of local institutions <p>Public actions</p> <ul style="list-style-type: none"> • Lack of disaster preparedness <p>Prevalence of endemic diseases</p>	<p>RISK = Hazard x Vulnerability</p> <p>R = H x V</p>	<ul style="list-style-type: none"> • High winds (cyclone/hurricane/typhoon) • Flooding • Volcanic eruption • Landslide • Drought • Virus and pests

Modified from Blaikie et al (1994)

and social environment. The purpose of vulnerability analysis, therefore, is to demonstrate that there are particular characteristics of different groups of people, which create differential vulnerabilities.

The logical step for the disaster management community to take is the operationalisation of the concept of vulnerability analysis to aid in the construction of valid and reliable indicators that link the theoretical development to effective actions. It will also enable the proper assessment of natural hazards and the designing of successful responses. The concept of vulnerability also helps the researchers to

focus on the reasons that generate disasters and their relevance to the sociological study of their access and preconditions.

For instance, promoting appropriate urban planning, the careful management of resources and effective education for civil protection can reduce the vulnerability of human systems to hazards. Deeply internalised cultural strategies for coping with disasters are as vital for survival of human systems as the reinforced concrete for preservation of buildings. They provide both individuals and social groups with a set of routine defensive behaviour patterns and attributes for coping with recurrent change (Moore, 1963; Anderson, 1965).

10.4 Disaster Risk Management in Kenya

Disaster management includes the whole array of activities ranging from raising public awareness to relief work, rehabilitation, reconstruction and planning and preparing for future disasters. It involves policy formulation, legislation, team formation and establishing institutional and logistical framework. Since disasters inflict all-dimensional damages, personnel from diverse professional backgrounds are required for their effective management. Developing favourable economic, social, resources distribution, utilisation and management policies and formulation of relevant legislation towards the reduction of people's vulnerability should be understood as part of disaster management. Disaster management should, therefore, be included in national development plans rather than divert resources earmarked for development when disaster strikes.

i Types of risks facing Kenya

Kenya is potentially at risk of environmental and technological disasters emanating from geological, climatic, biological and modern technological risks. The attendance of these calamities requires that a co-ordinated and deliberate system be put in place to address these events should they arise.

- a. **Geotectonic and Geomorphic Risks:** These include those driven by earth's internal energy including earthquakes, volcanoes and tsunamis. Earthquakes in Kenya arise from movement along the geological faults in the East African Rift System
- b. **Meteorological (Climate-related) risks:** These result from extreme climatic events including floods, landslides, lightning strikes and resulting fires, droughts, thunderstorms, hailstorms, sandstorms and frost.
- c. **Biological risks:** These include disease epidemics and epizootic, proliferation of pests and parasites and invasion of areas by insects. Climatic factors and available food sources influence spread of biological risks.

d. Technological risks: These are risks originating from technological and industrial sites, accidents, infrastructure failures and improper waste management.

The major environmental risks in Kenya today as articulated in Draft National Environmental Emergency Contingency Plan (2005) include the following:

a. Floods: These are naturally occurring flash, river and coastal inundation from intense rainfall associated with seasonal weather patterns. It is also induced by human manipulation of watersheds, drainage basins and floodplains. Flooding is a major hazard affecting most parts of Kenya. Floods originate from highland areas, which experience substantial rainfall. The flooding results from over utilisation of the environment through human activities over a period of time. These activities have traditionally included deforestation of catchment areas, cultivation of steep slopes and general land degradation in downstream areas caused by unsustainable land-use practices. Floods in Nyanza and western provinces are an annual occurrence. The main rivers in the lower plains of Nyanza are Kibos and Nyando. The other smaller rivers are Luanda, Nyaidho, Miriu and Awach. The source of the river system is in Kericho and Nandi Districts, which lie above 2000m above sea level with a mean annual rainfall of between 1,800-2000mm. The river basins have steep defined courses in their upper reaches, but on reaching the flat low-lying areas near the lake they meander and periodically overflow their banks before terminating into swamps neighbouring Lake Victoria.

Floods in Western Province also have their origin in the Rift Valley. The main stream of River Nzoia flows from the western side of Elgeyo Escarpment (Sergoi, Sosiani and Kipkelion tributaries) and Cherangani Hills (Chepkotet and Kaisungur tributaries) from an elevation of approximately 2,286 metres above sea level. Its tributaries, which flow from the high slopes of Mount Elgon attain maximum elevation in the river's basin and is estimated at about 4,300m above mean sea level. The tributaries in Mt. Elgon include Kuywa, Sioso, Ewaso, Rogai and Koitobos.

The floods along Tana River basin originate from Mt. Kenya and Aberdare catchment areas. The floods are a result of deforestation, poor land use practices and lack of plans to harvest the water within the catchment areas. They occur in the lower Tana area affecting Garissa, Tana River, Ijara, Lamu and Malindi districts. Flash floods occur following torrential rains, mainly in urban areas and, to some extent, in arid and semi-arid areas (ASAL). The floods are occasioned by sudden accumulation of water as a result of clogging of drainage systems or lack of proper drainage systems.

This is a frequent phenomenon in Nairobi, Mombasa, Kisumu, Eldoret and Naivasha. The ASAL areas commonly affected include Pokot, Turkana, Baringo, Samburu and most of Eastern province.

b. Landslides: This is the down slope transport of soil and rock resulting from naturally occurring vibrations, changes in direct water content, removal of lateral support, loading with weight, and weathering, or human manipulation of watercourses and slope composition. Landslides are frequent in Meru and Muranga districts of central Kenya. The situation is worsened by human activities such as clearing natural vegetation, quarrying, mining and construction. In the affected areas, damage caused can include loss of life, the destruction of crops, houses and infrastructure.

c. Lightening: This is a natural hazard caused by the discharge of static electricity generated in parts of storm clouds. In Kenya, the Western region experiences about 240 days a year of lightning discharge. It causes loss of life. This is prevalent in Kisii highlands, Nandi Hills, Kitale and Kakamega. The adverse effects include loss of life, destruction of buildings, telecommunications, power installations, and electronic systems among others.

d. Earthquakes: This is the slippage of crustal rock along a fault or area of strain and rebound to new alignment. The Rift Valley, which is one of the most earthquake prone areas of the world, runs through Kenya. In particular, the areas around Lodwar, Nakuru, Naivasha and Kilimanjaro, are prone to volcanic activity and earthquakes. The likely damages may include loss of lives, impact on environment, destruction of infrastructure and buildings.

e. Droughts: These are harsh climatic conditions due to rainfall deficit as a result of human induced changes in land use, higher sea surface temperatures, increase of atmospheric carbon dioxide and greenhouse gases. In Kenya, droughts have led to high mortality rate of wildlife, impacting negatively on tourism. Droughts have also led to power and water rationing in major urban centres. More significantly, the pastoral communities like Masaai, Kamba, Turkana and Samburu have often lost their livelihoods through droughts. Resource based conflicts between communities have also resulted directly from droughts.

f. Pest Infestation: Pest infestation refers to an increase in pest numbers due to one or a combination of ecological factors including temperature, crop monoculture, introduction of plants to new location, introduction of pest species, overcoming of genetic resistance in host, overcoming pesticide effects, conducive weather patterns, and migration. In Kenya, incidents of pest infestation have included locusts, armyworms and quails, which cause great destruction to crops and vegetation.

g. Chemical and Industrial Accidents: These hazards have taken many forms such as explosions and accidental discharges in plants or storage facilities handling toxic and flammable substances, accidents during transportation of hazardous and toxic chemicals, contamination of food or the environment by misuse of chemicals, improper waste management of toxic chemicals, technological system failures, failures of plant safety designs, natural hazards such as fire, earthquake or landslides as well as arson or sabotage incidents affecting human installations. Recently, there have been incidences of dam breakages, oil spills at sea and accidents of oil transportation tankers that have resulted to injuries and loss of life. Indeed, failure to observe professional and safety standards and ethics in all aspects of life causes various disasters. The promotion of public safety within the realms of building and construction, transport, industries, public sector, employment, educational institutions and other key sectors should be given priority.

h. Epidemics: This results from the exposure to a toxin resulting in pronounced rise in number of cases of parasitic or infectious origin. Epidemics spread due to poor sanitary conditions, crowding, poverty, ecological changes that favour breeding of vectors, non-immune persons migrating to endemic disease area, decline in nutritional status and contamination of water or food supply. The disease outbreaks associated with epidemics have led to illness and death, social and political disruption, economic loss and increased trauma in emergency settlements.

The recorded history of disasters in Kenya dates back to 1889. However, the disasters that affected Kenya in the last 40 years came from a diversity of hazards, such as droughts, fires, floods, bomb blasts and accidents in the transport industry (Table 6).

10.5 The National Policy on Disaster Management in Kenya

Policy is a formal statement of a course of action. Traditionally, policy development is traditionally a top-down process prepared and decentralised by the central authority as may be required. Implementation of strategies that arise from policy tends to be a bottom-up process in which higher levels in the implementation process assist lower levels. Historically, disaster management in Kenya was not viewed as an integral part of development planning implying that disasters were responded to in an ad hoc manner when they occurred. It was only after the November/December 1997 El Nino floods in Kenya that the National Disaster Operation Centre (NDOC) was set up. According to the first draft of the First National Water Resources management Strategy, the El Nino induced floods of 1997-1998 caused public property damage worth US \$ 151.4 million. In June 1999, the Government of Kenya in collaboration with the United Nations Disaster Management Unit was mandated to prepare disaster management strategies tailored to the Kenyan situation. The overall goal of the National Disaster Management Policy is to establish and maintain an efficient, effective and co-ordinated system for managing disasters in order to minimise

Table 6: Chronology of recent disasters in Kenya

Year	Type of disaster	Area of coverage	No. of people affected
1971, 75, 77, 80	Drought	Widespread	More than 150 000 in total
1982	Floods	Nyanza	4 000
1982	Fire	Nairobi	10 000
1983-84	Drought	Widespread	200 000
1984-2001	HIV/AIDS	Widespread and continuing	2.2 million dead by 2001, 700 daily mortality as of 2001
1985	Floods	Nairobi-western	10 000
1990	Fire	Lamu	20 dead
1994	Ferry accident	Mtongwe	270 dead
1995-96	Drought	Widespread	Up to 1.41 million on food aid
1997-98	El Niño floods	Widespread	Up to 1.5 million on food
August 1998	Bomb blast	Nairobi	214 dead and 5,600 injured
1999-2000	Drought	Widespread	4.4 million on food aid
March 2003	Floods	Budalangi	47 dead and 60 000 displaced
May 2003	Bomb blast	Mombasa	12 dead and several injured
2006	Collapse of Buildings	Building collapse at Nyamakima Nairobi	16 people dead and over 200 buried alive and or injured.
2006	Fire	Fire at Barot Agency at Libra house	10 dead and property worth millions destroyed

Shauri (2003)

losses and resulting disruptions of population, economy and the environment. The government has therefore committed itself to mobilising resources in order to provide ongoing leadership in disaster management to minimise disruptions and losses resulting from disasters.

The government of Kenya has elaborated specific policies touching on the perennial disasters facing the country and drawn plans of action to tackle them. For instance, the Government policy on droughts and floods is to continue with the establishment of integrated water related disaster management capacity and to reduce vulnerability to disasters through rehabilitation and conservation of critical catchment areas. The disaster management policy recognises the importance of effective co-ordination and communication at all levels and among all participating institutions. It recognises the need to develop capacity to respond to disasters and establish the institutional framework that enhances co-ordination, including development of appropriate expertise.

It also recognises the need to strengthen linkages with local development plans and Poverty Reduction Strategy Programmes. It recognises the fact that disaster management is a multi-sectoral and multidisciplinary issue hence envisages close

linkages between the sectors concerned at national, district and local levels. The policy also recognises the role played by the local authorities, private sector, state corporations, United Nations Organisations, non-governmental organisations, the media, volunteers, religious bodies and development partners in disaster management. It recognises the role of communities and promotes community consultations and participation in disaster mitigation, preparedness, prevention, response and recovery. The need for research and information dissemination and implementation of research findings is also recognised. Climate is highlighted as a key causal factor for some emergencies that lead to disasters and the need for factoring weather and climate information in disaster management is, therefore, considered as a vital component of the policy.

Since the policy promotes regional linkages between disaster management institutions, its strategies for the prevention and mitigation of flood disasters, for instance, include development of policies on settlement in flood-prone areas, improvement of catchment conservation and protection, development of infrastructure design parameters and regulations, and development of flood control infrastructure. The policy's strategies on flood preparedness include enhancement of data recording and information management systems, increase in public awareness on dangers of settling in flood-prone areas, need for insurance to indemnify losses, development of flood forecasting and early warning systems, and training and capacity building for appropriate response. Its strategies for flood response include establishment of an institutional framework for flood management and development of funding mechanisms. The policy also covers disaster recovery and rehabilitation.

10.6 Conclusions and Recommendations

Kenya has had no specific and organised preparedness and response plan to mitigate and manage the effects of environmental emergencies that can be caused by natural and man-made hazards. While natural disasters on the environment include occurrences of earthquakes, flooding, droughts, famine and wild fires, manmade ones include acts of terrorism, wars and technological hazards. These disasters can have harmful consequences on the national environment that can, in turn, endanger the health and safety of people. Hitherto the country's approach to the past environmental disasters has been reactive rather than pro-active.

There are various institutions dealing with disaster related activities but they do not work within a co-ordinated framework. These include various departments of the Office of the President such as the National Operations Centre, Arid and Semi Arid lands Resource Management Project, the Department of Relief and Rehabilitation and the National Aids Control Council. There are also specialised units in various aspects of disaster management such as the police force, Department of Defence, National Youth Service, Local Authorities, Fire Brigade, Hospitals and the Directorate of Labour among others. Additional assistance in the entire disaster management

cycle is often obtained from multilateral and bilateral agencies, such as the Inter-governmental Authority on Development (IGAD), United Nations agencies and other partners like international NGOs also. Although there is currently no coordinated response by the various arms, the government has proposed an administrative structure for disaster management (Figure 3), to be coordinated by the proposed National Disaster Management Authority (NADIMA). There is therefore need for a strong central coordination of all the actors in the entire disaster management cycle

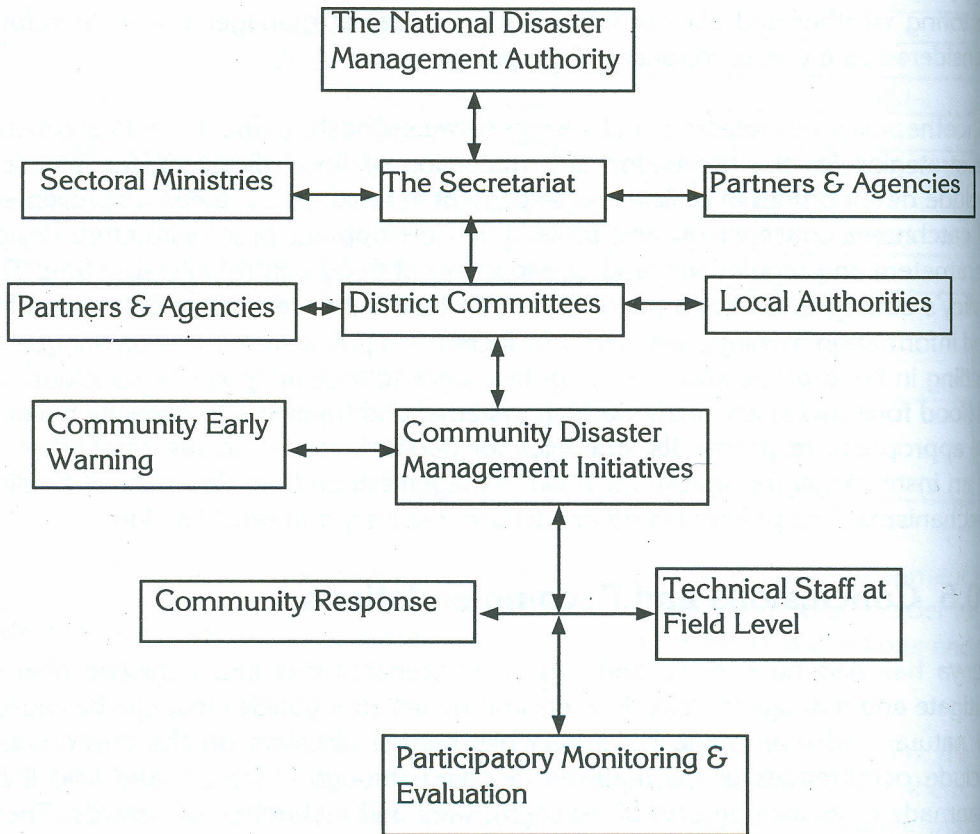


Figure 3: The Proposed Structure of the National Disaster Management Authority (Source: GoK, 2002)

The disaster management policy related reforms should contain the following measures to be put in place in order to strengthen the country’s capacity to manage disasters of all forms under a revamped National Disaster Management Authority:

- ◎ Identifying and setting aside land banks for the purposes of meeting urgent shelter requirements of refugees, returnees and internally displaced persons, including as appropriate, the construction of temporary housing with basic facilities taking into account gender specific needs,

- ⊙ Undertaking delineation of high-risk regions for different disasters for hazard mapping
- ⊙ Developing procedures for safe development of hillsides and application of environmental impact assessments,
- ⊙ Promoting research in alternative less flammable building materials,
- ⊙ Promoting hazard resistant building designs and construction in zones prone to earth movement and flooding by enforcing building specifications and regulations,
- ⊙ Promoting disaster prevention through timely and continuous maintenance of such services as storm water drains and fire alarm systems to reduce the impact of disasters,
- ⊙ Establishing data banks and information systems on disasters and developing appropriate dissemination channels to enhance community preparedness,
- ⊙ Building capacity on disaster management by training planners, designers and engineers in human settlements to promote disaster conscious land-use management in the development and implementation of land use plans,
- ⊙ Undertaking monitoring and evaluation as a means of response, and using lessons learnt from past disaster audits to take preventive measures that minimise negative impacts, and
- ⊙ Mainstreaming comprehensive emergency management plans

10.7 Review Questions

- i. Critically examine the relative importance of natural and anthropogenic factors as causes of disasters.
- ii. Using the WHO (1999) Group Hazard Identification Procedures, identify the hazards in your community and rank them on the basis of their seriousness
- iii. Using practical examples explore the relationship between vulnerability and disasters.
- iv. Critically examine the adequacy of the Kenya's policy framework for dealing with disasters and extreme events.

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