The Status of Disaster Management in Kenya: the Need for Training Programmes

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Abstract

A number of regions in Kenya have suffered devastating effects of disasters. Although the most common disasters in the country are weather related natural phenomena such as floods, droughts, landslides and lightning, anthropogenic factors causing land degradation; deforestation of catchment areas, poor agricultural practices, inappropriate land use systems, changing living conditions, among others are established to be contributing to increased impacts from the various natural hazards. The physical setting of the impacted areas and the agro-climatic zones play a major role. In the recent past, the emergence of man-induced types of disasters such as traffic accidents, civil conflicts, terrorism, industrial hazards and impacts from HIV/AIDS have also become common. Whenever the hazards occur, the consequences of the disasters are enormous; disruption of human settlements and destruction of shelter, damage to infrastructure facilities, crop failure, disease outbreaks and disruption of the environment. These are too often accompanied with serious human distress, suffering and fatalities. In order to cope with the hazards, the Government of Kenya, through the leadership and co-ordination of the Office of the President has formulated a National Policy on Disaster Management. This policy aims at addressing the increasing incidences and emergence of both slow and rapid on-set disasters and provides the management option. Here in lies the need for training programmes and research that can build human capacity and provide a repository of information for planning, monitoring and management. Two case studies: "Budalangi Flood Plain" and "Kajiado Mining Impacts" are presented to illustrate the potential of geoinformation technology in assessing and monitoring land use changes. A summary of current programmes at various Kenyan Universities that specifically address the issue of training is also presented.

INTRODUCTION

Mankind has been vulnerable to the impact of different natural disasters for a long time. There is no doubt that the benefits of exploiting the fertility of the flood plains of the world's great rivers has always had to be balanced against the risks of loss of life and property when major floods strike. Disaster agents, such as bush fires, droughts, cyclones, earthquakes and floods have recurring impacts on different parts of the world. The artificial boundaries of states do not limit the extent of natural disaster impacts. Records of major disasters in the past indicate that there were 113 disaster events between 1960 and 1990 with 34,823 people killed in the developed countries as compared to 793,616 killed in the developing countries (UNESCO/UNEP, 1988). The overall economic losses due to natural hazards increased worldwide and in the 1980s amounted to US$ 93 billion as compared to US$ 10 billion in the 1960s (UNESCO/UNEP, 1988).

Floods are the most significant of all natural hazards being responsible for 40 per cent of fatalities associated with disasters. Although floods, earthquakes and storms may be described as 'acts of God', their occurrence and impacts are often, determined by human activities such as deforestation of watersheds due to harvesting for timber, fuel wood and clearing of land for agriculture or simply setting the vegetation resources on fire (UNEP, 1986). The increase in floods in Bangladesh as a result of the denuding of the Himalayas is a typical example. Flooding along low-lying plains near rivers is the most wide spread hazard with Local Governments having to contend with loss of life, damage to property, roads, dams and other related public works and utilities affecting the livelihood of the people.

Kenya often suffers from the effect of flood and draught related disasters with displacements of people, loss of lives and properties, and crops damage being registered in various parts of the country at various periods. The disruption of economic activities has lead to heavy expenditure by the government and non-governmental organizations in relief operations and rehabilitation process. The areas affected most area known: the flood plains of Tana, Nzoia, Sondu and Nyando rivers and many sub-urban areas of Nairobi; and the 36 or so draught-prone districts in Kenya. Floods draught related disasters in these areas occur periodically and usually disrupt the socio-economic lifestyles, ecological systems and general development of the areas. The use of geoinformation tools such as remote sensing information in assessing the flood impacts in Budalangi and the processes of desertification in Kajiado District provide clear evidence on the need for integrated efforts in training and research.

STATUS OF DISASTER MANAGEMENT IN KENYA

Historically, disaster management in Kenya was not viewed as an integral part of development planning and disasters were responded to in an ad hoc manner when they occurred. It was not until November/December 1997 when the devastating effects of El Nino floods hit most parts of the country, when the National Disaster Operation Centre was set up in January 1998. According to the First National Water Resources Management Strategy, the El Nino induced floods of 1997-1998 caused some US $ 151.4 million in public property damage. In June 1999, the Government of Kenya in collaboration with the United Nations Disaster Management Unit sought to develop disaster management strategies tailored to the Kenyan situation.

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 overall goal of the National Disaster Management Policy is *"to establish and maintain an efficient, effective and coordinated system for managing disasters, in order to minimize losses and resulting disruptions of the population, economy and the environment"*. The government has committed itself to mobilizing resources in order to provide ongoing leadership in disaster management to minimize disruptions and losses resulting from disasters.

The Disaster Management Policy recognizes the importance of effective coordination and communication at all levels and among all participating institutions. It recognizes the need to develop capacity to respond to disasters and establishes the institutional framework that enhances

co-ordination and development of appropriate expertise. It provides for strengthening linkages with Local Development Plans and Poverty Reduction Strategy Programmes. The policy recognizes the fact that disaster management is a multisectoral and multidisciplinary issue and hence promotes close linkages between the sectors concerned at national, district and local levels and involves the local authorities, private sector, state corporations, United Nations Organizations, non-governmental organizations, the media, volunteers, religious groups and development partners in disaster management. It recognizes the role of communities and aims at promoting 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 recognized. Climate is noted as a key causal factor and there is therefore need to factor in weather and climate information in disaster management as a vital component of the policy.

The strategies for the *prevention and mitigation* of flood disasters include development of policies on settlement in flood prone areas; improvement of catchment conservation and protection, development of infrastructure design parameters and regulations to ensure that structures can sustain flooding at the design return periods; and development of flood control infrastructure. The 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 and the need for insurance so as to indemnify losses; development of flood forecasting and early warning systems at national district and grassroots levels; and training and capacity building for appropriate response. The strategies for *flood response* include the establishment of an institutional framework for flood management (Disaster Operations Centre [DOC]) at national, district and grassroots levels and development of funding mechanisms. On *recovery and rehabilitation* the policy strategy is to establish an institutional framework for disaster management i.e. DOC.

Linkages to Existing National Policies and Legislations

The National Development Plan (NDP) 2002-2008 recognizes that 56 percent of the Kenyan population is afflicted by poverty and that disasters can push more people below the poverty line or increase their impoverishment. The plan seeks to achieve sustainable economic growth and eliminate poverty. This will require an effective disaster management policy. The National Food Policy (1994) promoted enhanced food production and targeted relief through food for work programmes designed to reduce the poor households' vulnerability to food shortages. The HIV/AIDS Policy (1997) provides the framework for strategies aimed at preventing and controlling HIV/AIDS, which is a threat to the country's social and economic development. This is done through the National Aids Control Council (NACC) with which the National Disaster Management Authority (NDMA) works closely to deal with the pandemic. Sessional Paper No.1 of 1999 on National Policy on Water Resources Management and Development is silent on flood management issues. The Kenya Meteorological Information Policy has a provision for availing forecasts in general terms.

The Disaster Management Policy is linked to a number of other Acts including the Environmental Management and Coordination Act (EMCA -1999), which have a provision for hazards prevention. The Kenya Red Cross Society Act (Cap 256) mandates the voluntary aid society to respond to emergencies. The Water Act, 2002 (Cap 372) empowers the Minister for

Water Resources Management and Development (MWRMD) to declare an emergency where there is exceptional deficiency of water for domestic use. The act is biased to clean water provision without consideration to disasters arising from excess water in inhabited areas including flood plains. The St John's Ambulance of Kenya Act (Cap 259) provides for a reserve of technical staff that supplements the medical services of the Government during times of disaster. The Local Authority Act (Cap 265) provides for the establishment of a Disaster Management Office in every local authority. It also sets out special powers for resource mobilization that may be used in the event of a local disaster. The Disaster Management Policy recognizes international agreements, treaties and conventions (such as UNCCD, UNFCCC, UNCBD, GEF etc) that Kenya is a signatory to and the need to operate in tandem with their provisions. Other relevant acts include the Public Health Act, the Forest Act, and the Chief's Act.

Institutional Arrangements in Disaster Management

Various departments of the Office of the President deal with disaster management. Among these are 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 specialized units in various aspects of disaster management such as the Police Department, the Department of Defense, National Youth Service, Local Authorities, Fire Brigade, Hospitals and the Directorate of Labour among others. Education Science and Technology, IGAD, UN agencies and other bilateral partners and international NGOs also play a major role. The major disaster management institutions are the National Disaster Management Authority (NADIMA), the Kenya Food Security Meeting (KFSM), Local Authorities and District Security Committees. The proposed Structure of the National Disaster Management Authority (Figure 1).

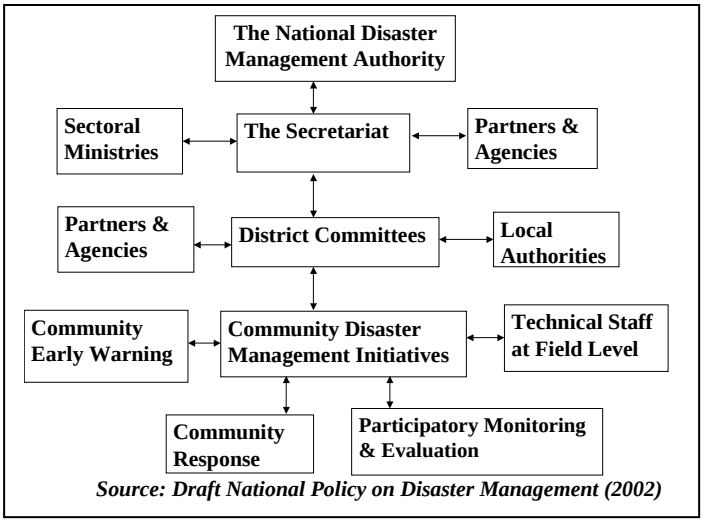

Figure 1: Structure of the National Disaster Management

Resource Mobilization and Management

Various resources required for disaster management include human, financial and material. These are sourced from or through the government. The disaster management policy recognizes the need to integrate disaster management issues into various national development initiatives for effective resource mobilization. Such initiatives include the National Development Plan (NDP), Medium Term Expenditure Framework (MTEF), Poverty Reduction Strategy Paper (PRSP), Sessional papers and sectoral policy.

Budgetary provisions of ministries with departments having direct or indirect contribution towards addressing disaster issues and contributions from other stakeholders are the main sources of funding. The disbursement and expenditure of funds is supervised by NADIMA through the National Disaster Trust Fund and a District Contingency Fund found in every district. It encourages continued collaboration with international development partners and encourages insurance initiatives. NADIMA is responsible for monitoring and evaluation of the progress towards the planned objectives and improvement of strategies as well as production of expected output within a given timeframe. It is envisaged that the National Disaster Management policy will create the necessary environment for developing strategic stockpiles of food items to add to strategic grain reserves.

The Executive Board of Research Committee on Disasters of the International Sociological Association made a declaration that; *"all disasters are failures on the part of human systems. In every disaster, the physical and social infrastructure fails 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 the vulnerability of the people to disaster, social and technology systems must adapt to changing physical and social environment. It is recognized that nature presents mankind with a set of opportunities and risks, which may vary greatly in their spatial distribution as conceptualized Figure 2.

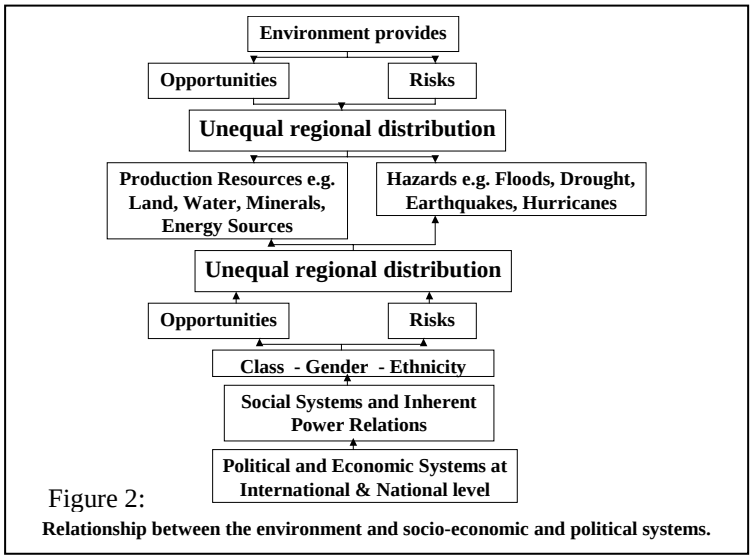

Figure 2:
Relationship between the environment and socio-economic and political systems.

UNDERSTANDING FLOOD IMPACTS IN BUDALANGI FLOOD PLAIN

The failure of the Busia District Development plan to propose any programmes for flood management signifies major weak linkages between National Planning and district planning that is reflected in the Budalangi flooding problem. Despite the government's extensive grassroots based development and administrative network, which would effectively manage emergencies, and disaster, there is no attempt to mainstream disaster management in national development plans. Consequently, sectoral budgets on disaster management are lacking. This also reflects weaknesses in the economic system and class structure that allocates income and access to resources. This has an impact in terms of people's ability to cope with flood hazards.

Although floods in Budalangi are a perennial problem, the present arrangements for disseminating information are inadequate. Flood forecasts are not disseminated immediately they are received from the forecast formulation team. The response teams on the ground get the information late and it does not reach a wide audience. Sometimes unwarranted flood warnings are issued based on inadequate data and this makes the affected communities tense. There is no proper co-ordination and control of activities in the hydrological stations. Despite efforts made by the Kenyan Government to deal with the floods through construction of dykes, the problem still persists. In 2003 for example, out of Budalangi's population of 53,000 nearly 25,000 were displaced by floods. Some 10,000 people were accommodated in the District officer's camp, necessitating health emergency measures to control possible outbreaks of malaria, bilharzias, cholera and other water borne diseases (Daily Nation, 24th September 2003). During flooding, roads are impassable, children are cut off from schools, food in farms is swept away and latrines and buildings collapse. The extent of the area impacted can be seen on the Landsat image, bands 453RGB captured on 18th May 2003. A comparison can be made with a state of no floods in 2nd Sept 1995.

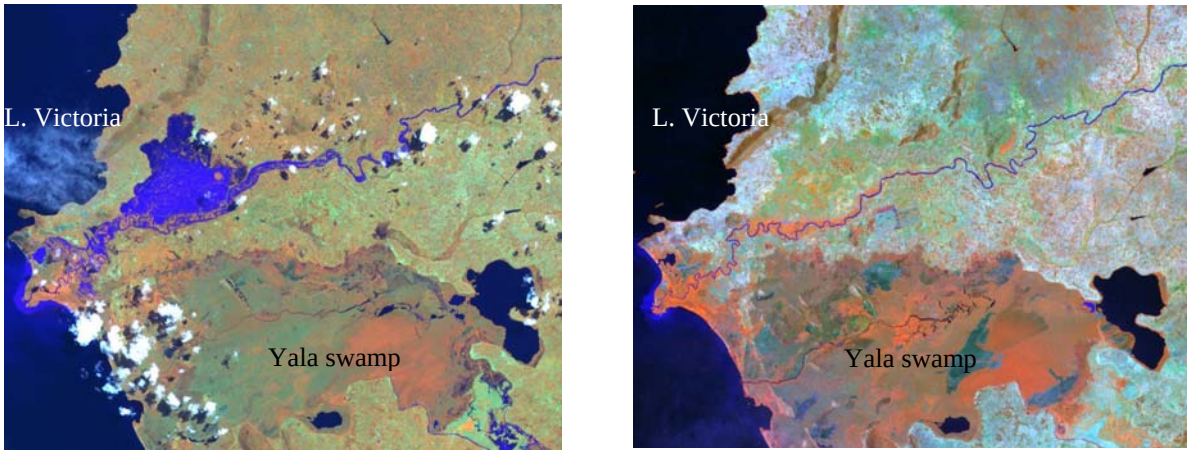

Figure 3: Landsat images p170r060 of 18th May 2003 and 2nd Sept 1995, bands 453 RGB showing Nzoia river. Note the extent of flooding.

The general blue waters indicate the level of turbidity and siltation at the mouth of the Nzoia river. While floods related disasters have been recorded in many parts of the country, the prevalence of floods in Budalangi has been unique in frequency and character. The Southern half of Budalangi Division is flood-prone lowland and is thus exposed to flooding nearly every year. Flooding in Budalangi has been noted even when there are no rains in the region raising concerns about the need to manage the entire Nzoia river drainage basin.

Figure 4: Challenges faced the communities settled in the Budalangi flood plain. Photo 1 is courtesy of UNEP/GoK survey July 2003. Other photos from

Although scientific and engineering techniques have developed remarkably over the decades, success has not been achieved in preventing floods or in insulating humans from their effects. Humans can avoided residing in flood prone areas which experience periodical flooding but populations growth and pressure for land will continue to push people to flood prone areas. More people are therefore at risk of flood hazards. Households in Budalangi Division have put themselves at risk although continuously appealing to donors and the government for resources whenever impacted. Their plight is clearly evident from exacerbated poverty level in the area. An integrated sustainable flood management action plan for Budalangi Division that takes into account land reform, policy review, formulation and implementation would enhance socio-economic activities and if put into good use may contribute significantly towards disaster reduction and poverty alleviation.

PROCESSES OF DESERTIFICATION IN KAJIADO DISTRICT

Kajiado District is one of the semi arid districts in the country. It is marked by three physiographic subdivisions (i) the Kapiti Plains formed by the Kapiti Phonolite and the overlying soft Athi Tuffs; (ii) a line of volcanic hills along the edge of the rift valley and younger flows within the rift floor characterised by Ol Doinyo Narok plateau, Olorgesailie and Ol Esakut volcanoes and associated Lake Magadi and Olorgesailie basins; (iii) Gneisses, limestones (marble) and quatizites of the basement systems known to be of Precambrian Age (Matheson, 1966). On the basement system, the soils are reddish brown and sandy with kunkar deposits in calcarious bands and black cotton soils in areas of poor drainage. In the area occupied by the Athi Tuff, the tuff grades into yellow clay. The Ol Doinyo Narok agglomerates and alkali trachytes produce a red volcanic soil.

The drainage in the area is affected by the geology and the pre-volcanic high ground and the edge of the Rift Valley. Within the Kapiti Plain the rivers, marked by lines of trees, form shallow valleys. Currently no rivers flow in the area perennially, but water can be obtained by digging in the riverbed of the Kajiado River and other streams. Apart from the springs on the Ol Doinyo Narok plateau, the local population is dependent on the water drained off the sand in the riverbeds and on boreholes and the water pipeline to Magadi from Ngong Hills across the Kapiti Plains (Kiserian-Isinya road) through Kajiado and along the railway line to Magadi Township. The vegetation of Kapiti plains and the other volcanic areas is characteristic of the semi-arid environment, consisting of rank grass and whistling thorn with a thicker growth of thorn trees in the area of the Mozambique belt system. In the Rift Valley vegetation is limited to stunted bushes and small patches of grass.

The variations in the geology and tectonic character has resulted in a number of mineralisation:

- Soda ash in lake Magadi
- Diatomite in Olorgesailie basin
- Marble at Lemilebbu-Turoka and other localities
- Gemstones (mainly garnets) at
- Gypsum at Olturoto and Athi River
- Calcrete materials and limestone at Athi River

Marble, granitoid gneisses and a number of tuff formations are exploited for dimension stone in an number of locations. The district is also a major source of river-sand for the construction

industry in Nairobi, Athi River and Kajiado. Open cast mining (Figure 6) is the chief method of mining practiced in Kajiado District with direct impact on the biological and physical environment.

Despite the enormous mineral resource potential the district is listed in the poverty index of Kenya as poor district. The district faced draught (famine) related disasters in 1926,1934, 1943, 1961, 1973, 1979, 1985 and 1994. The local community, the pastoral Maasai, are therefore faced with a number of challenges mainly occasioned by exploitation of earth resources by people from outside the district.

A recent study based on satellite imagery interpretation of various dates and a ground truth survey by Onywere (2005), revealed the extent of the mining impacts and the slow conversion of the ones faunal and floral-rich rangeland into an arid environment. This process of human induced desertification is an ecological disaster in waiting that is going to impact on the local community, their livelihood (livestock) and the wildlife. This area lies within the dispersal area of the Nairobi National Park which together with the Kapiti Plains is well stocked with plains game. In the southern part of the area all kinds of game have been plentiful in the past.

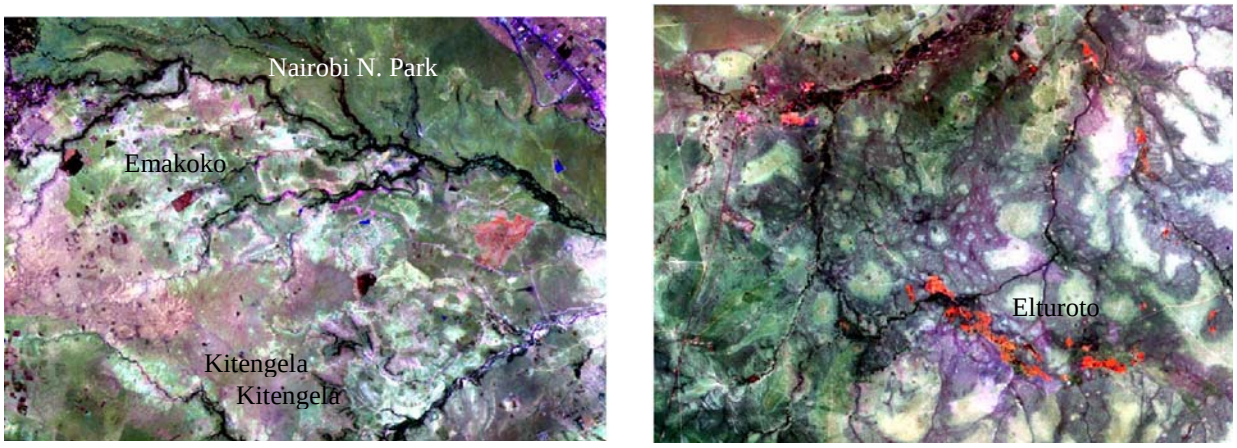

Figure 5: Extent of mining and land degradation in Emakoko-Kitengela area and Elturoto-Isinya-Athi River area. The images are subsets of Landsat p169r060 acquired 10th Feb 2002, Bands 732 RGB. The brighter tones are badly depredated areas the mines show up in orange colours

The nature and degree of impacts vary depending on the location and type of mining operations and can be broadly classified into three categories:

- **Physical**

  Physical impacts may cause: (i) the undercutting and collapse of river banks, (ii) the loss of adjacent land and/or structures, (iii) upstream erosion as a result of an increase in channel slope and changes in flow velocity, (iv) downstream erosion due to increased carrying capacity of the stream, downstream changes in patterns of deposition, and changes in channel bed and habitat type, and (v) inaccessibility to humans, livestock and wildlife due to generation of cliff-like mine walls, often tens of meters high (Figure 6a).

- **Water Quality**
  Mining activities, poorly planned stockpiling and uncontrolled dumping of overburden, and chemical/fuel spills from machinery will cause reduced water quality for downstream users and poisoning of aquatic life. Water quantity is also reduced due to lowering of the water table or diversion of the runoff to quarry pits.
- **Ecological**
  Mining which leads to the removal of rock adjacent to the river or removal of channel substrate, re-suspension of streambed sediment, clearance of vegetation (Figure 6c), and stockpiling on the streambed (Figure 6b), will have ecological impacts. These impacts will have an effect on the direct loss of stream reserve habitat, disturbances of species attached to streambed deposits, reduced light penetration, reduced primary production, and reduced wildlife feeding opportunities.

Figure 6: Different impacts occasioned by mining

Mining and Land Use Conflicts

Mining competes with other land uses naturally due to their location. The type of minerals determine the mining practices to be employed as well as the reclamation and possible choices for post-mining land use. Mining effects are long lasting and affect the land use almost irreversibly. In the process of mining, vegetation and over-burden must be removed and stockpiled elsewhere (Figure 6b). As mining progresses the excavation or pit will expand and more area is affected. Mining will not continue forever, it has a definite period once the deposit is exhausted. Once the mining is over the land may be restored for the previous use but like in many cases other uses are introduced. Abandoning of the site without rehabilitation is usually the case, particularly for those activities carried out before the enactment of the Environmental Management and Coordination Act (EMCA, 1999). These issues will definitely breed conflicts with miners and other land users including landowners, neighbouring residents and Environmentalists. The case of mining of gypsum will suffice.

Once the excavation for gypsum is completed hundreds of acres of land and grazing area in Empuyiankat area of Kajiado District will never be the same. Given the current state of neglect of the mines, reconstituting the ecosystem to an acceptable facsimile will be a taunting task. The mining could create an environmental disaster instead, with concerns about the quality and quantity of water in the drainage system (Figure 7b). The water is crucial to the health of the rivers and provides a drinking water source for the local Maasai Community and the wildlife in the area. The mining activities have reduced the water flows in the seasonal rivers and the contaminants from the mining sites have degraded the water quality. Gypsum mining within a river valley disrupts water quality, soils, drainage patterns, and wetlands. The process also leaves

mining and processing wastes, such as clay soils and small lamps of gypsum behind. These coupled with the magnitude of mining operations suggests impacts should be studied. Elturoto River's flow has already been affected and its decline in the recent past and the lack of a base flow in the dry seasons is raising concerns. There is need to reconnect the drainage systems of abandoned mine sites with the ephemeral river.

Another primary concern with the mining process is the excavation of the mine pits that removes a layer of dense clay with the ore (Figure 7a). The clay is spread around the vicinity to allow for drying and scooping of the gypsum. Such areas form an almost impervious seal over the land, which they cover. As a result, they don't readily allow rain to soak in to recharge surfacial aquifers. The clay may present an obstacle to the restoration of hydrologic functions (Figure 7b). Reclaiming clay-settling areas also could allow clay silt to wash into the river during storms. That clay often separates the uppermost aquifer from the intermediate aquifer below it, causing the two aquifers not to connect hence affecting the quantity of the aquifer water. It also makes the water table more prone to dropping, which could cause the streams to go dry.

Figure 7: Gypsum Mining and the disruption of river water resources and destruction of vegetation in Elturoto River at Empuyiankat.

Instream mining have other costly effects beyond the immediate mine sites. The generated extra vehicle traffic negatively impairs the environment. Where access roads cross riparian areas, the local environment is impacted. Many hectares of fertile streamside land are lost, as well as valuable timber resources and wildlife habitats in the riparian areas. Severely degraded channels lower land and aesthetic values.

Floral and faunal species require specific habitat conditions to ensure long-term survival. Native species are in particular uniquely adapted to habitat conditions that existed before humans began any alterations. In most streams and rivers the world over, habitat quality is strongly linked to the stability of channel bed and banks. Unstable stream channels occasioned by mining are inhospitable to most aquatic species and leads to habitat disruptions and overall declines in biological diversity and productivity.

- Riverbank and streambed incision increases stream bank heights, resulting in bank failure when the mechanical properties of the bank material cannot sustain the material weight. Channel widening causes shallowing of the streambed as deep pools fill with gravel and other sediments. Shallowing and widening of the channel also increases stream temperature extremes, and channel instability increases transport of sediments

downstream. These aspects can create a stress in the ecosystem that is now challenging Kajiado District (Figure 8).

Figure 8: Stress on land, livestock and wildlife in Kajiado District

DISASTER MANAGEMENT TRAINING PROGRAMMES IN THE UNIVERSITIES

Among the major environmental issue highlighted by environmental impact assessment included;
Physical Environmental Impact

- Changing of the topography and geology of the area permanently through mining/quarrying
- Hydrological effects on surface and shallow groundwater bodies.
- Impacts on soil and land use

Natural Environmental Impact

- Loss of annual and tree crops
- Loss of habitat for the animal diversity
- Loss of wetlands
- Loss of high plant diversity and ethno-botanical resources
- displaced households resulting in; loss of households, loss of community infrastructure and disruption of community networks.

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