



UNITED REPUBLIC OF TANZANIA

**GUIDELINES FOR MANAGEMENT OF ENVIRONMENTAL
EMERGENCIES**

VICE PRESIDENT'S OFFICE

2014

PREFACE

Environmental emergency can be defined as a sudden-onset disaster or accident resulting from natural, technological or human-induced factors, or a combination of these, that cause or threaten to cause severe environmental damage as well as harm to human health and/or livelihoods. They include secondary consequences from natural hazards such as earthquakes, storms, floods, tsunamis, wild land fires, landslides and/or man-made disasters such as industrial accidents, transport accidents, chemical spills, oil spills and a multitude of other types of emergencies.

The world has experienced a dramatic increase in the frequency and magnitude of natural and human induced environmental emergencies which severely affect lives, livelihoods and the environment. Disasters and emergencies have killed and displaced many people, and caused substantial economic, social and environmental damage. The impact of such events, include degradation of vital ecosystems and undermine sustainable development. People living in developing countries and in particular the poorest are the most vulnerable to the effects of environmental emergencies which often have long term secondary impacts affecting their livelihoods. Local communities all over the world are at the forefront of any response to such emergencies, including human induced industrial and technological emergencies. Reducing risk at the local level is therefore fundamental.

Tanzania, like many other developing countries, has experienced a number of environmental emergencies since her independence in 1961. Common environmental emergencies and disasters in the country are epidemics, pest infestation, drought, floods, major transport accidents, industrial accidents, refugees and fires. These environmental emergencies have lead to loss of lives, destruction of infrastructure and adverse impact to the country's economy.

In order to address challenges related to environmental emergencies, the Environment Management Act, 2004 Section 13(2) empowers the Minister responsible for Environment to develop guidelines for the management of environmental emergencies.

The purpose of these guidelines is to provide guidance for management of environmental emergencies pursuant to the requirements of the National Environmental Management Act, 2004. These guidelines cover detailed explanations in dealing with environmental emergencies related to major oils spills and gas leakages; spills of other hazardous substances; industrial accidents; natural disasters such as floods, droughts and pest infestations or other intrusions of alien species of fauna and flora; influx of refugees and fire. It is anticipated that these guidelines would be updated periodically, for more effective and efficient implementation. Therefore, any suggestions for improvement from all stakeholders would be highly appreciated. It is my expectation that these guidelines will serve and continue to be a valuable resource for many users. I urge all the responsible implementing Sector Ministries to start using these guidelines for betterment of the country.



Hon, Eng. Dr. Binilith S. Mahenge (MP)
Minister of State, Environment - Vice President's Office

TABLE OF CONTENTS

PREFACE	ii
TABLE OF CONTENTS	iii
List of Figures.....	v
Abbreviations and Acronyms	vi
Definitions of Terms.....	viii
1.0 BACKGROUND	1
1.1 The Purpose of the Guidelines	2
1.2 Scope of Guidelines.....	2
1.3 Justification of the Guidelines	2
2.0 APPROACH AND METHODOLOGY	3
2.1 Literature Review	3
2.2 Situational Analysis.....	3
2.3 Stakeholders' consultation and analysis of issues.....	3
3.0 POLICY, LEGAL FRAMEWORK AND INSTITUTIONS FOR THE MANAGEMENT OF ENVIRONMENTAL EMERGENCIES	4
3.1 National Policies	4
3.2 Legal Framework	8
3.3 Other Related Relevant Regulatory Framework.....	11
3.4 EMA-Based Institutional Framework for Environmental Management.....	12
4.0 ANTHROPOGENIC ACTIVITIES AND NATURAL SOURCES CONTRIBUTING TO ENVIRONMENTAL EMERGENCIES	14
5.0 GENERAL ENVIRONMENTAL EMERGENCY GUIDELINES	16
5.1 Climate Change Related Environmental Emergencies.....	16
5.1.1 Floods.....	16
5.1.1.1 Key elements of Flood Management	17
5.1.1.2 Flood Plain Management	18
5.1.1.3 Emergency Preparedness and Response	21
5.1.1.4 Emergency Management Team	24
5.1.2 Drought	24
5.1.2.1 Drought Preparedness and response	25
5.1.2.2 Emergency Management Team	26
5.2 Hazardous Waste.....	26
5.2.1 Control Measures of Hazards Wastes.....	27
5.2.2 Reporting a Chemical hazards.....	31

5.2.3 Emergency Response	31
5.2.4 Chemical hazards clean up	32
5.2.5 Environmental Emergency Team	32
5.3 Communicable Disease Prevention and Response Guide	33
5.3.1 Prevention	33
5.3.2 Identification of the Problem.....	34
5.3.3 Emergency Response	34
5.3.4 Environmental Emergency Team	35
5.4 Fire and Wildfire Outbreak.....	35
5.4.1 Planning and Preparation	36
5.4.2 Emergency Response	36
5.4.3 Environmental Emergency Team	37
5.5 Earthquake	38
5.5.1 Emergency Preparedness	38
5.5.2 Emergency Response	39
5.5.3 Emergency Response Team	40
5.6 Terrorism	41
5.6.1 Emergency Response	41
5.6.2 Emergency Response Team	42
5.7 Influx of Refugees	42
5.7.1 Emergency Response and Maintenance Phases	43
5.7.1.1 Supplies and Logistics.....	43
5.7.1.2 Physical Planning of Refugee Camps	44
5.7.2 Emergency Response Team	45
5.8 Oil Spill and Gas Leak	46
5.8.1 General Standards of Oil Spill Control Procedures.....	46
5.8.3 Specific Recommendations for Spills Management.....	48
5.8.4 Emergency Response Team	53
5.9 Pests Infestation	53
5.9.1 Emergency Response	54
5.9.2 Emergency Response Team	55
5.10. Alien and invasive species management	55
5.10.1 Emergency response	57
5.10.2 Emergency Management Team	58
5.11 Vehicular Accidents	58
5.11.1 Emergency response	59
5.11.2 Environmental Emergency Team	59
5.12 Marine Accidents	60
5.12.1 Environmental Emergency Response	60
5.12.2 Environmental Emergency Team	62

6.0 Appendix.....	63
Appendix I: The stakeholders consulted and their views are summarized in the following matrix	63
Appendix II: Classification and Potential Consequences of Common Environmental Emergencies.....	67
Appendix III. List of Relevant Policies, Plans and Legislation.....	68

List of Figures

Figure 1: Disaster Operation Function Diagram	5
Figure 2: Institutional Framework for Environmental Management in Tanzania.....	12

List of Tables

Table 1: Examples of anthropogenic activities and natural sources contributing to environmental emergencies	14
Table 2: Natural environmental emergencies incidencies in Tanzania (1900 – 2012).....	15
Table 3: Hazards waste control measures	28
Table 4: Examples of spills and leaks that should be considered an emergency	47

Abbreviations and Acronyms

ASDP	-	Agricultural Sector Development program
CAADP	-	Comprehensive African Agriculture Development Program
CEMC	-	City Environmental Management Committee
CEMO	-	City Environment Management Officer
CBO	-	Community Based Organization
CRED	-	The Centre for Research on the Epidemiology of Disasters
DEMC	-	District Environmental Management Committee
DEMO	-	District Environmental Management Officer
DMD	-	Disaster Management Department
DoE	-	Division of Environment
EIA	-	Environmental Impact Assessment
EMA	-	Environmental Management Act
HEPA	-	High Efficiency Particulate Air
IRA	-	Institute of Resource Assessment
IAS	-	Invasive Alien Species
MEM	-	Ministry of Energy and Minerals
MAFC	-	Ministry of Agriculture Food, Security and Cooperatives
MEMC	-	Municipal Environmental Management Committee
MEMO	-	Municipal Environmental Management Officer
MNRT	-	Ministry of Natural Resource and Tourism
NADMAC	-	National Disaster Management Committee
NEAC	-	National Environment Advisory Committee
NEMC	-	National Environment Management Council
NEP	-	National Environmental Policy
NEPAD	-	New Partnership for Africa's Development
NGO's	-	Non-Governmental Organizations
OFDA	-	Office of U.S Foreign Assistance
PMO	-	Prime Minister's Office
SAGCOT	-	Southern Agriculture Growth Corridor of Tanzania
SCBA	-	A Self Contained Breathing Apparatus
SUMATRA	-	The Surface and marine Transport Regulatory Authority
SVEMC	-	Sub Village Environmental Management Committee

SVEMO	-	Sub Village Environmental Management Officer
TAC	-	Technical Advisory Committee
TAFSIP	-	The Tanzania Food Security Investment Plan
TEMC	-	Town Environmental Management Committee
TEMO	-	Town Environmental Management Officer
TEPRP	-	Tanzania Emergency Preparedness and Response Plan
TWEMC	-	Township Environmental Management Committee
TWEMO	-	Township Environmental Management Officer
UN	-	United Nations
UNEP	-	United Nations Environment Program
UNHCR	-	United Nations High Commissioner for Refugees
URT	-	United Republic of Tanzania
VEMC	-	Village Environmental Management Committee
VEMO	-	Village Environmental Management Officer
VPO	-	Vice President's Office
WEMC	-	Ward Environmental Management Committee
WEMO	-	Ward Environmental Management Officer
WMO	-	World Metrological Organization

Definitions of Terms

This section presents definitions for different terms and concepts that are relevant to these guidelines.

Accident: means an unexpected event that result in loss or injury to a person and/or damage to property or the environment.

Emergency: means, in the context of these guidelines, an accidental situation involving the release or imminent release of dangerous goods or other substances that could result in serious adverse effects on the health and/or safety of persons or the environment. An emergency may be the result of man-caused or natural occurrences such as, but not limited to, process upsets, uncontrolled reactions, fires, explosions, threats, structural failures, tornados, earthquakes, floods, and storms.

Environment: The air or atmosphere, all surface and ground waters, and all land including sub-soils.

Environmental emergency: The degradation, or the threat of degradation of the environment to an extent that it creates or constitutes an emergency; often an event that involves hazardous materials.

Emergency Response: means a detailed program of action to control and/or minimize the effects of emergency requiring prompt corrective measures beyond normal procedures to protect human life, minimize injury, to optimize loss control, and to reduce the exposure of physical assets and the environment from an accident.

Guidelines: are statements by which to determine a course of action (s). Guidelines aim to streamline particular processes according to a set routine or sound practice.

Hazard: means an event with a potential for human injury, damage to property, damage to the environment, or some combination thereof.

Incident Command System: means a method by which the response to an extraordinary event, including a spill, is categorized into functional components and responsibility for each component is assigned to the appropriate individual or agency

Evacuation: is an operation whereby all or part of a particular population is temporarily relocated whether individually or in an organized manner, from an area in which a disaster or emergency is imminent or has occurred.

Risk: is the probability of harmful consequences or expected losses (deaths, injuries, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human-induced hazards and vulnerable conditions.

Vulnerability: refers to social and material conditions derived from characteristics of individuals and groups that make them susceptible to harm and loss from environmental hazards and that constrain their ability to cope with the adversities of disasters.

Hazardous material or hazardous substance(s): Any substance, element, compound, mixture, solution, wastes, material or goods, including pesticides and petroleum oils and their associated products, which by itself, or in conjunction with other substances, elements, compounds, mixtures, solutions materials or goods as a result of incomplete, uncontrolled or inadvertent reactions, presents a hazard to man or adversely affects man, animals or other living things including plants or the environment in general, and property, or has the potential to do so under the circumstances of the emergency.

Emergency Response Team: A decision-making response group consisting of representatives of partner ministries and other government agencies or departments, and possibly someone representing the responsible party or parties involved, and assigned by their respective agencies to assist the On-Scene Coordination tasks.

1.0 BACKGROUND

Environmental emergency can be defined as a sudden-onset disaster or accident resulting from natural, technological or human-induced factors, or a combination of these, that cause or threaten to cause severe environmental damage as well as harm to human health and/or livelihoods. Environmental emergencies are incidents or events that threaten public safety, health, and welfare. They include hurricanes, floods, wildfires, industrial plant explosions, chemical spills, acts of terrorism, and others. While these events range in size, location, cause, and effect, most has an environmental component.

Tanzania has experienced a number of environmental emergencies since her independence in 1961. Common environmental emergencies and disasters in the country have been epidemics, pest infestation, drought, floods, major transport accidents, industrial accidents, refugees and fires (URT-PMO, 2001). Such emergencies have resulted into major adverse impacts. For example, the sinking of MV Skagit in 2012 claimed 144 lives; the MV. Spice Islander in (2012) killed 203 people and the MV Bukoba in 1996 claimed the life of over 1,000 passengers. In Kilimanjaro and Arusha regions, rains that pounded in 2009 destroyed roads and bridges affecting thousands of people travelling to those regions. Also fire outbreaks have been common disaster in many parts of country. Similarly, floods have swept the central railway line around Kilosa areas twice causing disruption to main transport network and severe impacts to the national economy. In Dar es Salaam, many people in both planned and unplanned settlements have been affected by environmental emergencies such as floods, fire, etc. Generally, these hazards have resulted in loss of lives, damage to properties and infrastructure.

In order to effectively manage these Environmental Emergencies, the Vice Presidents Office through the Division of Environment is preparing guidelines. These guidelines development is a response to the Environmental Management Act (Cap. 191) which requires different sectors to address emergencies in their undertakings. The Act empowers the sectors to undertake various environmental roles and responsibilities that are relevant to their core functions. Section 229 (1) authorize the Minister responsible for environment to prepare guidelines for the management of environmental emergencies. These written Environmental Emergence Guidelines become living document, to be revised and changed over time as the environmental emergencies change.

1.1 The Purpose of the Guidelines

The purpose of formulating these guidelines is to provide government sectoral ministers, private institution, owners and operators of industrial, mining, buildings and other business facilities with guide for preparedness in the event of environmental emergencies. The guidelines are not an authoritative instruction but rather detailed recommendations based on accumulation of institutional memory and experiences related to international environmental emergency response.

1.2 Scope of Guidelines

The guidelines are intended for the use of sectoral ministries, government and private institutions, organizations or any person, who owns or has the charge, management, or control of environmental emergencies listed in the Environmental Management Act, 2004 (Section 229.-(1)) which include:-

- i. major oil spills and gas leakages;
- ii. spills of other hazardous substances;
- iii. industrial accidents;
- iv. natural disasters such as floods, droughts and major pest
- v. infestations or other intrusions of alien species of fauna and flora;
- vi. influx of refugees; and
- vii. fire.

1.3 Justification of the Guidelines

The preparation of the Environmental emergencies guidelines intends to address the requirements of the EMA (Section 229 (1) which empowers the Minister responsible for environment to prepare guidelines for the management of environmental emergencies including major spills and gas leakages; spills of other hazardous substances, industrial accidents and natural and climate change related disasters.

The increasing incidence and severity of environmental emergencies from industries, mining, transport accidents as well as climate change continue to seriously affect populations, hamper the attainment of sustainable development goals and disrupt security and stability. Much more should be done in the country in raising the awareness of emergencies, their impacts and the importance of preparedness. It is important to ensure the necessary high-level political and technical engagement in the important area of environmental emergencies

management, generate ideas and support the development of concrete initiatives on key issues, facilitate the creation of multi-stakeholder coalitions to reduce and prevent the environmental emergencies.

It is from this understanding that the Vice President's Office have decided to prepare environmental emergencies guideline to enable Ministries, government departments and agencies to prepare their guideline for environmental emergencies prevention, preparedness and control.

2.0 APPROACH AND METHODOLOGY

The study used a number of approaches and methodologies to develop the proposed guidelines. The following sections provide details on the methodologies used.

2.1 Literature Review

The study started with a desk work. This involved literature review for the earlier and similar studies on the environmental emergency guidelines. The literature documented environmental guidelines practices worldwide and highlighted best practices. It also intended to establish data requirements to address issues about environmental emergency guidelines. The study further reviewed the related policies and laws in the country. Literature review ended up with the identification of stakeholders and development of data collection tools.

2.2 Situational Analysis

This section involved situational analysis and an investigation of the current institutional arrangements for the environmental emergencies practices and highlight their strengths and weaknesses.

2.3 Stakeholders' consultation and analysis of issues

The second step involved a consultation with stakeholders and analysis of the issues. The aim of the consultation was to come up with an understanding of the current practices of environmental emergencies, existence and scope of guidelines and; find out their opinion on the guidelines framework to be developed. Some of the stakeholders which were consulted include VPO, PMO, MEM, MNRT, MAFC, SUMATRA, National Construction Council, Dar es Salaam, Regional Commissioner's Office and UNHCR. For details of the consulted stakeholders refer to Appendix I. The collected data were analysed and draft guidelines were

developed. The guidelines were presented at the stakeholders' workshop in Bagamoyo and comments and recommendations were incorporated to produce final guidelines.

3.0 POLICY, LEGAL FRAMEWORK AND INSTITUTIONS FOR THE MANAGEMENT OF ENVIRONMENTAL EMERGENCIES

3.1 National Policies

National Environmental Policy (1997)

The overall policy framework for environmental management in Tanzania is the National Environmental Policy, 1997 (NEP). The policy recognizes environment as a cross-cutting issue that requires a holistic approach and multi-level management. The policy aims at ensuring environmental sustainability, security and equitable use of resources for meeting the basic needs of the present and future generation without degrading the environment or risking health or safety. It also emphasizes on prevention and control of land, water, vegetation and air which constitute human life support system. Furthermore, emphasis are put in those areas which might lead to occurrence of environmental emergencies such as mining, industries and water resources. ***The National Disaster Management Policy (2004)***

A relatively comprehensive national disaster management policy and guidelines were developed for mainland Tanzania in 2004 under the Disaster Management Department (DMD) in the Prime Minister's Office as per the Disaster Relief Coordination Act, No. 9, of 1990. The responsibility of the DMD is to identify and anticipate hazards and prepare plans to effectively respond to disasters so as to save lives and protect property within Tanzania mainland. The DMD has developed disaster management guidelines which are applicable to all sectors but only for disaster rescues.

The National Disaster Management Policy (2004) recognizes the importance of environmental conservation in minimizing the impact of natural disasters and encourages capacity building to create awareness on the importance of environment management among the local communities. The policy has developed a good governance system from national to village levels in the process of implementation (Figure 1). This involves disaster management committees at each level and it clarifies the roles and responsibilities at each level up to individual household. It also sets clear responsibilities for other stakeholders including civil society, non-governmental organizations, media and the International Red Cross/ Crescent.

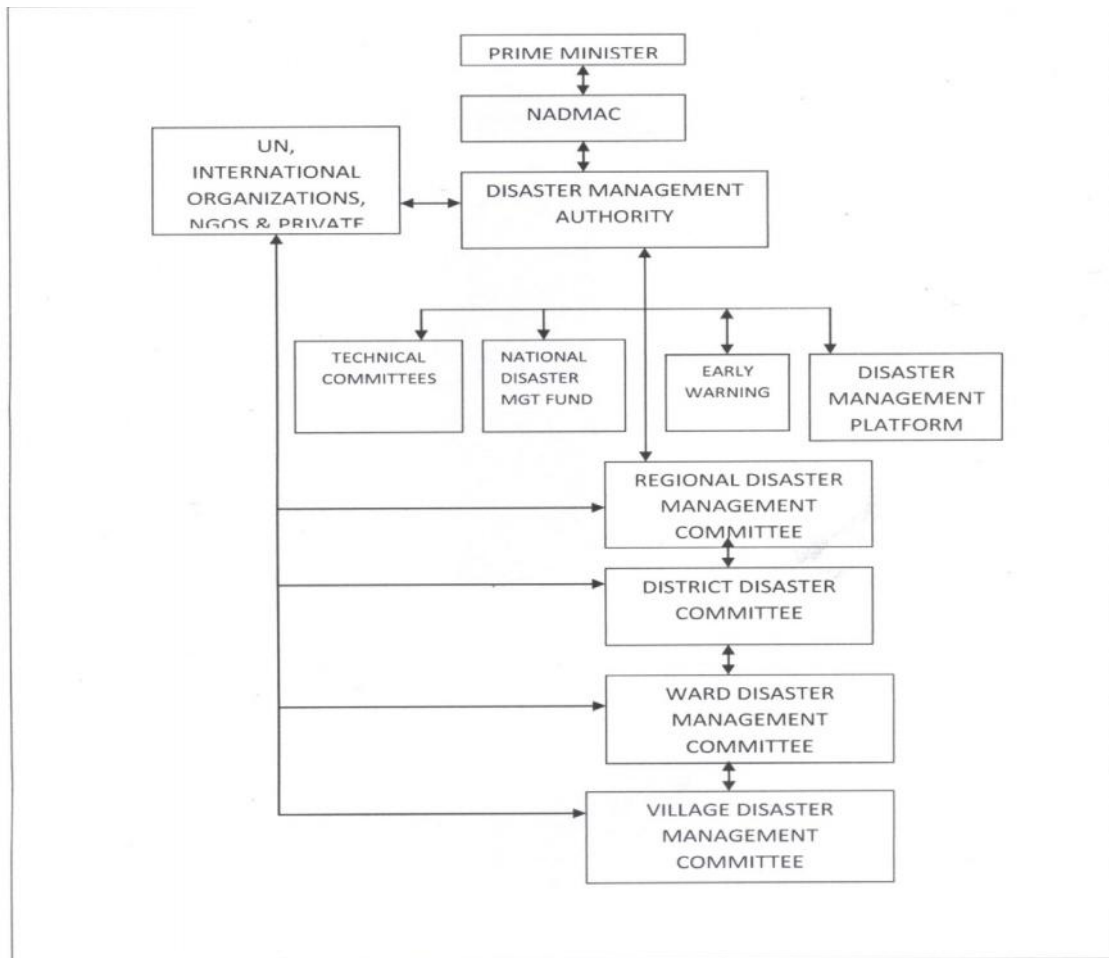


Figure 1: Disaster Operation Function Diagram

The DMD quotes another 15 related legal instruments and works with a number of Government departments of line ministries, government agencies, elected and appointed officials, volunteer organizations, UN Agencies, local and international NGOs and other stakeholders that support disaster preparedness and response efforts in Tanzania. Where major disasters or emergencies are involved, the Tanzania Emergency Preparedness and Response Plan (TEPRP) come into play, whereby the President of the United Republic of Tanzania declares that the national assistance is needed to supplement the local efforts and capacities. Although TEPRP does not specifically address long-term reconstruction and re-development activities of the recovery phase, it applies to all departments, government agencies and volunteer organizations that may be tasked to provide assistance in a major disaster or emergency.

Thus, in order to effectively perform the environmental disaster management functions, the DMD through consultation with key stakeholders, has developed a national emergency preparedness and response plan (TEPRP) that provides guidelines for coordination and response to all types of disasters and emergencies at all levels of the government. Specifically, the TEPRP has three main components namely: (i) the basic plan, which serves as an overview of the government's approach to emergency management; (ii) annexes that describe specific activities critical to emergency preparedness and response; and (iii) appendices which support each annex and contain technical information, details, and methods for use in emergency operations. Most of the policy issues The National Disaster Management Policy are also applicable to the proposed environmental emergency guidelines. Thus the proposed guidelines will be complementing on what is taking place under DMD.

The National Forest Policy (1997)

The Forest Policy was developed with the goal to enhance the contribution of the forest sector to sustainable development of Tanzania and conservation and management of her natural resources for the benefit of the present and future generations. The main policy objectives are: to ensure sustainable supply of forest products and services, increased employment and foreign exchange earnings, ensure ecosystem stability through conservation of forest biodiversity, water catchments and soil fertility. Some of the important issues in the context of this study are: to protect and conserve forest resources such as wildlife and vegetation, and to increase the importance of forest in conserving land, water sources and other environmental benefits in order to reduce the occurrences of environmental emergencies such as drought, floods, land degradation and wildfire outbreak.

National Agricultural Policy of 2013

The policy sees agriculture as stagnated and the aim of the policy is to intensify agriculture in the country to meet food security, enhance export earnings and contribute to poverty alleviation. In order to address the stagnating growth, a number of reforms have been effected including KILIMO KWANZA Resolve, the Tanzania Food Security Investment Plan (TAFSIP), Southern Agriculture Growth Corridor of Tanzania (SAGCOT), Feed the Future Programme and Bread Basket Initiative, have been initiated to complement speedy implementation of ASDP. The initiatives are linked to the Comprehensive African Agriculture Development Programme (CAADP) the African Union initiative for revamping agricultural development in Africa through the New Partnership for Africa's Development

(NEPAD). However, the sector is also aware of the environmental emergencies such as crop pests and diseases, Erosion of natural resource base and environmental degradation, adverse weather events like floods and storms that cause heavy losses to farmers pose a major threat to production and farmer's incomes. Furthermore, the policy highlights climate change as an attribute of unsustainable farming methods and systems including deforestation, land clearing and/or bush fires. According to the policy, the maintenance of the natural resource base is critical for sustainable agricultural development. Unsustainable utilization of production resources may result into many environmental emergencies including land degradation, desertification, widespread pollution from improper handling and inappropriate use of agrochemicals, and fertilizers. The environment is further degraded through poor cultivation practices, bush fires, overexploitation of forests. Thus the proposed guidelines will also address environmental emergencies facing agricultural sector.

National Livestock Policy 2006

The policy aims to increase livestock productivity through controlling diseases, improving breeds and grazing pasture. The policy emphasizes on the control of diseases such as rabies, brucellosis, tuberculosis, anthrax, trypanosomoses and salmonellosis. These diseases have also environmental emergency attributes. The proposed guidelines could be adopted by the livestock sector for managing such diseases.

The Construction Industry Policy (2003)

The Construction Industry Policy of 2003 is important in relation to all environmental emergencies related to the construction sector. These include issues such as collapse of buildings and destruction of roads as a result of natural disasters such as floods. While the policy highlights the importance of the construction industry, it also cautions that it could be a major source of environmental damage and occupational health problems. For example, construction activities affect the environment in a number of ways such as resource deterioration, physical disruption and chemical pollution, destabilization of fragile hill slopes etc. Deforestation associated with construction can cause loss of land by soil erosion, silting of reservoirs and disruption of aquatic ecosystems. The policy direction is therefore to promote and undertake research programs geared towards application of technologies, products and practices which are not harmful to environment, human health and safety. Such policy attributes also contributes to the developed policy guidelines.

The National Gas Policy of Tanzania, 2013

The main objective of the policy is to provide guidance for the sustainable development and utilization of the natural resource and maximization of the benefits there from and contribute to the transformation and diversification of the Tanzanian economy. Despite its importance to the national economy, natural gas operations may have adverse effects on the environment, health and safety of people. For instance, construction of marine pipeline can negatively impact marine ecology including disturbance of fish habitat. Gas flaring in the natural gas processing plants emits carbon dioxide to the atmosphere. The policy calls for adherence to good industry standards and practices will contribute significantly to preventing or mitigating such effects. The policy emphasizes the importance to plan for remedial measures prior to any natural gas operation. Regulations of these operations are necessary to ensure that natural gas activities are conducted taking environment, health and safety issues into serious consideration.

3.2 Legal Framework

Environmental Management Act (EMA) No.20 of 2004

In Tanzania disasters and emergencies are also addressed in the context of environmental management. The overall policy framework for environmental management in Tanzania is the National Environmental Policy, 1997 (NEP) which recognizes environment as a cross-cutting issue that requires a holistic approach and multi-level management. Thus, environmental issues are vested in the office of the Vice President where the Minister responsible for environment is the overall in-charge of all matters relating to the environment and in that respect is responsible for articulation of policy guidelines necessary for the promotion, protection and sustainable management of environment in Tanzania (EMA, 2004 Part III, Section 13(1)). The Environmental Management Act (Cap. 229) instructs the Minister to prepare guidelines for the management of environmental emergency guidelines including, Major oil spills and gas leakages, spills of other hazardous substances, industrial accidents, natural and climate change related disaster such as floods, cyclones, drought and major pest infestation or other intrusion of alien species of fauna and flora.

The Explosives Act, 1963

The Explosives Act, (No.56), (1963), has provisions that govern the manufacture, import, purchase, sale, possession and use of explosives. Transportation, handling, storage and

procedures for training and permitting of authorized people for handling explosives are provided under the Act. The explosives Act provide guidance for the construction of explosives storage facilities, stores and magazines, which cater for different types of users. Safety installations and precautions around storage facilities and during handling and transportation are stressed in this Act.

The Industrial and Consumers Chemicals (Management and Control) Act, 2003

The Industrial and Consumers Chemicals (Management and Control) Act No 3 of 2003 (URT, 2003) provides a legal framework for the management and control of industrial and consumer chemicals throughout their life cycle.

The law requires that all those persons who intends to produce, import, export, sale, deal in industrial and consumer chemicals must register with the Registrar of Industrial and Consumer Chemicals so that their capacities to manage chemicals can be assessed. The law also requires that facilities used in the production, storage disposal of chemicals and waste must be registered for the same reasons of ensuring that they are of sound designs and that are operated properly. The Registrar of Industrial and Consumer chemicals, as a regulator is required to inspect facilities on a regular basis to monitor conduct, management and control of chemicals.

The Environmental Management (Hazardous Waste Control) Regulations, 2009

The Regulations apply to all categories of hazardous waste and the generation, storage, transportation, treatment and disposal of hazardous waste and their movement into and out of Mainland Tanzania. For the administration and institutional arrangement, regulation 7 gives the Minister the duty to provide policy direction and Leadership in all matters pertaining to hazardous waste management under the Environmental Management Act, Cap. 191. The Minister will be assisted by the Director of Environment in carrying out his functions. Regulation 11 recognizes the classification of hazardous waste according to the Basel Convention on the control of trans-boundary movement of hazardous waste and their disposal, 1989 and the Bamako convention on the ban of import into Africa and the control of trans-boundary movement and management of hazardous waste within Africa.

Further the Regulations provides for packaging of wastes in the UN approved container and labelling them to identify the hazardous waste (regulation 12 and 13). Regulation 44 requires

the person intending to operate a hazardous waste treatment plant or disposal facility shall apply to the Director of Environment for a license.

Occupational Health and Safety Act (OSHA Act), 2003

The Occupation Health and Safety Act, (No. 5) (2003), deals with issues related to health and safety of workers in industrial areas. Under the Act, the Minister responsible for Labour shall appoint the Chief Inspector (CI) to perform the functions stipulated in the Act. Specific provisions of the OSHA Act – namely Section 21, 60, 61, 73-75 and 96 must be fully addressed in order to comply with this legal requirement.

The Act addresses such issues of safe equipment, provision of personal protective equipment and a clean and safe work environment (e.g. provision of regular medical examination, air, drinking water, sanitary convenience, washing facilities, accommodation for clothing, first aid facilities: including safety training, etc.).

Merchant Shipping Act, Cap 165, 2003

The merchant Shipping Act, Cap 165 provides regulation on how to handle dangerous goods and marine pollutants which can be harmful to the environment. The Act states that “where the operator has any cause to believe dangerous goods of marine pollutants cannot be handled or carried in bulk safely in that ship he shall ensure that the dangerous goods or pollutants are handled and carried in accordance with the requirements of appropriate codes and where the dangerous goods or marine pollutants consist of a liquid chemical or a liquefied gas shall be handled and carried in accordance with approval of the Authority specifying the date on which it takes and the condition which it is given.

Section 7 (1) of the Merchant Shipping Act provides directives for the preparation of oil pollution emergency plan, where, every harbour authority and every operator is required to submit to the Authority an oil pollution emergency plan for approval within fifteen months from the coming into force of these regulations. In preparing the oil pollution emergency plan, the harbour authority or operator shall take into account any guidance issued by the authority. These guidelines complements to the legal requirements for Merchant Shipping.

Mining Act, 2010

In respect of Environmental management, the Mining Act, 2010 under Section 53 articulates the conditions which must be attached to a Mining License and these conditions cover environmental aspects including the requirement of EIA. The Mining (Environmental Management and Protection) Regulations, 1998 under Regulation 3 states that EIA will be conducted in every mining activity at the discretion of the Minister responsible for Mineral Resources.

The Mining Act, 2010, section 112 (2) requires the avoidance of pollution to the air, surface and ground waters and soils and the regulation of all matters relating to the protection of the environment and the minimization of all adverse impacts to the environment including the restoration of land on which mining operations have been conducted, the regulation of all matters relating to sanitation and health, including the establishment of cemeteries, as regards mining areas, the reporting of accidents and deaths occurring on any prospecting area or mining area in connection with prospecting or mining. However, the law does not specify mechanism, institutional arrangement or procedures for dealing with environmental emergencies related to mining activities.

3.3 Other Related Relevant Regulatory Framework

Other regulatory frameworks that are relevant to the proposed development include the Surface and Marine Transport Regulation Authority (SUMATRA Act of 2001, with regard to transportation of goods from various sections of the projects; the Town and Country Planning Ordinance (Cap 378 of 1958) and Amendment of 1961, for planning purposes. Other regulatory frameworks that are relevant include Local Government Act (District & Urban Authorities (revised in 1997).

Results from the situation analysis have indicated various sectors have a certain level of environmental emergency guidelines. For example, PMO, Mining Department, UNHCR, SUMATRA and Dar es Salaam Region have in place elements of environmental emergency guidelines which are operational. However, these guidelines were sector specific and lacked coordination at national level (VPO). The details of individual response on environmental emergencies have been put in Appendix III.

3.4 EMA-Based Institutional Framework for Environmental Management

The EMA (2004) Part III provides institutional framework for environmental management as described below and illustrated in Figure 2.

The National Advisory Environmental Committee is comprised of members with experience from various fields of environmental management in the public, private sector and the civil society. The advisory committee advises the Minister on any matter related to environmental management. Other functions include performing other environmental advisory services to the Minister as it may be necessary.

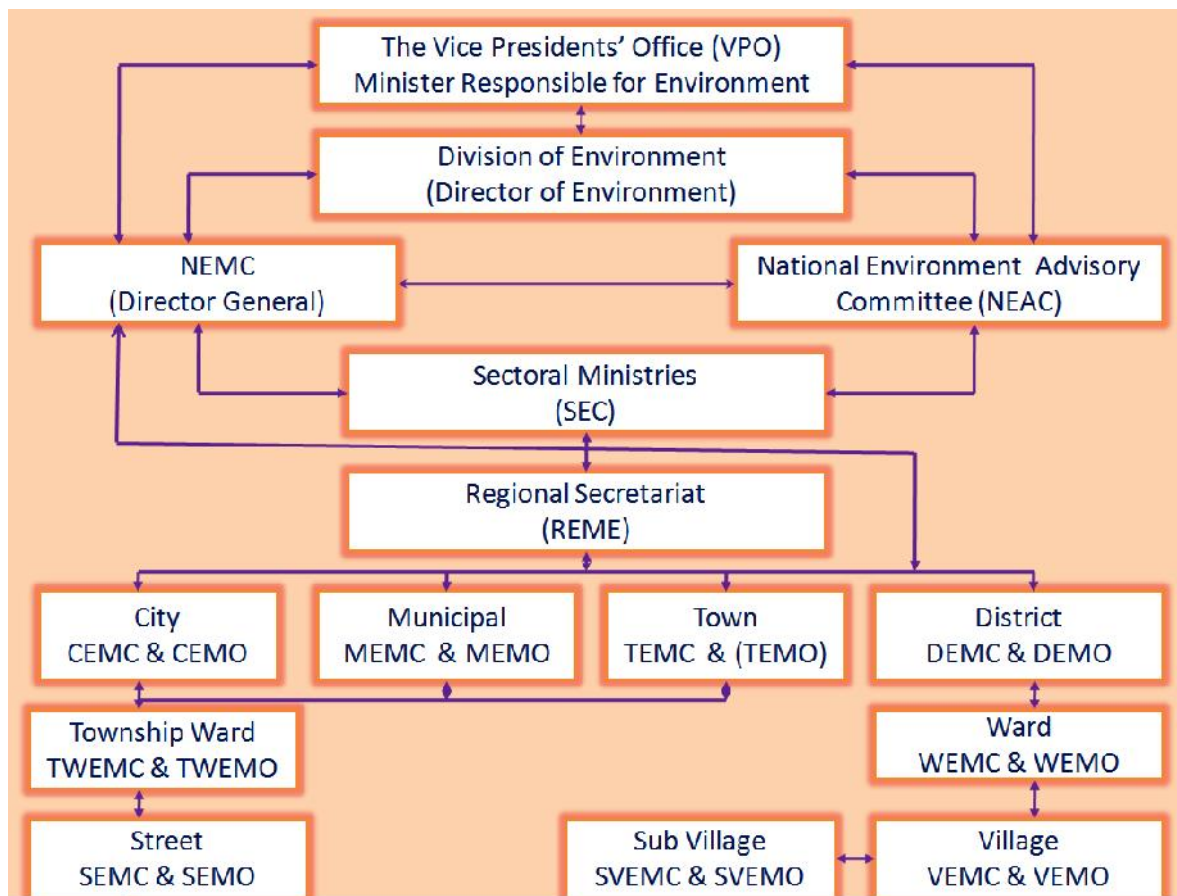


Figure 2: Institutional Framework for Environmental Management in Tanzania

The Minister of Environment is responsible for matters relating to environment, including giving policy guidelines necessary for promotion, protection and sustainable management of environment in Tanzania. The Minister may also delegate the power of approval for EIA to the DOE, Local Government Authorities or Sector Ministries.

The Director of Environment heads the Office of the Director of Environment and is appointed by the President of the United Republic of Tanzania specifically to: coordinate environmental management activities undertaken by other agencies; promote integration of environmental considerations into development policies, plans, programmes, strategies, projects; monitor and assess activities undertaken by relevant Sector Ministries and agencies; and coordinate issues relating to articulation and implementation of environmental management aspects of other sector policies and the National Environment Policy. **The NEMC's** purpose and objective is to undertake enforcement, compliance, review and monitoring of EIA and to facilitate public participation in environmental decision-making.

Under the existing institutional and legal framework **the Sector Ministries** are required to establish Sector Environmental Sections headed by the Sector Environmental Coordinator. The responsibilities of these Sector Environmental Sections include: to ensure environmental compliance by the Sector Ministry; liaising with the DOE and NEMC on matters involving the environment; ensure that environmental concerns are integrated into the ministry or departmental development planning and project implementation; refer to the NEMC any matter related to the environment; undertake analysis of environmental impact of sector legislation, regulation, policies, plans, strategies and programmes through SEA; and ensure that sector standards are environmentally sound.

The Regional Secretariat, headed by the Regional Environmental Management Expert is responsible for coordination of all environmental management in the region. It is also a link between the region and the DOE and the NEMC. Local Government Authorities under the Local Government Act of 1982 (Urban and District Authorities), include the District Council, Divisions, Wards, Village governments, *Vitongoji* and *Mitaa*. The Environmental Management Committee of each of these jurisdictions (including the Municipal Council and Town Council) has responsibilities including: initiating inquiries and investigation about any allegation related to the environment and implementation of or violation of the provisions of the Environmental Management Act; initiating proceedings of civil or criminal nature against any person, company, agency, department or institution that fails or refuses to comply with any directive issued by any such Committee.

4.0 ANTHROPOGENIC ACTIVITIES AND NATURAL SOURCES CONTRIBUTING TO ENVIRONMENTAL EMERGENCIES

Environmental emergencies are caused either by natural forces/processes (known as ‘*natural disasters*’) or by human actions, negligence, or errors (known as ‘*anthropogenic disasters*’).

Natural disasters are generally classified into three major groups (CRED, 2009):

- (i) Geophysical disasters (e.g., earthquake, volcanic eruption, rockfall, landslide, avalanche, and subsidence);
- (ii) Hydro-meteorological disasters (e.g., flood, drought, storm, extreme temperature, wildfire, and wet mass movement); and;
- (iii) Biological disasters (e.g., epidemic, insect infestation, and animal stampede)

Similarly, anthropogenic disasters are broadly classified into two major groups

- (i) Technological disasters’ (e.g., disasters due to engineering failures, transport disasters, and environmental disasters) and;
- (ii) Sociological disasters’ (e.g., criminal acts, riots, war, stampedes, etc.).

Table 1: Examples of anthropogenic activities and natural sources contributing to environmental emergencies

	NATURAL SOURCES		ANTHROPOGENIC ACTIVITIES
1	Agricultural diseases and pests	1	Hazardous materials
2	Damaging Winds	2	Power service disruption and blackout
3	Drought and water shortage	3	Nuclear power plant and nuclear blast
4	Earthquakes	4	Radiological emergencies
5	Emergency diseases (pandemic influenza)	5	Chemical threat and biological weapons
6	Extreme heat	6	Explosion
7	Floods	7	Civil unrest
8	Hurricanes and tropical storms	8	Crime
9	Landslides and debris flow	9	Terrorism
10	Thunderstorms and lightning	10	War
11	Tornadoes	11	Industrial hazards
12	Tsunamis	12	Structural collapse
13	Wildfire	13	Fire
14	Sinkholes	14	Radiation contamination
		15	Transportation disaster (air, rail, road, space, sea)

4.1 Natural disaster events and impacts in Tanzania

Available information shows that between 1900 and 2012, the number of reported natural disaster events in Tanzania was around 95, which killed 7,704 people and affected other 13,849,250 people. The leading natural disaster in claiming people's lives is epidemic followed by floods while in terms of total people affected it is drought followed by floods and then epidemics (Table 2).

Table 2: Natural environmental emergencies incidences in Tanzania (1900 – 2012)

S/N	Natural Disaster	Number of emergencies events	Number of people Killed	Total number of people affected	*Damage (000 US\$) ¹
1.	Drought	10	-	12,737,483	-
2.	Earthquake (seismic activity)	9	9	8,991	-
3.	Tsunami	1	10	-	-
4.	Epidemics	29	6,673	96,389	-
5.	Flood	34	695	1,002,455	7790
6.	Pest Infestation	2	-	-	-
7.	Landslide	4	13	150	-
8.	Strong winds	4	4	3,782	-
9.	Wildfire	1	-	-	-
	Total	94	7,704	13,849,250	7,790

Source: Modified after the OFDA/CRED International Disaster Database, 2012

These proposed guidelines are a response to these high incidences of environmental emergencies in the country.

5.0 GENERAL ENVIRONMENTAL EMERGENCY GUIDELINES

Tanzania has experienced a variety of environmental emergencies. Experience has shown that major environmental emergencies include drought, floods, epidemics, windstorms, landslides, earthquake, pest infestation and volcanic eruptions. However, windstorms, landslides, volcanoes and earthquakes are few and occur rarely, others occur more regularly especially drought, epidemics and floods. Some of these environmental emergencies have resulted in loss of lives, damage to properties and infrastructure consequently disrupting the development gains made over the years.

These guidelines provide information and guidance preparedness and response to potential environmental emergencies as stipulated in Environmental Management Act, 2004, that may occur on different government and private institutions, industries, mining areas and organizations. Each Guide addresses a unique emergency situation; some Guides require additional information to be provided by the user. The details of the environmental emergencies, preparedness, and emergency responses are as follows:

5.1 Climate Change Related Environmental Emergencies

Tanzania economic development has been adversely affected by weather and climate related disasters (drought, floods, tropical cyclones, landslides, and Tsunami). Societies are increasingly affected by inter annual variations in climate such as those associated with El Nino/La Nina, which affect precipitation and temperature on inter-annual timescale that are only predictable to some degree. These regional climatic shifts produce weather related emergencies associated with climate variability. The prevalence of floods and drought that trigger disasters show that many Tanzanian societies are vulnerable to natural climate variability and extremes.

5.1.1 Floods

Floods and landslides are becoming common in Tanzania and have the greatest damage potential of all natural disasters worldwide and affect the greatest number of people. On a global basis, there is evidence that the number of people affected and economic damages resulting from flooding are on the rise at an alarming rate. In recent years (2009-2011), heavy rains accompanied with strong winds have left thousands of people displaced and without food in Muleba, Kilosa, Same and Dar es Salaam. The flooding of 2009/2010 in Kilosa

proved as serious that over three quarters of the farmers reported their households were affected. One-third of the households were displaced from their homes, with some still displaced two years later (Fahey *et al.*, 2011).

Flood disaster management is an end-to-end process for recognizing and effectively combating the risk associated with floods through a suite of planned actions. The process of flood and landslides management involves the following activities that need to occur throughout the cycle:

- i. Pre-disaster - preventative measures and preparedness;
- ii. During the flood - disaster relief, response and mitigation actions; and
- iii. Post disaster - rehabilitation, reconstruction, economic recovery, and efforts to assess and fine-tune preventative measures.

5.1.1.1 Key elements of Flood Management

Delineation of the flood-prone area

In order to map and delineate an area affected by floodwaters, there is the need to select a "design" event. Various approaches for estimating the design event exist, based in essence on "acceptable" risk, although at the time of their adoption, the concept of acceptable risk was not explicitly recognized. These approaches include using a historical worst-case scenario that happened in the basin or could plausibly have happened, which is referred to as storm transposition

Flood risk mapping

Mapping defines the area at risk and should be the basis for all flood damage reduction programs and subsequent actions. The maps often have a legal connotation in terms of zoning and other structural and nonstructural measures undertaken, so they need to be accurate and credible. The mapping is normally based on a frequency of flood event determined by public consultation and reflected in policy, which may be based on a vulnerability analysis that is site specific.

Protecting flood-prone lands

Policies and programs to keep future flood damages from rising are based on the delineation and mapping of flood-prone areas. Generally the resulting programs will mean some form of control over new development in the flood-prone area combined with measures to reduce

damages to existing development. Such programs are needed to curb the rising social and economic losses that results from floods. Alternate use of flood-prone land should be considered where possible. It is better to have the land zoned and used for purposes such as parks, nature areas or ecological reserves than to try and ensure that future development is flood proofed. Zoning and flood proofing measures can be used to control development and reduce future flood damages, but the effectiveness of such measures is highly reliant on enforcement and maintenance.

Climatological forecasting

Climatological or seasonal forecasting has now advanced to the point of being a useful tool in reducing the risk of flooding. Extreme events are correlated to major changes in atmospheric and ocean circulation patterns, and once such patterns have been identified, the potential for a lesser or greater degree of storm activity can be forecast. This information can then be used to increase the degree of readiness of emergency response and forecasting agencies. In certain cases the climatic forecasts can also be used to increase the availability of storage in reservoirs, to influence water management decisions and to create an awareness of the potential for flooding. All of these measures can reduce the severity of flooding, if it occurs.

5.1.1.2 Flood Plain Management

Management of activities within the flood prone area can significantly reduce flood damages to existing development and prevent the amount of damages from rising in the future. The most desirable approach is to prohibit new development in the flood plain and to flood proof existing structures, or to replace the existing development by alternative usage of the land. However, where the amount of present development is substantial or the flood plain is essential for the production of food or other key economic activities, alternate strategies such as flood proofing and protection can be considered. The following measures are important in flood and landslides management:-

Structural Measures

Construction of dams/diversions/ storm channels/levees - Construction of protective works such as flood storage reservoirs, diversion of water to side channel storage or other watersheds, construction of storm channels to carry water around the area to be protected, and

levees along the floodway provide tools to reduce flood damages. Such works can be constructed to various levels of protection, usually based on

- i. Minimum standards for flood protection
- ii. The optimum level of costs and benefits based on an economic analysis; or
- iii. To meet established levels of acceptable risk.

Inspection, rehabilitation and Maintenance - Structural works require a periodic and systematic inspection, rehabilitation and maintenance programs to ensure that the design capabilities are maintained. For example, levees may be subject to weakening due to erosion during a past flood event, by the actions of burrowing animals, or the construction of utility lines through the levee. Of particular importance is an inspection programs and responsibility assigned for rehabilitation and maintenance. Structures such as dams should be subject to dam safety programs, usually at the national level, to ensure that the specialized expertise required is available for the inspection of all structures.

Flood proofing of new and existing structures - Any new construction permitted in the flood plain should be flood proofed to reduce future damages. Building regulation can be developed that minimize flood damages by ensuring that beneficial uses of buildings are located above the design flood elevation. For example, buildings can be raised above the design flood level by placement of fill; stilts or piles used to elevate the structure; and building utilities can be located above the flood level

Bridges and roads - Bridges generally constrict the flow of water, and they can act as artificial dams if debris jams on the structure. In all cases, their hydraulic characteristics must be considered at the design stage to prevent an unacceptable rise of water levels upstream of the structure. Bridges are important in terms of maintaining access for evacuation and delivery of medical and other emergency services. Key transportation corridors should have high design standards that will withstand extreme flooding events. However not all bridges require a high level of protection, and the design criteria can be to a lesser standard that takes into consideration the possibility of overtopping.

Enforcement of standards and codes

The enforcement of standards and codes for flood-prone areas is as important as their initial development. There is a tendency to bend the rules as the memory of a flood event and its catastrophic consequences gradually fade away with time. Enforcement procedures and penalties need to be built into the process, and emergency response drills undertaken to ensure that flood prevention measures such as waterproof closures still work. An audit procedure should be performed by the government with participation of all interested parties to ensure broad national standards are being met and that codes and rules are being suitably followed and enforced. The Government, through the Contractors Registration Act, 1997 should ensure that all construction works for structures which has an input of structural design and those which are for public utility have to be carried by a registered contractor.

Non-structural Measures

Non-structural measures are particularly applicable to flood-prone areas that are not yet developed. As such, they are a complement to structural approaches in areas where additional development may occur, and they also represent an independent approach where some control over flood plain development can be exercised at low cost. Non-structural approaches includes:-.

Land-use planning - Land-use planning at the local or municipal level can be a useful tool in reducing future flood damages. Consideration should be given to ensuring that there are conforming uses in flood-prone areas as part of master plans.

Zoning of flood-prone lands - The best way to reduce future flood damages is to prevent development from occurring on flood-prone lands. Zoning of such lands is an effective approach, but generally should be coupled with the broader land-use planning mentioned above so that the land has a defined use.

Redevelopment of flood-prone areas - A major flood disaster is sometimes an opportunity to correct the planning errors of the past. Removal of flood-prone development and conversion of the land to a conforming use is an option to consider. It may be less expensive in the long run to physically relocate flood-prone development, buy it out as part of a disaster assistance program, or include its purchase in long term planning.

5.1.1.3 Emergency Preparedness and Response

The most critical element in the suite of activities associated with flood-loss reduction is emergency preparedness and response activity. The response to a natural disaster warning must be immediate, comprehensive, and demonstrate very clear lines of command. There must also be a mechanism in place to quickly draw upon external resources available at higher levels of government, or even internationally, when the local level of response will not be sufficient. The following measures are recommended for emergency prepared and response:-

Collaboration and coordination

Emergency planning and preparedness is first a local responsibility, but one that requires collaboration and coordination with others in a growing circle of like-minded and expert groups that can be drawn upon as events unfold. In particular, there must be strong and reliable communication linkages to storm warning and forecast centers so that the emergency response actions taken are appropriate to the magnitude of the probable event. The network of linkages from the local level upward must be established in advance and, more importantly, key players must periodically meet to exchange information and become comfortable working together. Information sharing should be bidirectional, both upward and downward, between the levels of government. Practice drills are important.

There must be clear lines of authority, even if the lead agency changes dependent on the magnitude of the event. The community and individuals must have a good understanding of what is expected of them. A good example would be evacuation. Information that defines evacuation routes, identifies emergency shelters, and specifies actions to be taken before leaving, such as removing mobile equipment and removing personal goods and furniture, must be available in advance.

Preparedness and response plans

Detailed response plans need to be prepared in advance and reviewed with all of the key agencies and players. There is no one "common" response plan as the linkages will be different in each case. The response to a toxic chemical spill is very different from the response to a major fire or flood. Not only must the plan be in writing and available to those that will be responding, but also it must be continually reviewed and updated. Some of the key pieces of information are: which agency and individuals have the specific responsibility;

whom to contact for expert advice; and where to go for information on backup communication systems. This information is constantly changing and needs to be verified periodically and tested in exercises. Multiple contact points need to be established as the emergency may occur on a weekend, holiday, or after regular business hours.

Mechanisms for coordination must be included in the plan, including the structure of response committees, where they will meet and sources of resource information available to them. Often this takes the form of something equivalent to a "war room" where maps, plans, other material and support staff are available immediately

Inventory of resources

A key component of any emergency preparedness plan is an inventory of resources that can be accessed. In the case of flooding this could include items such as emergency vehicles, buses and trucks, earthmoving equipment, pumps, plastic, plywood, emergency generators, supplies of gravel and sand, sandbags, and mobile communications equipment. The inventory should also include access to expertise such as surveyors, levee or slope stability experts, forecasting specialists, the media and community leaders. Emergency shelters should be designated in advance, their individual capacity defined and plans made for obtaining sufficient supplies of water, food, medicine and medical/social assistance. If local resources are not sufficient, then the availability circle must be expanded to include adjacent communities, the district, regional and national government levels.

Triggering emergency action

Advance warning is the key to effective response. It is possible to set up a series of warnings in advance of an actual extreme storm event that can be used as alerts. This could start with long-term climatologic forecasts or more immediate hurricane forecasts that identify potential danger. For specific basins an alert could be issued based on antecedent precipitation and rainfall intensity data in advance of an actual flood forecast. A more detailed forecast would then be issued when all of the data and information required to make a flood forecast became available. The response to an extreme flood forecast should be immediate, and with no uncertainty as to what actions and activities should be taken. The public expects governments to act quickly and in a professional manner under such circumstances. Community leaders should be visible, informed and active right from the start.

Training and response exercises

Emergency response teams need to be well trained in advance and their skills constantly upgraded. Once the disaster strikes, it is too late to train or try to find missing expertise. Trained staff should know their responsibilities, have immediate access to response plans and other critical information, and already have built a working relationship with colleagues in other organizations. The only meaningful way to test response plans is to carry out periodic emergency exercises. These exercises are meant to simulate real emergency situations and test all aspects of the plan. Costs are significant, but have real payback in an actual emergency. Often critical gaps are identified and appropriate backup strategies developed as part of the exercise.

Advance preparation

Assuming that there is advance warning of a major storm event, a number of steps can be taken to increase readiness. Such steps include: construction of temporary flood protection works; placing emergency response teams on high alert; distribution of critical materials such as stockpiled sandbags to targeted locations; and preparation of emergency shelters and hospitals prepared for occupation.

The population at risk can be informed of what is expected of them in the actuality of an extreme event. As the event becomes more certain, actions such as evacuation of people, goods and machinery can begin. Even if the event is not as extreme as predicted, these preparations help test emergency response plans and inform the public as to the nature of natural hazards. Media and public information sessions help set the stage as well. The media are key players in the link between public officials and the public. It helps if they are familiar with the terminology used in warnings and forecasts and know whom to contact for more detailed information during an actual flood event.

After the flood event

The emergency response does not end with the event, but continues through cleanup and resettlement stages. People will want to know what assistance will be made available, who is responsible, and how to go about seeking that assistance. The government should develop clearly defined response policies and program in advance. In the absence of such policies, the response is often ad hoc, politically and emotionally motivated, and sets precedents that are not wise in the longer run.

Often the response is incomplete in that the obvious and immediate requirements are addressed, but fundamental changes in thinking and sustainable strategies are ignored. After a major flood it is beneficial to conduct an assessment of the causes and effects of the flood and to make recommendations that would improve preparedness for the next event and reduce future flood losses. Such an assessment can also lead to improvements in flood plain management policies. The long-term economic and social implications of flooding become evident in the post-disaster period.

5.1.1.4 Emergency Management Team

- i. Prime Minister's Office – Disaster Management Division
- ii. Ministry of Agriculture, Food Security and Cooperatives
- iii. Ministry of Lands and Housing and Human Settlements
- iv. Ministry of Regional Administration and Local Government
- v. Tanzania Metrological Agents
- vi. Community and Private Sector
- vii. UN Agencies and NGOs
- viii. Ministry of Health and Social Welfare
- ix. Ministry of Defence and National Service

5.1.2 Drought

Drought is the most gradual and hard to predict. Once it has affected crop growth, farmers and producers enter a new territory of what ifs. What if it rains next week? What if it doesn't rain for a month? Alternative crops may have to be planted or crop loss assistance applied for. If feed supplies are low, herds may have to be culled and/or feeds purchased. For farmers who were already facing financial hardship, a drought can force major decisions about diversification, irrigation, surviving a major loss or even selling the farm.

Persistent droughts especially in the central and northern regions, have led to repeated seasons of food shortages. Over one million people were food insecure in Tanzania in 2011 following a severe drought that affected the Horn of Africa. Data from Tanzania's Ministry of Agriculture, Food Security and Cooperatives, estimated that a total of 56 administrative districts in 16 regions countrywide faced acute food scarcity. According to an assessment conducted by Tanzania Red Cross Society in 2011, seven districts in three regions were

confirmed to be severely affected by drought and food insecurity, and were in need of immediate food assistance. They included the districts of Simanjiro (Manyara region), Same, Mwanga and Rombo (Kilimanjaro region) and Longido, Ngorongoro and Monduli (Arusha region). The affected areas are among the poorest and most food insecure in Tanzania and are also characterized by remoteness.

The occurrence of drought has caused a number of problems such as pastoralists and agro - pastoralists' migration from northern Tanzania that has moved into southern regions in search of water and pasture. The movement of these groups has resulted to increasing conflict with the agricultural communities. As a result of drought, a large part of Tanzania's rural population has been facing food shortages. It was estimated that 3 million people were affected by this drought, hence suffering from food shortages. More than 400,000 metric tonnes of grain were needed to help these most affected regions in northern Tanzania to get through the next growing season

5.1.2.1 Drought Preparedness and response

Before Drought

Examine water use efficiency and irrigation needs - This is research-based program assists growers in determining frequency and amounts of irrigation (if any) throughout the growing season; it can be extremely helpful during a drought. If you do not currently irrigate, consult with your agricultural agent and irrigation system dealers now before a drought occurs.

Keep up-to-date forage inventories. Accurate forage inventories in silos, hay mows and other storage areas help you determine feed supplies during a drought. Note the amount and accessibility of each lot of uniform quality forage. Your local feed representative or agricultural agent can assist you with this process.

Consider alternative on-farm related businesses

Diversification can be a good long-term approach to revenue shortfalls from drought. Some potential businesses include:

- i. Alternative crops and livestock which can persist to drought
- ii. Afforestation programs
- iii. Encourage non-production farm-related ventures such as fee hunting/shooting preserves, small business such as food vending

- iv. Home-based enterprises including sewing projects, crafts, catering services, carpentry secretarial service/word processing.

During a Drought

- i. Carry out rapid vulnerability assessment to determine the number of affected people
- ii. *Provide financial and food assistance in the early phase of a drought* - The earlier you enrol in food assistance or financial assistance programs, the sooner you will be eligible for help.
- iii. *Adjust fertilizer rates*. If you haven't already applied fertilizers, adjust your rates based on lower yield expectancy for the drought year. If little or no production is expected, consider skipping an application.
- iv. *Timely water interventions* - such as rebuilding water points, and setting up water management system.
- v. *Consider alternative crops persistent to drought*
- vi. *Destocking – reduce the number of livestock through selling*
- vii. *Recognize the early warning signs of emotional stress.*

5.1.2.2 Emergency Management Team

- i. Prime Minister's Office – Disaster Management Division
- ii. Ministry of Agriculture, Food Security and Cooperatives
- iii. Ministry of Lands and Housing and Human Settlements
- iv. Ministry of Regional Administration and Local Government
- v. Tanzania Metrological Agents
- vi. Community and Private Sector
- vii. UN Agencies and NGOs
- viii. Ministry of Health and Social Welfare
- ix. Ministry of Defence and National Service

5.2 Hazardous Waste

Management of hazardous wastes is a big challenge in the country. A larger part of the hazardous wastes are produced from the petroleum industry, vegetable oil and soap, cigarette and tobacco, paints, drugs, pesticides, laundry and toilet detergents, leathers, textiles, auto tyres, dry cells and auto batteries, steel rolling mills, foams and glassware. Factors affecting the management of hazardous waste in Tanzania include low public awareness, old

technologies and inadequate infrastructure. There are also challenges in enforcing laws and regulations on chemicals and hazardous wastes

In Tanzania, various Policies, Legislation, Regulations, Guidelines and Procedures for chemicals management have been established. The key Legislation includes the Industrial and Consumer Chemicals (Management and Control) Act no. 3 of 2003 and the Environment Management Act no. 20 of 2004. The two Laws have provisions for Chemical Accidents Prevention and Preparedness, Environmental Impact Assessment, and Contingency Plans are precautions for safety in the use and handling of chemicals. On the other hand, the Safety and Health Act no.5 of 2003 has some provisions regarding the safety implementations.

Hazardous wastes are waste that, in sufficient quantities and concentrations, poses a threat to human life, human health, or the environment when improperly stored, transported, treated, or disposed. Hazardous wastes can be liquids, solids, or sludges. They can be by-products of manufacturing processes or discarded commercial products. To ensure that companies handle waste safely and responsibly, The National Environmental Act, 2004 provide for legal and institutional framework for sustainable management of an environment and particularly in Section 110 which prohibit the discharge of hazardous wastes, chemicals materials, oils, etc and sections 133-139 which emphasize on management of Hazardous Wastes.

5.2.1 Control Measures of Hazards Wastes

Where the risk of exposure to chemical is found not acceptable, suitable control measures must be implemented to minimize the exposure so as to safeguard the safety and health of the workers.

Basically, control measures can be applied at:

- i. The source where the hazards (chemicals) are located or emitted
- ii. Along the path, that is between the source and the receiver
- iii. At the receiver or exposed person

Table 3 lists some control measures that can be applied at the source, along the path or at the receiver to eliminate or attenuate the risk of exposure

Table 3: Hazards waste control measures

Point of Control	Control Measures
At the source	Substituting with a less toxic or less harmful substance Changing to less hazardous process Enclosing of source Isolation of source Wetting of dusty work Installing effective local exhaust ventilation Maintain the machines regularly
Along the path	Applying dilution ventilation Increase the distance between the source and receiver Practicing good housekeeping Improving general ventilation
At the receiver	Enclosing the workers in control room Rotation of workers Training and education of workers Wearing suitable personal protective equipment

Control measures can take the form of engineering measures, safe work practices, personal protection, administrative measures, training and education.

Engineering control

Substitution/Elimination

Toxic substance should as far as possible be substituted with less toxic or non-toxic substances. It is important to consider both the health and safety aspects when selecting a substitute. It may not be advisable to substitute a toxic but non-flammable solvent with a less toxic but flammable compound and vice versa

Changing of processes

Processes or operations that are capable of creating hazardous exposures sometimes can be replaced to reduce or eliminate the exposure hazards. The following are some of examples of control of chemical hazards by changing the of processes

- i. Replace splash filling with submerged filling

- ii. Replace sand blasting with shot blasting
- iii. Replace fixed roof storage with floating roof storage

Enclosure

An entire process or a portion of a process can sometimes be enclosed to prevent escape of contaminants into the work place. Very toxic chemicals should be handled in enclosed systems. Effective hazard control is accomplished if the enclosure is kept under negative pressure. The following are some of some examples of control of chemical hazards by enclosure.

- i. Using glove box or booth handling of radioactive or highly toxic materials
- ii. Using chamber for abrasive blasting
- iii. Using enclosures for mixing tank, spray cleaning, material conveying or transferring

Isolation/segregation

Hazardous or potentially hazardous processes or operations should as far as possible be isolated or segregated to minimize the number of exposed persons. Such processes should be operated using remote control devices. Some typical examples are the operation of manufacturing processes by a control system in petroleum refining, lead smelting, polymerization and distillation.

Local Exhaust Ventilation

Toxic dust, fumes, gases and vapours from a process or operation can be effectively controlled by means of local exhaust ventilation applied at the source of generation. An exhaust system consists of exhaust hoods connected by ducting to air cleaner and an exhaust fan. Proper design, installation and maintenance are essential for effective operation of the system are commonly applied in processes or operations such as dipping of parts in degreasing tanks, paint spraying, welding and grinding operations.

Wetting/Suppression

The wetting of dusty processes or work using water or other agents is one of the oldest methods of control and can be very effective if properly applied. This method may be used to reduce dust emission when wetted materials are handled and water does not interfere with the process. Some examples are as follows:-

- i. Wetting of asbestos before removal

- ii. Water spraying during granite or stone crushing
- iii. Wet mixing of cement

Housekeeping

Good housekeeping plays an important role in contaminant control. Toxic dust or other contaminants that fall and settle onto the floor or work surface may become airborne again by drafts or air currents and normal plant activity. Constant good housekeeping by vacuum cleaning or wet washing or other means is necessary to remove these contaminants.

Personal Protection Equipment

Personal Protection Equipment (PPE) such as respirators, gloves, etc, should be worn by personnel who could possibly be in direct contact with chemicals such as during maintenance or repair of machinery. Selection of PPE should be based on the type of chemicals used. Furthermore, users could seek advice on PPE suppliers of their proper selection, usage and maintenance.

Administrative Measures

Some of the administrative measures that can be developed to ensure safe work include:

- i. Posting of signs at prominent places to warn workers of areas where hazards are present and to indicate that personal protective equipment (PPE) are required
- ii. Banning of smoking in all production areas and restricting smoking to designated areas, away from flammable or combustible materials.
- iii. Prohibition of any taking of food and drinks in production areas where toxic chemicals are used or handled
- iv. Conduct frequent checks and inspection to ensure that workers , including contractors observe all safety and health rules and regulations
- v. Implement a permit to work system for all hazardous works
- vi. Isolating susceptible (e.g. pregnant women) or allergic personnel from exposure to certain chemicals
- vii. Shortening the duration of exposure to chemicals by rotation of workers
- viii. Restricting entry to high risk areas (e.g. places where radioactive materials are used, to small number of trained personnel.

Education and Training

Workers handling or exposed to hazardous chemicals should be continually advised and educated on the hazards through meetings, training sessions and courses. They should also be

advised on good personal hygiene like washing their hands before meals. Workers must be taught to use and maintain their personal protective equipment. Workers should also be trained and drilled in emergency response and spillage control.

5.2.2 Reporting a Chemical hazards

Notify the responsible authority by providing the following details

- i. Location of the chemicals hazards
- ii. Chemical(s) or product(s) involved
- iii. Approximate quantity
- iv. Injuries and/or property damage
- v. Status of the hazards (e.g. contained, continued, abating, increasing, etc.)
- vi. Any other information that can assist in identifying, containing, or responding to the hazards.

5.2.3 Emergency Response

In the event that an emergency employees may respond to small incidental chemical spills that occur during the course of a routine work task or project so long as the spill is not greater than one gallon and does not pose a threat to human health, safety, or the environment. If a chemical spill occurs and the product is unknown, uncontrollable, immediately hazardous to human health or the environment, evacuate and secure the area then contact the responsible authority immediately and report the chemicals spill or Hazardous chemical spills may only be managed by trained personnel.

Exposure: In the event that you are exposed to a chemical, immediately wash/flush the exposed area for 15 minutes with water. Emergency shower and eyewash stations are located in laboratories and areas where hazardous materials are used or stored. If an emergency shower or eyewash is unavailable use a restroom sink or shower.

Shelter-In-Place: In the event of a large hazardous chemical spill that occurs outdoors, it may be necessary to take refuge within a building to help protect against exposure to hazardous gases, vapours, or fumes. If you are instructed to shelter-in-place do the following:

- i. Do not leave the building.
- ii. Locate a designated shelter area within the building or move to an appropriate shelter area

- iii. Not possess any windows or skylights
- iv. Be equipped with a door
- v. Have ample space for everyone that is expected to occupy the shelter to sit comfortably
- vi. Attempt to block all vents and openings into the room with whatever materials are present in the room such as tape, plastic trash bags and clothing.
- vii. Remain sheltered in place until instructed to leave by emergency response personnel.

5.2.4 Chemical hazards clean up

- i. Contact the responsible authority prior to responding to chemical hazards for assistance if needed.
- ii. Wear appropriate PPE as recommended.
- iii. Check equipment and containers for leaks, damage, or holes. Place damaged or leaking containers in impervious secondary containment..
- iv. If the chemical hazard is increasing in size, use absorbent or impervious material to block the most likely path the spilled material(s) will take.
- v. Ensure that hazard cleanup equipment is compatible with the chemical(s).
- vi. Start from the outside perimeter of the chemical hazard and begin absorbing the product using absorbent pads, booms, rags, or other media.
- vii. Collect all contaminated absorbent materials, PPE, and tools and place them in an appropriate rigid sealable container or sturdy plastic bag.
- viii. Label the container holding the hazard materials with a label that has both the date and the name of the spilled material(s) and include the words "Hazardous Waste".
- ix. Contact the responsible authority to remove and dispose of the chemical spill debris. Do not dispose contaminated clean up materials in the municipal waste bins.

5.2.5 Environmental Emergency Team

- i. Prime Minister's Office – Disaster Management Division
- ii. Ministry of Agriculture, Food Security and Cooperatives
- iii. Ministry of Lands and Housing and Human Settlements
- iv. Ministry of Regional Administration and Local Government
- v. UN Agencies and NGOs

- vi. Ministry of Health and Social Welfare
- vii. Ministry of Defence and National Service

5.3 Communicable Disease Prevention and Response Guide

Communicable diseases still represent the major public health problems leading to high morbidity and mortality rates among the population, particularly among children under 5 years old. Natural disasters often faced by the country turn the population vulnerable to water borne and drought related disease outbreaks such as cholera, dysentery, and meningococcal meningitis. Sporadic outbreaks of communicable diseases have occurred in the country. . This guide is designed to promote the health and safety of people in different areas by providing information that can be used to prevent the contraction and spread of communicable diseases and the appropriate response to a communicable disease outbreak. Communicable diseases are typically caused by bacteria, viruses, fungi, or parasites and normally spread through direct or indirect human contact or through the consumption of contaminated food/water. Examples of communicable diseases include but not limited to:

- i. Cholera
- ii. Ebola
- iii. Influenza
- iv. Measles
- v. Meningococcal Meningitis
- vi. Mumps
- vii. Rubella Tuberculosis

5.3.1 Prevention

Vaccines, antibiotics, antivirals, innate immunity, and/or acquired immunity can provide some protection against certain communicable diseases. Not all communicable diseases are treatable, nor are current treatments guaranteed to protect against a communicable disease. In the state of an emergency, it is important to limit the spread of a communicable disease before it has the potential to cause serious illness/disease by taking the following steps:

- i. Wash your hands frequently.
- ii. Cover your mouth and nose when coughing or sneezing.
- iii. Routinely clean and disinfect surfaces.
- iv. Practice a healthy lifestyle; exercise, eat a balanced diet, and get sufficient sleep.

- v. Handle and prepare food safely: keep foods at correct temperature, cook foods (especially meats) thoroughly, wash produce, and observe expiration dates.
- vi. Follow universal precautions when working with blood borne pathogens.
- vii. Avoid public places, work, or school when sick to prevent the spread of a communicable disease.
- viii. Maintain appropriate immunizations and vaccinations based upon the region in which you live and work, and your exposure risk.

5.3.2 Identification of the Problem

Recognizing the signs and symptoms of a communicable disease and understanding the modes of transmission is the first step in reducing the incidence of disease associated with communicable diseases. Signs and symptoms will vary depending on the disease, but common characteristics associated at the onset of most communicable diseases typically include fever and other flu-like symptoms; achiness, upset stomach, fatigue, fever, and headaches. When travelling abroad, be aware of communicable disease threats; certain communicable diseases are endemic to certain regions of the world.

5.3.3 Emergency Response

It is important to have a plan in place within sectoral government, institution or department to respond to staffing and other business issues that may arise during a communicable disease emergency or whenever employees are unable to attend work due to illness. The plan should address. The following procedures should be followed whenever there is an outbreak of communicable disease emergency.

- i. Seek medical attention if necessary.
- ii. Inform the responsible authority of your condition or diagnosis and relay pertinent information provided by your health care provider. Stay at home when sick and avoid close contact with others to the extent possible. Do not return to work until advised to do so by a health care professional or in the absence of medical consultation, do not return to work for the duration of the illness.
- iii. Notify your supervisor; and record your time away from work as sick leave.
- iv. To limit the spread of a communicable disease, avoid travelling when sick, unless otherwise deemed appropriate by a health care professional.

- v. Use antibiotics and antiviral appropriately and exactly as prescribed – do not self-medicate or share medications with others.
- vi. Maintain awareness of the situation and the progression and nature of the communicable disease emergency by monitoring media outlets.
- vii. To limit the spread of a communicable disease, avoid travelling when sick, unless otherwise deemed appropriate by a health care professional.

5.3.4 Environmental Emergency Team

- i. Prime Minister’s Office – Disaster Management Division
- ii. Ministry of Health and Social Welfare
- iii. Ministry of Lands and Housing and Human Settlements
- iv. Ministry of Regional Administration and Local Government
- v. Community and Private Sector
- vi. UN Agencies and NGOs
- vii. Ministry of Defence and National Service

5.4 Fire and Wildfire Outbreak

Fire hazards include the unplanned and massive burning which may cause destruction of equipment, settlements, property and life. Among the many factors that cause fire hazards are haphazard electric wiring, poor construction standards, accidents, arson and uncontrolled burning of bush or waste materials bush burning. Fires are common in industries, congested human settlements, institutions of learning and markets places. The risk of fire hazards is likely to be higher with Tanzania’s increasing exploitation of oil, gas and petroleum resources which are highly inflammable. It calls for preparedness and management of fire hazards calls for intensification of sensitization and public awareness campaigns.

Wild fires are reported to be increasing at an alarming rate due to insufficient plans and programs to control fire, inadequate human and financial resources; insufficient extension programme for local communities and lack of or weak integration of informal (Indigenous) knowledge and policy implementation relating to forest fires management (URT, 2008). The long term impact of frequent fires may result in changes in productivity and population structure of a species (Zolho, 2005). Forest fires reduce plant biomass and litter, thereby altering the energy, nutrient and water fluxes between the soil, plants and atmosphere. These changes in turn may affect the long term nutrient status and productivity of the system and

consequently population structure of a species, the composition of communities and ultimately, the probability and characteristics of future fires. This guide provides information to help government and private institutions, industries; schools as well as individuals plan, prepare, and respond to a fire disaster.

5.4.1 Planning and Preparation

In order to plan and prepare for possible fire emergencies in work place and schools, the following planning and preparation measures should be done:

- i. **Participate in fire drills:** Whenever a fire alarm is activated, it is mandatory that all persons evacuate the building. Practicing evacuation procedures during drills and alarms is the best way to prepare for a real fire emergency.
- ii. **Identify primary and alternate exits from the building:** Exit route signs are posted in conspicuous locations throughout buildings that identify primary and alternate exit routes. All individuals should familiarize themselves with exit routes for the building(s) they occupy. .
- iii. **Learn to use a fire extinguisher** – There should be periodic training in the use of portable fire extinguishers.

5.4.2 Emergency Response

Immediately reporting a fire, suspected fire, or fire alarm is the most important action necessary to mitigate fire damage, prevent injury or death, warn others, and avoid property damage. If you discover or become aware of a fire in your building or work area, the following should be done

- i. Activate the building fire alarm using a manual pull station located near an exit door.
- ii. Contact from a cell phone and be prepared to give the exact location of the fire, including building address, building name, and cause of the fire.
- iii. If you are confident you can control the fire with a portable fire extinguisher and have been properly trained in the use of portable fire extinguishers, attempt to extinguish the fire if safety permits.
- iv. Never allow a fire to come between you and an exit. Assist individuals with disabilities and those who appear to need direction.
- v. Evacuate the building as quickly as possible, using the primary or alternate exit routes. Exit route signs should be posted in conspicuous locations throughout

buildings. Alternate exit routes have to be identified in case the primary evacuation route is obstructed by a hazard, is occupied by emergency response personnel, or cannot otherwise be used.

- vi. If you are unable to exit the building, trapped in an elevator, or mobility challenged, contact Fire and Rescue Force - Ministry of Home Affairs.
- vii. Proceed to the designated assembly area and verbally warn others to evacuate the building as you exit the building. Designated assembly areas should be identified in the *Emergency Evacuation Guide*.
- viii. If you are unable to exit the building due to fire, disability, or other hazard, notify a person that is exiting the building or notify police from a cell phone, shout for assistance, dropping an object to the ground from an exterior window, or hang a highly visible object from a window to get the attention of first responders.
- ix. Do not re-enter the building until told to do so by responsible authorities or the fire department.

Keep in mind these tips as you follow the steps listed above:

- i. Feel door handles with the back of your hand before opening a door(s).
- ii. If the door handle is hot, don't open it. Go to a phone or window and call for help.
- iii. If the handle is not hot, open it cautiously.
- iv. Check for smoke, heat or fire before going out.
- v. If smoke is present, stay as low as possible and crawl to an exit door. Keep one shoulder against the wall as exit the building to avoid becoming lost. Do not use elevators. Knock on closed doors as you leave and yell "FIRE!" on your way out.
- vi. Make note of the location of anyone who may have been unable or refused to evacuate.

Fire Drills

Emergency evacuation and fire drills are required for most buildings, depending upon occupancy and use, and must be conducted in accordance with the Fire and Rescue Act and regulations number 14 of 2007. All emergency evacuation drills are scheduled and conducted by Fire and Rescue Force.

5.4.3 Environmental Emergency Team

- i. Ministry of Home Affairs - Fire and Rescue Force
- ii. Prime Minister's Office – Disaster Management Division

- iii. Ministry of Transport
- iv. Civil Aviation Authority
- v. Ministry of Education and Vocational Training
- vi. Ministry of Regional Administration and Local Government
- vii. Ministry of Energy and Minerals
- viii. Ministry of Natural Resource and Tourism

5.5 Earthquake

Earthquakes result from sudden violent movements of the earth's surface, sometimes causing tremendous loss of lives and property. Available seismic information indicates that the Central Region of Tanzania is ranked as a seismically active region. The earthquakes in the region are of tectonic origin. The majority of the epicentre points cluster along NE-SW trend which is similar to the orientation of the Gregory Rift System.

Whereas the probability of occurrence of an earthquake can be determined by existing technology, its exact timing is not easy to ascertain. This makes it imperative to have adequate preparedness for disasters related to earthquakes. The vulnerability to earthquakes and seismic related hazards increases with the construction of storied structures. Earthquake events have also been reported in various parts of the country. For example, in December 2005, a strong earthquake was recorded by the French Observatory of Earth Sciences after it had struck Kigoma remote areas in Buhingu division which caused loss of life and destruction of properties. This guide is designed to help familiarize the community in general with procedures before, during, and after an earthquake.

5.5.1 Emergency Preparedness

Forecasting based on monitoring of seismic activity, and historical incidence and observation need to be carried out. Besides, risk reduction measures such as public awareness and training, reduction of structural vulnerability through construction of resistant shelters based on enforceable building codes, and earthquake warning and preparedness programs must be carried out. The following are best practices recommended guidelines to prepare for earthquakes.

- i. Create a family plan that identifies alternate meeting locations in the event that you or your family are unable to return home, emergency contact numbers, and supplies that may be needed during an emergency such as water, non-perishable food, and reserve medications.
- ii. Identify your Primary and Alternate Assembly Areas.
- iii. Store heavy or breakable objects in closed cabinets, as low as possible.
- iv. Secure refrigerators, book shelves, appliances, bookcases and other heavy items to prevent them from falling during an earthquake.
- v. Evaluate where hanging objects are placed. Mirrors, pictures or other hangings near seating or sleeping areas could fall and cause injury. Arrange these items so they do not pose a fall hazard to those below.

5.5.2 Emergence Response

If You Are Indoors: Remain indoors and seek protection until the earthquake subsides. Stay calm and take precautions to protect yourself from potential debris by:

- i. Drop to the floor and get under or adjacent to a sturdy table, desk, or permanent fixture.
- ii. Cover your head and neck with your arms and hands.
- iii. Hold on to the table or desk you are under as objects may shift during the earthquake.
- iv. If you are not near a sturdy table or desk, drop to the floor against an interior wall and cover your head and neck with your arms and hands.
- v. Stay away from windows, overhead fixtures, objects on walls, tall furniture, large appliances and cabinets filled with objects that may be displaced and fall during an earthquake.
- vi. If you are in an elevator you are afforded a reasonable amount of protection and should remain in place. Entrapment may occur; notify emergency response personnel by using the elevator phone, help button, or cell phone.
- vii. If you are in bed, remain in bed and cover your head with a pillow.

If You Are Outdoors:

Move away from buildings, overhangs, trees, and power lines to a clear area such as a large open public area or field. If you're driving, pull over and stop in an area that does not have any overhead hazards.

After the Earthquake:

Once the earthquake has stopped do the following:

- i. Exit the building when safety permits and move to the designated assembly area.
- ii. Use emergency exit route information available throughout buildings to determine the quickest route out of the building.
- iii. If the building loses power during the earthquake and you are unable to safely navigate your way out of the building due to low visibility, remain in place and notify fire and rescue department or any other responsible authority in your area
- iv. Move to the Designated Assembly Area and take account of your co-workers, students or peers; report missing persons to emergency response personnel and Police.
- v. Do not re-enter any building until it is cleared by the responsible authorities, Facilities Management, emergency response personnel,

The responsible authority will assess buildings for damages, chemical and physical hazards, and utility failures prior to authorizing re-occupancy of buildings. If you witness trapped or injured people, contact Fire and Rescue department or any other responsible authority. .

Consider the following after an earthquake:

- i. Remain aware of the potential for aftershocks to occur in the days or weeks following the initial earthquake. Aftershocks are typically less severe than the initial earthquake but can still result in significant damage.
- ii. Buildings, parking structures, and roadways may remain closed for a period of time following an earthquake while damage assessments and repairs are conducted.
- iii. Be aware that utilities such as gas, power, and water lines may be damaged; if you are aware of a gas leak, power outage, utility failure, or other building damages report the issue to responsible authorities.

5.5.3 Emergency Response Team

- i. Ministry of Energy and Minerals
- ii. Ministry of Lands, Housing and Human Settlement
- iii. Universities and Research institutions
- iv. Ministry of Works
- v. Ministry of Water
- vi. Ministry of Transport
- vii. Ministry of Education and Vocational Training
- viii. Ministry of Regional Administration and Local Government

- ix. Ministry of Agriculture, Food Security and Cooperatives
- x. Prime Minister's Office – Disaster Management Division
- xi. Community and Private Sector
- xii. Ministry of Defence and National Service
- xiii. Ministry of Home Affairs – Fire and Rescue Force

5.6 Terrorism

Terrorism is coordinated crime and brutal aggression against government establishments and communities. Tanzania is located in the heart of the Great Lakes Region which has been a centre of armed conflict and large scale terrorist attacks. The simultaneous attacks on the American Embassies in Dar-es-Salaam in 1998 are an illustration of Tanzania's vulnerability to terrorist attacks. Terrorism may involve devastating acts using weapons of mass destruction, including chemical agents, biological hazards, radiological agents, nuclear devices or explosives. The primary objective of a terrorist is to create widespread fear.

5.6.1 Emergency Response

During a terrorist attack:

- i. Stay calm
- ii. Be vigilant
- iii. Look out for secondary hazards such as falling debris or additional explosions
- iv. Follow the instructions of emergency service personnel.

Bomb Threat

If you have received a bomb threat by telephone, try to remain calm and get as much information as possible from the caller. Try to write down the caller's exact words and the time of the call. Check to see if the caller's phone number or location is displayed on your phone.

Ask the caller:

- i. When is the bomb going to explode?
- ii. Where is the bomb?
- iii. What does it look like?
- iv. What kind of bomb is it?
- v. What will cause it to explode?
- vi. Did you place the bomb?

- vii. Why?
- viii. What is your name and address?

Try to notice descriptive or other useful details (preferably write them down):

- i. Did the caller sound like a man? a woman?
- ii. Approximate age?
- iii. Distinctive voice, pronunciation or accent, or speech patterns?
- iv. Tone of voice and attitude?
- v. Did the call seem to be a recording?
- vi. Were there background voices or noises or other clues about location or caller identity?

If the threat came in a form other than a call (e.g., a note was left or delivered):

- i. Immediately notify nearby police station or local government leaders.
- ii. Report the time, location, and content of the threat message, as well as your location and phone number.
- iii. Take a quick visual look around your area for any suspicious objects. Do not touch or move any object

If you are told to evacuate the area, take your notes about the call with you

5.6.2 Emergency Response Team

- i. Ministry of Defence and National Service
- ii. Ministry of Home Affairs
- iii. Prime Minister's Office – Disaster Management Division
- iv. Ministry of Regional Administration and Local Government

5.7 Influx of Refugees

Complex environmental emergencies are those that occur in such situations of civil unrest, conflict and the breakdown of authority, where bombing, looting and attacks on strategic industrial installations become commonplace. Environmental emergencies also occur in the aftermath of conflict, for example, when there is an accident at munitions storage or decommissioning facility. In common with natural disasters, such as droughts and tsunamis, conflict can lead to the displacement of thousands of people, who then congregate in

displacement camps. Damage to the environment from pollution of soil and water and deforestation will follow, especially when people are confined in an unsuitable location with few natural resources to support them.

One of the biggest disasters in Tanzania history was the influx of refugees in Ngara district during the Rwanda genocide in 1994, where more than 250,000 people crossed the border to Tanzania from Rwanda overnight. The influx of that big number of refugees overnight created a big crisis of housing, water, sanitation, health and insecurity to refugees themselves and host communities. Schools and the surrounding community were seriously affected, that some of the schools in the area had to be closed, and buildings were damaged and used as accommodation for refugees. The impacts were exacerbated by poor capacity of the people to absorb, deflect or manage the actual disasters. The environmental and socio-economic problems associated with the influx of refugee calls preparation of environmental emergency guide in order to minimize its impacts.

5.7.1 Emergency Response and Maintenance Phases

5.7.1.1 Supplies and Logistics

During the emergency phase, refugees need immediate access to basic goods and services such as drinking water, food and shelter. If these essential elements are not provided in time, refugees, in order to survive, must look to the surrounding environment for their needs. This can quickly result in environmental deterioration.

Measures to reduce or eliminate environmental impacts

The following should be considered:

- i. adequate supplies of appropriate materials must be in place as soon as possible after the arrival of refugees to minimise environmental destruction: the supply of other, more environmentally friendly, items(e.g. foods requiring little cooking and fuel), should be promoted where appropriate reduce excess transport and maximise use of empty vehicles: shipments of supplies and use of transport facilities should be co-ordinated with other implementing agencies to minimise overall transport requirements;
- ii. reduce the load on the environment: reduce unnecessary packaging materials at source and/or use empty trucks to remove waste to a location where it can be recycled

and/or disposed of in a more permanent dump or landfill site; and promote environmentally friendlier (“green”) procurement.

5.7.1.2 Physical Planning of Refugee Camps

- i. The location and layout of refugee camps and settlements and the design of refugee shelter determine to a large extent the effect which environmental conditions may have on refugees’ well being. These aspects are also influential in determining the type and degree of impacts on the environment in and around refugee sites, caused both by the presence of refugees as well as the delivery of humanitarian aid services. Environmental considerations must be integrated as site selection – review of recommended sites by the host government;
- ii. site surveys – detail review of the selected site before a final selection is made; site planning – proper site planning with protection and environmental considerations taken into account;
- iii. site preparation – preventing the removal of ground vegetation cover to the extent possible, and conscious landscaping, including the design of internal roads and location of services; and
- iv. Shelter construction – the type(s) of material used in the design of shelter.

Environmental impacts related to site establishment and shelter construction

Refugee’s health and protection concerns will be affected by such environmental factors as a prevalence of endemic diseases, weather conditions, dust, drainage and soil conditions, water quantity and quality, and exposure to manmade or natural hazards such as polluted soils, hurricanes, radiation sources, earthquakes and volcanic activities. The possible proximity of refugee sites to national parks, forest reserves, and wildlife reserves, areas of cultural importance, open water courses and fragile ecological areas increases the risk of potential damage by overuse or unmanaged exploitation of natural resources. This damage includes deforestation, loss of biodiversity, rangeland degradation, erosion, siltation and the pollution of water resources. Overuse of, and/or damage to, natural resources may cause conflict with the local population.

The location of refugee sites on steep slopes can increase the risk of erosion, as will inappropriate design of camps or settlements. Likewise, inappropriate location of a camp site may increase the risk of floods, the need to construct new access roads, or may result in increase distances to be covered by transportation.

Inappropriate camp layout, shelter design and poor maintenance of camp infrastructures may lead to an increased risk of soil erosion, poor sanitary conditions, water pollution, fire hazards, and exposure to wind, dust and extreme temperatures.

Measures to reduce or eliminate environmental impacts

When selecting a site for a camp or settlement, factors which need to be considered include the physical carrying capacity of the site/region; the availability of natural resources and space; proximity to environmentally sensitive areas; topographical, drainage and soil conditions; vegetation cover; weather conditions; the existence of endemic diseases; the risk of manmade or natural hazards; and the potential risk of conflict with the local population. Utmost care should be taken to avoid the establishment of refugee sites in or near forest reserves, other protected or locally important areas, and national historic monuments. All of these factors should be determined through systematic site surveys.

The size of a camp/settlement should in principle be determined by the carrying capacity of a proposed site. In exceptional cases, as an environmental mitigating strategy, the number of refugees may exceed the carrying capacity as far as available forest products are concerned, in order to confine environmental damage to areas of lower environmental value. In these cases special measures will have to be taken to provide sufficient wood resources or alternative materials. The site plan should determine where and how to build or site different camp elements and where to take special environmental measures such as establishment of greenbelts, construction of drainage canals and terracing. A plan of action for community-based maintenance of camp infrastructure should be included in this plan.

5.7.2 Emergency Response Team

- i. Prime Minister's Office – Disaster Management Division
- ii. Ministry of Defence and National Service
- iii. Vice President's Office - NEMC
- iv. Ministry of Home Affairs
- v. Ministry of Regional Administration and Local Government
- vi. Tanzania Red Cross Society -
- vii. Development Partner's, NGO's and CBO's

5.8 Oil Spill and Gas Leak

An oil spill is the release of a liquid petroleum hydrocarbon into the environment, especially marine areas, due to human activity, and is a form of pollution. The term is usually applied to marine oil spills, where oil is released into the ocean or coastal waters, but spills may also occur on land. Oil spills may be due to releases of crude oil from tankers, offshore platforms, drilling rigs and wells, as well as spills of refined petroleum products (such as gasoline, diesel) and their by-products, heavier fuels used by large ships such as bunker fuel, or the spill of any oily refuse or waste oil. Spilt oil penetrates into the structure of the plumage of birds and the fur of mammals, reducing its insulating ability, and making them more vulnerable to temperature fluctuations and much less buoyant in the water.

The discovering of gas in Tanzania along the coast areas makes the area vulnerable to oil spills and gas leakages. The extraction of hydrocarbons as well as their downstream linked industries carries notable environment hazards and other risks. Currently, most of the hydrocarbon exploration activities in Tanzania are taking place offshore in the Indian Ocean and that is where large discoveries of natural gas have been made.

5.8.1 General Standards of Oil Spill Control Procedures

1. Get away. The first person to notice the spill or leak should get away from the immediate area of the spill in order to evaluate the situation without exposing him or herself. Obviously, this might not be needed if the nature of the spill is known and is minor.
2. Identify the spill to the extent possible. Do so without being at risk. This includes identifying: a) the type of material spilled (e.g., from the label); b) the size of the spill and whether the leak has stopped; c) whether two chemicals are involved in the leak and could react with each other; and d) any unusual features such as foaming, odor, fire, etc.
3. Is this an emergency? Leaks that can be cleaned up by personnel on the spot or by maintenance personnel are not emergencies. If this is not clear, consider it an emergency.

Table 4: Examples of spills and leaks that should be considered an emergency

Type of spill	Amount	Examples
Extremely flammable liquids	> 0.5 litre	Rubber Cement
Flammable liquids	> 1 litre	Toluene
Combustible liquids	> 1 litre	Mineral Spirits
Toxic, volatile liquids	> 1 litre	Ammonia
Concentrated acids	> 4 litres	Sulphuric Acid
Concentrated alkalis	> 4 litres	Lye Solution
Poisonous, reactive materials	any	Cyanides, Sulfides
Oxidizing agents	> 0.5kg	Conc. Nitric Acid,
Leaks from gas cylinders	uncontrolled	Oxygen, Acetylene

5.8.2 Emergency Response

The following measures should be taken

- i. Get help for all but very minor spills. In emergency situations, the amount of training determines the degree of participation in the cleanup.
- ii. Identify the material spilled. Is it flammable, combustible, toxic and volatile, toxic or corrosive and non-volatile, or an oxidizing agent? The label and Material Safety Data Sheet for the product should give information on safe cleanup.
- iii. Plan how to clean up the spill or leak. Procedures for common types of spills and leaks are discussed below.
- iv. Obtain the proper spill control materials. This would include spill control materials and pillows, leak patches, spark proof tools, etc.
- v. Put on appropriate personal protective equipment. This can include respirators, gloves, goggles, etc., as needed.
- vi. Stop the source of the spill or leak. This can include turning off the valve of a leaking gas cylinder, patching a leaky hose, or up righting a knocked over container of liquid.
- vii. Stop the spill from spreading. This can include use of appropriate spill control pillows or other spill control materials for spilled liquids to build a dike, shutting down ventilation systems to keep gases and vapours from spreading, and plugging drains to prevent contamination of the water supply.
- viii. Flammable liquids in the sewer system, for example, can be an extreme explosion hazard. Allowing hazardous chemicals to enter the sewer system may also be a

violation of the Environmental Management (Hazardous Waste Control) regulation, 2009.

- ix. Clean up the spill using the appropriate adsorbing materials and equipment. In general, paper towels or rags should not be used for liquids that evaporate quickly since they will not prevent further evaporation. For very small spills, you can use paper towels if they are immediately placed in a proper oily waste can.
- x. Dispose of contaminated materials properly. Contaminated spill control materials and disposable personal protective clothing must be disposed of as hazardous waste. Contaminated tools and non-disposable personal protective equipment should be safely decontaminated.
- xi. File an incident report. The incident report should be filed with the health and safety program director for every spill, including non-emergency spills, detailing the nature of the spill, how it occurred, how it was cleaned up, any problems, and recommendations for preventing further spills of the type.

5.8.3 Specific Recommendations for Spills Management

The following section gives the hazards and specific recommendations for cleaning up a variety of common spills and leaks that could occur in any working place. When a spill is large enough for cleanup to be considered an emergency response, then the Emergency Response Plan should be followed. The recommendations below should be incorporated into the emergency response procedures.

Flammable Liquid Spills

Spills of flammable liquids are among the most dangerous types of spills because they are potentially hazardous to health as well as a fire hazard at room temperature and below. A spill of a flammable liquid will spread out and evaporate very quickly to reach high vapor concentrations. The lower explosive limit (LEL), the lowest concentration of the flammable vapor in air which can burn, can be achieved very easily, and then all it takes is a spark, flame or other source of ignition to cause a fire or explosion. Spills of more than a one pint of an extremely flammable liquid or one quart of a flammable liquid should be considered emergency response situations. The following are procedures to be followed for flammable liquid spills:

- i. Immediately shut off any flames. For large, emergency spills, shut off power to any electrical equipment, lights, etc. in the spill area using a control outside the spill area (e.g. fuse box) to prevent sparks setting off a fire or explosion.
- ii. Open the windows and turn on any explosion-proof fans exhausting to the outside (they should be on separate circuits from the rest of the room). Air conditioning and ventilation systems should be turned off to prevent vapors from spreading throughout the building.
- iii. Evacuate the area as a precaution because of the fire risk. In emergency response situations, trained emergency personnel would determine the degree of evacuation needed, unless the college has an immediate evacuation plan.
- iv. Wear gloves, goggles and air-purifying respirators for small spills (although minor spills might not require a respirator). Cleaning up large spills or unknown spills requires positive- pressure self-contained breathing apparatus (SCBA) because of high vapor concentrations that could be present. Other protective clothing and equipment that might be needed for large spills include goggles and face shield, impermeable clothing, and boots.
- v. Control the spread of large spills by diking with spill control pillows or similar materials. Make sure the flammable liquid does not enter drains.
- vi. Use appropriate spill control materials to clean up the spill. Dry clay or vermiculite will work if proper spill control materials are not available. Paper towels should not be used for more than tiny amounts of volatile liquids because the paper will aid evaporation.
- vii. Pick up contaminated spill control materials using spark proof tools (e.g. plastic, aluminum), and place in garbage bags.

Combustible Liquid Spills

Combustible liquids are not a fire hazard at normal room temperature since their flash point is above 38°C. In general, handle combustible liquid spills (e.g. mineral spirits) as a volatile liquid spill. However, if a spilled combustible liquid contacts hot surfaces, then heating of the liquid could result in a fire hazard and the spill should be handled as a flammable liquid spill.

Volatile Liquid Spills

Inhalation of vapors and possible skin absorption of the liquid are the major hazards associated with volatile liquid spills such as trichloroethane, methylene chloride, acetic acid and combustible liquids. Spills of solutions of gases dissolved in water such as ammonia, and bleach are also discussed here. Flammable liquids are treated separately. Spills of more than one quart should be considered emergency response situations. The following are procedures for cleaning up spills of volatile liquids:

- i. Open windows and turn on any fans exhausting to the outside. Ventilation systems should be turned off to prevent vapors from spreading throughout the building.
- ii. Evacuate the immediate area as a precaution because of the health risk. In emergency response situations, trained emergency personnel would determine the degree of evacuation needed, unless the college has an immediate evacuation plan.
- iii. Wear gloves, goggles and air-purifying respirators for small spills (although minor spills might not require a respirator).
- iv. Control the spread of large spills by diking with spill control pillows or similar materials.
- v. Use appropriate spill control materials to clean up the spill. Dry clay or vermiculite will also work if proper spill control materials are not available. Paper towels should not be used for more than tiny amounts of volatile liquids because the paper will aid evaporation.
- vi. Pick up contaminated spill control materials and place in approved waste disposal containers. This material must be treated as hazardous waste under EPA regulations. Flush affected area with water afterwards.

Acid and Alkali Spills

With acids and alkaline solutions, the concern is mostly skin contact due to the corrosive properties of concentrated acids and alkalis, and irritation from dilute solutions. Note that many concentrated acids react violently with water. Spills of more than a gallon of concentrated acids or alkalis should be considered an emergency response situation. All concentrated hydrofluoric acid spills should be considered an emergency and need special procedures. The following are recommended procedures:

- i. Do not touch spilled material.

- ii. Wear protective clothing, gloves, goggles, and boots in order to avoid skin contact. For concentrated acids and alkalis, a face shield is needed in addition to goggles. For volatile concentrated acids, SCBA may be needed.
- iii. Control the spread of large spills of concentrated acids by diking with spill control pillows or similar materials for later disposal as hazardous waste.
- iv. Small acid spills can be neutralized with sodium bicarbonate or sodium carbonate and alkali spills with sodium bisulfate or citric acid. Commercial adsorbent spill control materials can also be used.
- v. Neutralized acids and alkalis can then be mopped up, wringing out the mop in the sink or a pail with a wringer.

Cyanide and Sulphide Spills

Reactive materials such as cyanide and sulphide powders and solutions are potentially very hazardous because of the risk of producing extremely toxic hydrogen cyanide and hydrogen sulphide gases, especially if the spill also involves acids. Cyanide solutions may also be absorbed through the skin. All spills of cyanide, sulphide and other reactive materials should be considered emergency response situations. The following are recommended procedures:

- i. Do not touch spilled material.
- ii. Wear protective apron, goggles, gloves, and positive-pressure SCBA. For small powder spills, air-purifying respirators with a HEPA filter would suffice.
- iii. Scoop up powder with clean shovel or other tool, and place in a dry, container approved by the Department of Transportation.
- iv. Adsorb liquid spills with spill control materials. Do not allow spill to enter drains or sewer system.
- v. Flush spill area with water.
- vi. Dispose of as reactive hazardous waste.

Oxidizing Agent Spills

Oxidizers such as dichromates, nitrates, chlorates, concentrated hydrogen peroxide, and concentrated nitric acid are strong oxidizing agents which can ignite solvents and other combustible materials. They are also skin and respiratory irritants and may have other health hazards. The following are general procedures for

Oxidizer spills:

- i. Do not touch the spilled material. Keep away from combustible materials (wood, paper towels, oil, etc.)
- ii. Wear appropriate protective equipment (e.g. apron, goggles, gloves, respirators, etc.) For small powder spills, air- purifying respirators with a HEPA filter would suffice; for larger spills, SCBA is required.
- iii. Scoop up powder with clean shovel or other non-combustible tool, and place in a dry special container
- iv. Adsorb liquid spills with spill control materials. Do not allow spill to enter drains or sewer system.
- v. Flush spill area with water.
- vi. Dispose of the adsorbed material as flammable hazardous waste.

Organic Peroxide Spills

Methyl ethyl ketone peroxide and benzoyl peroxide are hardeners used with various plastics resins and can be ignited by sparks, flames and heat. They are normally dissolved in solvents to make them less reactive. Spills of organic peroxides should be handled as flammable liquid spills.

Water-Based Paint Spills

Latex paints and other water-based paints are not an inhalation hazard even though they may contain small amounts of organic solvents. Even large spills of water-based paints are not considered emergency response situations. The following are basic procedures for clean-up:

- i. Gloves and goggles should be worn for cleanup.
- ii. Wet mopping is the best method of cleanup.
- iii. The diluted paint can be flushed down the sewer if it does not contain lead, chromates, cadmium, or other toxic metals. If toxic metals are present, dispose of as hazardous waste.

Compressed Gas Cylinders

Leaking gas cylinders can be an emergency if the cylinder gas is oxygen (an oxidizer), a flammable gas such as acetylene or propane, or a toxic gas such as ammonia, and if the leak cannot be turned off by closing the cylinder valve. In this case, follow prescribed emergency response procedure. The following are recommended procedures:

- i. If a leak is suspected, test with nonfat (detergent) soap or other leak detection solution. Do not use a flame.

- ii. If the leak cannot be stopped by turning off the cylinder valve, take the leaking cylinder outside well away from sources of ignition if the gas is oxygen or is flammable. (If the gas is toxic, wearing positive-pressure self-contained breathing apparatus (SCBA))
- iii. Try and temporarily stop the leak through the cylinder valve by attaching a regulator which is closed.
- iv. Reopen the cylinder valve slightly to allow gas to escape slowly.
- v. Clearly tag and secure the cylinder. Post a sign warning people not to approach within 20 feet with cigarettes or other sources of ignition. If necessary, post a security guard.
- vi. Contact the supplier or manufacturer, and follow their further instructions.

What should be done IF gas is detected inside a building or other sheltered and poorly ventilated space?

- i. turn off gas supply - if safe to do so
- ii. evacuate to a well ventilated area
- iii. If, evacuation of the whole building is considered necessary, activate a 'Break Glass' Alarm
- iv. Report the incident to your local security service

5.8.4 Emergency Response Team

- i. Prime Minister's Office – Disaster Management Division
- ii. Ministry of Energy and Minerals
- iii. Ministry of Home Affairs - Fire and Rescue Force
- iv. Ministry of Regional Administration and Local Government
- v. UN Agencies and NGOs
- vi. Ministry of Health and Social Welfare
- vii. Ministry of Defence and National Service

5.9 Pests Infestation

These are unwanted and destructive insects or any animals that attack food or livestock both during the growing and post harvest seasons. Pest numbers increase due to one or a combination of ecological factors including among others, temperature, monoculture,

introduction of new pest species, weak genetic resistance, poor pesticide management, bad weather patterns, and migration. Pests lead to damage of plants and harvested crops, consequently leading to food shortages, famine and economic stress. Common pests in Uganda include weevils, locusts and caterpillar while diseases include coffee wilt, banana wilt and cassava mosaic. Risk can be reduced through pest monitoring and using an integrated pest management approach.

5.9.1 Emergency Response

Preparedness involve early warning which provide timely and effective information through identified institutions, so that vulnerable communities can take action to avoid or reduce their risk, and prepare for effective response. There is an urgent need to transmit scientific knowledge on hazards to support early warning and preparedness. The challenge is how to provide relevant education at different levels (communities, schools, tertiary institutions) to facilitate mitigation of hazards

Farmers are strongly advised to do the following to reduce potential damage to crops and the environment:

- i. Weeding for clean bunds and fields Regular surveillance. The earlier the presence of rodents is observed, the cheaper and simpler any subsequent action will be and losses will remain negligible.
- ii. Sanitation. It is much easier to notice the presence of rodents if the store is clean and tidy.
- iii. Proofing i.e. making the store rat-proof in order to discourage rodents from entering
- iv. Trapping. Place the traps in strategic positions
- v. Use recommended rodenticide. However, bait poisons should be used only if rats are present. In stores or buildings, use single-dose anticoagulant poisons, preferably as ready-made baits.
- vi. Encourage team approach for effectiveness. The larger the area managed or controlled with poison, the more effective the impact
- vii. Predation. Keep cats in stores and homesteads.

Depending on the type of pest infestations and crops, the following action should be taken

- i. Use persistent varieties if available
- ii. Biological control

- iii. Apply recommended selective insecticides if absolutely necessary
- iv. Apply botanical extracts
- v. Bush clearing
- vi. Early weeding and field sanitation
- vii. Early harvesting
- viii. Monitoring and management of outbreak flocks
- ix. Bird trapping
- x. Farmers to scout potential breeding sites and destroy nests
- xi. Monitoring and organise aerial spray
- xii. Spot spraying, targeting roosting sites
- xiii. Field sanitation including burning of crop residues and removal of volunteer plants
- xiv. Destruction of eggs in the seedbeds
- xv. Destruction of stubble after harvest

5.9.2 Emergency Response Team

- i. Ministry of Agriculture, Food Security and Cooperatives
- ii. Ministry of Health and Social Welfare
- iii. Ministry of Regional Administration and Local Government
- iv. Ministry of Water
- v. Prime Minister's Office – Department of Disaster Management
- vi. Research Institutions
- vii. Development partners, Red Cross, and NGOs

5.10. Alien and invasive species management

These are species – of non-native plants or animals, pathogens, or other organisms – that, on being introduced into environments to which they do not naturally belong, are able to become so well established as to transform and dominate the ecology of their adoptive homes. By suppressing or displacing resident species, or by subverting or disrupting the functional integrity and service delivery of colonised ecosystems, invasive alien species, once

established, are able to spread rapidly, impoverishing biodiversity and undermining human welfare.

The invasive aliens tend to be hardy generalists – versatile species, that is, which can adapt to a broad range of physical conditions, while being able to exploit a variety of foods and nutrients. On being deposited in a new environment, such aliens prosper in the absence of constraints – imposed by climate, predators, or rival species, or by parasites or disease – that in a home environment would keep their relative abundance in check. Invasive species are usually highly opportunistic too in being able to occupy vacant niches, or to capitalise on weaknesses resulting from conditions of ecological stress or disturbance induced by human activities.

Some of the areas where Invasive Alien Species has been experienced include the world-famous Serengeti–Masai Mara ecosystem of northern Tanzania where the noxious weed *Parthenium hysterophorus* and *Chromolaena odorata* has already gained a foothold. Both are unpalatable species that, once established, go on to replace nutritious native savannah grasses and herbs. So their proliferation – if this cannot be checked – poses a serious threat to the survival of some of the world’s most iconic populations of wild grazing herbivores. Also, emergency of water hyacinth (*Eichhornia crassipes*) in Lake Victoria has been a major problem.

Among the major impacts associated with the IAS in the country include loss of biodiversity, by impoverishing natural ecosystems, disrupting the animal food chain and subverting the delivery of essential ecosystem goods and services. Invasive Alien Species distort the evolutionary process, modifying the behavior of pollinators, nutrient recyclers, seed dispersers and other ecosystem service-providers, destroying the niches of specialised native species of plants and animals, undermining mutualisms, and – in extreme instances – triggering the collapse of whole ecosystems. Alien Invasive Species can also reduce water flows and lowering water-tables by draining on the diminishing water reserves on which people depend for their survival and for the cultivation of their food-crops and reducing agricultural crop yields, infestations of invasive alien plant species are a cause of food scarcity and economic hardship in many regions. They can also destroy grazing pastures by displacing nutritious indigenous grasses and herbs and lead to disruption of fisheries and despoilers of wildlife conservation areas through blocking light penetration and depleting levels of dissolved oxygen.

5.10.1 Emergency response

Eradication – This entails the systematic elimination over time of every individual plant of the invading species, until it can be ascertained that no new plants, and no viable seeds or other propagules (including roots, shoots, suckers, or other detached parts which, depending on the species, may be capable of developing into new plants) either, remain in an area.

Containment - A containment response – designed to restrict an invading species to a particular zone – is an essential first step towards eventual eradication. Again, containment is usually possible only where the presence of an invader is detected early.

Control - Where invasive alien species have already spread over very large areas, eradication and containment are seldom feasible as management options. Control, in conjunction with restorative habitat management, may then be the only realistic recourse. The aim of a control program is to reduce the abundance and density of infestations, and to keep harmful impacts of an invasion down, as far as possible, to within manageable limits. The effective control of widespread infestations usually calls for an integrated approach combining manual, mechanical, chemical and biological methods.

- **Manual and mechanical control** methods involve the removal – by hand, or with tools, implements, or machines – of an infestation’s individual invaders. Controlling alien plant invasions manually may include hand-pulling, uprooting, hoeing, felling or cutting back. Mechanical interventions using bulldozers or tractor-drawn ploughs or other machines to clear extensive weed infestations have the obvious drawback of being indiscriminate and of razing non target plant species as well, while at the same time creating conditions that may be ripe for re-invasion.

Chemical control methods, involving the judicious use of approved herbicides, can improve the efficacy of manual and mechanical clearing activities. Applying systemic herbicides to cut tree-stumps or to incisions made in the bark of trees or shrubs (in a procedure known as frilling) will, on spreading through the vascular tissue of treated invaders, eventually kill the targeted trees or shrubs. Basal stem applications and stem injections have the same effect. These applications are very target specific with no discernable non target impacts.

- **Biological control** (biocontrol) - This involves the deliberate, closely-monitored introduction of one or more species of highly specialized alien organisms that hail from the original home range of the invading plant species, and which physiologically are adapted to feeding exclusively on or attacking exclusively plants of that species.

- **Restorative habitat management**

No response to an alien plant invasion – whether the response is one of eradication, containment, or control – is complete without follow-up rehabilitative actions. Stands of an invasive species that are removed or killed need to be replaced with plantings of non-invasive or benign species (and preferably with a variety of native species) that will help restore the natural integrity and productivity of the whole ecosystem, while strengthening the land’s ability to resist re-invasion – by the same or by other species of invasive alien plants.

5.10.2 Emergency Management Team

- i. Ministry of Agriculture, Food Security and Cooperatives
- ii. Prime Minister’s Office - Department of Disaster Management
- iii. Ministry of Regional Administration and Local Government
- iv. Ministry of Energy and Minerals
- v. Ministry of Transport
- vi. Ministry of Water
- vii. Universities and Research Institutions
- viii. Development partners and NGOs

5.11 Vehicular Accidents

An accident is an unexpected, unplanned event in a sequence of events that occurs through a combination of causes and that result in physical harm (injury or fatality) to an individual, damage to property, a near miss, a loss, or a combination of these effects. Vehicles are being used for transporting heavy equipment for mining and industrial activities as well as heavy loads of waste materials and hazardous materials. Vehicular accidents, aside from endangering people, can lead to environmental effects due to spills from loads and/or fuel.

5.11.1 Emergency response

Procedures for handling vehicular accidents are addressed in the Road Traffic Act, 2002. However, for the purpose of this guideline, in the event of vehicular accident, the following should be taken into account

- i. Determine if there are any hazards before approaching the incident, or wait until the hazard can be mitigated
- ii. Notify the incident to responsible authorities such as SUMATRA, police – Fire and Rescue Force
- iii. If necessary and if qualified to do so, area personnel or witness should provide first aid care
- iv. Do not move the victims, except to prevent further injury – instead assess the state of the injured personnel
- v. Ensure the safety of all personnel at the scene, until the designated personnel arrives to take control of the situation.
- vi. Unless absolutely necessary, do not move the vehicle until preliminary facts of the investigation have been established
- vii. If there is a possibility of a spill oil/fuel/chemicals, report to the responsible authority such as local leaders
- viii. Ensure the area is secure

Documentation

- i. Record the names and addresses of all persons involved (including those who insist on leaving the area), rescuers, those removed for medical attention, and ambulance personnel.
- ii. Make detailed records of the incident.
- iii. Remain calm.

5.11.2 Environmental Emergency Team

- i. Prime Minister's Office – Disaster Management Division
- ii. Vice President's Office – NEMC
- iii. Ministry of Defence and National Service
- iv. Ministry of Home Affairs – Fire and Rescue Force
- v. Ministry of Transport

- vi. Ministry of Regional Administration and Local Government
- vii. Tanzania Port Authority
- viii. SUMATRA
- ix. Tanzania Red Cross Society
- x. Development Partner's, NGO's and CBO's

5.12 Marine Accidents

Seas, oceans, Lakes and rivers have been an important means of transport in Tanzania. However, due to times of high tide, human errors or factors beyond man's control, these waters have been a major cause of loss of lives and property and turn into graveyards. Despite great advances in seafaring technology and improved safety measures, the seas, Oceans, Lakes and Rivers can be quite dangerous places to be in and ferry accidents, often with tragically fatal consequences. Recent examples of marine accidents include the *MV Spice Islander* which sank in September of 2011, and the sinking of *MV Skagit* in July 2012. The Merchant Shipping Act (CAP 165), 2012 have outlined measures to be taken in a situation of emergencies related to oil pollution, however, for the purpose of this guideline the measures outlined should be applied to other marine related accidents.

5.12.1 Environmental Emergency Response

In a situation of marine accidents, the following action should be undertaken:-

A. Notification of Emergency

Immediately commence a personal log noting the time and date of any actions or conversations in order as listed below:

- i. Name of the vessel, person calling.
- ii. Call sign.
- iii. Exact Location – if a vessel, the latitude and longitude or bearing/direction and distance from a well known point.
- iv. Clear details of the incident and type of emergency.
- v. Type of assistance requested.
- vi. When all the relevant information has been received request the caller to standby and **immediately** contact the Harbour/Port or SUMATRA authorities.

B. Logging Marine Incident Information

Where possible the following information should be logged throughout any emergency operation and will assist in emergency management decision making and any subsequent inquiry:

- i. Time and date of each occurrence
- ii. Name, address, and telephone number or contact point of person reporting
- iii. Distressed vessel (name/type/call sign/registration) or identification
- iv. Position of emergency (latitude/longitude or bearing/distance) from a known point or the last reported position and the next reporting position)
- v. Nature of emergency (fire, collision, person overboard, disabled, overdue, crash, oil and spill accident, etc.)
- vi. Date/time of emergency occurrence
- vii. Date/time of notification
- viii. Details of persons on board, persons involved including number of people involved, ages, state of health, injuries, intentions
- ix. Date, time, departure point, planned route, speed and destination
- x. radio frequencies currently in use, monitored or scheduled
- xi. Emergency radio equipment and frequencies or flares
- xii. Actual weather/sea conditions
- xiii. Local action being taken or assistance required
- xiv. Owner/agent of distressed vessel and contact method
- xv. Navigation capabilities
- xvi. Survival equipment including quantity of food/water and signalling devices
- xvii. Other information sources, e.g. friends, relatives and associates,
- xviii. Mobile phone numbers of any person involved.

C. Person Overboard Incident Information

- i. Name and call sign of ship with man overboard
- ii. Position, course and speed of the ship
- iii. Date, time and position when the person went overboard
- iv. If time of person overboard unknown, when last seen

- v. Weather conditions (include water temperature if known)
- vi. Person's name, age and gender
- vii. Person's height and weight to determine survivability
- viii. Person's physical/mental condition and swimming ability
- ix. Person's clothing (amount and colour) height of fall from ship to water
- x. Lifejacket (worn, missing)
- xi. Has the ship been completely searched
- xii. Will the ship search for the person overboard and, if so, for how long
- xiii. Radio frequencies in use, monitored or scheduled
- xiv. Whether urgency broadcast is requested
- xv. Assistance desired
- xvi. Assistance being received
- xvii. Initial reporter (parent agency, radio station, name/call sign of ship);
- xviii. Other pertinent information.

5.12.2 Environmental Emergency Team

- i. Prime Minister's Office – Disaster Management Division
- ii. Vice President's Office – NEMC
- iii. Ministry of Defence and National Service
- iv. Ministry of Home Affairs – Fire and Rescue Force
- v. Ministry of Transport
- vi. Ministry of Regional Administration and Local Government
- vii. Tanzania Port Authority
- viii. SUMATRA
- ix. Tanzania Red Cross Society
- x. Development Partner's, NGO's and CBO's

6.0 Appendix

Appendix I: The stakeholders consulted and their views are summarized in the following matrix.

S/No	Name of Organisation	Issues and concerns raised
1	Director of Environment	<p>Current coordination uses the EMA Act (2004), there are no particular framework guidelines and the existing operations are ad hoc. We now need framework guidelines to coordinate preparation of sector guidelines.</p> <p>New guidelines would be faced with similar challenges affecting operationalization of EMA and associated SEA and EIA guidelines unless funds are forthcoming to deal with current understaffing, shortage of resources including qualified staff.</p> <p>VPO would like the Institutional Framework for new guidelines to follow EMA framework, but each sector adopting them to suit their environment.</p> <p>Guidelines should designate/map similar risk environments (e.g. drought, flood, landslide-prone areas and prepare their land use plans.</p> <p>For these initiatives to work effectively political will is of the essence.</p>
2	Assistant Director - Ministry of Industries and Trade	<p>The Ministry has no policy or guidelines on environmental emergencies and have very few practical experiences on dealing with emergencies (e.g. with Sunflag Industry and Tanga fertilizer Plant in the 1990s.</p> <p>We only deal with monitoring industrial performance and compliance but not the actual emergencies as these are left to relevant institutions like the Fire Unit and NEMC.</p> <p>Our current working relations with VPO through the Sector Environmental Units is not effective because the Units do not get adequate funds for operations, they do not have their own budgets, and within the Ministry environmental issues are not a priority – hence business as usual!</p> <p>We would support the institutional framework as per EMA Act (2004) although this framework as long as it is tested and current challenges are addressed e.g. the Environmental Units must receive direct government budget (as sectoral departments) or getting their funds directly from VPO, especially considering the BIG RESULTS NOW!</p>

		Any new/recommended institutional framework must be tested before it is approved for use
3	Ministry of Energy and Minerals.	<p>The MEM has guidelines for mining activities and biofuel development. These guidelines are not linked to the VPO whatsoever.</p> <p>However, the MEM links with VPO for EIAs review under the TAC.</p> <p>The Ministry also has Environmental Action Plan (2011-2016). The plan identifies the gap in the environmental management within the MEM and provides guidelines to address them. The major environmental emergencies identified by the Ministry include environmental degradation, deforestation, water pollution, air pollution, land degradation, noise and vibration impacts, Uranium exploration, drought and flooding.</p> <p>The Ministry has environmental Unit with its own budget though inadequate.</p>
4	MAFC- Environmental Management	<p>MAFC do not have any environmental emergency guidelines except that of EIAs.</p> <p>They provide education on agro-chemicals use and other destructive chemicals.</p> <p>They also participate in inspecting imported agricultural commodities.</p>
5	Director, Wildlife Department, MNRT	<p>Currently, there are no guidelines in place.</p> <p>When confronted with wildlife pests and diseases they contact TWIRI who assess the situation before taking action. TWIRI has in place an Emergence Preparedness Plan for wildlife diseases</p> <p>In cases of wild fires they simply mobilize teams to deal with the fires. However, the Tanzania Forestry Services have in place a satellite surveillance system nationwide to detect wild fires and inform respective institutions in case of fires. Also, every year we establish fire breaks to prevent fires entering protected areas.</p> <p>In the case of droughts, there are no preparedness plans. They let nature take its course although this can cost our wildlife, hence the need to start thinking of measures for dealing with droughts and water shortages</p> <p>Their current links with the VPO is through the Wildlife</p>

		<p>Management Act whereby they manage wetlands and Ramsar Sites on behalf of VPO and through the implementation of EMA and EIA in particular.</p> <p>Regarding the Institutional Framework, they recommend the VPO-system through EMA, but there is need to address the existing challenges regarding the chain of command and resource availability.</p> <p>Regarding dealing with drought they see the need to research on the possibility of establishing water dams and reservoirs to conserve water for wildlife for use in the dry season/droughts.</p>
6	-Quantity surveyor -Head of Building Works Department National Construction Council	<p>The council has no guideline related to environmental emergencies</p> <p>There are no clear monitoring mechanisms during construction of buildings to ensure that the specification and material used in construction are implemented properly.</p> <p>Client interruptions – to reduce cost of construction or change the original design while the construction have already started</p> <p>Most of Environmental and Social Impact Assessment are not affective to address some challenges related to environmental emergencies such floods</p> <p>Recommendations made by the council in relation to collapse of building are implemented and the council has legal authority to follow up the implementation</p> <p>Suggestions</p> <p>Engineers to ensure the use of recommended construction materials.</p> <p>City, Municipal and District council’s regulations on construction should be observed.</p> <p>Ethics for construction be adhered to the contractors’ Registration Board</p> <p>NEMC – Proper ESIA must be done in all construction projects</p> <p>Monitoring during project construction and operation is important to ensure implementation of mitigation measures</p> <p>NCC should be given more power to take legal action to contractors and consultants who fails to adhere the recommended construction procedures</p> <p>The need for environmental emergencies guidelines with legal and financial authority for implementation</p>
7	SUMATRA	Sumatra has the responsibility to ensure that both marine and surface environment related to transport are protected and preserved

		<p>Has the responsibility to regulate safety and security measures in the transport sector.</p> <p>Most of the environmental emergencies prevention and control measures in marine area are provided in the Merchant Shipping Act, (CAP, 165)</p>
8	Lieutenant General -DMU- PMO	<p>PMO disaster management was established under the Disaster Relief Coordination Act No 9 of 1990. Its mandate is to coordinate all human disasters in the country. Administratively, the Disaster Management Unit is divided into five zones country-wide and they work closely with the local authorities country-wide.</p> <p>At national level they have a national committee which is coordinated by the PMO and involve all key ministries.</p> <p>Their main role is disaster mitigation i.e reducing human adverse impacts including loss of life. They do not work either for prevention or for assisting communities to recover to the normal life. They are basically a resource coordinating unit for disasters at national level and do not work directly with grassroots.</p>

Appendix II: Classification and Potential Consequences of Common Environmental Emergencies

Environmental Emergencies	Potential Consequences	Proposed prevention and mitigation mechanisms
Natural Environmental Emergencies		
<p>Sudden Impact earthquakes, tropical storms, tsunamis, volcanic eruptions, floods, terrorists etc.</p>	<p>Death Destruction of properties Disease outbreaks Destruction of infrastructure such as road and railways</p>	<ul style="list-style-type: none"> • Improve early warning systems • Protective strategies such as construction of seawalls, dykes • Land-use planning strategies avoiding high-risk areas. • Proper drainage system • Put in place evacuation procedures and implementing adaptive regulatory measures.
<p>Slow-Onset— drought, famine, pest infestation, deforestation, etc.</p>	<p>Loss of life Outbreak of diseases Food shortage</p>	<ul style="list-style-type: none"> • Improve early warning systems • Distribution of water-treatment materials • Rain water harvest, tree planting • Food reserve
<p>Epidemic Diseases— water-borne, food-borne, vector-borne, etc.</p>	<p>Disease outbreaks Death</p>	<ul style="list-style-type: none"> • Prevent the development of infectious agents that can attack susceptible individuals • Minimise opportunities for exposure to infections • Reduce susceptibility to infectious diseases • Provide Safe and sufficient water supply • Ensure adequate food supply and nutrition • Adequate food and nutrition • Ensure basic health care and referral emergencies • Immunization programs
Man-made Environmental Emergencies		
<p>Industrial/Technological— pollution, fires, spillages, explosions, collapse of buildings etc.</p>	<p>Loss of people’s life Destruction of properties Destruction of environment Destruction of marine ecosystems</p>	<ul style="list-style-type: none"> • Install automatic fire detection and extinguishing systems, and water-sensing alarms • Establish routine maintenance measures • Regular review of safety measures • Improve the capacity and performance of contractors

		and consultants <ul style="list-style-type: none"> • Apply environmentally friendly products and practices • Harmonize different laws and regulations governing construction, transport, mining and industry sectors
Complex Emergencies — wars, civil strife, armed aggression, etc.	Loss of people’s lives Food shortage Involuntary migration (refugees) Insecurity Displacement of people	<ul style="list-style-type: none"> • Good governance • Fair distribution of resources and political power
Others — transportation accidents, material shortages.	Loss of life	<ul style="list-style-type: none"> • Proper technical and psychological training to drivers • Ensure regular maintenance of transport vehicles • Regular medical check up to drivers • Incentives to drivers

Appendix III. List of Relevant Policies, Plans and Legislation

Energy and Water Utilities Regulatory Authority Act. (2003).

Environmental Impact Assessment and Audit Regulations. G.N. No 339.

Environmental Management Act (EMA). Government Printer, Dar es Salaam.

Mineral Policy of Tanzania.

National Environmental Policy. 1997). Vice President’s Office, Dar es Salaam

National Land Policy. (1997).

Occupational Health and Safety Act. (2003). Government Printers, Dar es Salaam

Sustainable Industrial Development Policy – SIDP; 1996-2020.

The Construction Industry Policy of 2003

The Industrial and Consumers Chemicals (Management and Control) Act (2003).

The Land Act (No. 4 of 1999). Government Printer. Dar es Salaam

United Republic of Tanzania (URT) National Energy Policy, (2003)

United Republic of Tanzania (URT) the Wildlife Conservation Act (2009)

United Republic of Tanzania (URT) The National Forest Policy. (1998)

Water Policy (2002).

Water Resources Management Act of 2009

Water Utilization (Control and Regulations – Act No 42 of 1974). Dar es Salaam