13th International Conference of Ecosystems (ICE2023), June 3-5, 2023

jointly by University of Maryland College Park, ESSIC, MD, USA

Chicago,-Illinois,-USA-(online)

Environmental Disaster Waste Management

Prof. Dr. Sukru Dursun

Konya Technical University, Environmental Engineering Department, Konya, Türkiye

sdursun@ktun.edu.tr , Orcid: https://orcid.org/0000-0001-9502-1178

Abstract:

- **A disaster can be defined as “a serious disruption in the functioning of the community or society that causes widespread material, economic, social or environmental losses that exceed the ability of the affected community to cope using its own resources”. Disaster results from a combination of measures taken to reduce the chances of danger, vulnerability and insufficient capacity or potential risk. A disaster occurs when a hazard affects vulnerable populations and causes damage, casualties, and disruption. Any hazard - a triggering event with greater vulnerability such as a flood, earthquake, or hurricane (insufficient access to resources, sick and old people, unconsciousness, etc.) will lead to a disaster with greater loss of life and property. It is accepted by the scientific authorities that the intensity of the earthquakes as over 7 magnitudes in Kahramanmaraş-Turkey, which took place at distance of 7 kilometres from the ground surface and under dense residential areas, is incomparably stronger than its counterparts of similar magnitude. Of the aftershocks that followed the first earthquakes and whose number is approaching 20 thousand, 50 of them are between 5-6 and 600 of them are between 4-5 magnitudes. In other words, aftershocks occurred in the disaster area with almost 650 individual earthquake-sized aftershocks. It is another dimension of the disaster that the earthquake came on days with severe winter conditions. In the first stage, the rescue of the living/injured under the rubble and the exhumation of the dead bodies continued. Approximately 60 thousand people lost their lives, and more than 100 thousand people were injured. The dimension of treating the injured is also disaster management. Efforts to return to normal life by clearing the ruins of damaged buildings in the region continue. At this stage, disaster management should be carried out by considering environmental conditions and the needs of the victims should be met.**

Objectives:

- Organization of the profession's practices in such manner as will raise its scientific and professional standing
- Defend the members interests and dignity and uphold the profession's ethics and honor;
- Promote the scientific and professional standing of engineers and activate and support research in the science of engineering;
- Participate in planning and developing educational and training programs in engineering, industry.
- Participate in studies of inter-Arab nature, and exchange with the countries information, expertise , and publications covering engineering subjects;
- Provide a decent life to engineers and their families in the event of disability, old age, and other emergency cases;

INTRODUCTION

- **Disasters can have devastating impacts on individuals and communities. The frequency, complexity and severity of impacts are likely to increase in the future due to factors such as climate change, displacement, conflict, rapid and unplanned urbanization, technological hazards and public health emergencies. At the same time, contexts are becoming more complex; countries experiencing disasters associated with natural hazards may simultaneously be affected by conflict or large-scale displacement.**
- **The International Federation of Red Cross and Red Crescent Societies (IFRC), Red Crescent and their member National Red Cross and Red Crescent Societies strive to reduce the impact of disasters. National Societies are uniquely placed to support people and communities with their extensive network of local branches and volunteers, their role as auxiliaries to the public authorities in the humanitarian field and their disaster management capacities in almost every country in the world.**
- **Our top priorities in disaster risk management are to save lives, reduce suffering, and uphold human dignity. We seek to support individuals' and communities' own capacity to reduce risks, respond to disasters and recover. Our work in recovery also presents an opportunity to address future risks and vulnerabilities, such as promoting improved preparedness, climate change adaptation, safer infrastructure, strengthened societal systems, revitalized livelihoods, and protection of the environment. Together these activities aim to build the resilience of people and communities1 towards future risks and shocks.**

SCOPE

- **This policy covers our approach to all kinds of disasters, in all contexts, including fragile, protracted and conflict situations, in both urban and rural areas. It promotes integrated approaches so that all stages of the disaster risk management continuum are considered together in a coherent way, replacing the previous IFRC policies on Disaster Preparedness (1999), Emergency Response (1997), Post-emergency Rehabilitation (1999) and Linking Relief, Rehabilitation and Development (2001).**
- **It is a Federation-wide policy, and therefore applies to all National Societies Red Crescent and the IFRC Secretariat activities at local, national, regional and international levels. It is aligned with the Principles and Rules for Red Cross and Red Crescent Humanitarian Assistance which govern National Societies and their Secretariat in the organization and coordination of international assistance. Relationships within the International IFRC and Red Crescent Movement (the Movement)2 are governed by a different framework, comprising the Statutes of the Movement, the Seville Agreement and its Supplementary Measures.**

DEFINITIONS

- **Disaster:** A serious disruption of the functioning of a community that exceeds its capacity to cope using its own resources. There are many potential causes of such disruption, including natural and technological hazards, industrial accidents, mass movements of populations and infectious and contagious diseases, as well as various factors that influence the exposure and vulnerability of communities.
- **Disaster Risk Reduction**: Measures aimed at preventing new and reducing existing disaster risk.
- **Disaster Management:** The organization, planning and application of measures preparing for, responding to and recovering from disasters.
- **Disaster Risk Management:** The application of policies, strategies and other measures to prevent new disaster risk, reduce existing disaster risk and manage residual risk (through disaster preparedness, response and recovery), contributing to the strengthening of resilience and reduction of disaster losses.

STATEMENT

The following general operational principles underpin IFRC's approach to disaster risk management. National Societies and the IFRC Secretariat:

- **Recognize the right of all people to both offer and receive humanitarian assistance based on the principles of humanity, impartiality, neutrality and independence.**
- **Undertake all disaster risk management activities complying with the Fundamental Principles of the Red Cross and Red Crescent and other applicable instruments: the Principles and Rules for Red Cross and Red Crescent Humanitarian Assistance, the Code of Conduct for International Red Cross and Red Crescent Movement and NGOs in Disaster Relief, as well as relevant quality standards, in particular the Sphere Humanitarian Charter and Minimum Standards in Humanitarian Response and work towards the application of the Core Humanitarian Standard.**
- **Are fully cognizant of the Sendai Framework for Disaster Risk Reduction, the Sustainable Development Goals, the Paris Agreement on Climate Change and the New Urban Agenda in developing our approaches to disaster risk management.**
- **Acknowledge that disasters occur in a variety of contexts, such as fragile, protracted and conflict situations and in public health emergencies. We will therefore strengthen our knowledge and skills in analyzing these evolving contexts to inform and guide operations and practices, working with National Societies and ICRC in accordance with their mandates, and with external partners.**
- **Recognize that the reduction of disaster risk, disaster response and support for recovery are first and foremost the responsibility of public authorities. National Societies will actively aid disaster affected people as an auxiliary to, and in a spirit of cooperation and complementarity with the public authorities.**
- **Commit to continual improvement of our performance to protect the environment and prevent pollution4, applying a "do no harm" approach.**

Place people affected by disasters in the centre of what we do

- Affected communities and people are the best informed of their own situation and key agents in strengthening their resilience and responding to disasters. Therefore, we will ensure that they are at the centre of decision-making processes and lead and shape sustainable changes so that they emerge more resilient in the future. We will also identify those persons, households and communities most vulnerable to or affected by disasters as a basis for prioritizing location and focus of programming activities.
- Disasters have a different impact on men and women, as well as on different individuals and groups based on age, disability, nationality and other social, cultural and ethnic differences. As such, assessments, activities and programs should incorporate a gender and diversity analysis and should be designed and implemented in a culturally sensitive, participatory, inclusive and accessible way6 that respects and protects dignity and human rights. We also ensure that prevention and protection of vulnerable persons from sexual and gender-based violence as well as other forms of exploitation and abuse is essential in all our disaster risk management activities. We will establish mechanisms for accountability to affected communities and ensure that our performance is measured from the perspective of the people we serve.

Options for disposing of wastes from a natural disaster

- **Floods, tornadoes, and even large structural fires can create significant amounts of debris. To manage, sort, and dispose of such large volumes of unexpected waste, a variety of temporary and permanent disposal facilities may be required. This fact sheet provides information on disposal facilities so local decisionmakers can review and plan their disposal options.**

Table 1: Waste categories for community pickup and disposal

Category	Disposal option
Demolition debris, building materials, and concrete	Demolition landfill
Municipal waste, such as food, paper, clothing, household furniture, household waste, trash and asbestos waste.	Sanitary landfill
Hazardous waste: commercial or household	Household hazardous waste collection facility
Tree and brush waste	Compost facility
Appliances (white goods) and electronics, including washers, dryers, dishwashers, furnaces, microwave ovens, water heaters, televisions and computers	Appliance and electronics recycling/disposal site
Oil-soaked absorbent pads and other special wastes	Local designated collection

Table 2: Temporary solid waste categories for residential items

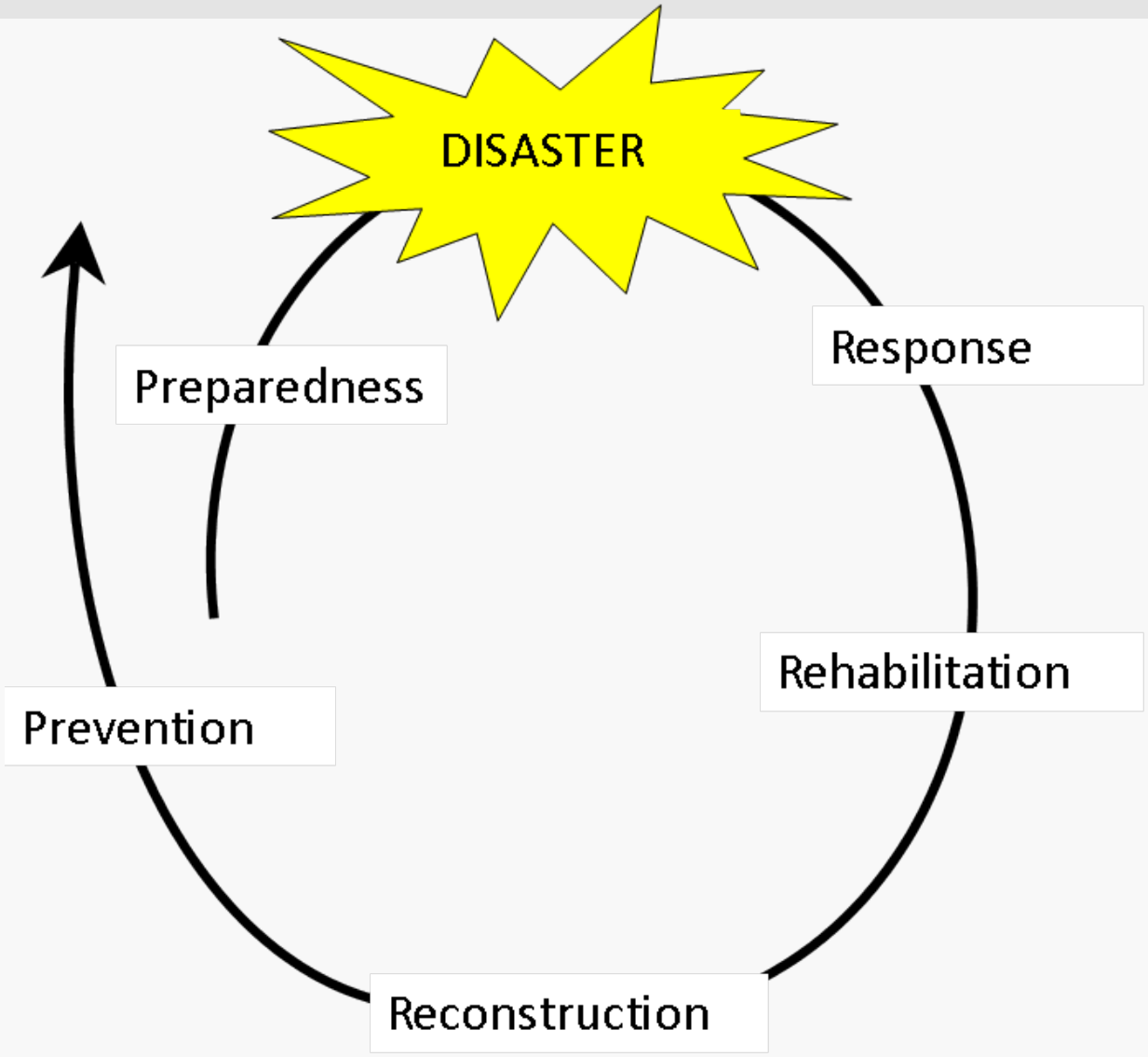
Item	Solid waste category
Air conditioners	Appliances
Appliances, portable (e.g., toasters, hotplates, heaters)	Municipal waste
Books, magazines (not recyclable)	Municipal waste
Cardboard (not recyclable)	Municipal waste
Carpeting (if remaining in demolished building)	Demolition waste
Carpeting (if removed and placed separately for disposal)	Municipal waste
Clothes dryers	Appliances
Clothing	Municipal waste
Concrete	Demolition waste
Food	Municipal waste
Freezers	Appliances
Furnaces	Appliances
Furniture	Municipal waste
Household pesticides, paints, stains, etc.	Household hazardous waste
Insulation (non-asbestos)	Demolition waste
Lumber (treated)	Municipal waste
Lumber (untreated)	Demolition waste
Microwave ovens	Appliances
Powdered detergent (not Household hazardous waste)	Municipal waste
Refrigerators	Appliances
Sheetrock, wallboard	Demolition waste
Stereos, radios	Municipal waste
Stoves	Appliances
Televisions, computers	Appliances or electronics
Window glass	Demolition waste

Temporary Transfer Station (How to set-up)

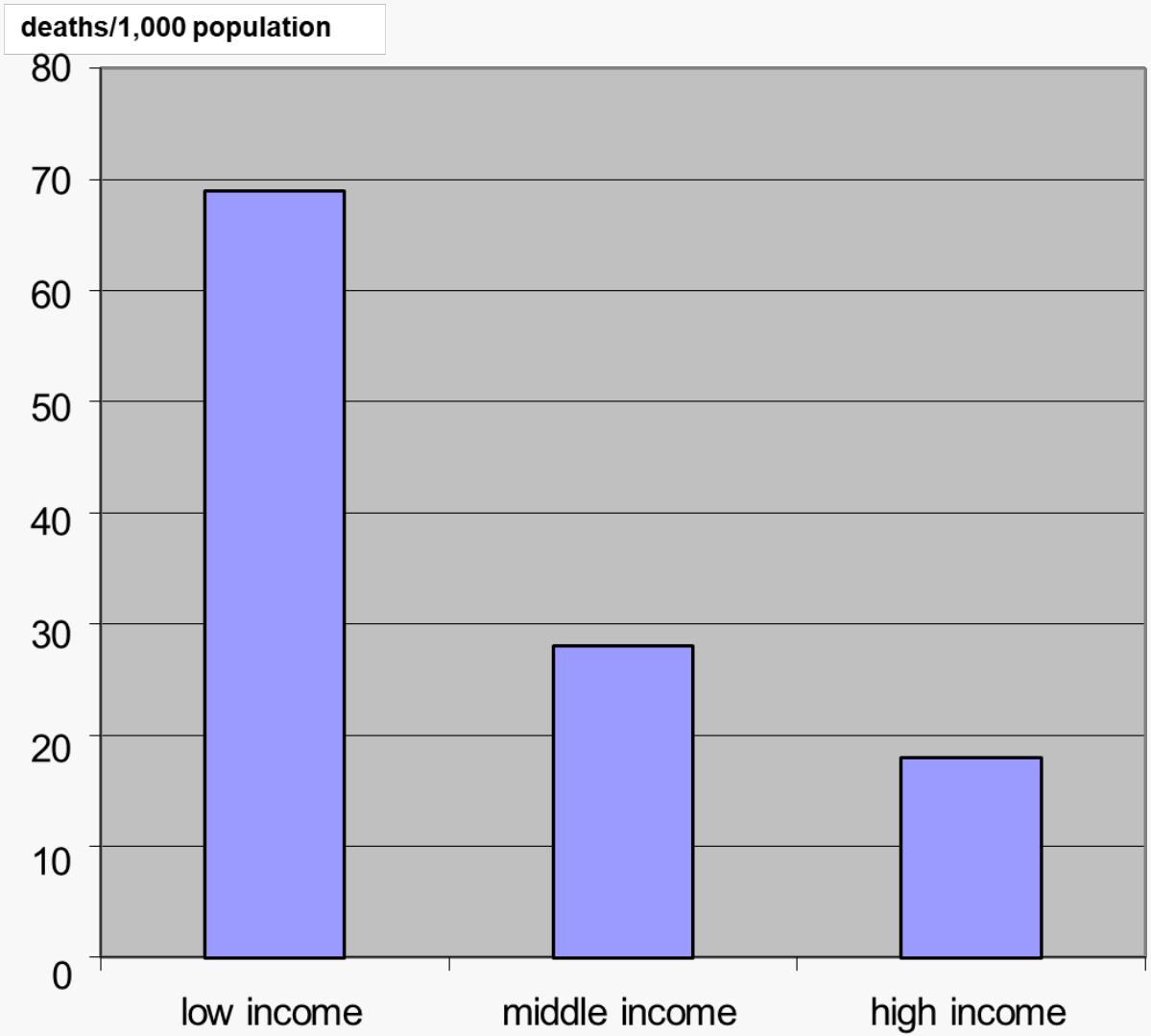
Disasters can strike with little to no warning leaving communities scrambling to accommodate victims and maintain infrastructure all the while operating in circumstances that demand flexibility and on-going adjustments. This fact sheet is designed to be a pro-active, and if necessary, a reactive tool to aid community clean-up operations using Temporary Transfer Stations. Considerations are described below and include:

1. Waste haulers and roll-offs
2. Location
3. Physical design of Temporary Transfer Station
4. Communications

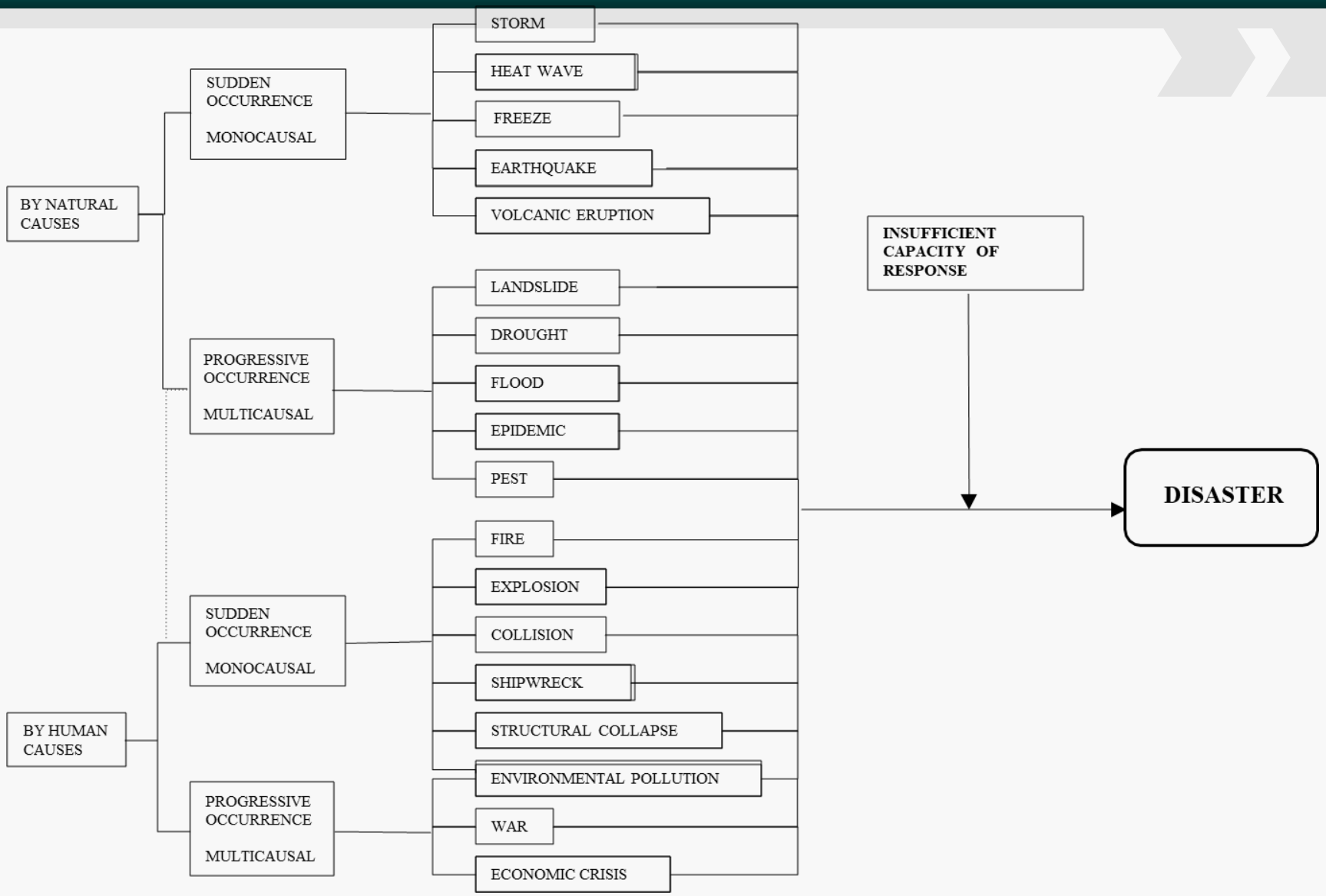
THE DISASTER -DEVELOPMENT



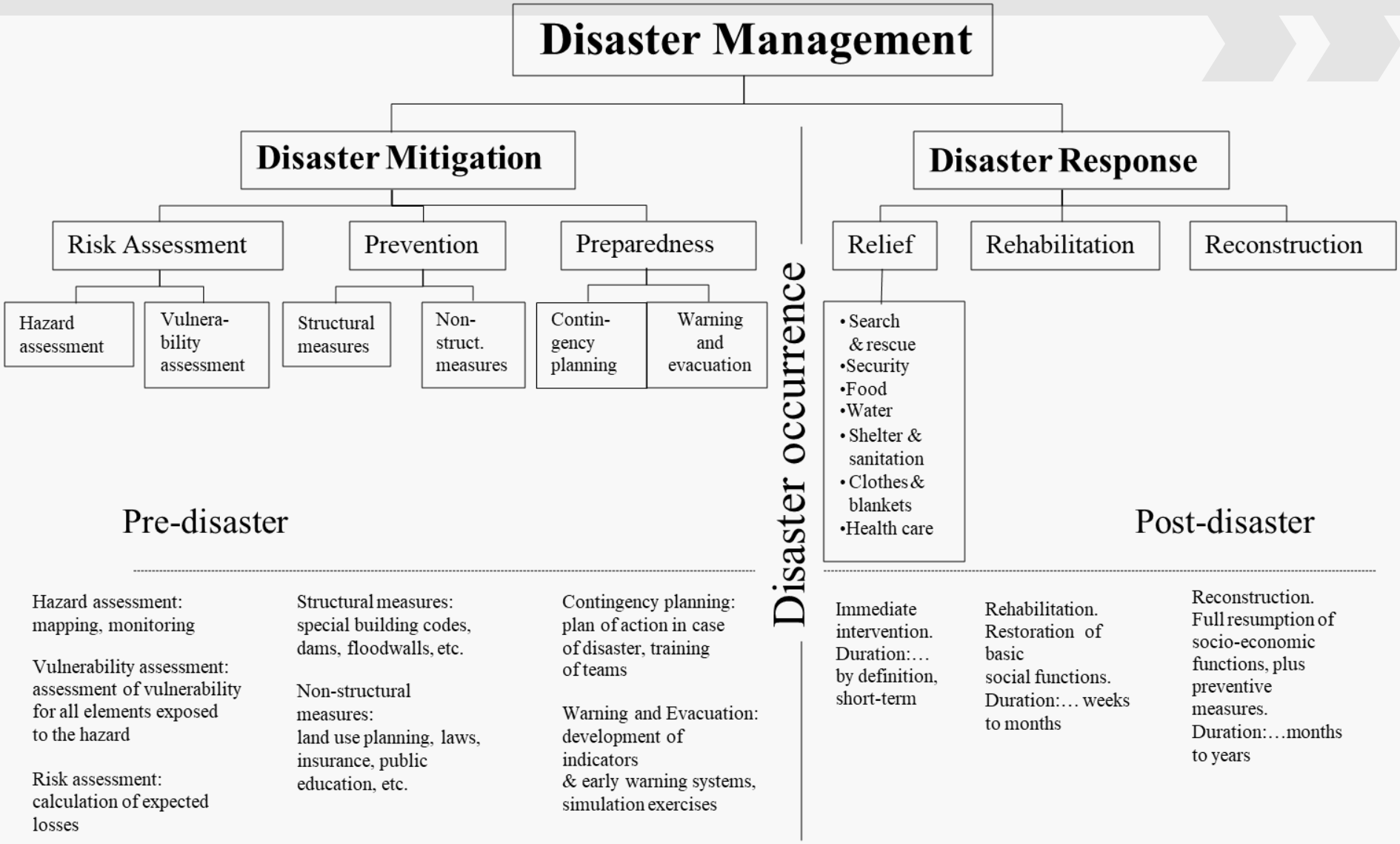
DISASTER MORTALITY IN RELATION TO DEVELOPMENT STATUS



HAZARDS AND DISASTERS: CLASSIFICATION

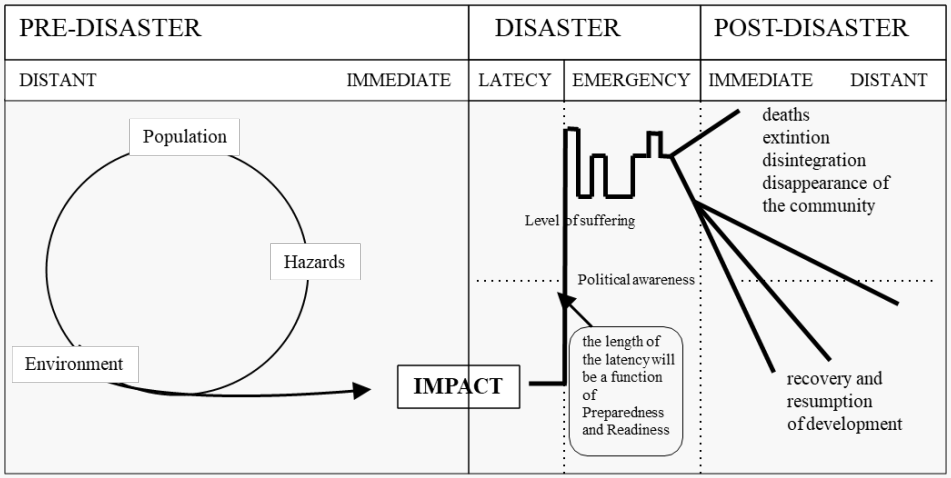


Disaster management: leading activities and related terms



Comparing the natural history of disaster with the disaster- development

PRE-PATHOGENIC PERIOD	PATHOGENIC PERIOD



VULNERABILITY	ALERT	READINESS	RELIEF	REHABILITATION	RECONSTRUCTION
PREVENTION	PREPAREDNESS		RESPONSE		RECOVERY
	EMERGENCY MANAGEMENT				
PREVENTION& MITIGATION			RESPONSE & RECOVERY		
DISASTER MANAGEMENT					

(Health Promotion and) PRIMARY PREVENTION	SECONDARY PREVENTION	TERTIARY PREVENTION
HEALTH CARE		

Common risks by disaster waste hazard type

- The following generic risks from various waste types are useful to prioritize DW actions:
- Chemical risks
- The following chemical risks arise from some types of waste:

Direct dermal (skin) contact with contaminants such as pesticides, oils and acids

- Inhalation of:
- Hazardous chemicals or products like pesticides
- Products of incomplete combustion including dioxins/furans, poly aromatic hydrocarbons (PAH),
- volatilized heavy metals from uncontrolled waste burning
- Dust, including small particulate matter (PM10)4 and asbestos fibres
- Ingestion of surface/groundwater contaminated by leachate from waste. This can contain high levels of
- organics, ammonium, heavy metals, trace organics such as PCBs, and volatile organic compounds (VOCs)
- Nuisance from odours arising from chemicals in the waste or decomposition of some waste types

Common risks by disaster waste hazard type

Biological risks

- The following are examples of biological risks:
- Dermal (skin) contact/ingestion of faecal matter/body fluids
- Direct exposure to healthcare waste
- Disease vectors from animals that congregate on or near waste:
- Rat excreta – hanta virus, leptospirosis, plague, scrub typhus
- Mosquitoes – malaria, dengue fever
- Flies – bacterial infections
- Nuisance from insects, birds and rodents which are attracted to and feed on waste

Physical risks

- Collapse of buildings and other constructions as well as waste piles, such as large piles of rubble that have been pushed to the side of a road
- Cuts and abrasions from sharp objects in waste, for example where healthcare waste has been mixed with general household waste
- Uncontrolled fires in piles of waste
- Vehicle accidents from trucks picking up, transporting and dumping waste in urban or rural areas; and
- Nuisance from smoke plumes and/or wind or wave-blown litter

Common risks by disaster waste hazard type

Local environmental risks

- The following can negatively affect the local surrounding environment
- Waste that contaminates soils, rendering it hazardous to humans and animals, and/or making it unsuitable for agriculture
- Leachate from fluids passing through waste and subsequently contaminating water
- Landfill gas from decomposing organic waste, which can pose risks to humans and animals
- Infestation of rodents and insects feeding on wast
- Windblown and wave transported litter which can impact an area

Summary

- Disaster Management and Disaster Risk Reduction plans should be dynamic and in a continual process of development as hazards, technologies, legislation and standards evolve.
- It is hoped that the concepts in this thesis, in particular the development of a disaster waste management planning approach based around key decisions, will empower decision-makers to successfully manage disaster waste in the future. Understanding the key decisions that need to be made, the main decision-drivers, and their relationships will give decision-makers greater confidence to make timely and effective decisions in a range of disaster scenarios.
- It is hoped that the reservations felt towards planning by some of the research participants, will be allayed by the findings in this thesis, and that communities can prepare for and respond to disaster events more effectively in the future.

Disaster Management