# DISASTER MANAGEMENT Compiled Notes for Unit Lectures

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# DISASTER MANAGEMENT

DISASTER
MANAGEMENT
PHASES

PREPAREDNESS

RESPONSE

MITIGATION

RECOVERY

BY

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*Compiled Notes for Unit Lectures*

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## 1. 0 Common Terminologies

**Project Disaster**:  This is any implementation process within the project phases that is considered to have not actualized as planned and led to derailment of the project and its acceptance

**Disaster Management**: The body of policy and administrative decisions and operational activities which pertain to the various stages of a disaster at all levels.

**Risk**: The expected losses (lives lost, persons injured, damage to property and disruption of economic activity) due to a particular hazard. Risk is the product of hazard and vulnerability.

**Vulnerability**: Degree of loss (for example, from 0 percent to 100 percent) resulting from a potentially damaging phenomenon. The following terms are key to understanding slow onset disasters and their impact on populations.

**Disaster Population**: Usually associated with crisis-induced mass migration in which large numbers of people are forced to leave their homes to seek alternative means of survival. Such mass movements normally result from the effects of conflict, severe food shortages or collapse of economic support systems.

**Disaster risk**: The potential disaster losses, in lives, health status, livelihoods, assets and services, which could occur to a particular community or a society over some specified future time period. Disaster risk management: The systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster.

**Disaster risk reduction**: The concept and practice of reducing disaster risks through systematic efforts, to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.

**Early warning system**: The set of capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities and organizations threatened by a hazard to prepare and to act appropriately and in sufficient time to reduce the possibility of harm or loss. Emergency management: The organization and management of resources and responsibilities for addressing all aspects of emergencies, in particular preparedness, response and initial recovery steps.

**Emergency services**: The set of specialized agencies that have specific responsibilities and objectives in serving and protecting people and property in emergency situations.

## 1.2 Characteristics of Disasters

In order to be able to identify that a situation is a disaster, the following characteristics must be eminent and must seem to resonate with the events leading to the situation:

- It is an extra-ordinary event
- Usually occurs because of one of the danger sources, whether caused by nature or human action.
- Seriously and substantially impact the most vulnerable groups
- Results in serious imbalance in the community functions
- Results in significant losses in human lives, materials and environment
- Exceeds the ability of an affected community to cope with using its own resources

In reporting disasters and recording the same, the word disaster size comes into mind and the disaster size takes into considerations the following aspects:

- **Scope** can be thought of as a measure of the breadth of damage caused by a disaster. It describes how extensively the larger community is impacted, including the rescue and support infrastructure, which in turn predicts how much help is available and how quickly recovery can proceed. In an event with a large scope, survivors may be unable to turn to their normal support systems of friends, family, and neighbors as they would after a smaller scale traumatic event, since those people may be dealing with their own recovery needs. Very large scope events, like Hurricanes Katrina and Sandy, or the 2010 earthquakes in Haiti and Chile, may leave survivors without a place to shop, work, go to school, or pray. Many may be forced to relocate in order to find housing, work, and schools, which adds the emotional stress of resettling and losing one's community on top of the direct disaster losses.

- **Intensity** refers to level of damage in terms of injuries and deaths—the event's human cost. Of course, any serious injury or loss of life will feel tragic for those directly affected, but disasters that cause multiple losses can compound distress for everyone involved, including professional responders who may suffer secondary trauma from exposure to many injured people or dead bodies. The effect of losing multiple loved ones goes beyond pure addition: Someone whose child and spouse were both killed in a disaster is not only grieving two deaths at once, but he or she may have lost what would have been the main source of comfort in grappling with the death of a child, as well as a chief reason to keep on going in coming to terms with the sudden loss of a partner. As a result, people who experienced multiple losses are at the highest risk of a difficult bereavement process and readjustment and should be a focus of early mental health attention.

  **Scope and intensity** are often linked, but not always. An event may be large in both, or large in one measure and small in the other. For example, a hurricane or ice storm may cause extensive property damage, but if warnings were provided and complied with, the human cost may be minimal. In contrast, an event like a fire in a nightclub can cause extensive casualties but affect

only one building, leaving the rest of the community's physical infrastructure intact as it copes with the human loss.

- **Duration** may be thought of in multiple ways. First, it can refer to the length of the disaster itself, which could range from seconds for an earthquake or explosion, to hours or days for a hurricane or blizzard, and even to weeks for a slowly advancing and receding flood. Or we can think of duration as the length of time people are affected by a disaster, including the recovery period as physical damage is repaired and losses are adjusted to emotionally. In the case of very large scope events that could take years, or could never be fully completed.

*"It is the people who matter most, and without the people we have no disaster"*

## 1.3 Types of Disasters

Disasters can be classified as:
- Natural disaster
- Human-Made disaster
- Incidences of Mass Trauma

### 1.3.1 Natural Disasters

These events are recognized as unpreventable and not anyone's responsibility. There is no one to blame, except possibly God or a higher power, so adjustment is often facilitated because survivors don't typically have anger or a desire for revenge compounding their losses.

Natural disasters are large-scale geological or meteorological events that have the potential to cause loss of life or property. These types of disasters include:
- Tornadoes and Severe Storms
- Hurricanes and Tropical Storms
- Floods
- Wildfires
- Earthquakes
- Drought

Severe storms and floods are the most common types of natural disasters reported in the United States. These meteorological events are occasionally preceded by presidential "emergency declarations" requiring state and local planning prior to the event, such as evacuations and protection of public assets. Disaster Distress Helpline staff are available to speak to those who call or text before, during, and after a natural disaster.

### 1.3.2 Human-Made Disasters

Examples include industrial accidents, shootings, acts of terrorism, and incidents of mass violence. As with natural disasters, these types of traumatic events may also cause loss of life and property. They

may also prompt evacuations from certain areas and overwhelm behavioral health resources in the affected communities.

In the aftermath of the tragic loss of life that occurred on September 11, 2001, the feelings of loss of security and well-being—arguably the most crucial ingredients for leading a happy, healthy life—dramatically affected the citizens of the United States. Disaster Distress Helpline staff are also trained to respond to calls or texts related to these types of disasters.

### 1.3.3 Incidences of Mass Trauma

Infectious disease outbreaks, incidents of community unrest, and other types of traumatic events can also bring out strong emotions in people.

The outbreak of Ebola affecting several countries in West Africa, with limited reported cases in the United States and other countries, may lead to feelings of anxiety and confusion, even to the point where it can interfere with one's regular routine. Community upheaval, such as that seen in Ferguson, Mo., can also impact emotional health. News reports and the 24-hour news cycle can make people even more anxious when these kinds of events occur.

### 1.4 Differences between Emergencies and Disasters

- A situation in which community is CAPABLE of coping is EMERGENCY.
- Emergency situations are generated by a real occurrence of events that require immediate attention of emergency resources.
- A situation in which community is INCAPABLE of coping is DISASATER.
- Disaster situations are natural or human-caused events which causes severe negative impact on community.

An emergency is an unforeseen incidence that can be responded to using available resources. They occur more regularly than disasters and are therefore more anticipated by a community. These may include medical crises, vehicular accidents, and neighborhood fires. As such, the availability of emergency medical services, fire departments, police departments, and other such public services ensure the proper response to such unfortunate events.

A disaster, however, is a critical event much wider in scope. It is the sudden occurrence of an unfavorable situation that causes serious disruption to the social routine. It endangers a larger social space, and while it occurs much less frequently than emergencies, the effects are graver, often causing multiple casualties and/or property damage. Such a greater impact can disrupt and incapacitate emergency responders, leading to the need for assistance outside of the locality. Resources may very well become choked.

While its effects are much greater than an emergency, a disaster is unlike a calamity in that it affects only a single community. As such, neighboring communities with ample resources and responders are able to offer support to usher the affected community towards its recovery. Disaster types include

natural hazards (earthquakes, tsunamis, wildfire, disease outbreaks), accidents (nuclear power plant accidents, widescale equipment failure), and terrorism (cyber attacks, bombings, use of chemical weapons).

**Emergency Characteristics**
• Lack of financial and human resources
• Disorder and lack of clarity of tasks and responsibilities
• Difficulty in determining priorities
• Lack of coordination between different agencies
• Lack of information
• Lack of security
• Spread of rumors and exaggerations
• Heavy presence of mass media

**How to Deal with Emergencies**
Evaluation; Response; Speaking on behalf of the affected; Distribute Aids; Supply Needs; Organize Works; Manage Resources; Deal with the Media; Advocate.

## 1.5 Disaster Management Life Cycle
The Disaster management cycle illustrates the ongoing process by which governments, businesses, and civil society plan for and reduce the impact of disasters, react during and immediately following a disaster, and take steps to recover after a disaster has occurred. Appropriate actions at all points in the cycle lead to greater preparedness, better warnings, reduced vulnerability or the prevention of disasters during the next iteration of the cycle. The complete disaster management cycle includes the shaping of public policies and plans that either modify the causes of disasters or mitigate their effects on people, property, and infrastructure.



*Figure 1.1: Disaster Management Life Cycle (source: CDP)*

The disaster life cycle includes several phases:

1. **Mitigation**: Disaster mitigation work involves directly preventing future emergencies and/or minimizing their negative effects. It requires hazard risk analysis and the application of strategies to reduce the likelihood that hazards will become disasters, such as flood-proofing homes or buying insurance.

2. **Disaster preparedness**: Disaster preparedness efforts include plans or preparations made in advance of an emergency that help individuals and communities get ready. Such preparations might include the stocking of food and water or the gathering and screening of willing volunteers, ready to mobilize post-disaster.

3. **Disaster response**: Disaster response work includes any actions taken during or immediately following an emergency, including efforts to save lives and to prevent further property damage. Ideally, disaster response involves putting already established disaster preparedness plans into motion. Typically, this phase of the disaster life cycle draws the most attention. It is also known as "disaster relief."

4. **Disaster recovery**: Disaster recovery happens after damages have been assessed and involves actions to return the affected community to its pre-disaster state or better – and ideally, to make it less vulnerable to future risk. Risk identification includes understanding the nature of hazards as well as understanding the nature of vulnerabilities. Subsequent efforts may range from physical upgrades to education, training and public awareness campaigns.

Most people give financially immediately after a crisis, in response to clear emotional appeals. Yet donors who allocate funds across the disaster life cycle have an opportunity to help ensure that each dollar given reaches its full potential. Investing in mitigation saves money. Research estimates that for every $1 spent by federal mitigation grant programs (Federal Emergency Management Agency, Housing and Urban Development or Economic Development Administration) at least $6 is saved in casualties, property damage and the like. On an international scale, it is more challenging to determine savings as each country faces different risks and mitigation needs.

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# CHAPTER 2
# RISKS AND VULNERABILITY ASSESSMENT

## 2.1 Introduction

**Disaster risk reduction**: The concept and practice of reducing disaster risks through systematic efforts, to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.

**Early warning system**: The set of capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities and organizations threatened by a hazard to prepare and to act appropriately and in sufficient time to reduce the possibility of harm or loss. Emergency management: The organization and management of resources and responsibilities for addressing all aspects of emergencies, in particular preparedness, response and initial recovery steps.

**Mitigation**: The lessening or limitation of the adverse impacts of hazards and related disasters.

**Preparedness**: The knowledge and capacities developed by governments, professional response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazard events or conditions.

**Prevention**: The outright avoidance of adverse impacts of hazards and related disasters.

**Public awareness**: The extent of common knowledge about disaster risks, the factors that lead to disasters and the actions that can be taken individually and collectively to reduce exposure and vulnerability to hazards.

**Recovery**: The restoration, and improvement where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors.

**Response**: The provision of emergency services and public assistance during or immediately

**Risk**: The combination of the probability of an event and its negative consequences.

**Sustainable development**: Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

**Vulnerability**: The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard.

## 2.2 Hazards and Hazard Assessment

A dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

Before beginning the hazard evaluation and risk assessment process, a researcher must define the scope of work. What are the tasks that must be evaluated? A well-defined scope of work is a key starting point for all steps in the risk assessment and hazard analysis.

The next step after identifying the scope of work is to identify the hazard. A HAZARD IS A POTENTIAL FOR HARM. Hazards can be identified as an agent, condition, or activity that has the potential to cause injury, illness, loss of property, or damage to the environment. The table below has been adapted from Identifying and Evaluating Hazards in Research Laboratories, which you can find in the Resource tab to the right.

### 2.2.1 Common Types of Hazards

| Hazard Types | Examples |
|---|---|
| Agent | Carcinogenic, teratogenic, corrosive, pyrophoric, toxic, mutagenic, reproductive hazard, explosive, nonionizing radiation, biological hazard/pathogenic, flammable, oxidizing, self-reactive or unstable, potentially explosive, reducing, water-reactive, sensitizing, peroxide-forming, catalytic, or chemical asphyxiate |
| Condition | High pressure, low pressure, electrical, uneven surfaces, pinch points, suspended weight, hot surfaces, extreme cold, steam, noise, clutter, magnetic fields, simple asphyxiant, oxygen-deficient spaces, ultraviolet radiation, or laser light |
| Activity | Creation of secondary products, lifting, chemical mixing, long-term use of dry boxes, repetitive pipetting, scale up, handling waste, transportation of hazardous materials, handling glassware and other sharp objects, heating chemicals, recrystallizations, extractions, or centrifuging |

### 2.2.2 Hazard Control

When evaluating the risks associated with specific hazards, the results of this evaluation should guide in the selection of risk management techniques including elimination, substitution, engineering controls, administrative controls, and personal protective equipment. This is known as the Hierarchy of Controls.
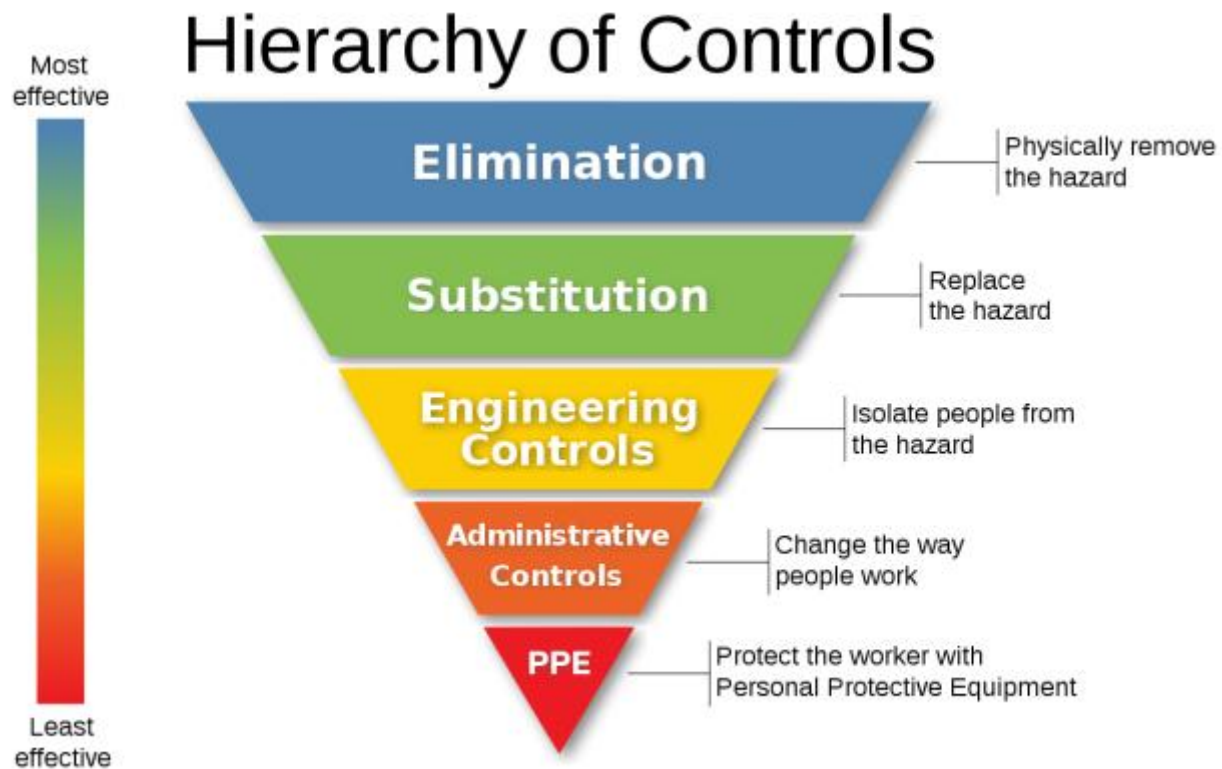
*Image courtesy: Wikipedia*

**Elimination and Substitution**

The most preferred method of controlling risk is to eliminate the hazard altogether. In most cases, elimination is not feasible and when possible, substitution is the best approach to hazard mitigation. When possible, substitute less hazardous agents in place of their more hazardous counterparts. This also applies to conditions and activities. Examples include substituting toluene for benzene, non-lead-based paints for lead-based ones, or SawStop table saws for existing traditional table saws.

**Engineering Controls**

Engineering controls consist of a variety of methods for minimizing hazards, including process control, enclosure and isolation, and ventilation.

Process controls involve changing the way that a job activity is performed in order to reduce risk. Examples of this include using wet methods when drilling or grinding or using temperature controls to minimize vapor generation.

Enclosure and isolation are targeted at keeping the chemical in and the researcher out, or visa versa. Glove boxes are a good example of enclosure and isolation. Interlock systems for lasers and machinery are other good examples of isolating processes.

The most common method for ventilation in research laboratories is localized exhaust systems.

**Administrative Controls**

Administrative controls are controls which alter the way work is performed. They may consists of policies, training, standard operating procedures/guidelines, personal hygiene practices, work scheduling, etc. These controls are meant to minimize the exposure to the hazard and should only be used when the exposure cannot be completely mitigated through elimination/substitution or engineering controls.

**Personal Protective Equipment (PPE)**

PPE should always be used as a last line of defense and is an acceptable control method when engineering or administrative controls cannot provide sufficient protection. PPE may also be used on a temporary basis while engineering controls are being developed.

**2.2.3 Hazard Classification**

**1) Dormant Mode:**
- The situation that has the potential to be hazardous, but no people, or environment is currently affected by this.

*For example:*
- An unstable hillside, has a potential for a landslide but there is nothing below or on the hillside that could be affected.

**2) Active Mode:**
- An incident in which hazard has actually occurred, creating an Emergency situations or Disasters.

**Classification of Hazards:**

Hazard can also be classified as:
- Natural Hazard
- Man-Made Hazard

**A. Natural Hazard:** These hazards are caused by a natural process.

Examples of some Natural hazards are:
- *Volcanic Eruptions:* Ashes and different toxic gases are expelled through volcanoes from deep inside the earth
- *Droughts*: A part of a land suffers from lack of rain during specific period of time which causes severe damage to the crops, soil, animals and people also.
- *Tsunamis*: Very large waves which caused by an Earthquake, Volcanic eruptions smashes into a shore.

**B. Man-made Hazard:**

These hazards are created by humans.

Examples of some Man-Made hazards are:

- *Global Warming*: Projected increases in the Earth's atmosphere's average temperature. In the 20th century the Earth's average temperature rose about 0.6 degree Celsius.
- *Crime*: It is a kind of Sociological hazard. Crime is a breach of laws and rules. For example Breach of contract.
- *Industrial Hazard*: It is a kind of Technological hazard. Industrial hazards often have an environmental impact. For example Bhopal Disaster ( worst industrial disaster to date).

## 2.3 Vulnerability, Capacity and Risk

**Vulnerability:**
Susceptibility of a person, group or society to physical or emotional injury.
OR
Person or group liable to injury.
As far as Hazards and Disasters are concern, the concept of Vulnerability is to link the relationship that people have with their environment to social forces and institutions and the cultural values that sustain them.

**Capacity:**
Within a community all the available resources, that can reduce risk level and disaster effects.
Frequent term used in Disaster is 'Capacity building'.
Capacity building is the efforts to develop human skills within a community to reduce risk levels.

**Risk:**
Occurrence probability of a hazard that trigger a disaster with an undesirable outcome
Risk involves an exposure to a chance injury or loss.
Risk generally described in terms of probability.
Risk can also be defined as the probability of a loss, risk depends on three elements:
- Hazard
- Vulnerability
- Exposure

### 2.3.1 Vulnerability Types
Vulnerability varies significantly within a community and over time. This definition identifies vulnerability as a characteristic of the element of interest (community, system or asset) which is independent of its exposure. However, in common use the word is often used more broadly to include the element's exposure.

*There are four (4) main types of vulnerability:*

- **Physical Vulnerability**: may be determined by aspects such as population density levels, remoteness of a settlement, the site, design and materials used for critical infrastructure and for housing (UNISDR).

> ***Example***: Wooden homes are less likely to collapse in an earthquake, but are more vulnerable to fire.

- ***Social Vulnerability*** refers to the inability of people, organizations and societies to withstand adverse impacts to hazards due to characteristics inherent in social interactions, institutions and systems of cultural values. It is linked to the level of well-being of individuals, communities and society. It includes aspects related to levels of literacy and education, the existence of peace and security, access to basic human rights, systems of good governance, social equity, positive traditional values, customs and ideological beliefs and overall collective organizational systems.
    > ***Example***: When flooding occurs some citizens, such as children, elderly and differently-able, may be unable to protect themselves or evacuate if necessary.

- ***Economic Vulnerability***. The level of vulnerability is highly dependent upon the economic status of individuals, communities and nations The poor are usually more vulnerable to disasters because they lack the resources to build sturdy structures and put other engineering measures in place to protect themselves from being negatively impacted by disasters.
    > ***Example***: Poorer families may live in squatter settlements because they cannot afford to live in safer (more expensive) areas.

- ***Environmental Vulnerability***. Natural resource depletion and resource degradation are key aspects of environmental vulnerability.
    > ***Example***: Wetlands, such as the Caroni Swamp, are sensitive to increasing salinity from sea water, and pollution from stormwater runoff containing agricultural chemicals, eroded soils, etc.

### 2.3.2 Risk Analysis and Rating

It considers the probability of harmful consequences, or expected losses (deaths, injuries, property, livelihoods, economic activity disrupted or environmentally damaged) resulting from interactions between natural or human induced hazards and vulnerable conditions.

Risk can be calculated using the following equation:

> ***Risk = Probability of Hazard x Degree of Vulnerability.***

There are different ways of dealing with risk, such as:
- **Risk Acceptance**: an informed decision to accept the possible consequences and likelihood of a particular risk.
- **Risk Avoidance**: an informed decision to avoid involvement in activities leading to risk realization.
- **Risk Reduction** refers to the application of appropriate techniques to reduce the likelihood of risk occurrence and its consequences.

- **Risk Transfer** involves shifting of the burden of risk to another party. One of the most common forms of risk transfer is Insurance.

The rating depends upon the likelihood of an event occurring (from most unlikely to most likely) and the severity of the injuries that might arise if the event does occur (from trivial injuries to major injuries).

To calculate a **Quantitative Risk Rating**, begin by allocating a number to the **Likelihood** of the risk arising and **Severity of Injury** and then multiply the Likelihood by the Severity to arrive at the **Rating**. The number to be allocated is set out in the table below.

Example:
A Most Unlikely Event [1] x Trivial Injuries if event occurs [1] = Risk Rating of [1] Minimal Risk (1x1=1)
A Likely Event [3] x Major Injuries if event occurs [4] = Risk Rating of [12] High Risk (3x4=12)

When you allocate the Rating you do so **after** taking into consideration any safety measures – called **Control Measures** – that you already have in place to reduce the hazard and any safety measure which you say you will put into place.

***Table 2.1: Risk Rating***

| Risk Rating | | | | Rating Action Bands | |
|---|---|---|---|---|---|
| Likelihood | X | Severity of Injury | = | Assessed Band | Control Measures |
| 1. Most Unlikely | | 1. Trivial Injuries | | Minimal Risk 1 or 2 | Maintain Existing Measures |
| 2. Unlikely | | 2. Slight Injuries | | Low Risk 3 or 4 | Review Control Measures |
| 3. Likely | | 3. Serious Injuries | | Medium Risk 6 or 8 | Improve Control Measures |
| 4. Most Likely | | 4. Major Injuries | | High Risk 9, 12 or 16 | Improve Control Measures immediately and consider stopping work activity until risk reduced |
| To establish Risk Rating multiply "Likelihood" by the "Severity" | | | | | |

**Assessed Rating Bands**
**Minimal Risk - Rating of 1 or 2**
**Low Risk - Rating of 3 or 4**
- Even if the risk is low, there may be things you can still do to bring the risk rating back down to Minimal.

**Medium Risk - Rating of 6 or 8**
- If the Rating Action Band is greater than 3 or 4 then you should review your existing Safety/Control Measures and add whatever Additional Control Measures may be necessary to bring the risk back to a Low or Minimal Risk.

- If you identify any hazard which, after applying any applicable control measures, is still rated as Medium, then speak to a professional health and safety advisor.

**High Risk - Rating of 9, 12 or 16**
- Under no circumstances should you continue operations that have a high risk rating without speaking to a professional advisor with a view to re-examining the hazard, the system of work in operation, the training and protection of your employees and the information to be provided to them.

**Alternative Risk Matrix**

You may wish to use an alternative Risk Matrix, perhaps one that breaks down the elements of the risk even further. One alternative would be the following:

| Likelihood of Occurrence | Severity of Consequences | | | | |
|---|---|---|---|---|---|
| | 1. Minor Injuries [No lost time] | 2. Significant Injury [up to 7 Days] | 3. Serious Injury [7 Day Injury] | 4. Major Injury | 5. Fatality |
| 1. Very unlikely [hasn't occurred before] | 1 | 2 | 3 | 4 | 5 |
| 2 - Slight [rarely occurs] | 2 | 4 | 6 | 8 | 10 |
| 3 - Feasible [possible, but not common] | 3 | 6 | 9 | 12 | 15 |
| 4 - Likely [has before, will again] | 4 | 8 | 12 | 16 | 20 |
| 5 - Very Likely [occurs frequently] | 5 | 10 | 15 | 20 | 25 |
| | | | | | |
| **Risk Rating:** Likelihood * Severity | Minimal 1-2 | Low 3-9 | Medium 10-15 | High 16-20 | Extreme 25 |

**Key**:

| | |
|---|---|
| Score 1-3 | Minimal Risk - Maintain Existing Measures |
| Score 3-9 | Low Risk - Review Existing Measures |
| Score 10-15 | Medium Risk - Improve Control Measures |
| Score 16-20 | High Risk - Consider Stopping Activity |
| Score 25 | Extreme Risk - Do Not Proceed |

*Figure 2.1: Risk rating model*

**Frequency of Exposure**

Where Frequency of Exposure is an Important Consideration the following may be appropriate:

*Table 2.2: Frequency of exposure analysis*

| Risk Rating | | | Assessed Band |
|---|---|---|---|
| **Likelihood** | **Severity of Injury** | **Frequency** | |
| 1. Unlikely | 1. Minor Injuries | 1. Irregular | 1-3. Minimal Risk – Maintain Existing Measures |
| 2. Feasible | 2. Serious Injuries | 2. Occasional | 4-10. Low Risk – Review Measures |
| 3. Probable | 3. Major Injuries | 3. Frequent | 11-20. Medium Risk – Improve Measures |
| 4. Inevitable | 4. Death | 4. Continuous | 21 + High Risk – Improve Measures Consider Stopping Work |
| **To establish Risk Rating multiply "Likelihood" by the "Severity" by the "Frequency"** | | | |

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# CHAPTER 3
## DISASTER MANAGEMENT FRAMEWORKS IN KENYA

Disaster preparedness in Kenya is perceived to be fragmented, with the country often better at reactive rather than pro-active action.

## 3.1 Legal and Institutional Frameworks

Except for the Kenya Meteorological Department, these institutions are in charge of disaster preparedness, response and coordination. There are also disaster risk reduction (DRR) focal persons in various ministries. We introduce these institutions and present findings on respondents' perceptions of them.

### 3.1.1 National Drought Management Authority

Established in 2011 through the State Corporations Act following the 2011 drought, the National Drought Management Authority (NDMA) leads on drought preparedness and response in the ASALs. It is an authority under the Ministry of Devolution and Planning. Over time NDMA has progressed and received government, parliament and development partner support. This has been strengthened by the NDMA Act 2016, which gives the authority a stronger legal status. Among other things, the Act gives NDMA the responsibility for policy, coordination of drought response, putting in place systems of drought early warning and linking the country's drought management to international processes.

### 3.1.2 Water Resource Management Authority and Ministry of Water and Irrigation

Flood preparedness and management brings together the Water Resource Management Authority (WARMA) and the Ministry of Water. WARMA coordinates water resource management at the national and subnational level. For flood preparedness, it maps out flood prone areas; supports communities to develop flood management infrastructure and disseminate early warning information. The Ministry of Water is responsible for policy issues on water resources. Responsibilities for flood response are more diverse and link up with other agencies.

### 3.1.3 Ministry of Health

The Ministry of Health through the Division of Disease Surveillance and Epidemic Response Unit is responsible for providing leadership on preparedness for human disease outbreaks. The Division of Health Emergencies and Disaster Risk Management, on the other hand, is responsible for response. Health is now a devolved function and there are systems for disease surveillance and response at the county level. However, our respondents felt these need strengthening.

### 3.1.4 National Disaster Operations Centre

As the name suggests, the National Disaster Operations Centre (NDOC) is responsible for coordinating all disaster response operations in the country – and was leading the country's El Niño flood response in 2015. It does this through partnering with other actors such as the police and the Kenya Red Cross. NDOC was established in 1997 following the El Niño floods and sits within the Ministry of Interior. Besides response, NDOC also plays a preparedness role by managing the country's disaster loss database. It has also led disaster drills for man-made disasters.

### 3.1.5 National Disaster Management Unit

The National Disaster Management Unit (NDMU) was established through a presidential directive in 2013 and sits within the Ministry of Interior. It is seen as the government unit responsible for disaster risk management in the country, but also carries out some response activities. Led by the National Police Service, its operations cut across both natural and man-made disasters. NDMU has established the country's emergency response plan and SOPs.

### 3.1.6 Kenya Meteorological Department

The Kenya Meteorological Department plays a key role in disaster preparedness by providing early warning information. It is the government department that all government agencies rely on for weather information. Respondents provided mixed perceptions about the Kenya Meteorological Department. Government respondents expressed trust in the department and its accuracy of information. Respondents outside government felt that the department could provide more timely information in a more innovative manner for it to lead to faster decision-making and response. At the county level, the department has representatives who could better disseminate the weather information to guide disaster preparedness.

### 3.1.7 The Kenya Red Cross

The Kenya Red Cross is an auxiliary to the government's humanitarian services and works closely with government and other humanitarian actors. Recognised as a first responder to emergencies, it has gained traction as the go-to institution both at the national and subnational level. All our respondents felt that the Kenya Red Cross does well in response but also has a preparedness system in place.

### 3.1.8 The Kenya Humanitarian Partnership Team (KHPT)

This is a platform that brings together the UN agencies, donor agencies, INGOs, private sector, local organizations, national and subnational government. The main role of the KHPT is to ensure strategic coordination and coherence of humanitarian action by the Government of Kenya, and national and international humanitarian actors towards better humanitarian preparedness and response. To promote government ownership, the Ministry of Interior chairs the KHPT and the UN resident coordinator is the co-chair. KHPT meets every quarter at a senior level and monthly at an operational level. NDMA, NDOC and UNOCHA form part of the secretariat (NDMU does not seem to be part of KHPT). While KHPT is not a formal arrangement, acting more out of the goodwill of the participants, respondents feel that it plays a useful role in influencing government and advocating for better preparedness and response. It is also well recognized by development partners and UN agencies as it provides direct access to government.

### 3.1.9 National Disaster Risk Management Authority and county disaster risk management committees

The Disaster Management Act 2019 establishes the National Disaster Risk Management Authority (NADIMA) as the body that will lead and coordinate the country's approach to disaster prevention, preparedness, mitigation, response and recovery. From our interviews – with an INGO and a government agency – it appears that NADIMA will bring together the NDMA, NDOC and the NDMU agencies.

## 3.2 Kenya National Policy for Disaster Management: The Highlights

The National Policy for Disaster Management in Kenya aims at the establishment and strengthening of disaster management institutions, partnerships, and networking and mainstreaming disaster risk reduction in the development process in Kenya, to strengthen the resilience of vulnerable groups to cope with potential disasters.

The policy document contains six chapters that provide background information on disaster patterns and profiles in Kenya including existing categories. Justification summarizes the existing initiatives for Disaster Management, and the consequent problems and challenges. The Systematic Approach gives guidelines and principles for effective disaster management and Code of Conduct expected of different stakeholders involved in disaster management in Kenya.

It provides for enactment by Parliament for a legislative provision for effective Disaster Management by establishment of an institutional framework that is legally recognized and embedded within the Government structures. Innovative ways of mobilizing resources, managing them and accounting for them properly have also been provided for, together with a rigorous monitoring and evaluation framework not only to monitor the progress in the implementation of this policy, but also to undertake regular disaster risk profiling and monitoring in order to be more prepared for disasters.

**The highlights:**
- Developed in March 2009 and approved by the Kenyan cabinet in May 2018.
- Highlights the current disaster management initiatives
- Provides for systematic approach to Disaster Management
- Outlines the policy, legal and institutional arrangements
- Provides for structures and procedures in resource mobilization management and accountability.
- Allows for monitoring, evaluation and research in disaster management projects.

This document is freely available online for review by students studying disaster management related policies.

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# CHAPTER 4
# DISASTER MANAGEMENT RESOURCES

## 4.1 Introduction

If there is a fire inside a building, the fire alarm system warns employees to evacuate. An evacuation team guides employees to safe exits and outside to assembly areas. The fire alarm system, evacuation team and exits are resources.

When a primary facility cannot be occupied, a suitable alternate facility (if available) may be used. The alternate facility is a resource for the business continuity plan.

A needs assessment should be conducted to determine resources needed. Resources may come from within the business including trained employees, protection and safety systems, communications equipment and other facilities owned or leased by the business. Other resources from external sources include public emergency services, business partners, vendors and contractors.

The availability and capability of resources must be determined - some are required immediately. For example, trained people (employees or public emergency services) capable of administering first aid or cardiopulmonary resuscitation (CPR) must be available to respond at a moment's notice. Other resources such as plywood to board up windows in anticipation of a hurricane may be stockpiled in advance or purchased when a storm is forecast. Even if plywood is stockpiled in advance, temporary labor may be needed to install the plywood over windows and doors.

The availability of resources often depends on logistics. Logistics is the management of resources to get them to where they are needed when they are needed.

## 4.2 The Need for Disaster Management Resources

Assessing resources for the preparedness program begins with reviewing program goals and performance objectives. High-level goals of the resources should include:

- Protect the safety of employees, visitors, contractors and others who may be at risk from hazards at the facility
- Maintain customer service by minimizing disruptions of business operations
- Protect facilities, physical assets and electronic information
- Prevent environmental pollution
- Protect the organization's brand, image, and reputation

Examples of performance objectives include:

- The first aid team (that is trained to administer first aid and perform CPR) will be able to reach any employee within two minutes.
- The evacuation team will be able to direct all employees to safe exits and account for them outside the building within four minutes.

- Customer service staff will begin contacting customers within 8 hours of a service disruption using office space and telephone service provided by a business partner.
- The primary network server will be restored within 24 hours with replacement equipment from your primary vendor and data restored from backup media retrieved from the secure storage site.
- Production of product A will resume within 1 week by displacing production of product B at Plant B.

For each objective, an assessment of resources needed to accomplish the objective should be conducted. Simple objectives may require limited resources. Aggressive objectives will require many resources with significant capabilities available on short notice. Remember, without sufficient resources, or if resources lack required capabilities, objectives may not be attainable

## 4.3 Types of disaster management resources
There are many resources needed to support the preparedness program. These resources can be organized into different categories:
- People
- Facilities
- Systems
- Equipment
- Materials
- Supplies
- Funding
- Information

Resources are needed for all phases of the program including prevention/deterrence, mitigation, emergency response, business continuity, crisis communications and disaster recovery.

## 1. Human Resources
Employees are needed to staff emergency response, business continuity and crisis communications teams. The emergency response team may be limited to employees trained to direct evacuation or sheltering. Some businesses may choose to organize emergency response teams to administer first aid, perform CPR and use automated external defibrillators (AEDs). Still others may train staff to use portable fire extinguishers. Regulations define minimum requirements that include training and organizing employees. Staff is needed to develop and manage the business continuity and crisis communication plans. The teams will likely be made up of employees working in their respective departments. Some staff may be assigned to work at alternate worksites if a primary worksite cannot be occupied.

## 2. Facilities
Facilities for emergency response include defined shelter space for protection from a tornado or interior space when "shelter-in-place" from an exterior airborne hazard is required. Facilities should also include

a room that can be equipped to serve as an emergency operations center for supporting response to an incident. Other facilities needed include office space or a meeting room with communications equipment to serve as a communications hub.

Facilities for business continuity may include alternate workspace equipped for continuation of business operations. Alternate facilities may be owned or contracted including office space, data center, manufacturing and distribution.

### 3. Systems

Systems for emergency response may include detection, alarm, warning, communications, suppression and pollution control systems. Protection of critical equipment within a data center may include sensors monitoring heat, humidity and attempts to penetrate computer firewalls.

Every building has exit routes so people can evacuate if there is a hazard within the building. These exit routes should be designed and maintained in accordance with applicable regulations.

Business continuity resources may include spare or redundant systems that serve as a backup in case primary systems fail. Systems for crisis communications may include existing voice and data technology for communicating with customers, employees and others.

### 4. Equipment

Equipment includes the means for teams to communicate. Radios, smartphones, wired telephone and pagers may be required to alert team members to respond, to notify public agencies or contractors and to communicate with other team members to manage an incident.

Other equipment depends on the functions of the team. Automated External Defibrillators may be required for a first aid/CPR team. Fire extinguishers would be required for a fire brigade. Spill containment and absorbent equipment would be required for a hazardous materials response team or trained employees working in their assigned workspace. Personal protective equipment including hearing, eye, face and foot protection may be required for employees as part of a safety program.

Many tools may be required to prepare a facility for a forecast event such as a hurricane, flooding or severe winter storm.

### 5. Materials and Supplies

Materials and supplies are needed to support members of emergency response, business continuity and crisis communications teams. Food and water are basic provisions.

Systems and equipment needed to support the preparedness program require fuel. Emergency generators and diesel engine driven fire pumps should have a fuel supply that meets national standards or local regulatory requirements. That means not allowing the fuel supply to run low because replenishment may not be possible during an emergency. Spare batteries for portable radios and chargers for smartphones and other communications devices should be available.

### 6. Funding

Money invested in the preparedness program can pay big dividends if an incident occurs. Consider the benefits of a fire being controlled quickly; immediate medical assistance that saves an injured employee; or a recovery strategy that enables continued customer service. Spending funds prudently on

preparedness can pay back multiple times when measured against the potential for damage to equipment, facilities, loss of staff, lost customers and lost revenue.

## 4.4 International Resource Mobilization for Disasters

The use of international resources by any country is likely to depend on factors, such as:

- scale and effectiveness of its own resources;
- bilateral assistance arrangements with allied countries;
- political implications, from a recipient country's viewpoint of accepting international assistance; and;
- Suitability of international resources in a particular disaster situation.

### 4.4.1 Types of International Resources

The type of international resources most generally needed by stricken countries fall into the following broad categories:

### 1. Pre-disaster

Equipment and expertise for developing measures of prevention, mitigation, and preparedness; for instance, providing emergency communications or developing plans and organizational arrangements

*Assistance in preparedness*

- Planning – Providing assistance in formulating plans at national and other levels; also with departmental operational guidelines and standard operating procedures.
- Organization – Providing assistance in establishing and developing disaster management organizational structures or key points; for instance, the establishment of a national disaster management center, office, or section.
- Systems and facilities – Providing or assisting with:
  - ✓ warning systems;
  - ✓ communications systems;
  - ✓ emergency operations centers;
  - ✓ emergency broadcasting systems; and
  - ✓ protection of key installations, such as power supplies.
- Equipment – Stockpiling of emergency items such as generators, chainsaws, shovels, cooking equipment, shelter materials, and medical equipment.
- Training – Providing overseas training; assisting with in-country training.

### 2. During response operations

As with pre-disaster circumstances, assistance in response operations can also take various forms. Some common examples are:

- Monitoring and warning of potential disaster impact; for instance, assistance from world meteorological networks or tsunami warning centers.
- Post-impact survey and assessment; for instance, aerial photographic or visual reconnaissance.

- Providing emergency assistance teams; for instance, medical teams, defense force teams, other specialist teams.
- Providing emergency equipment and supplies; for instance, communications, generator, clothing, shelter materials, food, transport and medical supplies.
- Providing specialist personnel; for instance, to install and operate water purification plant.
- Providing temporary major response capabilities; for instance, helicopter capability for various emergency roles (including survey and assessment and food distribution), shipping capability for movement of heavy/bulky supplies, off-road vehicle capability.

**3. During recovery programs**

The post-disaster recovery process usually consists of a series of distinct but interrelated programs; for instance, covering infrastructure, medical and health systems, education facilities, and so on. International assistance may therefore be directed toward a specific recovery program or comprise some form of contribution to overall recovery, such as:

- financial grants or credits,
- building materials,
- technical equipment,
- agriculture rehabilitation,
- extended feeding program,
- specialists or specialist teams,
- food-for-work program.

*4. For future development*

Assistance from the resources of overseas governments and international organizations, often as an extension of recovery programs

Sources of international assistance may vary in the case of individual countries, depending on geographical position, regional groupings, and other factors. It is therefore advisable for each country to make a careful survey of the possible sources that are most suitable and convenient for its own needs.

A factor to be taken into account when considering international assistance is the existence, in-country, of various organizations such as the Red Cross, ADRA, and World Vision, because these already have day-to-day international links.

**4.4.2 Sources of International Assistance**

Source of international assistance may vary for individual countries but usually comprise:

- Multilateral organizations and agencies, and
- Bilateral organizations

## 4.5 Resource Organizations Functional Requirements

Before examining these possible methods, however, it is advisable to look further at some of the key requirements that affect the functions of resource organizations. These include:

- *Clear understanding of the disaster role*

It is obviously necessary that organizations should have an absolutely clear understanding of the disaster role(s) required to be fulfilled, especially the additional commitments involved.

- *Organizational scope and limitation*

The scope and limitation of organizations in relation to their disaster tasks also needs to be examined; for instance, to identify any sections and/or personnel who may not be required to participate in the allotted disaster role. These sections/personnel may be valuable for earmarking as reserve capability of some kind.

- *Role capability*

The capability of organizations to fulfill their disaster roles must also be examined, monitored, and confirmed; also their ability to sustain the role under disaster conditions.

- *Timely role conversion*

Organizations must be able to convert to their disaster roles in time to meet tasking requirements; alternatively, there must be adjustment to those requirements.

- *Suspension of normal role elements*

If some elements of some organizational roles can be temporarily suspended or left in abeyance, these should be identified as clearly as possible, thus releasing the relevant resources for disaster purposes.

- *Effect of disaster commitments on own resources*

A factor which often concerns and constrains organizations in relation to disaster roles is the various forms of loss which they may suffer. This can happen in the form of using up fuel, transport capability, supplies and budget allocations. The result is that, after the disaster, an organization's own role capability is depleted or downgraded. Moreover, in conditions of post-disaster stringency, the losses may take a significant time to recoup. This point needs to be resolved, as far as possible, especially to ensure that organizations are not inhibited from carrying out their disaster operations.

- *Exposure to risk*

Sometimes disaster operations may expose the personnel and equipment of resource organizations to risk or loss. This may not be acceptable to resource organizations, resulting in reluctance to carry out certain tasks. This point, if it is likely to be relevant, needs to be satisfactorily settled during the planning process.

- *Legal Implications*

As with exposure to risk, disaster operations may sometimes involve disaster workers and/or organizations in legal implications. For instance, damage may be caused to private property during these operations. Resource organizations need to be assured that they are safeguarded against this kind of eventuality. Disaster legislation can usually be framed to cover this kind of possibility.

## 4.6 The Onion Effect
The effect which a disaster commitment might have on a resource organization can be illustrated as shown below.
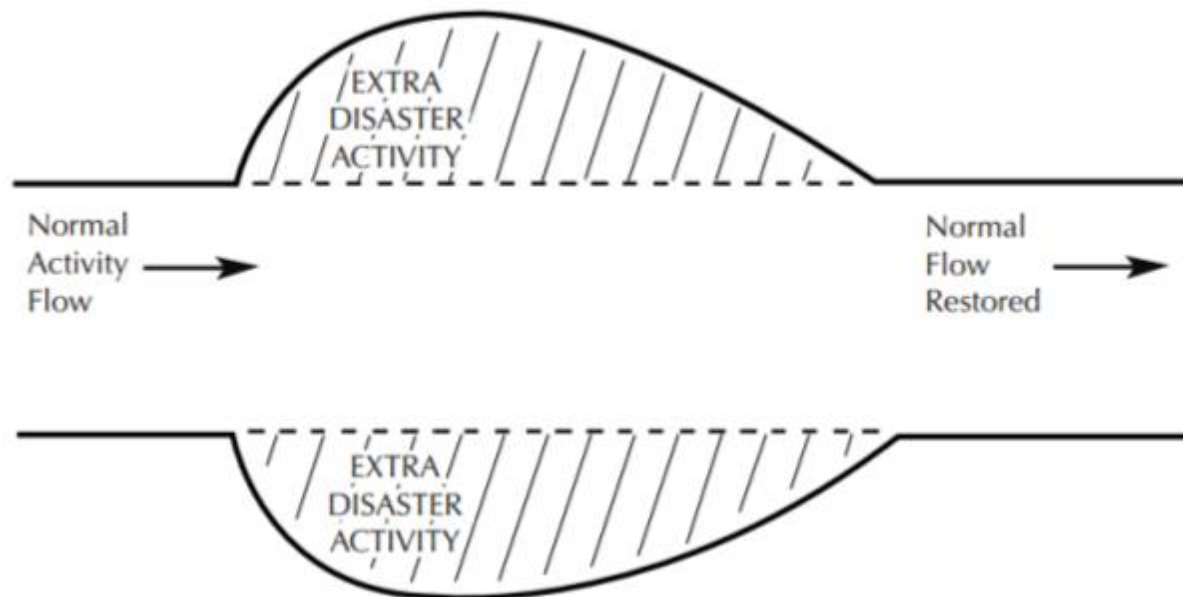


*Figure 4.1: Onion/Balloon Effect of a disaster (source: Disaster mgt handbook – ADB)*

This onion or balloon effect, if it occurs, obviously needs to be controlled and kept to a minimum, otherwise the organization may choke and become useless in its disaster role.

*Some possible ways of dealing with the onion effect may be:*
- The shedding of some normal role activity as soon as the need to convert into the disaster role becomes evident.
- Implementing special planning measures to absorb or offset the extra load, particularly during the peak load.
- The training and employment of extra staff; that is, the use of some form of reserve or auxiliary component. For instance, some countries call up and use police auxiliaries during disaster periods.
- The holding of some special stand-by facilities or capability (e.g. equipment, stores) if these are especially applicable to. The organization's disaster role.
- The use of emergency operating procedures which reduce the workload.
- The acceptance of the extra load and the use of all facilities and staff on a crash-program basis, in the hope that the crisis may be short-lived. This is not a recommended management risk and

it can be dangerous if the crisis period is prolonged and/or a secondary disaster impact follows closely upon the original one.

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# CHAPTER 5
# DISASTER MITIGATION

## 5.1 Introduction

Mitigation is the effort to reduce loss of life and property by lessening the impact of disasters. In order for mitigation to be effective we need to take action now—before the next disaster—to reduce human and financial consequences later (analyzing risk, reducing risk, and insuring against risk). It is important to know that disasters can happen at any time and any place and if we are not prepared, consequences can be fatal.

Disaster mitigation measures are those that eliminate or reduce the impacts and risks of hazards through proactive measures taken before an emergency or disaster occurs.

One of the best known examples of investment in disaster mitigation is the Red River Floodway. The building of the Floodway was a joint provincial/federal undertaking to protect the City of Winnipeg and reduce the impact of flooding in the Red River Basin. It cost $60 million to build in the 1960s. Since then, the floodway has been used over 20 times. Its use during the 1997 Red River Flood alone saved an estimated $6 billion. The Floodway was expanded in 2006 as a joint provincial/federal initiative.

## 5.2 All-hazards approach

An all-hazards emergency management approach looks at all potential risks and impacts, natural and human-induced (intentional and non-intentional) to ensure that decisions made to mitigate against one type of risk do not increase our vulnerability to other risks.

## 5.3 Types of disaster mitigation

Disaster mitigation measures may be **_structural_** (e.g. flood dikes) or **_non-structural_** (e.g. land use zoning). Mitigation activities should incorporate the measurement and assessment of the evolving risk environment.
Activities may include the creation of comprehensive, pro-active tools that help decide where to focus funding and efforts in risk reduction.

Other examples of mitigation measures include:
- Hazard mapping
- Adoption and enforcement of land use and zoning practices
- Implementing and enforcing building codes
- Flood plain mapping
- Reinforced tornado safe rooms
- Burying of electrical cables to prevent ice build-up
- Raising of homes in flood-prone areas
- Disaster mitigation public awareness programs
- Insurance programs

## 5.4 Health and Safety of Workers

Cleanup during disaster recovery involves many occupational hazards. Often, these hazards are exacerbated by the conditions of the local environment as a result of the natural disaster. While individual workers should be aware of these potential hazards, employers are responsible for minimizing exposure to these hazards and protecting workers when possible, including identification and thorough assessment of potential hazards, application of appropriate personal protective equipment (PPE), and the distribution of other relevant information in order to enable safe performance of work. Maintaining a safe and healthy environment for these workers ensures that the effectiveness of the disaster recovery is unaffected.

### 5.4.1 Physical exposures

**Flood-associated injuries**: Flooding disasters often expose workers to trauma from sharp and blunt objects hidden under murky waters that cause lacerations and open and closed fractures. These injuries are further exacerbated with exposure to the often contaminated waters, leading to increased risk for infection. When working around water, there is always the risk of drowning. In addition, the risk of hypothermia significantly increases with prolonged exposure to water temperatures less than 75 degrees Fahrenheit. Non-infectious skin conditions may also occur including miliaria, immersion foot syndrome (including trench foot), and contact dermatitis.

*Earthquake-associated injuries*: The predominant injuries are related to building structural components, including falling debris with possible crush injury, burns, electric shock, and being trapped under rubble.

### 5.4.2 Chemical exposures

### 1. Hazardous material release

Chemicals can pose a risk to human health when exposed to humans at certain quantities. After a natural disaster, certain chemicals can become more prominent in the environment. These hazardous materials can be released directly or indirectly. Chemical hazards directly released after a natural disaster often occur at the same time as the event, impeding planned actions for mitigation. For example, airborne magnesium, chloride, phosphorus, and ammonia can be generated by droughts; dioxins can be produced by forest fires; and silica can be emitted by forest fires. Indirect release of hazardous chemicals can be intentionally released or unintentionally released.

An example of intentional release is insecticides used after a flood or chlorine treatment of water after a flood. The chemical released is often toxic and serves no beneficial purpose when released to the environment. These chemicals can be controlled through engineering to minimize their release when a natural disaster strikes; for example, agrochemicals from inundated storehouses or manufacturing facilities poisoning the floodwaters or asbestos fibers released from a building collapse during a hurricane.

### 5.4.3 Biological exposures

**Mold exposures**: Exposure to mold is commonly seen after a natural disaster such as flooding, hurricane, tornado or tsunami. Mold growth can occur on both the exterior and interior of residential or commercial buildings. Warm and humid condition encourages mold growth; therefore, standing water and excess moisture after a natural disaster would provide an ideal environment for mold growth especially in tropical regions. While the exact number of mold species is unknown, some examples of commonly found indoor molds are Aspergillus, Cladosporium, Alternaria and Penicillium. Reaction to molds differs between individuals and can range from mild symptoms such as eye irritation, cough to severe life-threatening asthmatic or allergic reactions. People with history of chronic lung disease, asthma, allergy, other breathing problems or those that are immunocompromised could be more sensitive to molds and may develop fungal pneumonia.

The most effective approach to control mold growth after a natural disaster is to control moisture level. Some ways to prevent mold growth after a natural disaster include opening all doors and windows, using fans to dry out the building, positioning fans to blow air out of the windows, and cleaning up the building within the first 24–48 hours. All wet items that cannot be properly cleaned and dried within the first 48 hours should be promptly removed and discarded from the building. If mold growth is found in the building, it is important to concurrently remove the molds and fix the underlying moisture problem. When removing molds, N-95 masks or respirators with a higher protection level should be used to prevent inhalation of molds into the respiratory system. Molds can be removed from hard surfaces by soap and water, a diluted bleach solution or commercial products.

**Human remains**: According to the Center for Disease Control and Prevention (CDC), "There is no direct risk of contagion or infectious disease from being near human remains for people who are not directly involved in recovery or other efforts that require handling dead bodies."[18] Most viruses and bacteria perish along with the human body after death. Therefore, no excessive measures are necessary when handling human remains indirectly. However, for workers in direct contact with human remains, universal precautions should be exercised in order to prevent unnecessary exposure to blood-borne viruses and bacteria. Relevant PPE includes eye protection, face mask or shield, and gloves. The predominant health risk is gastrointestinal infections through fecal-oral contamination, so hand hygiene is paramount to prevention. Mental health support should also be available to workers who endure psychological stress during and after recovery.

**Flood-associated skin infections**: Flood waters are often contaminated with bacteria and waste as well as chemicals on occasion. Prolonged, direct contact with these waters leads to an increased risk for skin infection, especially with open wounds in the skin or history of a previous skin condition, such as atopic dermatitis or psoriasis. These infections are exacerbated with a compromised immune system or an aging population. The most common bacterial skin infections are usually with Staphylococcus and Streptococcus. One of the most uncommon, but well-known bacterial infections is from Vibrio vulnificus, which causes a rare, but often fatal infection called necrotizing fasciitis.

**Other salt-water Mycobacterium infections** include the slow growing M. marinum and fast growing M. fortuitum, M. chelonae, and M. abscessus. Fresh-water bacterial infections include Aeromonas hydrophila, Burkholderia pseudomallei causing melioidosis, leptospira interrogans causing leptospirosis, and chromobacterium violaceum. Fungal infections may lead to chromoblastomycosis, blastomycosis, mucormycosis, and dermatophytosis. Numerous other arthropod, protozoal, and parasitic infections have been described.[6] A worker can reduce the risk of flood-associated skin infections by avoiding the water if an open wound is present, or at minimum, cover the open wound with a waterproof bandage. Should contact with flood water occur, the open wound should be washed thoroughly with soap and clean water.

### 5.4.4 Psychosocial exposures

According to the CDC, "Sources of stress for emergency responders may include witnessing human suffering, risk of personal harm, intense workloads, life-and-death decisions, and separation from family." These stresses need to be prevented or effectively managed in order to optimize assistance without causing danger to oneself. Preparation as an emergency responder is important, in addition to establishing care for responsibilities at home. During the recovery efforts, it is important to understand and recognize burnout and sources of stress. After the recovery, it is vital to take time away from the disaster scene and slowly re-integrate back to the normal work environment.

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# CHAPTER 6
# DISASTER RESPONSE

## 6.1 Introduction

The aim of emergency response is to provide immediate assistance to maintain life, improve health and support the morale of the affected population. Such assistance may range from providing specific but limited aid, such as assisting refugees with transport, temporary shelter, and food, to establishing semi-permanent settlement in camps and other locations. It also may involve initial repairs to damaged or diversion to infrastructure.

The focus in the response phase is on putting people safe, prevent need disasters and meeting the basic needs of the people until more permanent and sustainable solutions can be found. The main responsibility to address these needs and respond to a disaster lies with the government or governments in whose territory the disaster has occurred. In addition, Humanitarian organizations are often strongly present in this phase of the disaster management cycle, particularly in countries where the government lacks the resources to respond adequately to the needs.

## 6.2 Common Objectives of Disaster Responders

The following objectives forms part of the disaster response responders purpose:
- saving and protecting human life;
- relieving suffering;
- containing the emergency – limiting its escalation or spread and mitigating its impacts;
- providing the public and businesses with warnings, advice and information;
- protecting the health and safety of responding personnel;
- safeguarding the environment;
- as far as reasonably practicable, protecting property;
- maintaining or restoring critical activities;
- maintaining normal services at an appropriate level;
- promoting and facilitating self-help in affected communities;
- facilitating investigations and inquiries (e.g. by preserving the scene and effective records management);
- facilitating the recovery of the community (including the humanitarian assistance, economic, infrastructure and environmental impacts);
- evaluating the response and recovery effort; and
- identifying and taking action to implement lessons identified.

## 6.3 Disaster response planning

The United States National Fire Protection Association (NFPA) 1600 Standard (NFPA, 2010) specify lements of an emergency response, as: defined responsibilities; specific actions to be taken (which must include protective actions for life safety); and communication directives. Within the standard, NFPA recognize that disasters and day-to-day emergencies are characteristically different. Nevertheless, the prescribed response elements are the same.

In support of the NFPA standard, Statoil's (2013) practical application of emergency response is across three distinct "lines" that incorporate NFPA's elements. Line 1 is responsible for the operational management of an incident; line 2, typically housed off-site, is responsible for tactical guidance and additional resource management. Finally, in the case of major incidents, line 3 provides strategic guidance, group resource management, and government and media relations.

While it is impossible to plan for every disaster, crisis or emergency, the Statoil investigation into the terrorist attacks on In Amenas place emphasis on the importance of having a disaster response. The report concludes that a disaster response framework may be utilized in an array of disaster situations, such as that at In Amenas.

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# CHAPTER 7
# DISASTER RECOVERY

## 7.1 Introduction
Disaster Recovery involves a set of policies, tools and procedures to enable the recovery or continuation of vital technology infrastructure and systems following a natural or human-induced disaster. Disaster recovery focuses on the IT or technology systems supporting critical business functions, as opposed to business continuity, which involves keeping all essential aspects of a business functioning despite significant disruptive events. Disaster recovery can therefore be considered a subset of business continuity.

## 7.2 Disaster Recovery Plan
A disaster recovery plan (DRP) is a documented, structured approach that describes how an organization can quickly resume work after an unplanned incident. A DRP is an essential part of a business continuity plan (BCP). It is applied to the aspects of an organization that depend on a functioning IT infrastructure. A DRP aims to help an organization resolve data loss and recover system functionality so that it can perform in the aftermath of an incident, even if it operates at a minimal level.

The step-by-step plan consists of the precautions to minimize the effects of a disaster so the organization can continue to operate or quickly resume mission-critical functions. Typically, disaster recovery planning involves an analysis of business processes and continuity needs. Before generating a detailed plan, an organization often performs a business impact analysis (BIA) and risk analysis (RA), and it establishes recovery objectives.

## 7.3 Recovery plan considerations
A disaster recovery strategy should start at the business level and determine which applications are most important to running the organization. The recovery time objective (RTO) describes the target amount of time a business application can be down, typically measured in hours, minutes or seconds. The recovery point objective (RPO) describes the age of files that must be recovered from backup storage for normal operations to resume.

Recovery strategies define an organization's plans for responding to an incident, while disaster recovery plans describe how the organization should respond. Recovery plans are derived from recovery strategies.

In determining a recovery strategy, organizations should consider such issues as:

- Budget
- Insurance coverage
- Resources -- people and physical facilities
- Management's position on risks
- Technology

- Data
- Suppliers
- Compliance requirements

Management approval of recovery strategies is important. All strategies should align with the organization's goals. Once disaster recovery strategies have been developed and approved, they can be translated into disaster recovery plans.

## 7.4 Types of disaster recovery plans

DRPs can be specifically tailored for a given environment. Some environment-specific plans include:

**Virtualized disaster recovery plan** - Virtualization provides opportunities to implement disaster recovery in a more efficient and simpler way. A virtualized environment can spin up new virtual machine (VM) instances within minutes and provide application recovery through high availability. Testing can also be easier to achieve, but the plan must include the ability to validate that applications can be run in disaster recovery mode and returned to normal operations within the RPO and RTO.

**Network disaster recovery plan** - Developing a plan for recovering a network gets more complicated as the complexity of the network increases. It is important to detail the step-by-step recovery procedure, test it properly and keep it updated. Data in this plan will be specific to the network, such as in its performance and networking staff.

**Cloud disaster recovery plan** - Cloud disaster recovery (cloud DR) can range from a file backup in the cloud to a complete replication. Cloud DR can be space, time and cost-efficient, but maintaining the disaster recovery plan requires proper management. The manager must know the location of physical and virtual servers. The plan must address security, which is a common issue in the cloud that can be alleviated through testing.

**Data center disaster recovery plan** - This type of plan focuses exclusively on the data center facility and infrastructure. An operational risk assessment is a key element in data center DRPs. It analyzes key components such as building location, power systems and protection, security, and office space. The plan must address a broad range of possible scenarios.

## 7.5 Scope and objectives of DR planning
A disaster recovery plan can range in scope from basic to comprehensive. Some DRPs can be upward of 100 pages long.

Disaster recovery budgets can vary greatly and fluctuate over time. Organizations can take advantage of free resources, such as online DRP templates. Several organizations, such as the Business Continuity Institute and Disaster Recovery Institute International, also provide free information and online how-to articles.

A disaster recovery plan checklist includes identifying critical IT systems and networks, prioritizing the RTO, and outlining the steps needed to restart, reconfigure and recover systems and networks. The plan should at least minimize any negative effect on business operations. Employees should know basic emergency steps in the event of an unforeseen incident.

Distance is an important, but often overlooked, element of the DRP process. A disaster recovery site that is close to the primary data center may seem ideal -- in terms of cost, convenience, bandwidth and testing -- but outages differ greatly in scope. A severe regional event can destroy the primary data center and its disaster recovery site if the two are located too close together.

## 7.6 How to build a disaster recovery plan

The disaster recovery plan process involves more than simply writing the document. Before writing the DRP, risk analysis and business impact analysis can help determine where to focus resources in the disaster recovery planning process. The BIA identifies the impacts of disruptive events and is the starting point for identifying risk within the context of disaster recovery. It also generates the RTO and RPO. The RA identifies threats and vulnerabilities that could disrupt the operation of systems and processes highlighted in the BIA. The RA assesses the likelihood of a disruptive event and outlines its potential severity.

A DRP checklist should include the following steps:
- establishing the range or extent of necessary treatment and activity -- the scope of recovery;
- gathering relevant network infrastructure documents;
- identifying the most serious threats and vulnerabilities, and the most critical assets;
- reviewing the history of unplanned incidents and outages, and how they were handled;
- identifying the current disaster recovery strategies;
- identifying the incident response team;
- having management review and approve the DRP;
- testing the plan;
- updating the plan; and
- implementing a DRP audit.

Disaster recovery plans are living documents. Involving employees -- from management to entry-level -- helps to increase the value of the plan.

Another component of the DRP is the **communication plan**. This strategy should detail how both internal and external crisis communication will be handled. Internal communication includes alerts that can be sent using email, overhead building paging systems, voice messages or text messages to mobile devices. Examples of internal communication include instructions to evacuate the building and meet at assembly points, updates on the progress of the situation and notices when it's safe to return to the

building.

External communications are even more essential to the business's continuity plan and include instructions on how to notify family members in the case of injury or death; how to inform and update key clients and stakeholders on the status of the disaster; and how to discuss disasters with the media.

## 7.7 Disaster recovery plan template

An organization can begin its DRP with a summary of vital action steps and a list of important contacts, so the most essential information is quickly and easily accessible.
The plan should define the roles and responsibilities of disaster recovery team members and outline the criteria to launch the plan into action. The plan should then specify, in detail, the incident response and recovery activities.

Other important elements of a disaster recovery plan template include:
- a statement of intent and disaster recovery policy statement;
- plan goals;
- authentication tools, such as passwords;
- geographical risks and factors;
- tips for dealing with media;
- financial and legal information and action steps; and
- plan history.

## 7.8 Incident management plan vs. disaster recovery plan

An **incident management plan** (IMP) -- or **incident response plan** -- should also be incorporated into the disaster recovery plan; together, the two create a comprehensive data protection strategy. The goal of both plans is to minimize the impact of an unexpected incident, recover from it and return the organization to its normal production levels as quickly as possible. However, incident management plans and disaster recovery plans are not the same.

The major difference between an incident management plan and a DRP is their primary objectives. An incident management plan focuses on protecting sensitive data during an event and defines the scope of actions to be taken during the incident, including the specific roles and responsibilities of the incident response team. In contrast, a DRP focuses on defining the recovery objectives and the steps that must be taken to bring the organization back to an operational state after an incident occurs.

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# CHAPTER 8
# INTERNATIONAL ORGANIZATION IN DISASTER MANAGEMENT

## 8.1 The International Emergency Management Society

The International Emergency Management Society (TIEMS) is an international non-profit NGO, registered in Belgium. TIEMS is a global forum for education, training, certification, and policy in emergency and disaster management. TIEMS' goal is to develop and bring modern emergency management tools, and techniques into practice, through the exchange of information, methodology innovations and new technologies.

TIEMS provides a platform for stakeholders to meet, network, and learn about new technical and operational methodologies and focuses on cultural differences to be understood and included in the society's events, education, and research programs by establishing local chapters worldwide. Today, TIEMS has chapters in Benelux, Romania, Finland, Italy, Middle East and North Africa (MENA), Iraq, India, Korea, Japan and China.

## 8.2 International Association of Emergency Managers

The International Association of Emergency Managers (IAEM) is a non-profit educational organization aimed at promoting the goals of saving lives and property protection during emergencies. The mission of IAEM is to serve its members by providing information, networking and professional opportunities, and to advance the emergency management profession.

It has seven councils around the world: Asia, Canada, Europa, International, Oceania, Student and USA.

The Air Force Emergency Management Association, affiliated by membership with the IAEM, provides emergency management information and networking for U.S. Air Force Emergency Management personnel.

International Recovery Platform
The International Recovery Platform (IRP) is a joint initiative of international organizations, national and local governments, and non-governmental organizations engaged in disaster recovery, and seeking to transform disasters into opportunities for sustainable development.

IRP was established after the Second UN World Conference on Disaster Reduction (WCDR) in Kobe, Japan, in 2005 to support the implementation of the Hyogo Framework for Action (HFA) by addressing the gaps and constraints experienced in the context of post-disaster recovery. After a decade of functioning as an international source of knowledge on good recovery practice, IRP is now focused on a more specialized role, highlighted in the Sendai Framework for Disaster Risk Reduction 2015–2030 as an "international mechanism for sharing experience and lessons associated with build back better"

## 8.3 The International Red Cross and Red Crescent Movement

The International Federation of Red Cross and Red Crescent Societies (IFRC) works closely with National Red Cross and Red Crescent societies in responding to emergencies, many times playing a pivotal role. In addition, the IFRC may deploy assessment teams, e.g. Field Assessment and Coordination Teams (FACT), to the affected country if requested by the national society. After assessing the needs, Emergency Response Units (ERUs) may be deployed to the affected country or region. They are specialized in the response component of the emergency management framework.

## 8.4 Baptist Global Response

Baptist Global Response (BGR) is a disaster relief and community development organization. BGR and its partners respond globally to people with critical needs worldwide, whether those needs arise from chronic conditions or acute crises such as natural disasters. While BGR is not an official entity of the Southern Baptist Convention, it is rooted in Southern Baptist life and is the international partnership of Southern Baptist Disaster Relief teams, which operate primarily in the US and Canada.

## 8.5 United Nations

The United Nations system rests with the Resident Coordinator within the affected country. However, in practice, the UN response will be coordinated by the UN Office for the Coordination of Humanitarian Affairs (UN-OCHA), by deploying a UN Disaster Assessment and Coordination (UNDAC) team, in response to a request by the affected country's government. Finally UN-SPIDER designed as a networking hub to support disaster management by application of satellite technology.

## 8.6 World Bank

Since 1980, the World Bank has approved more than 500 projects related to disaster management, dealing with both disaster mitigation as well as reconstruction projects, amounting to more than US$40 billion. These projects have taken place all over the world, in countries such as Argentina, Bangladesh, Colombia, Haiti, India, Mexico, Turkey and Vietnam.

Prevention and mitigation projects include forest fire prevention measures, such as early warning measures and education campaigns; early-warning systems for hurricanes; flood prevention mechanisms (e.g. shore protection, terracing, etc.); and earthquake-prone construction. In a joint venture with Columbia University under the umbrella of the ProVention Consortium Project the World Bank has established a Global Risk Analysis of Natural Disaster Hotspots.

In June 2006, the World Bank, in response to the HFA, established the Global Facility for Disaster Reduction and Recovery (GFDRR), a partnership with other aid donors to reduce disaster losses. GFDRR helps developing countries fund development projects and programs that enhance local capacities for disaster prevention and emergency preparedness.

## 8.7 European Union

In 2001 the EU adopted the Community Mechanism for Civil Protection to facilitate cooperation in the event of major emergencies requiring urgent response actions. This also applies to situations where there may be an imminent threat as well.

The heart of the Mechanism is the Monitoring and Information Center (MIC), part of the European Commission's Directorate-General for Humanitarian Aid & Civil Protection. It gives countries 24-hour access to a one-stop-shop of civil protections available amongst all the participating states. Any country inside or outside the Union affected by a major disaster can make an appeal for assistance through the MIC. It acts as a communication hub, and provides useful and updated information on the actual status of an ongoing emergency.

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