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AFRICAN INSTITUTE

Of Research and Development Studies

CENTRAL MANAGEMENT CENTRE

STANDARD LECTURE NOTES

DISASTER MANAGEMENT

FOR

DIPLOMA

IN SOCIAL WORK

ACADEMIC AFFAIRS CMC - 2011

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MESSAGE FROM THE CHAIRMAN & MANAGING DIRECTOR

I would like to take this chance to express my sincere gratitude to all the staffs who have been involved in developing these standard lecture notes to be used in all our campuses.

The standard lecture notes are part of our bigger efforts to ensure total quality management in our delivery of service. We anticipate that the standard lecture notes will enhance the delivery of service by the lecturers .Students who have used standard lecture notes in the past have shown remarkable performance in the internal and national examinations

I wish to urge all the lecturers and students to make maximal use of these lecture notes.

Positive and negative feedback are most welcome. We shall Endeavour to continuously improve these manuscripts with the final intention of reaching international standard based on your feedback.

Yours faithfully,

Dr. Noah Chepkech, Bpharm (UON), Dphil (SA), MPSK, Rh.P.
CHAIRMAN& MANAGING DIRECTOR

DISASTER MANAGEMENT

INTRODUCTION

The module unit is designed to equip the trainee with knowledge, skills and attitudes that will enable him/her to effectively manage disaster in a society.

GENERAL OBJECTIVES

By the end of this module unit, the trainee should be able to;

a) Acquire skills in disaster management and mitigation
b) Institute measures to prevent disaster
c) Appreciate the importance of disaster preparedness and response

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CHAPTER ONE

INTRODUCTION TO DISASTER MANAGEMENT

Specific Objectives

By the end of this topic the trainee should be able to;

a) Explain the meaning of disaster
b) Describe the historical background of disasters in Kenya
c) Discuss issues in disaster management
d) Classify disasters

INTRODUCTION

Meaning of disaster management

WHO defines Disaster as "any occurrence that causes damage, ecological disruption, loss of human life, deterioration of health and health services, on a scale sufficient to warrant an extraordinary response from outside the affected community or area". Disasters can be defined in different ways.

- A disaster is an overwhelming ecological disruption occurring on a scale sufficient to require outside assistance
- A disaster is an event located in time and space which produces conditions whereby the continuity of structure and process of social units becomes problematic
- It is an event or series of events which seriously disrupts normal activities

The magnitude of the effects of the event will be viewed differently.

HISTORICAL BACKGROUND OF DISASTER IN KENYA

The country of Kenya has been stricken by various disasters ,Kenya's disaster profile is dominated by droughts, fire, floods, terrorism, technological accidents, diseases and epidemics that disrupt people's livelihoods, destroy the infrastructure, divert planned use of resources, interrupt economic activities and retard development. The Kenya government through the Ministry of State for Special Programmes has developed National Policy for Disaster Management in Kenya and National Disaster Response Plan to guide in the disaster risk reduction.

The history of disasters in Kenya has been collected to assist in predicting and planning for the future occurrences. The historical document has covered the period of disasters occurrence, areas covered, the kind of disaster and the estimated causalities.

FOREST FIRES UPDATE AS AT 1530 HOURS 27TH MARCH 2009
This report covers fires that date back to early February 2009. We have since then had serious fire outbreaks in many forests all over the country. This state is attributed to prolonged drought

conditions, heavy fuel loads in the forests and inaccessibility of the forests. The fires increased in the early days of the month of March, within the Mau complex, Mt. Kenya ecosystem, Aberdare Area and the response has been gaining grounds, so far the predicted fire behavior has not been good at all, as long as the rains continued to delay. The continuing fires are in Nakuru, Koibatek, Lariak, Meru south in Chogoria and the Kipipiri forest areas. Most of the fires in Kipipiri have been put off except 2 fires. The district forest officers are mopping up the fires and monitoring the situation.As of today 30th March 2009, most of the forest stations have reported that the ragging fires had been put off over the weekend by the showers that were there in most parts of the country.

NAIROBI, 2ND APRIL 2009
THE NAKUMATT AND MOLO FIRE TRAGEDY
The Nakumatt Supermarket fire broke out at 2.45pm on 28th January 2009. The cause of the fire is yet to be established but it is alleged to have been started by an electric power surge.
The Molo fire broke out on 31st January 2009 at 6.45 at a remote area known as Sachangw'ani, 3 KM from Salgaa trading centre along Nakuru-Eldoret highway. It involved a Mercedes Benz truck Reg. No.KAY 030F that was carrying 50,000 litres of petrol from Kenya Pipeline Nakuru depot to Juba, Southern Sudan. The cause of the fire is not yet established but it is alleged that an irate person who had been denied access to siphon oil from the fallen tanker ignited the fire but himself was the first person to perish on the spot.
The effect of the two fires was too enormous in terms of human causalities, loss of lives and property and in testing the effectiveness of the Kenyan response systems. The effects of the fire could therefore not be ignored. All over a sudden, everyone realized how vulnerable they were and several interventions followed in succession of one another, which included establishment of the Nakumatt/Molo fire Victims Fund and its Management Committee and calls politicians and leaders for having in place a Disaster Management Policy and its Operational Plan.
RESPONSE
When the fires broke out, the responses were timely – with all major response agencies taking part. For the Nakumatt fire, the Nairobi Fire Fighters were on the scene in 15 minutes while for Molo fire the General Service Unit personnel were on the scene even before the fire started. What followed is that these teams were ill equipped and had to seek help from other response agencies, both private and public, who either arrived too late, were equally ill equipped or were not well coordinated to effectively prevent the full cycle of the raging fires. By the time the fires had been contained, 29 people were confirmed dead and one survivor recorded in the Nakumatt fire tragedy and 373 persons recorded as victims in the Molo fire tragedy which included 130 who died on the spot and 243 who were hospitalized as either in-patients or out-patients in various hospitals in Molo and Nakuru. A significant number of the victims were airlifted to Nairobi Hospitals the same day. (See more statistics below).
On 6th February 2009, His Excellency the President, Hon. MwaiKibaki established a Fund, 'The Nakumatt/Molo Fire Victims Fund' and its Fund Raising and Management Committee through Kenya Zagette Notice No. 1171. The objective and purpose of establishing the Fund was to provide (a) assistance in payment of medical bills; and (b) associated humanitarian assistance, to the victims of both tragedies. The Fund consists of donations by leaders, the private sector, the public service, the civil society, development partners, members of the public and other well wishers.

The Gazetted Fund Raising and Management Committee for the Fund comprise of

(i) NaushadMerali – (chairman),
(ii) Peter KaharaMunga,
(iii) Martin Oduor-Otieno
(iv) Bethwelkiplagat; and
(v) EddahLisigi

The Committee is based in the Ministry of State for Special Programmes.

After its initial meetings the Committee co-opted other sub-Committee members to represent special interests. These include:-

(i) Daud A. Mohamed – Permanent Secretary, Ministry of State for Special Programmes
(ii) Abbas Gullet - Director, Kenya Red Cross
(iii) Dr. Francis Kimani - Director, Medical Services
(iv) Steve Smith - Chairman, Private Sector Alliance
(v) Joseph N. Macharia - Was appointed as Secretaries of the Committee

THE COMMITTEES TASK AND ACCOMPLISHEMENT

The Committee's initial work was to establish the facts relating to the fires, and on 14th and 15th February 2009 it held its first meeting, visited all hospitals and the scene of the fire; and held discussions with patients, doctors, volunteers and Officials from Provincial Administrations and Internal Security. These interactions enabled the Committee to learn the status of the patients, the difficulties being faced in their treatments and to get vital relevant information.

The Committee next step was to fund raise for the victims as no budget had been set aside by the Government for the victims. On 19th February 2009, a fund raising ceremony presided by His Excellency the President raised Kshs. 80,700,000 on the spot with pledges coming in later. 80 percent of the amounts were raised by Public Servants led by His Excellency the president while the rest came from private sector. Motivated by the overwhelming generosity of the well-wisher, the Committee established other machineries to raise more money and Kshs. 111.4 million had been raised as at 2nd April, 2009. Donations in kind received from various donors in terms of Medical supplies, food and food items, and volunteer services were worth approximately Kshs. 20 million.

The Committee then decided to pay hospital bills and provide other humanitarian assistance.

The Committee on 4th March 2009 paid Kshs. 19,750,269.65 to eight hospitals as follows:-

(1) The Mater Hospital Kshs. 9.396,684.95
(2) The Aga Khan Hospital Kshs. 5,416,338.20
(3) The Nairobi Hospital Kshs. 3,742,218.50
(4) War Memorial Kshs. 745,210.00
(5) St. Joseph Nursing Home Kshs. 203,100.00
(6) Valley Hospital Limited Kshs. 144,638.00
(7) Lee Funeral Home Kshs. 65, 000.00
(8) St. Mary Mission Hospital Kshs. 37,080.00

Total Kshs. 19,750,269.65

On 18th Mrach 2009 an additional **Kshs. 80,490** was paid to the following two hospitals:

(1) Lee Funeral Home Kshs. 27,990.00

(2) St. Mary Mission Hospital Kshs. 52,500.00

Total Kshs. 80,490.00

As may be noted, no Public Hospital bill had been paid by 2nd April 2009 because the Committee had not received a comprehensive breakdown of the medical Bills and the medical supplies donated to them to enable the Committee makes a decision. By the time of preparing this brief, the bills were being sorted out for presentation to the Committee.

The Committee also has resolved to provide humanitarian assistance of Kshs. 50,000 to the victims to assist in burial or other humanitarian needs. However, it is only the next of kin of dead victims will receive the money. Survivors who were hospitalized for more than 15 days or more will also be paid Kshs. 50,000 each. Already 6 people have been paid a total of Kshs. 300,000 and another 130 persons have been cleared to receive the payment. The remaining 164 persons who qualify for payment are being vetted before receiving the payment. In total, about 300 people will each be paid Kshs. 50,000 humanitarian assistance.

Regarding the Nakumatt fire Victims, Nakumatt Holdings Limited is meeting all the bills which include payments for the DNA tests and provision of humanitarian assistance of Kshs. 100,000 for every victim that died. The amounts are collected by verified next of kins of the deceased. The Committee is merely facilitating the process to ensure the money gets to the victims.

The Committee has also resolved to construct a memorial site where the accident took place and 78 people put to rest in a mass grave. In addition, the Committee has agreed to set aside some funds to construct a Burns Unit at the Rift Valley Provincial General Hospital.

The Statistics

1. Molo Fire Tragedy 373 people were affected out of whom:-

(i) 31 are still Hospitalized - 6 in Kenyatta National Hospital and 25 in Rift Valley Provincial General Hospital.

(ii) 72 died in various hospitals where they were admitted

(iii) 68 had been admitted in various hospitals but have since been discharged

(iv) 72 had minor injuries and were treated and discharged the same day

(v) 130 were badly burned some beyond recognition. Out of these 78 were buried in mass burial at Shachangw'ani, 42 were identified and claimed, and 10 were identified but unclaimed. It is out of these numbers that 300 beneficiaries will be identified to be provided humanitarian assistance.

2. Nakumatt Fire Tragedy

(a) 29 people died, out of whom 18 have been identified through DNA and 11 are yet to be identified through second round of DNA testing.

(b) Initially it was reported that there were no survivors in the tragedy but later reports show that two people survived- one is still in Kenyatta Hospital and the other was treated at the Nairobi West Hospital and discharged but is still getting treatments.

The Committee is still in operation and more details will be provided in our next brief.

CLASSIFICATION OF DISASTERS

Disasters are classified in various ways.

- Natural disasters and Man made disasters
- Sudden disasters and Slow onset disasters

The dividing line between these types of disasters is imprecise. Activities related to man may exacerbate natural disasters.

Disaster means Sudden or Great Misfortune

Although experts may differ in their definitions of disaster, many public health practitioners would characterize a disaster as a "sudden, extraordinary calamity or catastrophe, which affects or threatens health". Disasters include

- Tornadoes,
- Fires
- Hurricanes,
- Floods / Sea Surges / Tsunamis
- Snow storms,
- Earthquakes,
- Landslides,
- Severe air pollution (smog)
- Heat waves,
- Epidemics,
- Building collapse,
- Toxicological accidents (e.g. release of hazardous substances),
- Nuclear accidents,
- Explosions
- Civil disturbances,
- Water contamination and
- Existing or anticipated food shortages.

EFFECTS OF MAJOR DISASTERS

Disasters throughout history have had significant impact on the numbers, health status and life style of populations.

- Deaths
- Severe injuries, requiring extensive treatments
- Increased risk of communicable diseases
- Damage to the health facilities
- Damage to the water systems
- Food shortage
- Population movements

Health problems common to all Disasters

- Social reactions
- Communicable diseases
- Population displacements
- Climatic exposure
- Food and nutrition
- Water supply and sanitation
- Mental health
- Damage to health infrastructure

POPULATION GROWTH AND DISASTERS

Hardly a day passes without news about a major or complex emergency happening in some part of the World.

Disasters continue to strike and cause destruction in developing and developed countries alike, raising peoples concern about their vulnerability to occurrences that can gravely affect their day to day life and their future.

Major disasters have had a big impact on the migration of populations and related health problems, and many millions are struggling for minimum vital health and sanitation needs and suffer from malnutrition.

Vulnerable Populations

Emergencies, especially those that occur in Nature, only become catastrophic events when they combine with vulnerability factors such as human settlements and population density.

An earthquake occurring in a deserted area would be considered a natural hazard; but if it occurred in a mega city it would be recognized as a major disaster.

Man made emergencies and another type of emergency that has to do with population vulnerability concerns technological disasters such as those of a Chemical or Radiological or Nuclear in nature. E.g. Bhopal Gas Tragedy and Chernobyl nuclear disaster.

These examples demonstrate that major and complex emergencies are closely linked to anarchic population growth, leading to unplanned population settlement, environmental degradation and poverty.

The lack of minimum health services and basic health education are aggravating factors which could make a disaster out of an emergency and a complex emergency out of social tension.

Civil Disturbance

Any incident that disrupts a community where intervention is equired to maintain public safety constitutes a civil disturbance. Some examples are demonstrations, riots, strikes, public nuisances, and criminal activities. Civil disturbance incidences may include resistance or rejection of all different types of control and authority. They tend to occur in areas of concentrated populations including sporting, concert, cultural and conference events. Some areas subject to civil disturbances may include college communities, areas with concentrations of

disparate economic status populations and government offices. Some examples of criminal activities associated with civil disturbances may include looting, assault, property or environmental damage, illegal drug use or distribution, fire-setting, vandalism and violation of noise ordinances.

Terrorism

Devastating acts such as the terrorist attacks on the World Trade Center and the Pentagon have left many concerned about the possibility of future incidents in the United States and their potential impact. These attacks have raised uncertainty about what might happen next. Terrorism may involve devastating acts using weapons of mass destruction ranging from chemical agents, biological hazards, a radiological or nuclear device, and other explosives. The primary objective of a terrorist is to create widespread fear. Nevertheless, there are things you can do to prepare for the unexpected and reduce the stress that you may feel now and later, should another emergency arise.

The Palm Beach County Terrorism Response Program coordinates with the Florida Department of Law Enforcement and the United States Department of Homeland Security to ensure that the County's terrorism response plan meets all state and federal requirements. Activities integrated in this coordination include planning, training, exercising, critical infrastructure enhancement, inter-agency cooperation, as well as grant identification and expenditure mechanisms to ensure that Palm Beach County has a viable anti-terrorism program that includes cross-agency training and development.

The program provides local partner agencies with support and technical assistance in order to adequately address their homeland security needs. In addition to the local activities, the program also participates in State and Federal planning groups and task forces.

Before a Terrorist Attack Occurs:

- Have at least a 5 to 7 day Disaster Supplies Kit assembled.
- Create a shelter-in-place plan.
- Create an evacuation plan.

If you Receive a Bomb Threat:

- Ask the caller the following questions: When is the bomb going to explode? Where is the bomb right now? What kind of bomb is it? What does the bomb look like? Why did you place the bomb? Where are you calling from?
- Record the exact time and length of the call.
- Write down the exact words of the caller.
- Listen carefully to the caller's voice and background noise.
- After you hang up, call 9-1-1 immediately from a hard-wired telephone. Do **NOT** use cell phones to report a bomb threat.

If a Terrorism-Related Event Happens:

- Stay calm and be patient.
- Listen to a local radio or television station for news and follow the instructions of emergency service personnel.
- Be vigilant. If the incident occurs near you, look out for secondary hazards such as falling debris or additional attacks.
- Check for injuries and summon help for seriously injured people.
- If the incident occurs near your home while you are there, check for damage using a flashlight. Do **NOT** use matches or turn on electrical switches.
- Check for fires, fire hazards and other household hazards.
- If you smell gas or suspect a leak, turn off the main gas valve, open your windows and get everyone outside.
- Check on your neighbors, especially those who are elderly, disabled, or who live alone.
- Only call 9-1-1 about life-threatening emergencies.

Homeland Security Advisory System

The Homeland Security Advisory System was developed to provide a comprehensive and effective means to disseminate information regarding the risk of terrorist acts to local, state and federal authorities, and the American people. This system provides warnings based on a set of graduated threat conditions that increase as the risk of the threat increases. At each threat level federal departments and agencies implement a corresponding set of protective measures to further reduce vulnerability or increase response capability during a period of heightened alert. There are five threat conditions**,** each identified by a description and corresponding color.

TYPES

EARTHQUAKES

Definition and Measurement

"An earthquake is a sudden motion or trembling of the ground produced by the abrupt displacement of rock masses".

Most earthquakes result from the movement of one rock mass past another in response to tectonic forces.

The focus is the point where the earthquake's motion starts,

The epicenter is the point on the earth's surface that is directly above the focus.

Earthquake Magnitude is a measure of the strength of an earthquake as calculated from records of the event made on a calibrated seismograph.

In 1935, Charles Richter first defined local magnitude, and the Richter scale is commonly used today to describe anearthquake's magnitude.

Earthquake Intensity

In contrast, earthquake intensity is a measure of the effects of an earthquake at a particular place. It is determined from observations of the earthquake's effects on people, structures and the earth's surface.

Among the many existing scales, the Modified Mercalli Intensity Scale of 12 degrees, symbolized as MM, is frequently used

Earthquake Hazards

Earthquake hazards can be categorized as either direct hazards or indirect hazards.

Direct Hazards

- Ground shaking;
- Differential ground settlement;
- Soil liquefaction;
- Immediate landslides or mud slides, ground lurching and avalanches;
- Permanent ground displacement along faults;
- Floods from tidal waves, Sea Surges & Tsunamis

Indirect Hazards

- Dam failures;
- Pollution from damage to industrial plants;
- Delayed landslides.

Most of the damage due to earthquakes is the result of strong ground shaking. For large magnitude events, trembling has beenfelt over more than 5 million sq. km.

Site Risks

Some common site risks are:

(I**) Slope Risks** - Slope instability, triggered by strong shaking may cause landslides. Rocks or boulders can roll considerable distances.

(ii) **Natural Dams** - Landslides in irregular topographic areas may create natural dams which may collapse when they are filled.

This can lead to potentially catastrophic avalanches after strong seismic shaking.

(iii) **Volcanic Activity** - Earthquakes may be associated with potential volcanic activity and may occasionally be considered as precursory phenomena.

Explosive eruptions are normally followed by ash falls and/or pyroclastic flows, volcanic lava or mud flows, and volcanic gases.

CYCLONE

The term "cyclone" refers to all classes of storms with low atmospheric pressure at the centre, are formed when an organized system of revolving winds, clockwise in the Southern Hemisphere, anti-clockwise in the Northern Hemisphere, develops over tropical waters.

Cyclones are classified on the basis of the average speed of the wind near the centre of the system as follows:

- Wind Speed Classification
- Up to 61 km/hr Tropical Depression
- 61 km/hr - 115 km/hr Tropical Storm
- Greater than 115 km/hr Hurricane

Hurricane

A hurricane is a low pressure, large scale weather system which derives its energy from the latent heat of condensation of water vapor over warm tropical seas. A mature hurricane may have a diameter ranging from 150 to 1000 km with sustained wind speeds often exceeding 180 km/hr near the centre with still higher gusts.

A unique feature of a hurricane is the Eye. The eye provides a convenient frame of reference for the system, and can be tracked with radar, aircraft or satellite.

Classification

The Saffir/Simpson scale is often used to categorize hurricanes based on their wind speed and damage potential. Five categories of hurricanes are recognized:

¨ Minimal, Moderate, Extensive, Extreme & Catastrophic

The destructive potential of a hurricane is significant due to the high wind speeds, accompanying torrential rains which produceflooding, and storm surges along the coastline

TSUNAMIS

Tsunamis are Ocean Waves produced by Earth Quakes or Underwater land slides.

The word is Japanese and means “Harbor Waves”

Tsunami is actually a series of waves that can travel at speeds from 400-600 mph in the open ocean. As the waves approach the coast, their speed decreases, but their amplitude increases.Unusual wave heights of 10-20 ft high can be very destructive and cause many deaths and injuries.Most deaths caused by Tsunamis are because of Drowning.Associated risks include;

- ❖ Flooding
- ❖ Contamination of Drinking Water

- ❖ Fires from ruptured gas lines and tanks
- ❖ Loss of vital Community Infrastructure [police, fire, medical]
- ❖ Areas of greatest risks are;

-Less than 25 feet above sea level

-Within 1 mile of the shore line.

Environmental Conditions left by the Tsunamis may contribute to the transmission of the following diseases, from Food or Water

- ❖ Diarrhea illnesses; Cholera, Acute Diarrhea, Dysentery
- ❖ Hepatitis-A, Hepatitis-E
- ❖ Typhoid Fever
- ❖ Food borne illnesses;Bacterial;Viral;Parasitic;Non-infections;

EFFECTS OF NUCLEAR HOLOCAUST

The effects of nuclear holocaust will result into blasts, heat storms, secondary fires, fire, ionizing radiation and fall outs.These effects fall into 3 categories;

a) Immediate,
b) Short term and
c) Long term effects.

The immediate effects

Include blast effects, heat effects, electromagnetic pulse (EMP) effects and radiation effects.

The short term effects

Include problems connected with water supply, sanitation, food, dispersal of excreta, wastes and dead bodies, and break down of vector control measures and outbreak of infections. Radioactive contamination of water and food are major concerns. The affected area creates a lot of other problems for the survivors and the rescue teams.Major problem among survivors is of bone marrow depression resulting in leucopenia, which increases their susceptibility to infections.

Long term effects

The knowledge about the long-term effects is still incomplete. Some well-known effects include radiation injuries due to radiation fallout, suppression of body immunity, chronic infection and other associated illnesses. Persistent radiation hazards will lead to prolonged contamination of water supply, increased ultraviolet radiation, climatic and ecological disturbances, psychological disturbances and genetic abnormalities.

Current World Concern

In the light of the above facts the current world concern about the use of nuclear weapons is justified. The world already possess an estimated total of 30,000 megatons of nuclear weapons with a total explosive

power 50-100 times greater than that of all the explosives used during the Second World War.Even if 1% of the nuclear weapons now possessed are used on urban populations, they can cause more deaths in a few hours than during the entire period of the Second World War.

The fundamental aspects of Disaster Management Program

- ¨ Disaster Prevention
- ¨ Disaster preparedness
- ¨ Disaster response
- ¨ Disaster mitigation
- ¨ Rehabilitation
- ¨ Reconstruction

Fundamental Aspects of Disaster Management

- Disaster response
- Disaster Preparedness
- Disaster Mitigation

These 3 aspects of Disaster Management corresponds to the 2 phases in the Disaster Cycle, ie,

1, Risk Reduction Phase, before a Disaster

2. Recovery Phase, after a Disaster

Issues of Disaster Management

Personal mitigation is mainly about knowing and avoiding unnecessary risks. This includes an assessment of possible risks to personal/family health and to personal property.

One example of mitigation would be to avoid buying property that is exposed to hazards, e.g., in a flood plain, in areas of subsidence or landslides. Home owners may not be aware of a property being exposed to a hazard until it strikes. However, specialists can be hired to conduct risk identification and assessment surveys. Purchase of insurance covering the most prominent identified risks is a common measure.

Personal structural mitigation in earthquake prone areas includes installation of an Earthquake Valve to instantly shut off the natural gas supply to a property, seismic retrofits of property and the securing of items inside a building to enhance household seismic safety. The latter may include the mounting of furniture, refrigerators, water heaters and breakables to the walls, and the addition of cabinet latches. In flood prone areas houses can be built on poles/stilts, as in much of southern Asia. In areas prone to prolonged electricity black-outs installation of a generator would be an example of an optimal structural mitigation measure. The construction of storm cellars and fallout shelters are further examples of personal mitigate actions.

Mitigation involves Structural and Non-structural measures taken to limit the impact of disasters.

Mitigation efforts are attempts to prevent hazards from developing into disasters altogether or to reduce the effects of disasters. The mitigation phase differs from the other phases in that it focuses on long-term measures for reducing or eliminating risk. The implementation of mitigation strategies is a part of the recovery process if applied after a disaster occurs. Mitigation measures can be structural or non-structural. Structural measures use technological solutions like flood levees. Non-structural measures include legislation, land-use planning (e.g. the designation of nonessential land like parks to be used as flood zones), and insurance. Mitigation is the most cost-efficient method for reducing the affect of hazards although not always the most suitable. Mitigation includes providing regulations regarding evacuation, sanctions against those who refuse to obey the regulations (such as mandatory evacuations), and communication of risks to the public. Some structural mitigation measures may harm the ecosystem.

A precursor to mitigation is the identification of risks. Physical risk assessment refers to identifying and evaluating hazards. The hazard-specific risk (R_h) combines a hazard's probability and affects. The equation below states that the hazard multiplied by the populations' vulnerability to that hazard produces a risk Catastrophe modeling. The higher the risk the more urgent that the vulnerabilities to the hazard are targeted by mitigation and preparedness. If, however, there is no vulnerability then there will be no risk, e.g. an earthquake occurring in a desert where nobody lives.

REVISION QUESTION

1. Explain the meaning of disaster
2. Describe the historical background of disasters in Kenya
3. Discuss issues in disaster management

CHAPTER TWO

DISASTER PREPAREDNESS

Specific Objectives

By the end of this topic the trainee should be able to;

a) Explain the meaning of disaster preparedness
b) Discuss the process of disaster preparedness
c) Discuss management cycle

INTRODUCTION

Preparedness focuses on preparing equipment and procedures for use when a disaster occurs, i.e., planning. Preparedness measures can take many forms including the construction of shelters, installation of warning devices, creation of back-up life-line services (e.g., power, water, sewage), and rehearsing evacuation plans. Two simple measures can help prepare the individual for sitting out the event or evacuating, as necessary. For evacuation, a disaster supplies kit may be prepared and for sheltering purposes a stockpile of supplies may be created. The preparation of a survival kit such as a "72-hour kit" is often advocated by authorities. These kits may include food, medicine, flashlights, candles and money. Also, putting valuable items in safe area is also recommended.

The objectives of the disaster preparedness is to ensure that appropriate systems, procedures and resources are in place to provide prompt, effective assistance to disaster victims, thus facilitating relief measures and rehabilitation services.

Disaster preparedness is an ongoing, multi-sectoral activity to carry out the following activities;

- Evaluate the risk of the country or particular region to disasters.
- Adopt standards and regulations
- Organize communication, information and warning systems
- Ensure coordination and response mechanisms
- Adopt measures to ensure that financial and other resources are available for increased readiness and can be mobilized in disaster situations.
- Develop public education programs
- Coordinate information sessions with news media
- Organize disaster simulation exercises that test response mechanisms

For the Health Sectors Disaster Preparedness plan to be successful, clear mechanisms for coordinating with other sectors and internationally must be in place.

The Health Disaster Coordinator is in charge of preparedness activities and coordinating plans with

- Govt. Agencies
- Foreign Relations- UN, UNICEF.WHO& other international agencies
- NGO's- Red Cross etc
- Those responsible for power, communication, Housing, water services etc
- Civil Protection agencies-Police, armed forces

EMERGENCY PREPAREDNESS

Agents, Diseases and Other Threats

1. Natural Disasters

   Earthquakes, Floods, Cyclones, Typhoons, Tsunamis, Winter

2. Bio-Terrorism Agents

   Anthrax, Plague, Smallpox

3. Chemical Emergencies

   Ricin, Phosgene, Bromine, Sarin

4. Radioactive Emergencies

5. Mass Trauma

   Explosions, Blasts, Burns, Injuries

6. Recent Outbreaks and Incidents

   Bird flu, SARS, West Nile Virus, Mad Cow Disease

DISASTER MITIGATION

It is virtually impossible to prevent occurrence of most Natural Disasters, but it is possible to minimize or mitigate their damage effects.

Mitigation measures aim to reduce the Vulnerability of the System [e.g. By improving & enforcing building codes etc]

Disaster prevention implies complete elimination of damages from a hazard, but it is not realistic in most hazards. [e.g.relocating a population from a flood plain or from beach front]

Medical Casualty could be drastically reduced by improving the Structural Quality of Houses, Schools, and Public or Private Buildings.

Also ensuring the Safety of Health facilities, Public Health Services, Water Supply, Sewerage System etc.

Mitigation complements the Disaster Preparedness and Disaster Response activities.

A specialized Unit within the National Health Disaster Management Program should coordinate the works of experts in the field of

- Health, Public Policy & Public Health
- Hospital Administration
- Water Systems
- Engineering & Architecture
- Planning, Education etc

The Mitigation Program will direct the following activities

1. Identify areas exposed to Natural Hazards and determine the vulnerability of key health facilities and water systems

2. Coordinate the work of Multi Disciplinary teams in designing and developing building codes and protect the waterdistribution from damages

3. Hospitals must remain operational to attend to disaster victims

4. Include Disaster Mitigation Measures in the planning anddevelopment of New facilities

5. Identify priority hospitals and critical health facilities that complies with current building codes and standards

6. Ensure that mitigation measures are taken into account in a facility's maintenance plans

7. Inform, sensitize and train those personnel's who are involved inplanning, administration, operation, maintenance and use of facilities about disaster mitigation

8. Promote the inclusion of Disaster Mitigation in the curricula of Professional training institutes

TECHNICAL HEALTH PROGRAMS

- Treatment of casualties
- Identification and disposal of bodies
- Epidemiological surveillance and disease control
- Basic sanitation and sanitary engineering
- Health management in shelters or temporary settlements
- Training health personnel and the public
- Logistical resources and support
- Simulation exercises / Mock Exercises

EPIDEMIOLOGIC SURVEILLANCE AND DISEASE CONTROL

Natural disasters may increase the risk of preventable diseases due to adverse changes in the following areas

- Population density
- Population displacement
- Disruption and contamination of water supply and sanitation services
- Disruption of public health programs
- Ecological changes that favor breeding of vectors
- Displacement of domestic and wild animals
- Provision of emergency food, water and shelter in disaster situation

The principles of preventing and controlling communicable diseases after a disaster are to;

i) Implement as soon as possible all public health measures to reduce the risk of disease transmission
ii) Organize a reliable disease reporting system to identify outbreaks and to promptly initiate control measures
iii) Investigate all reports of disease outbreaks rapidly. Early clarification of the situation may prevent unnecessary dispersion of scarce resources and disruption of normal progress

ENVIRONMENTAL HEALTH MANAGEMENT

Post disaster environmental health measures can be divided into two priorities

1. Ensuring that there are adequate amounts of safe drinking water, basic sanitation facilities, disposal of excreta, waste water and solid wastes and adequate shelter

2. Providing food protection measures, establishing or continuing vector control measures, and promoting personal hygiene

· Water Supply

Alternate water sources

Mass distribution of Disinfectants

· Food Safety

· Basic Sanitation and Personal Hygiene

· Solid Waste Management

· Vector Control

- Burial of the Dead
- Public information and the Media

EVALUATION

In the case of disaster management, the Evaluator will be looking at the “actual" verses the "desired" on two levels, i.e. the overall outcome of disaster management efforts and the impact of each discrete category of relief efforts (Provision of food, shelter, management of communications etc)

A critical step in the management of any disaster relief is the setting of objectives, which specify the intended outcome of the relief.

The general objectives of the disaster management will be the elimination of unnecessary morbidity, mortality and economic loss directly and indirectly attributable to mismanagement of disaster relief.

The comparison of the "actual" with "desired" is the first critical step of evaluation. If the objectives were met, those who have participated in the relief have demonstrated that they have accomplished what they set out to do.

On the other hand, if the objectives were not met, it is desirable for those conducting the evaluation to continue with the evaluation process, identify the reasons for the discrepancy and suggest corrective action.

Simulated Disaster Preparedness Operations should be undertaken to test the various components before actual need arise.

Evaluation of the health disaster management program

- Evaluation of the preparedness program
- Evaluation of the mitigation measures
- Evaluation of the training

PREVENTION OF DISASTERS

Existing knowledge that might reduce the undesirable effects of disasters is often not applied.

- Hurricane/Tornado/ Cyclone warning systems
- Legislation preventing building in the flood prone areas

¨ Requirement of protective cellars/shelters in disaster prone areas

¨ A Seismic housing code for earthquake-prone area

¨ Strict procedural code followed to prevent Nuclear, Toxicological and Chemical disasters

¨ Early warning systems and Disaster preparedness which will help to minimize morbidity, mortality and economic loss

Disaster Preparedness Plan and Development in Kenya

Located on the eastern side of the African continent is one of the most developed and industrialized countries in East Africa known as the Republic of Kenya. However, one aspect that has always been an enduring development challenges in Kenya is the way the country responds to disasters.

Republic of Kenya is one country that has a vast history of being at the receiving end of numerous natural and man-made disasters. In fact, the list of disasters in Kenya almost goes on endlessly. Some of these major disasters that happened in Kenya include El Nino floods, Kyanguli fire disaster, droughts, poverty, USA embassy bombing, ethnic clashes in the coastal region, health-related disasters such as malaria and HIV/AIDS and frequently occurring political conflicts that result in massive loss of lives, property and displacement of people. Over the years, Kenya did not have a proper disaster preparedness plan. However, the situation seems to be changing in the recent times with the intervention of several national and international organizations including the International Red Cross Society.

As per the International Red Cross Society, every country should have an effective disaster preparedness plan so as to respond to the disaster in an effective way. Any disaster should be first handled at the local level by local organizations. An international response is then built up on these local efforts.

Under the disaster preparedness plan, the Government of Kenya is doing a lot to ensure that preventive measures are properly in place so as to reduce the impact caused by these dangers. Some of the achievements include

1. Installation of early warning systems and weather forecasts
2. Development of local disaster management teams. These teams are structured in accordance with the disasters that frequently happen at a particular place. In order to know about the disasters happening at one place, information and data is gathered from the local people and accordingly a disaster preparedness plan is developed. Training is also provided to disaster management teams at the local level.
3. Disaster committees comprising of government, non-government, national and international agencies.
4. Creating public awareness and imparting education to local people regarding health-related issues so as to reduce the spread of conditions like HIV/AIDS and other infections.

All these plans are a step towards improvement. There are several other challenges that the country is facing and is looking for ways to tackle them. Some of these include poverty, illiteracy, extreme weather conditions and increased crime rate.

Disaster management aims to reduce, or avoid the potential losses from hazards, assure prompt and appropriate assistance to victims of disaster, and achieve rapid and effective recovery. 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.

The mitigation and preparedness phases occur as disaster management improvements are made in anticipation of a disaster event. Developmental considerations play a key role in contributing to the mitigation and preparation of a community to effectively confront a disaster. As a disaster occurs, disaster management actors, in particular humanitarian organizations become involved in the immediate response and long-term recovery phases. The four disaster management phases illustrated here do not always, or even generally, occur in isolation or in this precise order. Often phases of the cycle overlap and the length of each phase greatly depends on the severity of the disaster.

- Mitigation - Minimizing the effects of disaster.
  Examples: building codes and zoning; vulnerability analyses; public education.
- Preparedness - Planning how to respond.
  Examples: preparedness plans; emergency exercises/training; warning systems.
- Response - Efforts to minimize the hazards created by a disaster.
  Examples: search and rescue; emergency relief .
- Recovery - Returning the community to normal.
  Examples: temporary housing; grants; medical care.

Disaster Risk Management Cycle

The disaster risk management cycle, consists of four phases: Prevention/Mitigation andPreparedness in the pre-disaster stage, and Response and Rehabilitation/Reconstruction in post-disaster stage. In the "Prevention/Mitigation" phase, efforts are made to prevent or mitigate damage (*e.g.* construction of dikes and dams against floods). Activities and measures for ensuring an effective response to the impact of hazards are classified as "Preparedness" (*e.g*. emergency drills and public awareness) and are not aimed at averting the occurrence of a disaster. "Response" includes such activities as rescue efforts, first aid, fire fighting and evacuation. In the "Rehabilitation/Reconstruction" phase, considerations of disaster risk reduction should form the foundations for all activities.

Developmental considerations contribute to all aspects of the disaster management cycle. One of the main goals of disaster management, and one of its strongest links with development, is the promotion of sustainable livelihoods and their protection and recovery during disasters and emergencies. Where this goal is achieved, people have a greater capacity to deal with disasters and their recovery is more rapid and long lasting. In a development oriented disaster

management approach, the objectives are to reduce hazards, prevent disasters, and prepare for emergencies. Therefore, developmental considerations are strongly represented in the mitigation and preparedness phases of the disaster management cycle. Inappropriate development processes can lead to increased vulnerability to disasters and loss of preparedness for emergency situations.

Mitigation

Mitigation activities actually eliminate or reduce the probability of disaster occurrence, or reduce the effects of unavoidable disasters. Mitigation measures include building codes; vulnerability analyses updates; zoning and land use management; building use regulations and safety codes; preventive health care; and public education.

Mitigation will depend on the incorporation of appropriate measures in national and regional development planning. Its effectiveness will also depend on the availability of information on hazards, emergency risks, and the countermeasures to be taken. The mitigation phase, and indeed the whole 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.

Preparedness

The goal of emergency preparedness programs is to achieve a satisfactory level of readiness to respond to any emergency situation through programs that strengthen the technical and managerial capacity of governments, organizations, and communities. These measures can be described as logistical readiness to deal with disasters and can be enhanced by having response mechanisms and procedures, rehearsals, developing long-term and short-term strategies, public education and building early warning systems. Preparedness can also take the form of ensuring that strategic reserves of food, equipment, water, medicines and other essentials are maintained in cases of national or local catastrophes.

During the preparedness phase, governments, organizations, and individuals develop plans to save lives, minimize disaster damage, and enhance disaster response operations. Preparedness measures include preparedness plans; emergency exercises/training; warning systems; emergency communications systems; evacuations plans and training; resource inventories; emergency personnel/contact lists; mutual aid agreements; and public information/education. As with mitigations efforts, preparedness actions depend on the incorporation of appropriate measures in national and regional development plans. In addition, their effectiveness depends on the availability of information on hazards, emergency risks and the countermeasures to be taken, and on the degree to which government agencies, non-governmental organizations and the general public are able to make use of this information.

Humanitarian Action

During a disaster, humanitarian agencies are often called upon to deal with immediate response and recovery. To be able to respond effectively, these agencies must have experienced leaders, trained personnel, adequate transport and logistic support, appropriate communications, and

guidelines for working in emergencies. If the necessary preparations have not been made, the humanitarian agencies will not be able to meet the immediate needs of the people.

Response

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 infrastructure. The focus in the response phase is on meeting the basic needs of the people until more permanent and sustainable solutions can be found. Humanitarian organizations are often strongly present in this phase of the disaster management cycle.

Recovery

As the emergency is brought under control, the affected population is capable of undertaking a growing number of activities aimed at restoring their lives and the infrastructure that supports them. There is no distinct point at which immediate relief changes into recovery and then into long-term sustainable development. There will be many opportunities during the recovery period to enhance prevention and increase preparedness, thus reducing vulnerability. Ideally, there should be a smooth transition from recovery to on-going development.

Recovery activities continue until all systems return to normal or better. Recovery measures, both short and long term, include returning vital life-support systems to minimum operating standards; temporary housing; public information; health and safety education; reconstruction; counseling programs; and economic impact studies. Information resources and services include data collection related to rebuilding, and documentation of lessons learned.

REVISION QUESTION

1. Explain the meaning of disaster preparedness
2. Discuss the process of disaster preparedness
3. Discuss management cycle

CHAPTER THREE

DISASTER RESPONSE

Specific objectives

By the end of this topic the trainee should be able to;

a) Explain personal survival skills
b) Discuss the recovery and rehabilitation strategies
c) Discuss ways of responding to disaster
d) Discuss the role of community in disaster response
e) Discuss challenges in disaster response
f) Describe practical disaster drills

INTRODUCTION

Meaning of Disaster Response

The response phase includes the mobilization of the necessary emergency services and first responders in the disaster area. This is likely to include a first wave of core emergency services, such as firefighters, police and ambulance crews. When conducted as a military operation, it is termed Disaster Relief Operation (DRO) and can be a follow-up to a Non-combatant evacuation operation (NEO). They may be supported by a number of secondary emergency services, such as specialist rescue teams.

A well rehearsed emergency plan developed as part of the preparedness phase enables efficient coordination of rescue. Where required, search and rescue efforts commence at an early stage. Depending on injuries sustained by the victim, outside temperature, and victim access to air and water, the vast majority of those affected by a disaster will die within 72 hours after impact.

Organizational response to any significant disaster - natural or terrorist-borne - is based on existing emergency management organizational systems and processes: the Federal Response Plan (FRP) and the Incident Command System (ICS). These systems are solidified through the principles of Unified Command (UC) and Mutual Aid (MA)

There is a need for both discipline (structure, doctrine, process) and agility (creativity, improvisation, adaptability) in responding to a disaster. Combining that with the need to onboard and build a high functioning leadership team quickly to coordinate and manage efforts as they grow beyond first responders indicates the need for a leader and his or her team to craft and implement a disciplined, iterative set of response plans. This allows the team to move forward with coordinated, disciplined responses that are vaguely right and adapt to new information and changing circumstances along the way;

a) Appropriate application of current technology can prevent much of the death, injury, and economic disruption resulting from disasters
b) Morbidity and mortality resulting from disasters differ according to the type and location of the event.
c) In any disaster, prevention should be directed towards reducing;
   - ❖ Losses due to the disaster event itself
   - ❖ Losses resulting from the Mismanagement of disaster relief.

Therefore, the public health objectives of disaster management can be stated as follows:

1. Prevent unnecessary morbidity, mortality, and economic loss resulting directly from the disaster.

2. Eliminate morbidity, mortality, and economic loss directly attributable to Mismanagement of disaster relief efforts.

Nature and Extent of the Problem

Morbidity and mortality, which result from a disaster situation, can be classified into four types:

1. Injuries,

2. Emotional stress,

3. Epidemics of diseases,

4. Increase in indigenous diseases.

The relative numbers of deaths and injuries differ on the type of disaster.

Injuries usually exceed deaths in explosions, typhoons, hurricanes, fires, famines, tornadoes, and epidemics.

Deaths frequently exceed injuries in landslides, avalanches, volcanic eruptions, tidal waves, floods, and earthquakes.

Disaster victims often exhibit emotional stress or the "disaster shock" syndrome. The syndrome consists of successive stages of shock, suggestibility, euphoria and frustration.

Each of these stages may vary in extent and duration depending on other factors.

Epidemic**s** are included in the definition of disaster; however, they can also be the result of other disaster situations.

Diseases, which may be associated with disasters, include

- ¨ specific food and/or water bone illnesses
- (e.g., typhoid, gastroenteritis and cholera),
- ¨ vector bone illnesses
- (e.g., plague and malaria),
- ¨ diseases spread by person-to-person contact
- (e.g., hepatitis A and shigellosis)
- ¨ Diseases spread by the respiratory route (e.g., measles and influenza).

a. The current status of environmental sanitation, disease surveillance, and preventive medicine has led to a significant reduction in the threat of epidemics following disaster.
b. Immunization programs are rarely indicated as a specific post disaster measure.
c. A disaster is often followed by an increase in the prevalence of diseases indigenous to the area due to the disruption of medical and other health facilities and programs.

Disaster wears many faces. It can be a hurricane, a flash flood, a fire in your home, a terrorist attack or a financial crisis. Surviving and thriving during adverse events takes more than a vague idea of "doing something, going somewhere and waiting for the government to take care of me." Surviving a disaster takes planning and preparation.

Personal Preparation

- A disaster is any event that swamps a community's or individual's ability to cope and respond. During an emergency, all levels of government may be overwhelmed with managing the crisis. Government help may not reach you and your family for days. Being able to meet your basic needs for at least a week is a sensible course of action. e. first aid, the

Meeting Needs

- The immediate needs of you and your family are air to breathe, water to drink, a warm and secure place to stay, nutritious and easy-to-prepare food to eat, and the ability to stay in contact with others. Stocking up on face masks like the N100, storing at least one gallon of water per day per person for a week or more, having the materials and skills to repair a damaged roof, maintaining enough nonperishable canned and packaged food and the means to prepare it, and keeping your cell phone charged at all times can work wonders in making life bearable and safe until help arrives.

Financial Matters

- Financial preparation is an area sometimes overlooked. Maintain adequate levels of insurance on your possessions and on yourself in case your family needs to continue without you. Have spare cash on hand, enough to operate for a week or more. ATMs will not work without electricity, leaving you without funds. Point-of-sale cash registers won't work for the same reason. Make sure you have a stash of small bills and coins because store owners will be unable to give you change.

Home Communications

- Establish a safe rallying point outside of your home where all family members can meet in case your home is uninhabitable or you can't make it back. Call a family

member or friend who lives out of state to let them know you're all right. Local phone lines may be swamped and it is often easier to contact someone in a different state because of the way phone traffic is switched and routed. Consider keeping your landline telephone in case of an emergency, because cell towers are often swamped with traffic or may sustain damage in a disaster.

News from the Outside

- Being able to access information during and after a disaster can give you peace of mind and help you avoid more danger. Internet access may not be available if the power goes off or if regional servers are not in service. A battery- or solar-powered multi-band radio will provide you with information when there is no electricity.

Morbidity and Mortality from Mismanagement of Relief

Ideally, attempts to mitigate the results of a disaster would not add to the negative consequences;

However, there hhtheteteve been many instances in which inappropriate and/or incomplete management actions taken after a disaster contributed to unnecessary morbidity, mortality, and a waste of resources.

Many of the Causalities and much more of the Destruction occurring to natural disaster are due to ignorance and neglect on the part of the individuals and public authorities.

There is a plethora of literature describing the inappropriate actions taken to manage past disasters. Many of the same mismanagement problems tend to recur.

- Physicians and nurses have been sent into disaster areas in numbers far in excess of actual need.
- Medical and paramedical personnel have often been hampered by the lack of the specific supplies they need to apply their skills to the disaster situation.
- In some disasters, available supplies have not been inventoried until well after the disaster, resulting in the importation of material which is used or needed.

In a study of past disaster mismanagement problems and their causes, these problems were categorized as follows:

- Inadequate appraisal of damages
- Inadequate problem ranking
- Inadequate identification of resources
- Inadequate location of resources
- Inadequate transportation of resources
- Inadequate utilization of resources

DISASTER RELIEF

An effective plan for public health and other personnel during a disaster would outline activities designed to minimize the effects of the catastrophe.

These efforts can be summarized as closely situation analysis andresponse; the two types of activities are interrelated.

Although many relief workers may be needed to obtain surveillance information, analyze the data, provide relief services, evaluate results, and provide information to the public, it is essential that a single person with managerial experience be placed in absolute charge of the entire disaster relief operation.

Following a disaster, the desire to provide immediate relief may lead to hasty decisions which are not based on the actual needs of the affected population.

The disaster relief managers can determine the actual needs of the population and make responsible relief decisions.

Reliable information must be obtained on problems occurring in the disaster stricken area, relief resources available and relief activities already in progress. Forthis, Surveillance systems must be set up immediately.

The objective of Surveillance in a disaster situation is to obtain information required for making relief decisions.

RECOVERY AND REHABILITATION STRATEGIES

Crises incited by conflict and natural phenomena can have profound affects on the agricultural systems of rural people. Unfortunately these systems are often unprepared to withstand the impacts of these stresses. When the integrated socioeconomic, environmental and cultural elements of the farming system are damaged, the ability of farmers to maintain seed security may be compromised. Seed security is the access by farmers to adequate good quality seed of locally adapted varieties. It is of paramount importance in achieving long-term food security in developing countries and in maintaining sustainable livelihoods.

In response to these problems, international, national and local organizations often intervene in order to help affected communities recover and restore their agricultural systems. Due to the lack of preparation and the complexity related to emergency operations, many relief interventions have been unsuccessful in restoring the full agricultural capacity of farming systems (Bushamuka 1999; Hines et al 1998). Longley, who has been echoed by other writers, argues that a more detailed understanding of agricultural rehabilitation and relief is required.

Responding to these sentiments, this paper aims to investigate prominent issues in past post-disaster seed relief, namely seeds and tools, and emerging rehabilitation strategies in the field around the world. The issues that will be reviewed and explored include needs assessments; proposed strategies for short-term and long-term intervention; biodiversity issues in post-disaster activities; dependence arising from external interventions; coordination of agencies; and coordination of different forms of relief. It is hoped that this investigation provides a better understanding of the benefits and drawbacks of different interventions.

Needs Assessment/Diagnosis Issues

Reasons for and Approaches to Needs Assessments

A post-disaster needs assessment involves diagnosing the nature and magnitude of a disaster once it occurs. Relief and rehabilitation initiatives are, in essence, the management of information and resources, based on assessments and reports; if officials are to make effective decisions about the deployment of resources it is essential that they are properly informed.

In the past, needs assessments have been absent from many post-disaster seed initiatives, as is reflected in the paucity of literature on the subject. Critiques have increasingly been put forth arguing that intervening agencies have missed or mis-diagnosed the most important issues in relief and rehabilitation. Critics claim that many needs assessments disproportionately concentrate on food requirements, with a diagnosis of food insecurity implying seed insecurity. Additionally, these assessments tend to establish the formal seed sector structures without attempting to understand the potential role of local seed systems in disaster recovery. Consequently, these projects enhance the productivity of one component of the farming system as opposed to the resilience of the entire system.

In response to these critiques and problems, there is a growing body of literature emphasizing the importance of practicing holistic needs assessments that aim to accurately represent the diverse components of local farming systems and lead to more inclusive planning for post-disaster interventions. The latter body of literature will be explored below in addition to proposed reasons for frequent absence of needs assessments.

Two examples illustrating problems arising from an inaccurate needs assessment are explored here. Firstly, FAO and the other relief agencies working in Somalia relied on data collected for food assessments as proxy variables for estimating levels of seed needed. By doing so they assumed that seed was in short supply where harvest outputs were low. This approach did not taken into account how local seed networks in Somalia encourage the flow of seed from surplus to deficit areas in times of stress. Presumably seed capacity building initiatives would have been more effective in this situation if the primary stakeholders played a larger role in the needs assessment.

Secondly, O'Keefe and Kirby describe how widespread famine was declared without adequate supporting evidence during Kenya's drought in the early 1990's. This resulted in multiple inefficiencies as well as conflicts between local communities and relief agencies. In both of these accounts, the authors attribute the misunderstanding to the absence of an accurate needs assessment and imply that the agencies involved had little understanding of the way farmers might acquire seed for themselves.

Several reasons have been put forth in attempt to explain the absence of appropriate needs assessments. Firstly, many agencies feel that there is no time for a needs assessment as they feel rushed by the sense of urgency in emergency conditions. Secondly, agencies may also assume that the farmer seed system has completely collapsed or that it was inadequate to begin with. Thirdly, in some cases the overriding agenda of agencies may obscure the accuracy of the needs

assessment and adversely affect the outcome of relief and rehabilitation initiatives. Poorly conducted and unsuitable needs assessments are a critical issue for exploration as in some cases they have resulted in the intended beneficiaries becoming dependent upon external support and aid.

Following from this justification for a strong needs assessment, the issue of *how* an assessment is conducted is portrayed as equally important as whether or not it is conducted. There are several methodologies put forth for conducting this initial planning component concerning timing, inter-agency coordination, participatory research methods and building data collection methods into existing institutions in the affected region.

With respect to timing of needs assessment, there are strong arguments supporting ongoing assessments as crucial to successful long-term recovery. Agriculture and seed systems are constantly changing and adapting to dynamic markets, land intensification, natural resource degradation and the potential of future disasters. A 'one-shot' needs assessment can be problematic as it only describes the state of affairs and needs at a particular point in time and does not reflect the dynamic nature of these needs. Consequently initiatives should aim to use iterative diagnostic and evaluative tools that can be adapted on an ongoing basis.

In almost all of the case studies reviewed, multiple agencies intervened in the disaster affected region. Inter-agency coordination at the needs assessment stage is a prerequisite for successful recovery operations. Coordination implies understanding, assessing and evaluating the impact of previous seed and relief (i.e. food) interventions and looking at current support provided by other agencies. Very often relief organizations have little knowledge of each others' operations and tend to overlap in their assessment areas and activities. Reports from both Kenya and Rwanda illustrate the detrimental consequences arising from lack of agency coordination; these include competition and contradicting assessments of seed availability and drought conditions.

Intervening agencies are often unfamiliar with local conditions and do not use participatory planning methodologies. Pottier notes that many post-disaster agricultural interventions are guided by "media images and rhetoric, through which outside agency workers liaise with local bureaucrats to arrive at perspectives and solutions which they (the outsiders) control" (Pottier 1996:56). Contrasting discourses in international development, neither local participation nor stakeholder involvement has been explored extensively in a post-disaster agricultural context. Individuals that have investigated studies using participation comment that it is frequently overlooked in post-disaster work.

Pratten notes that it is a difficult to facilitate the emergence of strong community based organizations for help in needs assessments (1997). Responding to this difficulty, Longley proposes that the diagnostic process should be integrated into existing information collecting methods. As an example she points to the household economy approach developed by Save the Children-UK (SCF) which is widely used for field monitoring in emergency situations throughout Africa. Because this methodology involves an understanding of farmer seed systems, it has also been used to support information collecting methods in post-disaster agricultural needs assessments.

Which factors should be diagnosed and assessed?

Building on these methodologies, the content of a needs assessment is also critical. It has been argued that too many projects disproportionately focus on crop productivity and the formal sector and that this concentration obscures the inherent strength and resilience of the entire system. Argue that balancing productivity with socioeconomic, cultural and biological components of the farming system is vital in disaster recovery. This overall balance should be reflected in the needs assessment;

- General trends of information needs for appropriate project planning are outlined as follows:
- existing and pre-disaster physical structure of farmer systems
- local knowledge and its role in maintaining agricultural sustainability
- feasibility of facilitating access to seeds
- targeting and stakeholder identification
- normally existing informal and formal seed channels
- social, gender, cultural and class relations in the farming system
- the natural environment (land mines, soil fertility etc.)
- the situation of displaced individuals
- coordination with other areas of disaster recovery and relief
- livelihood recovery
- selection and multiplication for seed distribution (if required)
- the impact of the disaster upon all of the factors aforementioned
- transition to long-term development

Some of these issues are expanded upon and explored below;

Firstly, an understanding of the pre-disaster and contemporary farming systems is vital to guide relief and rehabilitation planning. In the initial planning stages, many agencies assume that farmer seed systems have completely collapsed or were inadequate to begin with. However, there is a growing body of literature suggesting that researching the strengths of the past and contemporary traditional farmer system will reveal the resilience and its capacity to recover independently.

Secondly, characterizing the disaster and understanding how it has impacted upon the farming system are essential components of needs assessments. Several disaster impacts that should be assessed include the speed of its onset, whether it is a situation of acute or chronic stress, the geographic scope of the impacts, the scale of population affected, geographic population movements, environmental degradation, changes in wealth distribution, changes in social relations in the community and the loss of diverse assets. The distinct combination of impacts will likely necessitate very different repertoires of development relief interventions.

Thirdly, in post-disaster management understanding social and economic relations between and among men and women is critical to needs assessments. Arguably, crisis situations are never gender neutral. Because they impact men and women in different ways, effective interventions must take this into account. With respect to agriculture, it should be noted that a large proportion

of the agricultural sector is made up of women. FAO now estimates that, on average, women produced between 60-80% of the food in the developing world. Given this significant contribution, it is noteworthy that in post-disaster agricultural recovery, the importance of gender is often neglected. Few, if any, calculations are made of losses of 'female' crops and "agricultural recovery from disasters is a responsibility that women are left to shoulder largely on their own".

Given the discrepancies of disaster impacts upon men and women and their distinctly different roles in the agricultural sector, it is not surprising that men and women exhibit different coping strategies and prioritize different needs in post-disaster situations. An example illustrating this point is in Nicaragua following Hurricane Mitch where women in one community listed 'fear' as the worst impact of the disaster whereas men thought 'decreased coffee production' was the worst impact (Trujillo 2000). All of these factors should be taken into account in post-disaster agricultural needs assessments in order to ensure gender sensitive interventions.

Finally, re-accessing and strengthening seed channels is an important part of ensuring seed availability and successful recovery (McGuire 2001; Remington 2001). Almekinders argues that understanding the local and formal seed systems and the complex relations between these sectors will help reveal if there is an absolute scarcity of seeds (2001). Several channels that households may acquire seeds from are formal outlets, local merchants, exchange with family or neighbours, or from hybridization in their own fields. Looking at how and if these channels can be recovered could be an important key in understanding the degree of seed security in the area (McGuire 2001). In situations of seed scarcity, variety selection and choice becomes increasingly important; this will be further explored in the section 'Biodiversity Issues Related to Relief and Rehabilitation Interventions' section.

From these arguments, it can be inferred that a holistic needs assessment is critical to the successful post-disaster recovery of a farming system. Although work in this field is increasing, the majority of practical experiences and literature on the subject either misses needs assessments entirely or disproportionately concentrates on certain aspects of the farming system, such as productivity. Increasingly emerging and important issues for future investigation within this subject include on-going needs assessments and monitoring methodologies that reflect the changing needs of disaster affected populations, the participation of farmers throughout the process and the integration of a gendered perspective in post-disaster planning.

Proposed Strategies in Relief and Rehabilitation

Reflected both in practice and in the literature, there are two different inter-related approaches to post-disaster seed interventions. One looks at seed distribution as a form of short-term relief whereas the other addresses alternative seed capacity building strategies as a form of long-term development. Although some writers and projects integrate the two approaches, a significant number of agencies focus on either one or the other. Furthermore, surprisingly little work exists concerning the integrated transition between short-term relief to long-term sustainable development. General themes in each school of thought and their integration will be explored below.

Distribution of Seed Relief

The short-term approach that is most frequently used in post-disaster situations is the distribution of seeds, inputs and agricultural tools; this approach is referred to as the distribution of 'seeds and tools'. Several reasons why this approach is favoured by practitioners are explored here. Seed distribution can help re-establish a 'self-help' mode within communities by helping families to produce their own food and support their livelihoods. Seed distributions are also often perceived to be a more long-term and effective activity than short-term food aid. Furthermore, when rural livelihood systems have been damaged, it is possible to distribute seeds and tools immediately and efficiently thus enabling the benefits of a catch-crop in the first available season.

Delivery mechanisms and proper targeting of recipients are important in seeds and tools initiatives. With respect to targeting, identifying those most in need is critical to providing effective assistance. Following Hurricane Mitch it was revealed that the hardest hit were the most marginalized members of society such as small producers, and female-headed households. In Honduras, female headship increased from a pre-disaster level of 20.4% to 50%. Targeting initiatives should take into account such changing demographics. In this case, distributing seeds solely to male-headed households would have further handicapped a large portion of the population. Within the literature reviewed, community participation was portrayed as the most effective way to ensure proper and inclusive targeting of seed distribution.

Although community participation is vital in targeting, challenges can potentially arise with this approach. Illustrating this, Richards describes targeting methodologies in Sierra Leone in the mid-1990s where relief agencies organized village committees to identify potential beneficiaries for seeds and tools. However, amongst these identified beneficiaries, not all farms were included. In some cases, the excluded individuals were angry enough to threaten joining the rebels (2001). In a similar example of participatory targeting in Ethiopia, the community based organization in charge of targeting excluded women in their seed distributions (Pratten 1997). These case studies illustrate the importance of integrating the unique social and economic make-up of the population into participatory targeting in order to help those who are most in need.

With respect to distribution techniques, there are a variety of benefits and drawbacks to delivering seeds by donation, credit or sale. Firstly, when relief is given by donation, it supports farmers who have insufficient funds to purchase materials themselves and is logistically easier for NGOs. However, donating seed has been critiqued because it may reduce farmer incentive to rescue their own production systems and can potentially create dependency upon the donors.

Secondly, delivering seeds on credit is common in relief interventions. For example, in Rwanda CARE requested project beneficiaries to return three times as much seed for each bean seed loan (the particular variety had a multiplication rate of ten seeds). The collected seed was then given to the Ministry of Agriculture for later distribution to returning farmers who had been displaced (ODI 1996). However, the success of credit systems can depend on the intervening agency's logistical capacity to monitor and keep track of repayments (Pratten 1997). Furthermore, the farmer's ability to repay the loan is dependent on the success of the harvest.

Thirdly, there have been cases of intervening agencies selling seeds as a method of distribution. For example, SCF and World Food Program working in Ethiopia's Ogaden desert sold donated grain at low rates to desert traders in an effort to maintain the established market patterns and decrease the likelihood of a dependency growing on food aid (Hill 1992). Despite the intent to maintain market normalcy, selling seed can have negative implications socially. Distributions may exacerbate discrepancies between rich and poor farmers if some farmers can not afford the seeds (ODI 1996). It is commonly agreed upon that different types of distribution methods may be required for different portions of the affected population (Sperling 2001). In cases where seeds are distributed, selection of appropriate targeting and distribution methodologies should be determined at the needs assessment stage.

Critiques of Seed Distribution Strategies

Seeds and tools methodologies are used in most post-disaster agricultural relief situations because of their immediacy in helping to re-establish food security, their role as a self-help initiator and their role in reducing farmer's dependence on external organizations. Despite these benefits, there is a growing body of literature exploring the limitations of short-term seeds and tools initiatives and favouring the integration of long-term alternative intervention strategies. Two case studies illustrating problematic seed distributions are explored here.

Ahmed et al. illustrate that seed distributions in Somalia are rarely effective. In the exceptional cases when there is an absolute lack of seed, perhaps caused by a massive population displacement, short term distributions could serve a 'start-up' role. With the high multiplication rates of desired crops, farmers felt that there was rarely a need to continue relief distributions for more than one or two seasons (Ahmed et al 2001). Similarly, in Mozambique it has been argued that any seed distribution, even short term, has been relatively ineffective. Although the relief interventions have helped many households to immediately start up crop production, farming systems have remained vulnerable and unable to reach a state of self-sufficiency; the initial on-farm reserves that were accumulated were unable to withstand small disasters. Based on the Mozambican case study, Whiteside argues that agencies should focus on long-term planning for seed capacity building schemes.

Several generalized limitations of seeds and tools are explored below. Firstly, in many cases external agencies rely too heavily on the formal seed sector for distributions as opposed to focusing on recovering informal seed exchange channels. Secondly, such agencies are accused of lacking an understanding of and appreciation for local farmer seed systems. They largely neglect the resilience of farming systems and that local systems may be able to recover themselves. Arguably, seed and tools distributions are only required in exceptional cases and should not be the norm (Longley 2001). Finally, these initiatives are rarely critically evaluated for their long-term effectiveness, they do not have a lasting impact on small communities and better opportunities to better assist farmers are missed at the expense of this methodology. Increasing analysis is showing that this type of aid intervention is ineffective in addressing a variety of seed related problems and opportunities,

Alternative Rehabilitation Strategies

The growing numbers of critiques of short-term seeds and tools interventions have inspired a body of literature and practice that focuses on longer term interventions. As opposed to distributions of physical inputs, these interventions focus on strengthening social and economic variables in the farming systems. Mengistu argues that long-term sustainability and self-sufficiency will be unlikely if emergency aid is not accompanied by rehabilitation measures (2001).

Facilitating farmers' *access* to seed has been proposed by several writers as an effective alternative to seeds and tools projects. Very rarely is there an absolute scarcity of seeds within an affected region but rather farmers are unable to access these seeds due to an erosion of their former seed entitlements. For example, Sperling notes that a farmer's financial status is often more responsible for their lack of seeds as opposed to a poor harvest or a lack of technical expertise. In crisis situations, wealthier farmers have occasionally acted as village seed banks to less affluent farmers. Even in normal times, those giving out seeds in informal supply circuits are generally the wealthier farmers. Given these conditions, facilitating the flow of existing seed in the region is arguably more effective than large scale seed distributions.

Consistent with this argument, the practice of voucher-seed fairs is based upon the assumption that there is rarely an absolute shortage of seeds and thus aims to facilitate access to existing seeds. In northern Uganda and drought affected regions of Kenya, the Catholic Relief Services (CRS) has helped to organize such fairs. CRS distributed vouchers to farm families and arranged fairs where seed sellers (farmers, traders etc.) exchanged seed for vouchers. The vouchers were, in turn, exchanged for cash by CRS. Benefits of seed-voucher fairs have also been noted by Ahmed et al who praise the fairs because individuals can obtain their preferred crops and varieties, farmers can judge the seed quality for themselves and the fairs are logistically simple. Furthermore, this strategy strengthens social and economic linkages between different members of the farming system.

Given the importance of financial resources in accessing seeds, several writers propose that post-disaster agricultural rehabilitation should concentrate specifically on rebuilding economic livelihoods. In Rwanda, SCF conducted a study revealing that income-generating opportunities usually available had been severely disrupted as a result of the conflict. Farmers stressed that the restoration of opportunities for seasonal wage work, as opposed to merely material inputs, would be essential alongside other strategies to rebuild the agricultural sector. Supporting this example, Longley and Hussein note that the use of livelihood approaches in situations of chronic conflict or instability is a growing field of study.

Another methodology aiming to facilitate access to seeds is the creation of communal seed banks. Within seed banks stocks of seeds are grown, harvested and stored and can be accessed by the community in times of need. Benefits to this approach are that seed banks can function with limited external assistance and they can serve as both a preventative measure before disasters and a post-disaster recovery measure. Despite these advantages, seed banks may be vulnerable to depletion when prolonged conflict or natural disasters hinder community replenishment. For

example, although community seed banks in Sahel worked reasonably well, periodic drought conditions condemned the banks to a life-span of a decade at most.

Also related to facilitating access, some writers propose that interventions should focus on recovering and strengthening former seed exchange channels. In doing so, it is important to take into account both formal channels, such as markets, and informal channels such as exchanges between neighbours (McGuire 2001). A disproportionate concentration on one type of channel may adversely affect the overall resilience of the seed system.

Building on this, Almekinders portrays informal and formal systems as inversely complementary in their strengths and flaws. He proposes that their improved integration will improve opportunities for small-scale farmers. He identifies weaknesses in the informal sector as new seed technology, introduction of new materials and exotic genes, and seed diffusion (over larger distances and across social barriers) and states that the formal sector has a comparative advantage in these areas. Contrastingly, the informal sector has a comparative advantage over the formal sector in knowledge about local situations, capacity to adapt genetic materials and technologies, inter-community diffusion of new materials, and maintaining genetic diversity.

Facilitating access to seed can also be achieved by strengthening existing social linkages with an emphasis on gender sensitivity. EUROSTEP notes that women often cope in disaster situations by mobilizing formal and informal social networks in order to meet the needs of her family and the larger community. They organize community relief efforts and utilize kin networks and activate women's groups to meet immediate needs. Men, on the other hand, often rely on strategies that take them away from their families and other social networks such as searching for employment. Acknowledging and strengthening the existing coping strategies of women may be an effective avenue to encourage seed security.

Another approach aiming to strengthen existing social linkages and building seed security is to encourage the formation of small-scale seed enterprises through relief interventions. Constructed of farmers, entrepreneurs, or local institutions, the enterprise members are trained in methods of seed production and assisted in setting up the enterprise. In Uganda and Kenya this approach has been established for potatoes and enterprises for other crops are also being set up. Although this strategy requires high initial investment to establish and organize, it has the potential to be sustainable in the long-term. Furthermore, these enterprises will also prepare farmers to cope with any potential future disasters.

Providing advice and training on agricultural technologies can also increase seed security. Firstly, agricultural training can be given to displaced farmers who may be unfamiliar with soils that differ from their home environment. Secondly, farmers may have lost labourers and family members during the disaster; technological advice may help them to alleviate the impact of these losses on the farm. Thirdly, historically farmers have showed willingness to test and experiment with small amounts of novel seeds and new varieties of crops. In post-disaster situations, agencies could provide advice on seed technologies to help decrease vulnerability to diseases, water-logging and poor soils.

Within the literature, no writer portrayed one approach as a panacea for long-term agricultural recovery. In many cases, a mix of rehabilitation activities may be required to engage a wide spectrum of farmers in need. Although an effective needs assessment will help to determine which combination of approaches is appropriate for the local context, Longley warns that planning and implementing these interventions must still be approached carefully. Alongside all of these activities, ongoing monitoring and evaluation are critical for responding to changing conditions and long-term sustainability.

Transition from Emergency Aid to Long-Term Development

Although much is written on immediate seed relief and longer term rehabilitation, there is a scarcity of literature on the transitionbetween short-term and long-term activities or on approaches that integrate short-term relief and long-term rehabilitation at the outset. Noting this absence of information, O'Keefe and Kirby write that "the striking thing about disaster handbooks is not the detail of what to do in the relief phase but the absence of any information on how to move on from relief" (1997: 2). They feel that this stage is particularly important as communities in post-disaster situations risk becoming dependent on short term aid activities in the absence of a transition to long-term planning.

There are a wide variety of reasons relief-development transitions may be problematic such as the changing conceptual frameworks on part of donors and beneficiaries and the inadequately linked and different timetables. In response to these difficulties and variables, several ideas are put forth for successful relief-development transitions:

- the integration of short and long term plans should be at the initial planning stages
- a shared vision of end goals between the donor community and key local actors
- a joint needs assessment that prioritizes the essential elements of basic needs and reconstruction and peace-building efforts
- clear schedules and assigned responsibilities for hand-over from emergency agencies to their successors undertaking rehabilitation and development programs
- the ongoing participation of community based organizations from the needs assessment through to long-term planning
- performance and utilization-focused monitoring integrated into planning
- the development of an exit strategy at the planning stage of the relief operation

As illustrated in the list above, some writers perceive relief and development activities as distinct events requiring a *transition* between the two different sets of activities and sets of organizations. An example illustrating this was in Nicaragua following Hurricane Mitch. Many of the organizations that were mobilized during this disaster were providing short-term assistance in many municipalities in which they had never worked. Similarly, many agencies who did have established networks and long-term involvement in these regions were not utilized during the disaster stage. In this situation, the expertise and knowledge of local conditions of neither the relief nor development agencies were appropriately used. Presumably an approach integrating the expertise of both relief and development agencies would have been more effective.

Contrasting the transition from short to long term planning, some writers favour an integrationof short-term and long-term strategies from the outset. FAO notes that development objectives should not be set aside during emergencies; they need to be maintained throughout the emergency and should incorporate elements of prevention and preparedness which reduce susceptibility to disasters. Despite strong arguments that an integrated approach will better address farmer systems' changing needs, there is a large gap both in practice and in the literature in this area.

Biodiversity Issues Related to Seed Choice in Relief and Rehabilitation Interventions

Crop diversity is portrayed as an essential prerequisite for productive agricultural ecosystem and sustainable livelihoods in developing countries. Growing different varieties and diverse crops helps farmers to fine-tune their farming systems to local environmental conditions, to maintain food security and to utilize crop related benefits. Several factors posing a threat to crop diversity globally include the spread of commercial agriculture, natural disasters and conflict. Consequently, agricultural biodiversity is integrally linked with post-disaster rehabilitation and relief initiatives. Despite aims to the contrary, in seed relief efforts many agencies have had negative impacts on crop diversity.

Issues concerning the benefits and drawbacks of different relief and rehabilitation interventions on crop diversity will be explored below. Seed distributions are the post-disaster strategies that have the most direct impact on biodiversity. Although a small portion of this literature focused on farmers' participatory varietal selection for seed distributions, a larger portion focused on the debate between seeds from in situ/ ex situsources, informal/formal sources and local/modern high yielding varieties. In addition to seed selection issues, the effects of social and economic variables on the management of biological diversity were also significant components of the literature explored.

Farmer Participation in Complex Situations

Most writers reviewed agreed that the starting point for post-disaster seed rehabilitation is to understand farming community's pre-disaster situation. Determined during the diagnostic stage, if germ plasma is to be introduced into the community, it should closely resemble pre-disaster conditions. Thus if farmers have been growing only local varieties of target crops, then these should be the focus; if farmers were growing modern high-yielding varieties, then these should be provided . However, in many post-disaster situations this is not always so straightforward.

Firstly, farmers may have experience with an eclectic mixture of local and modern varieties; it may be difficult to tell the difference between the two types of seeds as farmers may have over time adapted a range of varieties from different sources. In such cases, deciding which types of seeds to distribute can be problematic.

Secondly, the seed being used by farmers prior to the disaster may not be available for purchase in the area. Furthermore, disaster agencies are dependent on the seed's natural multiplication rate and successful yields if regional breeding programs are pursued. This raises the question of what type of seed is appropriate if seeds of local varieties cannot be obtained.

Thirdly, in some countries, such as Afghanistan, Angola, Cambodia, Eritrea and Mozambique, where wars have lasted over 10 years, it may not be feasible to return to a farmer system on a pre-war level; markets, populations, ecological conditions etc. will have changed extensively. In these cases, there is often debate over what varieties to introduce. Several writers question if agencies are then justified in helping the country to take a 'technological jump' and implement modern seed technologies where otherwise local varieties would have been chosen.

In each of these situations, facilitating the recovery of the farming system to pre-war levels is problematic. Farmer participation in selection of seeds is a potential strategy to move forward in these situations. Although there are examples of farmer participatory varietal selection in a development context, surprisingly little has been written on the subject in a post-disaster context. Reasons for this may be the perceived lack of time in disaster relief or the perceived lack of farmers' knowledge to make an informed choice. Kundermann proposes that farmers may over-value foreign seed where there is a lack of information and opportunities to assess the imported resources or misappropriate foreign resources due to a lack of confidence in the unknown material (2000). However, it is debatable whether these reasons justify the denial of control to farmers of seed selection in their own production systems. Alternative to these cases of farmer varietal selection, much of the literature focused on the drawbacks and merits of different seeds for distribution in the context of their environmental, social and economic suitability in post-disaster situations.

Seed distributions from Ex situ and/or Formal sources

In many instances the seeds distributed are obtained *ex situ* or from the formal agricultural sector. When agencies concentrate on the formal sector in seed related interventions, modern variety seeds are more often selected for distribution than local farmer varieties. A disproportionate concentration on these seed varieties will have implications for biodiversity and the overall farming system. Several instances where modern varieties have been distributed are: the Caribbean following Hurricane Mitch, in Bangladesh following floods in 1999, in Rwanda following the civil war in the mid-1990s and in Uganda in response to the droughts, flooding and rebel insurgency in the 1990s.

Proponents of modern varieties herald that they have the benefits of shorter growing seasons, boost local economies, conserve forest land, prevent childhood malnutrition and increase resistance to pests, diseases and drought. Furthermore, they have contributed to a worldwide rise in crop yields, as famed by the 'Green Revolution' where food yields (per person per acre) doubled or tripled within 20-30 years. Such varieties are often portrayed as an effective vehicle towards achieving global food security and towards economic rehabilitation in agriculture.

Supporting the role of high-yielding varieties in the recovery of livelihoods and poverty alleviation, Evenson states that "basic economic logic indicates that with lower rates of productivity growth, farm production costs will be higher and lower quantities of crops will be produced in developing countries". This would result in higher prices for all consumers including farmers for foods they do not produce. In the event that prices rise, the harm is would be greatest among the poorer groups because the poor spend a higher fraction of their income.

Two arguments describing the benefits of modern varieties on local biodiversity are as follows. Firstly, in order for traditional varieties to produce equivalent yields to modern varieties, a larger area of land is required for cultivation. This land requirement puts more pressure on the biodiversity of habitats and fragile land problems (Evenson 2000). Avery states that the solution for protecting wildlands is to pursue "higher yields of crops and livestock from the land we are already farming" (Avery 1998: 32). Secondly, the availability of modern varieties has prompted many of the world's poorest countries to invest in plant breeding programs and produce varieties suited to local environments; this has helped to maintain high levels of biodiversity (Evenson 2000).

Modern variety seeds and seeds from the formal sector also been praised for their accessibility and reliable quality in post-disaster situations. With respect to quality, there have been instances where farmers are provided with seeds of poor quality during disaster situations. Distributing seed that is of poor physiological, analytical or sanitary quality can be worse than distributing no seed at all (ODI 1996; ISTF 1997). In addition to these issues of quality, *ex situ* seed acquired from international seed banks is often more accessible than local varieties acquired *in situ* in times of disaster.

Despite these benefits, other writers have argued that the belief in the superiority of formal sector varieties over farmer varieties is inappropriate for post-disaster agricultural interventions. Several critiques of modern high-yielding varieties include being prematurely introduced into environments where they are not compatible with local conditions; requiring high levels of chemical inputs that negatively impact the surrounding environment; the large-scale use of uniform germplasm making their cropping sector more vulnerable to large-scale harvest failures; displacing local knowledge systems and decreasing overall levels of biodiversity.

The experience of Honduras following Hurricane Mitch is one example that has inspired such critiques. Firstly, farmers expressed disappointment with the concentration and similar modern cultivars that were vulnerable to the harsh conditions at these altitudes and resulted in poor harvests. Furthermore, the distribution of only a few modern varieties with no action to protect local varieties resulted in a loss of plant genetic resources and important genetic properties necessary to the 'subsistence agriculture' in the region. From this example De Barbentane concludes that although the aim of agencies was to rebuild food security in the region, they had a negative impact on food security, biodiversity and sustainability of local agriculture systems by introducing seeds that were inappropriate to that context.

Seed Distributing from In Situ and/or Informal Sources

Many agencies focus on distributing *ex situ* seeds and in strengthening the formal sector in order to ensure the benefits of quality and high yields. However, this disproportionate concentration may also be because agencies do not have a good understanding of the informal sector. Although the informal management of genetic material does not typically follow the distinct rules characteristic of the formal sector, supporting its recovery in post-disaster situations is arguably very important. Bushamuka states that crop diversity, maintained through local management, is the basis of agricultural systems in developing countries and should thus be preserved (1998).

Additional proposed benefits of local varieties include their suitability to local conditions, their resilience in war times, and their role in maintaining local knowledge systems.

Several of these claimed benefits are explored as follows. If local traditions of experimenting with and selecting seeds are displaced by the formal sector, the overall resilience of the farming system may be adversely affected (Haugen 2001; Ahmed et al 2001). For example, during the war in Rwanda in the mid-1990s, the production some 1,300 phenotypes of local bean varieties remained stable as they were restocked through the local farmer markets. Contrasting this, the pre-war potato production had largely consisted of three modern varieties. Its failing post-war production was attributed to its reliance on the formal sector to supply clean seed, fungicide and fertilizer; all of these had been lost at the beginning of the war. Kundermann states that the more extreme the agro-climatic conditions, the greater the benefits of locally developed farmers' varieties over varieties produced by formal breeding programs.

Refuting the claim that modern varieties produce higher yields, some writers argue that local varieties result in higher yields because they are not as vulnerable to crop failure. This is especially true in the case of rain-fed areas where modern varieties, which generally require more water than local varieties, do not often produce their famed higher yields (Hossain 2001). Reportedly, the practice of growing mixed varieties and crops inherent in local farming practices reduces vulnerability to insects, diseases, climatic irregularities and a wide range of agro-ecological conditions that could drastically lower yields. It was for all of these reasons that the SCF supported the distribution of these seeds in Rwanda.

Much of the literature made the correlation between *ex situ* seeds, the formal sector and modern varieties and between *in situ* seeds, the informal sector and local farmer varieties. It is very important to note that these correlations do not always exist. *Ex situ* seeds from neighbouring countries and international gene banks may also be local varieties stored there as a as a disaster prevention method. Furthermore, in some cases seeds found *in situ* that are modern varieties. When reviewing other post-disaster agricultural relief experiences, it is noteworthy that this *ex situ* does not always mean 'modern' and *in situ* does not always 'local'.

The Effects of Agricultural Rehabilitation Interventions on Biodiversity

Several writers argue that restoring biodiversity and long-term productivity to farmer systems requires more than a straightforward substitution or reintroduction of seeds. In addition to the agro-ecological considerations, the maintenance of seeds and biodiversity within a farming system is closely linked with features of social organization, economic activities and cultural/religious norms of the community. Some of these socio-economic and cultural aspects will be explored below.

Bushamuka notes the effects of socio-cultural and socio-economic factors on the diversity in farming systems. Agricultural relief and rehabilitation policies are often guided by the assumption that populations depend on crops from commercial farming. Because commercial production and income are often controlled by men, their desired variety types are often given preference in post-disaster programmes. However, it is vital to note that women contribute significantly to the agricultural work force and have different crop preferences which are often

neglected in programmes. For example, home garden's managed by women are among the richest remaining repositories of genetic diversity. One study in Thailand found a total of 230 different plant species growing in the gardens of one village alone. The majority of available literature on gender and biodiversity is within a development context and the link with post-disaster situations is still at a preliminary stage.

Cultural norms can also influence the selection of crop varieties produced for consumption such as low yielding landraces that are often maintained for their particular cultural or culinary values. Consistent with these descriptions, Sperling notes that in Rwanda and Sierra Leone community systems of knowledge and social relationships in exchanging seed are integral to the sustenance of varietal diversity. She goes on to argue that the culmination of factors contributing to biodiversity maintenance by farmers is not just about the physical seeds but about the political, social and economic that enable local people to manage their cropping systems. Post-disaster interventions should take into account the relation of these forces to agricultural biodiversity in relief and rehabilitation measures.

Following from this, interventions that concentrate on the formal seed systems involve a limited number of actors doing or regulating each process.A disproportionate concentration on the formal seed system can potentially result in a transfer of the site of knowledge creation and seed maintenance away from local communities and to centralized control by intervening agencies. In many cases farmers are resistant to this knowledge transfer favouring new seeds and techniques. For example, farmers in Sudan were mistrustful of distributed modern seeds because they had not tested them under normal conditions and the varieties were unfamiliar in that area. Furthermore, a farmer receiving a modern variety during an emergency may persist to farm the seed in a similar way he or she would plant a traditional variety seed because they are comfortable with that method of farming.

Synthesizing these arguments and experiences put forth above, it can be inferred that seed distributions that concentrate too heavily on one type of seeds may not adequately take into account all of the factors involved in sustaining local biodiversity and productive and farming systems. Benefits of ex situ and/or modern varieties and/or seeds in the formal sector include poverty alleviation, conservation of wildlands, quality control and easy access for distribution. Benefits of in situ and/or local varieties and/or seeds from the informal sector include natural resilience of the system, preservation of local knowledge and of local power structures. In cases where a return to pre-war varieties is no longer possible, optimally farmer's participation will play a role in determining which types of seeds are best for their local conditions. Ideally planning for relief interventions should be based upon the site-specific balance of these benefits and drawbacks and give an accurate representation to the diverse variables constructing a farming system.

Conclusion

Given the complexity and fragility of post-disaster farming systems, external interventions have a responsibility to intervene and facilitate recovery cautiously. From the experience and opinions expressed in this investigation, several recommendations and cross-cutting themes are worth highlighting.

Firstly, many of the issues, strengths and problems described throughout the literature related back to the importance of accurately and comprehensively diagnosing the situation at the outset. A needs assessment that is conducted in a holistic manner and gives representation to the diverse aspects of the informal and formal seed sectors with an emphasis on understanding the strengths of the pre-war and current farming systems is vital. Furthermore, iterative needs assessments and monitoring methodologies should be integrated into post-disaster recovery in a way that the planned activities can meaningfully respond to changing conditions in the farming system.

Secondly, past experience has revealed that there is tendency of agencies to plan interventions without sufficient knowledge of the entire interconnected components of the farming system. This leads to relief and rehabilitation interventions that disproportionately concentrate on improving one aspect of the farming system at the expense of neglecting another. Illustrating this were agencies decision to distribute seeds and tools to farmers in response to their lack of availability to seeds as opposed to improving farmers' access to seeds.

Thirdly, agencies tend to concentrate on improving the formal sector and productivity of farming systems without adequately understanding the informal sector and the socioeconomic and cultural variables of the farming system. As was revealed, all seed distributions and rehabilitation strategies also have tremendous impacts on the biodiversity of the farming system, livelihoods, gender relations and social and economic inequalities. A broad perspective that takes into account all of these issues should be integrated into seed relief and rehabilitation interventions.

Finally, gender and people's participation are also significant cross-cutting themes. Integrating the diverse perspectives and variables present within the farming system is critical to long-term recovery. These issues are crucial not only at the needs assessment stage, but also in other activities such as varietal selection and ongoing monitoring. Disasters affect men and women in different ways in addition to differentially affecting economic classes. This needs to be taken into account in all aspects of planning. Given the magnitude of complex problems in crises and the rapid responses they require, the difficulty of participatory and gendered planning that accurately represents a diverse cross-section of the farming systems needs and interests is somewhat understandable. However, the significant absence of these factors within work in this area is still largely regrettable. Byrne and Baden note that the inclusion of participatory processes and gender sensitivity can speed up, rather than slow down, the relief to development transition.

This investigation has revealed many of the complexities of post-disaster seed relief and rehabilitation. In doing so, it is hoped that increased insight has been provided into the drawbacks and benefits of past experiences and provided an enhanced understanding of emerging strategies in the field.

Ways of responding to disaster

The specific information required would vary from disaster to disaster, but a basic, three -step processes includes:

(1) Collect data,

(2) Analyze data,

(3) Respond to data.

The analysis involves collating and interpreting the data and can include asking questions as the following:

- What problems are occurring? Why are they occurring?
- Where are problems occurring?
- Who is affected?
- What problems are causing the greatest morbidity and mortality?
- What problems are increasing or decreasing?
- What problems will subside on their own?
- What problems will increase if unattended?
- What relief resources are available?
- Where are relief resources available?
- How can relief resources be used most efficiently?
- What relief activities are in progress?
- Are relief activities meeting relief needs?
- What additional information is needed for decision making?

After answering such questions one can carry out the third part, i.e., planning an appropriate Response to the situation described in the surveillance data.

In developing this plan one will decide what types of relief responses are appropriate and what the relative priorities are among the relief activities.

This 3-step process of Data Collection, Analysis and Response can be described as a closed feedback system involving re-evaluation of relief needs and their effects.

Surveillance following a disaster evolves in phases:

1. Immediate Assessment

2. Short term assessment

3. Ongoing Surveillance

Immediate Assessment

The object of this phase of surveillance is to obtain as much general information as possible and as quickly as possible.

The most basic information needed at this point is the following:

(1) The geographical extent of the disaster-stricken area,

(2) The major problems occurring in the area,

(3) The number of people effected.

This information can be obtained by whatever means seems most efficient. Listening carefully and asking questions is the best way to begin.

An Arial survey may be useful in defining the geographical extent of the disaster-stricken area and in observing major damage and destruction.

Census data can be examined to determine how many people previously lived in the disaster-stricken area and thus were at risk.

Hospitals, clinics, and morgues, which were in operation, may be able to obtain numbers of known deaths and injuries.

It is useful to determine the most frequent causes of deaths and types of injuries in order to predict whether demands for medical care will be increasing or decreasing.

Some problems likely to occur after a disaster can be predicted according to past experience with that particular type of disaster.

For example, experience has shown that disruption of water supplies has often been a problem following earthquakes.

New types of disasters, such as chemical emergencies and nuclear accidents, still present many unknown problems.

Short-term Assessment

The short-term assessment involves more systematic methods of collecting data and is likely to result in more detailed reliable information on problems, relief resources, and relief information on problems, relief resources and relief activities in progress.

One way to organize data collection during this phase of assessment is to divide the disaster-stricken area into smaller areas or "blocks" to be surveyed simultaneously by different workers or teams of workers.

Simple reporting forms can be developed and workers sent out to survey the different areas and report at a specified time.

The following is a list of Information, which may be needed in order to make relief decisions

- The geographical extent of the affected area as defined by streets and other clear boundaries.
- The number of persons known to be dead, possibly according to age groups and sex.
- The estimated number of persons severely injured and / requiring medical care, possibly according to age group, sex, and type of injury or medical problem.
- Estimated number of homes destroyed, homes uninhabitable, and homes, which are still habitable.
- Condition of schools, churches, temples and other public buildings etc.
- Condition and extent of water supply.
- Condition and extent of food supply.
- Condition of roads, bridges, communication facilities and public utilities.
- Location and condition of health facilities
- Estimates of medical personnel, equipment's and supplies available
- Description of relief activities already in progress, (E.g. search and rescue, first aid, food relief etc).

Ongoing Surveillance

Depending on the factors above, short-term assessment may take as little as 5-6 hours or up to 3-4 days. As early as possible, relief priorities should be determined, resources ordered and full scale relief activities initiated.

Once the short-term assessment is complete and appropriate relief is in progress, surveillance becomes an ongoing system.

When information obtained by the ongoing surveillance is analyzed, new problems may become apparent, requiring investigation.

The surveillance report is one way of coordinating different agencies and preventing duplication of relief efforts.

A relief plan developed during any of the surveillance cycle may include some or all of the following activities:

- Rescue of victims
- Provision of emergency medical care
- Elimination of physical dangers (fire, gas leak etc)
- Evacuation of the population (nuclear and chemical emergencies)
- Provision of preventive and routine medical care
- Provision of water
- Provision of food
- Provision of clothing
- Provision of shelter
- Disposal of human waste
- Control of vector born diseases
- Disposal of human bodies
- Disposal of solid waste

MASS CASUALTY MANAGEMENT

Management of mass casualties is divided into three main areas

1. Pre-Hospital Emergency Care
    - Search and Rescue
    - First Aid
    - Field Care
    - Stabilization of the victims
    - Triage
    - Tagging
2. Hospital Reception and Treatment
    - Organizational structure in the hospital with a disaster management team consists of senior officers in the medical, nursing and administrative fields
    - Standardized simple therapeutic procedures followed
3. Re-distribution of Patients between Hospitals

Recovery

The aim of the recovery phase is to restore the affected area to its previous state. It differs from the response phase in its focus; recovery efforts are concerned with issues and decisions that must be made after immediate needs are addressed. Recovery efforts are primarily concerned with actions that involve rebuilding destroyed property, re-employment, and the repair of other essential infrastructure. Efforts should be made to "build back better", aiming to reduce the pre-disaster risks inherent in the community and infrastructure. An important aspect of effective recovery efforts is taking advantage of a ‘window of opportunity’ for the implementation of mitigate measures that might otherwise be unpopular. Citizens of the affected area are more likely to accept more mitigate changes when a recent disaster is in fresh memory.

In the United States, the National Response Plan dictates how the resources provided by the Homeland Security Act of 2002 will be used in recovery efforts. It is the Federal government that often provides the most technical and financial assistance for recovery efforts in the United States.

Phases and personal activities

Mitigation

Personal mitigation is mainly about knowing and avoiding unnecessary risks. This includes an assessment of possible risks to personal/family health and to personal property.

One example of mitigation would be to avoid buying property that is exposed to hazards, e.g., in a flood plain, in areas of subsidence or landslides. Home owners may not be aware of a property being exposed to a hazard until it strikes. However, specialists can be hired to conduct risk identification and assessment surveys. Purchase of insurance covering the most prominent identified risks is a common measure.

Personal structural mitigation in earthquake prone areas includes installation of an Earthquake Valve to instantly shut off the natural gas supply to a property, seismic retrofits of property and the securing of items inside a building to enhance household seismic safety. The latter may include the mounting of furniture, refrigerators, water heaters and breakables to the walls, and the addition of cabinet latches. In flood prone areas houses can be built on poles/stilts, as in much of southern Asia. In areas prone to prolonged electricity black-outs installation of a generator would be an example of an optimal structural mitigation measure. The construction of storm cellars and fallout shelters are further examples of personal mitigative actions.

Mitigation involves Structural and Non-structural measures taken to limit the impact of disasters.

Structural Mitigation:-

This involves proper layout of building, particularly to make it resistant to disasters.

Non Structural Mitigation:-

This involves measures taken other than improving the structure of building.

Preparedness

Personal preparedness focuses on preparing equipment and procedures for use when a disaster occurs, i.e., planning. Preparedness measures can take many forms including the construction of shelters, installation of warning devices, creation of back-up life-line services (e.g., power, water, sewage), and rehearsing evacuation plans. Two simple measures can help prepare the individual for sitting out the event or evacuating, as necessary. For evacuation, a disaster supplies kit may be prepared and for sheltering purposes a stockpile of supplies may be created. The preparation of a survival kit such as a "72-hour kit", is often advocated by authorities. These kits may include food, medicine, flashlights, candles and money. Also, putting valuable items in safe area is also recommended.

Response

The response phase of an emergency may commence with search and rescue but in all cases the focus will quickly turn to fulfilling the basic humanitarianneeds of the affected population. This assistance may be provided by national or international agencies and organisations. Effective coordination of disaster assistance is often crucial, particularly when many organizations respond and local emergency management agency (LEMA) capacity has been exceeded by the demand or diminished by the disaster itself.

On a personal level the response can take the shape either of a shelter in place or an evacuation. In a shelter-in-place scenario, a family would be prepared to fend for themselves in their home for many days without any form of outside support. In an evacuation, a family leaves the area by automobile or other mode of transportation, taking with them the maximum amount of supplies they can carry, possibly including a tent for shelter. If mechanical transportation is not available, evacuation on foot would ideally include carrying at least three days of supplies and rain-tight bedding, a tarpaulin and a bedroll of blankets being the minimum.

Recovery

The recovery phase starts after the immediate threat to human life has subsided. During reconstruction it is recommended to consider the location or construction material of the property.

The most extreme home confinement scenarios include war, famine and severe epidemics and may last a year or more. Then recovery will take place inside the home. Planners for these events usually buy bulk foods and appropriate storage and preparation equipment, and eat the food as part of normal life. A simple balanced diet can be constructed from vitamin pills, whole-meal wheat, beans, dried milk, corn, and cooking oil. One should add vegetables, fruits, spices and meats, both prepared and fresh-gardened, when possible.

As a profession

Emergency managers are trained in a wide variety of disciplines that support them through out the emergency life-cycle. Professional emergency managers can focus on government and community preparedness (Continuity of Operations/Continuity of Government Planning), or private business preparedness (Business Continuity Management Planning). Training is provided by local, state, federal and private organizations and ranges from public information and media relations to high-level incident command and tactical skills such as studying a terrorist bombing site or controlling an emergency scene.

In the past, the field of emergency management has been populated mostly by people with a military or first responder background. Currently, the population in the field has become more diverse, with many experts coming from a variety of backgrounds without military or first responder history. Educational opportunities are increasing for those seeking undergraduate and graduate degrees in emergency management or a related field. There are over 180 schools in the

US with emergency management-related programs, but only one doctoral program specifically in emergency management.

Professional certifications such as Certified Emergency Manager and Certified Business Continuity Professional are becoming more common as the need for high professional standards is recognized by the emergency management community, especially in the United States.

Role of the Community in Disaster Response

In 2007, Dr. Wayne Blanchard of FEMA's Emergency Management Higher Education Project, at the direction of Dr. Cortez Lawrence, Superintendent of FEMA's Emergency Management Institute, convened a working group of emergency management practitioners and academics to consider principles of emergency management. This project was prompted by the realization that while numerous books, articles and papers referred to "principles of emergency management," nowhere in the vast array of literature on the subject was there an agreed-upon definition of what these principles were. The group agreed on eight principles that will be used to guide the development of a doctrine of emergency management. The summary provided below lists these eight principles and provides a brief description of each.

Principles: Emergency management must be:

1. Comprehensive – emergency managers consider and take into account all hazards, all phases, all stakeholders and all impacts relevant to disasters.
2. Progressive – emergency managers anticipate future disasters and take preventive and preparatory measures to build disaster-resistant and disaster-resilient communities.
3. Risk-driven – emergency managers use sound risk management principles (hazard identification, risk analysis, and impact analysis) in assigning priorities and resources.
4. Integrated – emergency managers ensure unity of effort among all levels of government and all elements of a community.
5. Collaborative – emergency managers create and sustain broad and sincere relationships among individuals and organizations to encourage trust, advocate a team atmosphere, build consensus, and facilitate communication.
6. Coordinated – emergency managers synchronize the activities of all relevant stakeholders to achieve a common purpose.
7. Flexible – emergency managers use creative and innovative approaches in solving disaster challenges.
8. Professional – emergency managers value a science and knowledge-based approach; based on education, training, experience, ethical practice, public stewardship and continuous improvement.

Tools

In recent years the continuity feature of emergency management has resulted in a new concept, Emergency Management Information Systems (EMIS). For continuity and interoperability between emergency management stakeholders, EMIS supports the emergency management process by providing an infrastructure that integrates emergency plans at all levels of government and non-government involvement and by utilizing the management of all related resources (including human and other resources) for all four phases of emergencies. In the healthcare field, hospitals utilize HICS (Hospital Incident Command System) which provides structure and organization in a clearly defined chain of command with set responsibilities for each division.

Within other professions

Practitioners in emergency management (disaster preparedness) come from an increasing variety of backgrounds as the field matures. Professionals from memory institutions (e.g., museums, historical societies, libraries, and archives) are dedicated to preserving cultural heritage—objects and records contained in their collections. This has been an increasingly major component within these field as a result of the heightened awareness following the September 11 attacks in 2001, the hurricanes in 2005, and the collapse of the Cologne Archives.

To increase the opportunity for a successful recovery of valuable records, a well-established and thoroughly tested plan must be developed. This plan must not be overly complex, but rather emphasize simplicity in order to aid in response and recovery. As an example of the simplicity, employees should perform similar tasks in the response and recovery phase that they perform under normal conditions. It should also include mitigation strategies such as the installation of sprinklers within the institution. This task requires the cooperation of a well-organized committee led by an experienced chairperson. Professional associations schedule regular workshops and hold focus sessions at annual conferences to keep individuals up to date with tools and resources in practice in order to minimize risk and maximize recovery.

Tools

The joint efforts of professional associations and cultural heritage institutions have resulted in the development of a variety of different tools to assist professionals in preparing disaster and recovery plans. In many cases, these tools are made available to external users. Also frequently available on websites are plan templates created by existing organizations, which may be helpful to any committee or group preparing a disaster plan or updating an existing plan. While each organization will need to formulate plans and tools which meet their own specific needs, there are some examples of such tools that might represent useful starting points in the planning process. These have been included in the External Links section.

In 2009, the US Agency for International Development created a web-based tool for estimating populations impacted by disasters. Called Population Explorer the tool uses Landscan population data, developed by Oak Ridge National Laboratory, to distribute population at a resolution 1 km^2 for all countries in the world. Used by USAID's FEWS NET Project to estimate populations

vulnerable and or impacted by food insecurity, Population Explorer is gaining wide use in a range of emergency analysis and response actions, including estimating populations impacted by floods in Central America and a Pacific Ocean Tsunami event in 2009.

In 2007, a checklist for veterinarians pondering participation in emergency response was published in the Journal of the American Veterinary Medical Association, it had two sections of questions for a professional to ask them self before assisting with an emergency: Absolute requirements for participation: Have I chosen to participate?, Have I taken ICS training?, Have I taken other required background courses?, Have I made arrangements with my practice to deploy?,Have I made arrangements with my family?

Incident Participation: Have I been invited to participate?, Are my skill sets a match for the mission?, Can I access just-in-time training to refresh skills or acquire needed new skills?, Is this a self-support mission?, Do I have supplies needed for three to five days of self support?

While written for veterinarians, this checklist is applicable for any professional to consider before assisting with an emergency.

International Organizations

International Association of Emergency Managers

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

Red Cross/Red Crescent

National Red Cross/Red Crescent societies often have pivotal roles in responding to emergencies. Additionally, the International Federation of Red Cross and Red Crescent Societies (IFRC, or "The Federation") may deploy assessment teams (e.g. Field Assessment and Coordination Team - FACT) to the affected country if requested by the national Red Cross or Red Crescent Society. After having assessed 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.

United Nations

Within the United Nations system responsibility for emergency response rests with the Resident Coordinator within the affected country. However, in practice international response will be coordinated, if requested by the affected country’s government, by the UN Office for the Coordination of Humanitarian Affairs (UN-OCHA), by deploying a UN Disaster Assessment and Coordination (UNDAC) team.

World Bank

Since 1980, the World Bank has approved more than 500 operations related to disaster management, amounting to more than US$40 billion. These include post-disaster reconstruction projects, as well as projects with components aimed at preventing and mitigating disaster impacts, in countries such as Argentina, Bangladesh, Colombia, Haiti, India, Mexico, Turkey and Vietnam to name only a few.

Common areas of focus for prevention and mitigation projects include forest fire prevention measures, such as early warning measures and education campaigns to discourage farmers from slash and burn agriculture that ignites forest fires; early-warning systems for hurricanes; flood prevention mechanisms, ranging from shore protection and terracing in rural areas to adaptation of production; and earthquake-prone construction.

In a joint venture with Columbia University under the umbrella of the ProVention Consortium the World Bank has established a Global Risk Analysis of Natural Disaster Hotspots.

In June 2006, the World Bank established the Global Facility for Disaster Reduction and Recovery, a longer term partnership with other aid donors to reduce disaster losses by mainstreaming disaster risk reduction in development, in support of the Hyogo Framework of Action. The facilities helps developing countries fund development projects and programs that enhance local capacities for disaster prevention and emergency preparedness.

European Union

Since 2001, the EU adopted Community Mechanism for Civil Protection which started to play a significant role on the global scene. Mechanism's main role is to facilitate co-operation in civil protection assistance interventions in the event of major emergencies which may require urgent response actions. This applies also to situations where there may be an imminent threat of such major emergencies.

The heart of the Mechanism is the Monitoring and Information Centre. It is part of Directorate-General for Humanitarian Aid & Civil Protection of the European Commission and accessible 24 hours a day. It gives countries access to a platform, to a one-stop-shop of civil protection means available amongst the 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 at headquarters level between participating states, the affected country and dispatched field experts. It also provides useful and updated information on the actual status of an ongoing emergency.

International Recovery Platform

The International Recovery Platform (IRP) was conceived at the World Conference on Disaster Reduction (WCDR) in Kobe, Hyogo, Japan in January 2005. As a thematic platform of the International Strategy for Disaster Reduction (ISDR) system, IRP is a key pillar for the implementation of the Hyogo Framework for Action (HFA) 2005–2015: Building the Resilience

of Nations and Communities to Disasters, a global plan for disaster risk reduction for the decade adopted by 168 governments at the WCDR.

The key role of IRP is to identify gaps and constraints experienced in post disaster recovery and to serve as a catalyst for the development of tools, resources, and capacity for resilient recovery. IRP aims to be an international source of knowledge on good recovery practice.

National Organizations

Australia

The key federal coordinating and advisory body for emergency management in Australia is Emergency Management Australia (EMA). The five states and two territories each has its own State Emergency Service. The Emergency Call Service provides a national 000 emergency telephone number to contact state Police, Fire and Ambulance services. Arrangements are in place for state and federal cooperation.

Canada

Public Safety Canada is Canada's national emergency management agency. Each province is required to have legislation in place for dealing with emergencies, as well as establish their own emergency management agencies, typically called an "Emergency Measures Organization" (EMO), which functions as the primary liaison with the municipal and federal level.

Public Safety Canada coordinates and supports the efforts of federal organizations ensuring national security and the safety of Canadians. They also work with other levels of government, first responders, community groups, the private sector (operators of critical infrastructure) and other nations.

Public Safety Canada's work is based on a wide range of policies and legislation through the Public Safety and Emergency Preparedness Act which defines the powers, duties and functions of PS are outlined. Other acts are specific to fields such as corrections, emergency management, law enforcement, and national security.

Germany

In Germany the Federal Government controls the German Katastrophenschutz (disaster relief) and Zivilschutz (civil protection) programs. The local units of German fire department and the TechnischesHilfswerk (Federal Agency for Technical Relief, THW) are part of these programs. The German Armed Forces (Bundeswehr), the German Federal Police and the 16 state police forces (Länderpolizei) all have been deployed for disaster relief operations. Besides the German Red Cross[citation needed], humanitarian help is dispensed by the Johanniter-Unfallhilfe, the German equivalent of the St. John Ambulance, the Malteser-Hilfsdienst the Arbeiter-Samariter-Bund, and other private Organization, to cite the largest relief organisation that are equipped for large-scale emergencies. As of 2006, there is a joint course at the University of Bonn leading to the degree "Master in Disaster Prevention and Risk Governance"

India

The role of emergency management in India falls to National Disaster Management Authority of India, a government agency subordinate to the Ministry of Home Affairs. In recent years there has been a shift in emphasis from response and recovery to strategic risk management and reduction and from a government-centered approach to decentralized community participation. The Ministry of Science and Technology supports an internal agency that facilitates research by bringing the academic knowledge and expertise of earth scientists to emergency management.

A group representing a public/private partnership has recently been formed by the Government of India. It is funded primarily by a large India-based computer company and aimed at improving the general response of communities to emergencies, in addition to those incidents which might be described as disasters. Some of the groups' early efforts involve the provision of emergency management training for first responders (a first in India), the creation of a single emergency telephone number, and the establishment of standards for EMS staff, equipment, and training. It operates in three states, though efforts are being made in making this a nation-wide effective group.

The Netherlands

In the Netherlands the Ministry of the Interior and Kingdom Relations is responsible for emergency preparedness en emergency management on national level and operates a national crisis centre (NCC). The country is divided in 25 safety regions (veiligheidsregio). Each safety region is covered by three services: police, fire and ambulance. All regions operate according to the Coordinated Regional Incident Management system. Other services such as the Ministry of Defence, waterboard(s), Rijkswaterstaat etc. can have an active role in the emergency management process.

New Zealand

In New Zealand, responsibility for emergency management moves from local to national depending on the nature of the emergency or risk reduction programme. A severe storm may be manageable within a particular area, whereas a national public education campaign will be directed by central government. Within each region, local governments are unified into 16 Civil Defence Emergency Management Groups (CDEMGs). Every CDEMG is responsible for ensuring that local emergency management is robust as possible. As local arrangements are overwhelmed by an emergency, pre-existing mutual-support arrangements are activated. As warranted, central government has the authority to coordinate the response through the National Crisis Management Centre (NCMC), operated by the Ministry of Civil Defence& Emergency Management (MCDEM). These structures are defined by regulation.

Terminology

New Zealand uses unique terminology for emergency management to the rest of the English-speaking world.

4Rs is a term used to describe the emergency management cycle locally. In New Zealand the four phases are known as:

- Reduction = Mitigation
- Readiness = Preparedness
- Response
- Recovery

Emergency management is rarely used locally; many government publications retain usage of the term civil defence. For example, the Minister of Civil Defence is responsible for central government's emergency management agency, MCDEM.
Civil Defence Emergency Management is a term in its own right. Often abbreviated as CDEM, it is defined by statute as the application of knowledge to prevent harm from disasters.
Disaster very rarely appears in official publications. In a New Zealand context, the terms emergency and incident usually appear when speaking about disasters in general. When describing an emergency that has had a response from the authorities, the term event is also used. For example, publications refer to the "Canterbury Snow Event 2002"

Russia

In Russia the Ministry of Emergency Situations (EMERCOM) is engaged in fire fighting, Civil Defense, Search and Rescue, including rescue services after natural and human-made disasters.

United Kingdom

The United Kingdom adjusted its focus on emergency management following the 2000 UK fuel protests, severe flooding in the same year and the 2001 United Kingdom foot-and-mouth crisis. This resulted in the creation of the Civil Contingencies Act 2004 (CCA) which defined some organisations as Category 1 and 2 Responders. These responders have responsibilities under the legislation regarding emergency preparedness and response. The CCA is managed by the Civil Contingencies Secretariat through Regional Resilience Forums and at the local authority level.

Disaster Management training is generally conducted at the local level by the organisations involved in any response. This is consolidated through professional courses that can be undertaken at the Emergency Planning College. Furthemore diplomas, undergraduate and postgraduate qualifications can be gained throughout the country - the first course of this type was carried out by Coventry University in 1994. The Institute of Emergency Management is a charity, established in 1996, providing consulting services for the government, media and commercial sectors.

The Professional Society for Emergency Planners is the Emergency Planning Society.

One of the largest emergency exercises in the UK was carried out on 20 May 2007 near Belfast, Northern Ireland, and involved the scenario of a plane crash landing at Belfast International Airport. Staff from five hospitals and three airports participated in the drill, and almost 150 international observers assessed its effectiveness.

United States

Under the Department of Homeland Security (DHS), the Federal Emergency Management Agency (FEMA) is lead agency for emergency management. The HAZUS software package developed by FEMA is central in the risk assessment process in the country. The United States and its territories are covered by one of ten regions for FEMA's emergency management purposes. Tribal, state, county and local governments develop emergency management programs/departments and operate hierarchically within each region. Emergencies are managed at the most-local level possible, utilizing mutual aid agreements with adjacent jurisdictions. If the emergency is terrorist related or if declared an "Incident of National Significance", the Secretary of Homeland Security will initiate the National Response Framework (NRF). Under this plan the involvement of federal resources will be made possible, integrating in with the local, county, state, or tribal entities. Management will continue to be handled at the lowest possible level utilizing the National Incident Management System (NIMS).

The Citizen Corps is an organization of volunteer service programs, administered locally and coordinated nationally by DHS, which seek to mitigate disaster and prepare the population for emergency response through public education, training, and outreach. Community Emergency Response Teams are a Citizen Corps program focused on disaster preparedness and teaching basic disaster response skills. These volunteer teams are utilized to provide emergency support when disaster overwhelms the conventional emergency services.

The US Congress established the Center for Excellence in Disaster Management and Humanitarian Assistance (COE) as the principal agency to promote disaster preparedness and societal resiliency in the Asia-Pacific region. As part of its mandate, COE facilitates education and training in disaster preparedness, consequence management and health security to develop domestic, foreign and international capability and capacity.

Challenges of Disaster Management

The Fritz-Georgetown meeting offered a unique opportunity for academics and operational agency staff to examine the "supply and demand" issues in humanitarian education and training. Participants in both operational and academic communities were selected because of their established commitment to expanding cooperation among their respective organizations. Acknowledging that systematic training for humanitarian agency staff is not a luxury but a necessity, the practitioners sought to identify the most productive training content, forms and venues, and the role of training in career development and advancement. Likewise, recognizing the importance of preparing the next generation of humanitarian professionals, the university representatives assessed the means by which courses, seminars, programs and university resources overall could be better suited to preparing students for careers within and related to public service and humanitarian work. All saw the advantages of building relationships that would foster knowledge sharing and joint training activities.

At the outset, participants identified major problems and gaps facing organizations involved in disaster management and complex emergency response, which should be addressed in training. They cited problems ranging from knowledge sharing mechanisms to fundraising from coordination and partnering to ethics. These themes were repeated throughout the proceedings.

Training itself constitutes a serious challenge because of wide staff dispersal, multiple languages spoken and rapid turnover. These difficulties are exacerbated by a lack of resources, due especially to donor pressures to reduce indirect costs. Most donors have yet to be persuaded that systematic training and capacity building programs are essential elements for effective disaster and emergency responses and there is an evident need to bring more donors into discussions like the Georgetown-Fritz meeting. Additionally, there is paucity both of appropriate materials and of faculty who have the necessary balance of academic knowledge and practical experience.

The remaining discussion covered four overlapping themes:
1) Defining the humanitarian "profession," and the role of training and education within that definition or, as the discussion demonstrated: those definitions;
2) The challenges both to agencies and universities in designing and implementing relevant training and education;
3) Opportunities for and limitations on collaboration related to different organizational cultures;
4) The importance (and inherent difficulties) of measuring effectiveness and evaluating performance.

Professionalism and Humanitarian Response
The participants discussed the pros and cons of this trend, identifying what skills and what kinds of knowledge need to be emphasized to best prepare humanitarian leadership for the kinds of emergencies emerging in the 21st century. A paper, "What does it mean to be a Professional Humanitarian?" and presentations by Peter Walker from Tufts University on professionalism and Dan Curran from Harvard University on humanitarianism and entrepreneurship guided this opening discussion.

Assuming there is a disaster management/humanitarian field, is it characterized as other professional fields are, by standards, educational degrees and membership requirements? The answer is, partially yes. This field, and the organizations within it, identify with specific value sets, skills and systems for organizing knowledge and procedures. The participants considered the increasing professionalization of the industry to be generally positive in view of the benefits gained from greater knowledge, higher standards, and technical competence.

Nevertheless, many participants also acknowledged disadvantages to the extent that establishing a professional corps for humanitarian work might mean excluding competent and innovative people who lack advanced formal education and professional degrees. Finding people with the intrinsic qualities such as motivation, critical thinking, communication skills, team building, problem solving, innovation etc. should remain a priority for recruitment efforts. Training can fill the gaps.

The discussion turned to barriers to greater professionalism of the field, as well as better management of operations. First, the field is poorly financed. It depends on few donors who make only short-term commitments. Second, decision-making throughout the system tends also to be short-term, reactive and opaque. Third, because of the unpredicatability of the location and size of disasters and emergencies, it is a challenge to recruit and train staff and expensive to retain them between crises. Thus, the industry is characterized by high turnover with little or no job security. Fourth, the public, private and international entities in the humanitarian field

operate with overlapping roles and a lack of specific focus. The result is poorly managed competition and great difficulty achieving rationally coordinated actions.

While nearly everyone agrees that better management and marketing would increase the efficiency of humanitarian programs overall, there is still resistance to adopting lessons and practices gleaned from successful business operations. The resistance reflects a real gap in understanding between private and public sectors. Few schools of business offer courses targeted at the non-profit sector and fewer still attract students interested in the humanitarian field. While there may be a desire in the private sector to engage, partnerships with humanitarian organizations seem to be few and confined to the donation of cash or goods when disasters occur. There does not seem to have been a discussion of how the humanitarian and corporate sectors can collaborate with respect to expertise, talent or technology. In a nutshell, it seems that humanitarian organizations must more clearly articulate their needs and develop the ability to engage the private sector if they want access to their resources.

Training: Its Potential and Place in Humanitarian Careers

The next session identified the specific kinds of training and other forms of learning and competence building that should be incorporated into the activities of (different kinds of) humanitarian agencies, and at what stages of the staff development/ career path. Barbara Murphy-Warrington from CARE and Barbara Howald from OFDA introduced the discussion.

As explained by the organizational representatives around the table, training is essential to establish and maintain certain levels of skills and knowledge among their employees. Additionally, training for humanitarian staff, like training for today's new business managers can, and indeed must, emphasize imaginative thinking and motivation, as well as concrete knowledge and technical skills. Providing training also helps to retain employees as they see prospects for advancing their career paths. For employees, training is beneficial not only because it increases skill levels but it also increases their commitment to the field.

That said, there is still considerable latitude in defining what core competencies need to be developed and in what balance. The discussion emphasized the importance of training in a wide variety of subject areas because employees need more than sectoral skills; they also need knowledge and skills that they can apply in a range of situations. Frequently staff members have mastered technical skills or country knowledge related to a specific position only to find that they are dealing with rapidly changing situations that modify their duties, and therefore require a wider breadth of knowledge. Participants listed a range of fields they felt to be relevant and amenable to training, including social, political and economic analyses, protection norms and practice, participatory methodologies, rights-based and gender sensitive approaches, psycho-social considerations, capacity-building and conflict management.

At the present time, humanitarian staff members are offered opportunities for training in a variety of forms: They receive on-the-job training for their specific tasks. Those in technical areas generally are given skills updates. Workshops are frequently offered both for agency personnel and, especially in the field, for local partners. And, increasingly, individual university faculty and inter-disciplinary university programs are assuming responsibilities for training

humanitarian agency staff. All of these alternatives can be valuable depending on the purpose and circumstances. Each entity needs to take stock of its training needs and determine the format, venue, frequency and content of training options that most effectively meet these needs. The meeting participants explored the relationship between learning needs and the educational or training forms suited to meeting the needs. Both content and venue of training will vary depending on the purpose to be served, that is whether training is intended to impart specific skills, to enhance general knowledge or to inculcate the values of an organization in its employees.

Fostering Greater Collaboration between Humanitarian Organizations and Academic Institutions

Building on the discussion of training and education needs and capacities, the discussion turned to ways to promote greater collaboration between operational agencies and academic and training institutions. This session discussed successful models of collaboration, different organizational forms that academic collaboration may take, and ways to increase the synergies between universities and humanitarian agencies. Angela Raven-Roberts from Tufts University opened this discussion.

Fritz Institute is breaking new ground in recognizing the need for greater private sector involvement and in facilitating mutual learning. Private sector involvement in disaster management has already proven beneficial. The benefits are mutual, because in both cases, management and field staff face similar problems of security, culture and contextual understanding. The case studies that are meant to assist international businesses in problematic and dangerous countries can be used to advantage by humanitarian agencies as well. The agencies, in turn increasingly have been preparing and disseminating their own case studies which may find their way into corporate offices.

These observations and the opportunities they imply lead to questions of resources. Due to the already inadequate and declining funding for humanitarian agencies, they are facing staff shortages, are unable to fill gaps in service and, as previously mentioned, are under pressure to reduce what donors deem to be “indirect costs,” including training. Because the traditional governmental and international organizational donors will not, or can no longer finance such indirect costs, and because the private sector has long been contributing resources to university programs, attention now turns to possibilities of private sector contributions to long term research, case studies, visiting practitioners and other forms of education to enhance the fields of disaster management, emergency response, and conflict related development challenges.

There are many challenges to raising the level of training opportunities. Moreover, if training falls short of needs for larger agencies in developed countries, it is infinitely more deficient in those countries where humanitarian emergencies are likely to occur. Despite the frequent references to “capacity building” projects and commitments to strengthen local government and NGOs, the amount invested in such activities is minimal and sometimes amounts to little more than lip service. The largest problem, however, seemed to be knowledge sharing and management. Since it is impossible to offer training to everyone in the organization, especially to people in the field, practitioners are seeking ways to share knowledge better. This is of concern

in the humanitarian field because of the high turnover and wide geographic spread of employees. Nevertheless, it is essential to expand training opportunities to local employees. Although many agencies keep information on the internet for employees, computer access can be a problem and most of the materials are solely in English.

Many participants pointed to the lack of curriculum related to humanitarian issues and of faculty who want to teach and pursue research topics in this area. Where humanitarian studies programs exist: Georgetown, Tufts, Harvard, MIT, Colombia, Johns Hopkins, Tulane, they are in multidisciplinary programs within a foreign policy or social science school, or schools of nutrition and public health. Traditional disciplines like anthropology, international law and political science have made important intellectual contributions, and less traditional but up-and-coming areas like security studies and conflict resolution often attract students whose interests merge with those of humanitarian studies. Nevertheless, for the kind of collaboration discussed in the meeting, academic resources are still not readily available, nor are there recognized publishing outlets. Humanitarian studies is notably less well established than the closely related and overlapping field of refugee studies, which has attained considerable academic attention—at least in schools of law—and has a number of dedicated journals. Participants at the meeting made suggestions for increasing contact and cooperation among interested academics, for example, by establishing a dedicated academic association and/or a journal, and they urged the hiring of more adjunct faculty. Other proposed actions were online courses and e-learning that reaches students and staff, including those in developing country partner institutions.

Evaluating Effectiveness: Indicators, Tracking, Program Assessments, and Staff Stability

The fundamental goals of all people who are devoted to disaster management and emergency response is to be as effective as possible, to empower rather than to create dependency, and to act in ways that are sensitive to culture, gender and individual rights. There are two fundamental difficulties in fulfilling these goals: first, almost every achievement involves some kind of trade-off. One sector gains, another loses; one reconstruction objective is completed, causing another to be postponed. Second, the urgency and complexity of the situations in which humanitarian interventions are required make it difficult to measure successes and failures with traditional assessment tools like log frames, indicators, etc. Accountability is another problem. Humanitarian actions should be made accountable, of course, but to whom? Stakeholders include governments, donors, the institution undertaking the work, and various categories of victims, whose interests do not necessarily coincide. There are further obstacles inherent in the field of humanitarian action related to the fast-paced nature of the work. Time is rarely set aside for quality monitoring and evaluation.

In practice, there is very little follow up to determine the impacts of disaster relief and emergency response. On this point, meeting participants argued forcefully for more monitoring and evaluation, as well as better methodologies for doing the monitoring and evaluation. Without these, organizations neither can be sure what has been achieved, nor can they improve. The notion that action should be based on “lessons learned” has become a well-worn phrase. However, several of the meeting participants noted that lessons do not appear to be learned, and the same mistakes are frequently repeated. The main obstacle to improving monitoring and evaluation are funding and, consequently, training. Thus the donors’ insistence on funding action

programs while keeping overhead costs low proves costly because systematic learning is impeded. Participants discussed means to convince, or better said, "sell" donors on the benefits of monitoring and evaluation.

The funding gap promises to grow more severe due to the withdrawal of support from the Mellon Foundation. Nearly every participant in the Georgetown-Fritz meeting had benefited from Mellon support and expressed concern about preserving important projects in the coming year. Funding mechanisms under Mellon also fostered collaboration and coordination among academic centers. In the future, these centers will have to develop permanent mechanisms for continued cooperation.

Conclusions and Next Steps

The workshop ended with discussion of next steps to promote improved training, education and collaboration between humanitarian organizations and academic institutions. For the agencies and donors, training must be recognized as a core activity, as essential to the operations of an agency as any other activity. Donors need to understand that training is the underpinning to successful completion of all other activities. However, simply increasing training opportunities is not a solution in and of itself. Equally important is to correctly diagnose what kind of training is needed based on the activities of the organization and the profile and assigned tasks of the individual. Moreover, although it may be more difficult to measure, trainings should cover not only technical skills, but also teach other skills that enhance innovation and problem-solving.

Training has been and will continue to be improved by greater collaboration between universities and agencies. The participants discussed how the increasing exchanges of staff between both universities and agencies through agency staff sabbaticals and field opportunities for university faculty are improving performance and products in many cases. Such exchanges could further assist training within both contexts by giving agencies and universities respectively a greater understanding of what the other has to offer. For example, case studies from the field could be used in university classrooms to teach practical problem-solving skills.

Suggestions for Agencies:

- Hire staff with intrinsic qualities needed for successful humanitarian work such as motivation, critical thinking and communication skills and use training to teach other needed skills
- Train staff in widely-applicable skills beyond technical ones;
    - Include universities, university faculty, and academic resources for social, political and economic analyses related to ongoing programs
    - Include universities, university faculty, and academic resources in training related to rights based and gender sensitive approaches; protection norms and practice; participatory methodologies and; psycho-social considerations
- Ensure that training increases staff capacity-building;
    - Involve staff in determining training and education needs
    - Use online courses and other e-learning methods to increase training opportunities for field and local staff
    - Provide training in languages besides English
    - Ensure that training is provided even in emergency situations

- Encourage private sector involvement
    - Use private sector case studies for training in problem-solving.
    - Show how increased funding for humanitarian activities helps private sector as well
- Incorporate "lessons learned" in future programming
    - Set aside resources and time for quality monitoring and evaluation
    - Encourage honest appraisal of difficulties and failures
    - Use lessons gained from monitoring and evaluation to design future training programs
    - Convince donors to fund quality monitoring and evaluation

Suggestions for Universities

- Work with agencies to design educational and training programs that meet the needs of the agencies
- Develop multi-disciplinary curricula to prepare students for careers in humanitarian work
- Seek faculty within the various disciplines who want to teach and research humanitarian issues
- Increase awareness in the university community of the benefits of providing programs focusing on humanitarian fields, especially in the social sciences
- Make available adjunct faculty and short-term sabbatical research opportunities for operational agency staff
- Encourage faculty who are embarking on field research to contact and gain the assistance of humanitarian and development agency staff operating programs in the research areas
- Facilitate cooperation and communication among university programs devoted to aspects of humanitarian studies and research
- Create partnerships with developing country institutions
    - Devote resources to capacity building as appropriate
    - Encourage faculty and student exchanges
- Consider establishing an academic association of humanitarian studies and/or a dedicated journal

Suggestions for Donors:

- Recognize training as a core activity and fund it accordingly
- Recognize monitoring and evaluation as essential to improving programming and fund it accordingly
- Develop donor staff expertise related to training and to evaluation needs of humanitarian agencies
- Make long-term funding commitments to allow agencies and universities to develop comprehensive training and education programs
- Make long-term funding available for effective north-south partnership.
- Fund proactive training and education programs for agencies and universities
- Promote and fund collaborative programs between and among agencies and universities
    - Support adjunct faculty from agencies
    - Support faculty sabbaticals to the field
    - Support training and education programs developed from agency-university collaboration

- Support partnerships and exchanges among universities, nationally and internationally

Private Sector Organizations

- Encourage collaboration with and contributions to humanitarian training
- Provide professionals to conduct training or provide expertise to help create training modules
- Encourage the use of private-sector case studies by humanitarian agencies with funding and increased dissemination
- Learn about the humanitarian issues and institutions working in the places where business is being conducted

Kenya Country Case Study: Impacts and Responses to the 1997-98 El Niño Event

This project was carried out for Kenya, which lies between latitudes 5° North and 5° South and between longitudes 34° and 42° East on the eastern side of the African continent. Kenya has a land area of about 569,137 km^2. It has a great diversity of landforms ranging from glaciated mountain peaks with permanent snow cover, through a flight of plateaus to the coastal plain. The country is split by the Great Rift valley into the Western part which slopes down into Lake Victoria from the Mau ranges and Mt. Elgon (4,300 m) and the Eastern part which is dominated by Mt. Kenya and the Aberdare mountain ranges that rise to altitudes of 5,200m and 4,000m, respectively.

The socio-economic problems experienced by Kenyans are varied including those arising from inequitable patterns of land ownership, a high population growth rate, rural-urban migration of the population, poorly planned urbanization, deforestation, a low level of literacy, and high levels of unemployment. Kenya's population growth rate is still one of the highest in the world at 2.6 %. This implies that the economy of the country has to support a large and growing number of young people. This has also created rural-urban migration that over-stretches the resources in the urban areas leading to a decrease in the standards of land management, infrastructure, water, sanitation and municipal services. The result has been a steady decline of health and environmental standards as well as an increased vulnerability to human-made and natural disasters. Due to the population growth, there has been a noticeable rural-rural migration to the arid and semiarid land areas, affecting the ecosystems of these regions and rendering them more vulnerable to disasters such as drought and environmental degradation.

The above problems are coupled with high levels of poverty prevalent in all sections of the Kenyan society. According to a 1994 welfare monitoring survey, 48% of the rural population are food-poor, while 47% of the rural population and 29% of the urban population were identified as absolutely poor. A large number of the poor are living by either subsistence agriculture or employment in the urban informal sector. The recent El Niño (1997-1998) and the heavy rains of 1999 showed that those most affected by these natural occurrences are the poorer sectors of the population living in slums and squatting along flood and landslide areas. Poverty also seriously affects their resilience to disasters given the constant challenges for survival, which many face.

Kenya is characterized by its limited natural resources, especially water, minerals and agricultural land. This condition, coupled with the fragility of its ecosystems and vulnerability to increased pressure by human activities, raises critical environmental issues related to biodiversity, deforestation, desertification, drought, floods and water and air pollution. Forest resources and soil cover are being depleted due to the rapid increase in population and the demand for human settlements and agricultural land, grazing, sources of construction materials, food, fuel wood, essential oils and herbal medicines.

These factors make Kenyans highly vulnerable to any major disruptive activities, for example, damages caused by natural hazards such as floods and droughts. The number of deaths and injuries to both human beings and animals, damages to infrastructure, disruption of public services, and economic losses from man-made and natural hazards are on the increase and present a threat to the socio-economic development of the country.

In order to reduce the impacts of these hazards, it is necessary to put in place measures to manage the hazards before and as they occur. To do this, an early warning system must be in place to create awareness of the impending disasters and, hence, enhance preparedness. A system should also be in place to deal with the effects of an ongoing hazard. This requires the setting up of disaster mitigation and emergency response facilities. The main objective of this assessment is to review forecasts and impacts of the 1997-98 El Niño, as well as the climate-related early warning and natural disaster preparedness systems in Kenya in order to improve its ENSO coping mechanisms. Based on this assessment, the project identified research and policy needs and forms a basis for developing preliminary guidelines for future regional and national natural disaster preparedness plans for ENSO warm and cold events and their impacts. Specifically, the project is aimed at forming the basis for:

- Identifying policy needs which can then be developed or incorporated into appropriate operational disaster management and research programs. This would include, but would not be limited to, those relating to the potential yet-to-be-identified linkages between ENSO and climate change.
- Developing a preliminary set of guidelines for national and regional preparedness for ENSO's extremes.
- Designing a capacity-building program for fellowship and the training of mid-level resource and sector managers, post-graduate education, and outreach to the international academic and scientific communities.

Through an improved understanding of early warning, the project ultimately contributes to the safety and welfare of people and the environment by enhancing preparedness for the impacts of future ENSO warm and cold events.

In achieving the main objective, the project considered the impacts of the 1997-98 El Niño phenomenon on various sectors of Kenya. The responses of Kenyans to the phenomenon were also studied. In particular, the project studied the water resources, agricultural, transport, human health and the socio-economic sectors.

The short rains, which occur during the months of October to December, were extremely magnified during the 1997-98 El Niño episode. The rains, which started as normal rains in October in most parts of the country, picked up to flooding levels during the beginning of November and continued at high levels into January of the following year. They subsided slowly and ended by mid February 1998 in most parts of the country.

It was determined during the project that the Kenya Meteorological Department (KMD) had issued a forecast for the 1997-98 El Niño event as early as July 1997. According to the KMD, this forecast was sent to the Office of the President, Ministry of Agriculture, and the Ministry of Information, Transport and Communications, which are usually on their mailing list. The information was also sent to the Kenya Power and Lighting Company, which normally uses the monthly and seasonal rainfall forecasts for planning. This forecast was subsequently widely published through the electronic and print media. However, it was received with skepticism due to alleged earlier "wrong" forecasts from KMD. It was therefore not taken seriously, and hence no mitigation and/or emergency response procedures were put in place. In general, a sizable percentage of the Kenyan population were aware of the impending heavy rainfall in advance, but did very little to safeguard against its effects.

As the heavy rains hit the country and continued into December 1997, almost everybody realized that the warnings from KMD were real, and immediately thereafter, almost anything that happened to the water resources in the country was attributed to the El Niño. The interest in and awareness of El Niño was enhanced when its devastating impacts were seen throughout the country. The various articles and presentations in the print and electronic media created more interest and awareness on the subject. Due to its uniqueness, intensity and destructive power, the 1997-98 El Niño event was an intriguing phenomenon to many in the country, even to those involved in ENSO research. It was, therefore, not surprising that the 1997-98 El Niño was blamed for almost all the problems, that individuals, groups and the Kenyan population as a whole were facing, be they the worsening national economy, social ills and diseases, retarded national development or even domestic hardships. The resultant floods had wide-ranging positive and negative impacts on various sectors of the national economy. The sectors identified that were seriously affected were agriculture, water resources, transport, communications and health.

Water resources sector

The water resources sector was both negatively and positively affected by the 1997-98 El Niño event. The negative impacts included widespread flooding that led to the destruction of property in several sections of the country, increased soil erosion in areas with poor land use and management practices, and increased frequency of mud- and landslides, especially in the hilly areas. Other negative impacts included surface and ground water pollution, destruction of small storage earth dams, and the increased sedimentation and siltation in the rivers and streams that led to the sedimentation and siltation of the major water storage reservoirs. The general cost of these negative impacts amounted to about US$9 million. However, this sector also benefited from the excess rainfall during this period. Pollution loads were reduced through the washout effect of the rainfall, soil moisture for agricultural production was enhanced, and the water reservoirs were adequately recharged boosting the levels of the hydroelectric dams.

Agriculture sector

The agricultural sector was also negatively and positively affected by the phenomenon. The abundance of rainfall resulted in increased plant and animal diseases that affected the livestock and crop production in several regions in the country. The flooding also affected the farms through waterlogging leading to further reduction in yields, and destruction of livestock water facilities. Several cases of deaths of animals through drowning were also reported. The estimated combined loss suffered by this sector reached US$236 million.

However, in the arid and semiarid areas the rains were a welcome relief from the perennial dry situation leading to development of good pasture and the resultant improved livestock performance. Agricultural production in some areas increased due to the enhanced availability of moisture for the crops. The rains enhanced and prolonged the time of moisture availability for the biological soil and water conservation structures to take up. Tree planting and survival rates were generally increased to nearly 100 percent.

Transport and communications sector

The El Niño rains devastated the transportation sector. The accompanying floods and landslides wreaked havoc on the roads and transportation infrastructure throughout the country. Several bridges and an estimated 100,000 km of both rural and urban roads were destroyed leading to a general paralysis of the transportation system in most parts of the country. The estimated cost of these damages was about US$670 million. The aviation and shipping industries were also disrupted through the flooding of the facilities. Scheduled and chattered flights were disrupted due to poor visibility and the submergence of the navigational equipment and runways by floodwaters. The docking facilities at the shipping ports were also submerged in floodwaters making it impossible to off load merchandise from the ships. Telecommunications were severely affected by falling trees that destroyed the communication lines. The underground cable channels were also flooded, causing a disruption in services. Interruptions of electric energy supply were experienced as some equipment was destroyed by floodwaters, falling trees, and collapsing buildings. However, a positive effect of the event was experienced by the energy sector with the complete recharging of the hydroelectric dams and, hence, the enhancement of the production of electricity.

Health sector

The 1997-98 El Niño event greatly affected the health sector. Over 300,000 families were adversely affected by the phenomenon. The country's health resources were stretched beyond manageable levels. Several health facilities were physically destroyed, water sources were contaminated, and there were increases in the number of stagnant water ponds, overgrowth around homesteads and market centers, blockage and overflow of sewers and open drains, and an increase in fly breeding as a result of decomposition of refuse. These factors led to an upsurge of disease epidemics and an increase in the morbidity and mortality rates.

All of the above impacts directly or indirectly affected the socio-economic well-being of the Kenyan society. The education sector was also affected, with schools being inaccessible because

of flooding which led to closures or to low attendance rates. The end-of-year examinations were disrupted. Businesses were seriously affected through the aforementioned transportation and energy disruptions. The political general elections, scheduled for the end of 1997, were affected and by the problems in the transport sector and subsequently rescheduled. The heavy rains that were experienced also interfered with social functions, such as weddings, funerals and church services, during this period.

Considering the impacts of the 1997-98 El Niño event on various sectors of Kenya, it is evident that Kenyans were not adequately prepared and had no facilities in place to cushion the adverse impacts. Although the forecast was available in July 1997, no mitigation or emergency procedures were put in place. Due to the low frequency of widespread flooding problems in the country, the Kenya government had neither a flood disaster management policy nor an institutional framework to monitor and manage flood disasters prior to the 1997-98 El Niño floods. The only disaster management institution that was in operation during the early periods of the 1997-98 El Niño floods was The National Famine Relief Program, whose mandate is almost exclusively related to the monitoring and management of the negative impacts of droughts. This program was not well equipped to manage the impacts of heavy rains. Further, an attempt by the government to mitigate the effects of the negative impacts of the 1997-98 El Niño floods was hampered by the diversity of the impacts which could not, therefore, be handled by any one government ministry in isolation.

However, after the effects of the rains began, the government acted by setting up the National Disaster Operation Center to oversee and coordinate all efforts put toward addressing the serious impacts. It also embarked on a public awareness campaign through the electronic and print media and declared the floods a national disaster. Despite the limitations of the existing economic and financial constraints, the government spent large amounts of money to purchase and transport emergency food, water treatment chemicals and medical supplies to the worst-affected communities. It also approached donor countries and agencies to help defray the costs of rehabilitation and emergency operations.

The media played an important role during the 1997-98 El Niño event by publishing, on a daily basis, stories related to the effects of the event. It raised the awareness of the public as well as that of the policy makers. The private companies responded to the emergencies by pooling their resources together and participating in the rehabilitation of the infrastructure around them. They resorted to the use of diesel-generated power in cases where there were power interruptions and hence were able to maintain some production levels.

Lessons Learned

From the devastating impacts of the 1997-98 El Niño event, several lessons were learned. The scientific community, which is involved with research on the ENSO phenomenon and rainfall characteristics in the region, has learned that the warming (or cooling) of the Indian as well as Pacific Oceans adversely affects the rainfall patterns in Kenya considerably. However, research has not as yet revealed clearly the quantitative association between ENSO's extremes in the tropical Pacific Ocean and the variations in rainfall in this region. A lot of effort is, therefore, being made to understand the frequency and occurrence of extreme rainfall events, and how

these are related to El Niño. Several research papers have been produced on this topic, furthering our knowledge about it and El Niño's teleconnections to Kenya. The relationship between the El Niño and the rainfall over Kenya is now relatively better understood leading to better rainfall forecasts.

The 1997-98 El Niño event hit the country at a time when the government had no plans or policies in place to deal with the associated flood and resulting health hazards. The country had neither a national plan nor a policy for responding to flood disasters that could impact negatively on national economic sectors such as agriculture, health, and infrastructure. The government has learned that such a plan or policy should be developed or added to either the National Disaster Plans or to the National Water Policy, with clear flood early warning and management mechanisms.

In addition, there are many uncoordinated efforts among different Early Warning Units in various departments and ministries such as the Kenya Meteorological Department (KMD), the Central Bureau of Statistics (CBS), the Department of Resource Survey and Remote Sensing (DRSRS), and the Arid Lands Resource Management Project (Office of the President), among others. It has, therefore, been proposed that coordination among the noted departments and ministries be strengthened and an early warning unit be established and be well equipped to enable it to monitor the situation on the ground and collect reliable data, which would enable the ministries to respond appropriately and effectively to disasters in their economic or social sectors.

Some of the other lessons learned include the following:

- The forecast should, if possible, be for periods longer than 3 months, so that effective control measures can be put in place.
- The storm drainage systems in urban areas should be maintained and serviced regularly.
- The government should educate the public well in advance through pro-active awareness campaigns about possible El Niño-related disasters.
- The Kenya Meteorological Department's forecasts should be as accurate as possible.
- The settlement of potential disaster areas, especially those in the flood plains, should be discouraged through a clear government policy.
- In the future, planners should always incorporate climate and weather information in their planning activities.
- The government should institute a policy or plan that supports flood prevention through integrated watershed development programs in eroded mountainous regions.
- The government should also support the design and management of strategic food security reserves.
- There is need to find a viable response to future disasters through intervention by, for example, capacity building for early warning and disaster preparedness.

Disaster Drill

A disaster drill is an exercise in which people simulate the circumstances of a disaster so that they have an opportunity to practice their responses. Disaster drills can range from earthquake drills in schools to multi-day exercises which may span across entire communities, including detailed simulations and a chance to work with the same equipment which would be utilized in a disaster. Such drills are used to identify weak points in a disaster response plan, and to get people familiar with the steps they need to take so that their response in a disaster will be automatic.

Disasters are unpredictable by nature, and this can make them difficult when it comes to preparation. Sometimes communities get advance warning, as in the case of some disasters caused by severe weather, while in other cases, disaster can strike in an instant in the form of an earthquake or a severe fire. If people do not practice their responses, they will usually not be prepared when disaster does happen; while a disaster drill may not anticipate every potential scenario, it gives people an idea of how to behave during a disaster.

On a basic level, drills can include responses by individuals to protect themselves, such as learning how to shelter in place, understanding what to do in an evacuation, and organizing meetup points so that people can find each other after a disaster. For emergency services and other first responders, disaster drills handle topics like what to do when communications are cut off, how to deal with lack of access to equipment, tools, and even basic services like water and power, and how to handle evacuations. A disaster drill also provides a chance to practice for events such as mass casualties which can occur during a disaster.

Regular disaster drills are often required for public buildings like government offices and schools. During the disaster drill, people are expected to practice things like evacuating the building and assisting each other so that they will know what to do when a real alarm sounds. People may also organize disaster drills for their families so that household members will know what to do in an emergency.

Community-based disaster drills such as whole-city drills provide a chance to practice the full spectrum of disaster response. These drills can include actors and civilian volunteers who play roles of victims, looters, and other people who may be encountered during a disaster, and extensive planning may go into such drills. A disaster drill on this scale may be done once a year or once every few years.

REVISION QUESTIONS

1. Explain personal survival skills
2. Discuss the recovery and rehabilitation strategies
3. Discuss ways of responding to disaster
4. Discuss the role of community in disaster response
5. Discuss challenges in disaster response
6. Describe practical disaster drills

CHAPTER FOUR

POST DISASTER DEVELOPMENT OR MANAGEMENT

Specific Objectives

By the end this topic, the trainee should be able to;

a) Discuss the meaning of post disaster development
b) Discuss the ways to assess the impact of disaster
c) Discuss the impact of disaster development

INTRODUCTION

Meaning of Post-disaster development

Post-disaster development has various approaches and different priorities in different countries. It is not surprising that there are widely divergent views and interpretations in various countries, with marked differences between countries that have a developed market economies, those with transition economies and in developing countries. Not all countries with one of theses three development levels, understand post-disaster development in the same way and so have different strategies.

Successful strategies for post-disaster development should be more-or-less compatible with disaster level, economic, social, cultural, institutional, technological, technical, cultural, environmental and legal/regulatory situations in the country under consideration. A varied spectrum of strategies can be launched, while keeping in mind that the mix of influencing factors and the relative emphasis is on one or other of the factors and overall will depend on local conditions.

Therefore, the best post-disaster development strategy of another country cannot just be copied. Strategies may only be adapted into a real disaster situation, economic, social, cultural, institutional, technological, technical, cultural, environmental and legal/regulatory circumstances of the existing state. There is no such thing as a single post-disasterdevelopment strategy that could be applied to all countries.

The trends of post-disaster development and modeling were investigated by researchers from various countries. For example,

- Ruangrassamee and Saelem (2009) described effect of Tsunamis generated in the Manila Trench on the Gulf of Thailand.

- Scheffers et al. (2008) analysed Late Holocene tsunami traces on the Western and Southern coastlines of the Peloponnesus (Greece).
- Barbier (2008) presented lessons learned from the household decision to replant mangroves in Thailand.
- Cochard et al. (2008) reviewed the 2004 tsunami in Aceh and Southern Thailand with special emphasis on coastal ecosystems, wave hazards and vulnerability.
- Alongi (2008) studied mangrove forests with special emphasis on resilience, protection from tsunamis, and responses to global climate change.
- Morton et al. (2007) presented physical criteria for distinguishing sandy tsunami and storm deposits using modern examples. Prez-Maqueo et al. (2007) examined coastal disasters from the perspective of ecological economics.
- Rose (2007) analysed economic resilience to natural and man-made disasters.
- Altay and Green (2006) applied OR/MS research in disaster operations management.
- Benson and Clay (2006) analysed disasters, vulnerability and the global economy with special emphasis on implications for less-developed countries and poor populations.
- Galbraith and Stiles (2006) reviewed disasters and entrepreneurship.
- Hassan (2005) performed simplified two-dimensional numerical modelling of coastal flooding. Bates et al. (2004) analysed mitigating impacts on tourism.
- Alcntara-Ayala (2002) studied geomorphology, natural hazards, vulnerability and prevention of natural disasters in developing countries.
- Jayaraman et al. (1997) analysed management of the natural disasters from space technology inputs.

It can be noticed that above researchers engaged in the analysis of a post-disaster development and modeling but did not consider the research's object as was analyzed by the authors of the present investigation. A life cycle of a post-disaster development may be described as follows: post-disaster development life cycle, the stakeholders involved in a post-disaster development as well as the micro and macro environments, having a particular impact on it and making an integral whole.

Ways of assessing post disaster development

There are two essential branches of knowledge development;

- explicit and
- Tacit.

Explicit

Explicit knowledge is widely used in information technologies. Explicit knowledge is comprised of the documents and data (for example, estimate for building costs) that are stored within the memory of computers. This information must be easily accessible, so that stakeholders could get all the necessary knowledge without disturbances.

Tacit

Tacit knowledge is knowledge housed in the human brain, such as: expertise, understanding, skills, professional intuition, competence, experience, organizational culture, informal organizational communication networks, intellectual capital of an organization, ideals, traditions, values, emotions, etc.

The research's aim was to develop a Knowledge Model for assessing Post-disaster development by undertaking a complex analysis of micro and macro environment factors affecting post-disaster life cycle and to present recommendations on efficient eliminating disaster's subsequences. The research was performed by studying the most advanced expertise in the field. A simulation was undertaken to provide insight into creating an effective micro and macro environment.

The level of efficiency of the post-disaster development depends on the many micro and macro-level variable factors and all these variable factors can be optimized. The main objective of this Model is to analyze the best experiences in the field, to compare it and consequently to present particular recommendations.

The word 'model' implies 'a system of game rules', which the post-disaster development could use to its best advantage. The stakeholders of the post-disaster management cannot correct or alter the micro and macro level variables, but they can go into the essence of their effect and take them into consideration in their activities. Stakeholders, by knowing the environment affecting their activities, can organize their present and future actions more successfully.

Six stages of assessing post disaster development

a) **Comparative description of the post-disaster development**

- A system of criteria characterizing the efficiency of post-disaster development was determined by means of using relevant literature and experts methods;
- Based on a system of criteria, a description of the present state of post-disaster development is given in conceptual (textual, graphical, numerical, etc.) and quantitative forms.

b) A comparison and contrast of post disaster development

- Identifying the global development trends (general regularities) of the post-disaster development;
- Identifying post-disaster development differences between countries under analysis;
- Determining pluses and minuses of these differences for countries under analysis;
- Determining the best practice of post disaster development for countries under analysis as based on the actual conditions.
- Estimating the deviation between post-disaster developers' knowledge of worldwide best practice and their practice-in-use

c) A development of some of the general recommendations as how to improve the efficiency levels for post-disaster development
d) Submission of particular recommendations for post-disaster development
e) Each of the general recommendations proposed in the fifth stage carry several particular alternatives

   A multiple criteria analysis of post-disaster development's components and a selection of the most efficient version of post-disaster's development life cycle were determined at this stage. After this stage, the received compatible and rational components of a post-disaster development are joined into the full post-disaster development process.

f) Performance of transformational learning and redesigning the mental and practical behaviour of post-disaster development

- Post-disaster developers (stakeholders) becoming aware and conceptualize of their practice-in-use;
- Post-disaster developers' (firms') becoming aware and conceptualize of their knowledge of worldwide best practice;
- Post-disaster managers (stakeholders) estimating the deviation between knowledge of worldwide best practice and their practice-in-use;
- Performance of best practice learning;
- Fulfilling of best practice actions (understanding what the recurring motives caused developer' initial behaviour are; redesigning managers' core patterns of thought and behaviour);
- Performance of transformational learning (acquiring new manners of technological, social, ethical, etc. behaviour, get better understanding of how to interact with micro and macro environment) and redesigning the behaviour.

In order to throw more light on the Knowledge Model for Post-disaster development, further follow more detailed description of the some above mentioned stages of analysis (determining the best practice for post-disaster development as based on the actual conditions and performance of transformational learning and redesigning the developer' mental and practical behaviour).

Impact of post disaster development

Humanitarian aid agencies have a long-standing interest in evaluating the effectiveness of their assistance and interventions. The Development Assistance Committee adapted their core set of principles or criteria for the evaluation of development initiatives specifically for complex emergency settings. These criteria, reviewed in detail in aguide, include:

- Relevance/appropriateness
- Connectedness
- Coherence

- Coverage
- Efficiency
- Effectiveness
- Impact

In this context, "impact" is defined as the broader, longer-term effect of a project, and is distinguished from "effectiveness", which considers more short-term, intermediate objectives and outcomes.

The guide argues that impact of post disaster development may not be relevant in all contexts, "particularly those carried out during or immediate after an intervention" and advocates undertaking impact evaluation only when impact evaluation specialists are involved, a longitudinal analysis is possible, and adequate data are available. The attribution challenge is discussed briefly—how is it possible to attribute observed change tospecific interventions as time progresses? The discussion assumes that quasi-experimentaldesigns are rarely feasible in this context, and encourages the use of "informal" controlgroups where possible. Impact evaluation is identified as the "most challenging" aspect ofhumanitarian action evaluation. This understandable note of caution has typified discussionsof impact evaluation throughout the humanitarian community.

Interest however, Humanitarian Action, afull third of the report was devoted to the theory and practice of impact assessment (which Ihere consider to be synonymous with impact evaluation) in the humanitarian context. The report traces the evolution of a more evidence-based,outcomes-oriented approach to the provision of humanitarian relief over the past twodecades, and cites the many initiatives around impact evaluation currently underway acrossthe sector and through the wide aid and development communities, including a randomizedstudy of a community-driven reconstruction program in Liberia; a participatory impactassessment in drought -affected communities in Niger; impact assessment of FAO'semergency programs in DRC; and the Tsunami Recovery Impact Assessment and Monitoring

The report includes an eye-opening list of constraints to impact assessment in thehumanitarian sector, including;
1) The complexity of terminology surrounding impactassessment;
2) lack of skills and capacity for impact assessment within most humanitarianagencies;
3) The unique timing of project and budget cycles; and
4) An absence of animpact orientation at the institutional level.

Alsocite cultural biases against impact evaluation in humanitarian agencies, including thetendency to value action over analysis and risk aversion in the light of severely constrainedresources. These constraints and biases have slowed progress towards establishing shareddefinitions of and methodologies for impact assessment.

The report is careful to draw an important distinction between approaches to impactevaluations ("comparative vs. "theory -based") and data collection and analysis methods(quantitative vs. qualitative). Comparative approaches are described as quantitative,counterfactual methods while

theory-based approaches are look at underlying causalmodels or program theories to identify the links from program activities through outcomes.

While the humanitarian community has often conflated these different aspects of evaluation (e.g., assuming that all counterfactual analyses must be quantitative, or that all case studyor theory of change models must be qualitative), this report and other recent discussionsshould help clarify the distinction.

A third important message on the report is the importance of choosingevaluation methods to suit the evaluation task at hand, a common theme in discussions ofevaluation in the humanitarian sector. A notable backlash against experimental methods (orat least against anointing experimental approaches as the "gold standard" in evaluation) hasprompted several different algorithms or frameworks for matching evaluation methods tointervention characteristics or evaluation goals:

- Standardized interventions in identical settings with common beneficiaries arebest suited to experimental designs.
- Standardized interventions in diverse settings, possibly with diverse beneficiaries,are better suited to quasi-experiments and comparative approaches.
- Customized interventions in diverse settings with diverse beneficiaries are bettersuited to case studies, narratives, and qualitative approaches.

Another important recent study from the humanitarian community examines motivationsand opportunities and options for joint humanitarian impact evaluation commissioned. The study outlines in detail the many questions and issues that would have to agree upon before undertaking successful joint evaluation of humanitarianinterventions. These include the purpose and use of joint evaluation, the conceptualframework to be used, the evaluation focus and scale (institutional vs. population), andmethods. A set of pilot studies may emerge from the study, further evidence of thehumanitarian community's growing interest in impact evaluation.

REVISION QUESTIONS

1. Discuss the meaning of post disaster development
2. Discuss the ways to assess the impact of disaster
3. Discuss the impact of disaster development

CHAPTER FIVE

DISASTER OPERATIONS

Specific objectives

By the end of this topic, the trainee should be able to;

a) Explain the meaning of disaster operations
b) Explain the players in disaster operation
c) Discuss the role of stakeholders in disaster operation
d) Practice disaster operation skills

INTRODUCTION

Meaning of disaster operations

Perception, that much more attention has to be paid to the knowledge creation and spread in the form of the knowledge bases of best practice, have been recently set in a post disaster management field. Knowledge bases of the best practice are knowledge-obtaining tools, which allow to save a lot of time, provide information on the best post-disaster management practice in different forms (regulations, e-books, slide presentations, structural schemes, text, video and audio material, etc.).

Tacit knowledge base of best practice consists of informal and unrecorded procedures, practices, and skills. Knowledge management systems are of value to the extent that it can codify "best practices" in a post-disaster management, store them, and disseminate them as needed. Tacit knowledge is highly personal, context-specific, and therefore hard to formalize and communicate. Tacit knowledge is extremely important to the post-disaster management because, once a tsunami subsequences are eliminate, professionals tend to forget it and start something new. Therefore, knowledge utilization is a key factor in effectively executing a post-disaster management.

Education involves the enhancement and use of indigenous knowledge for protecting people, habitat, livelihoods, and cultural heritage from natural hazards. Educational practices can be conducted through direct learning, information technology, staff training, electronic and print media and other innovative actions to facilitate the management and transfer of knowledge and information to citizens, professionals, organizations, community stakeholders and policymakers. History teaches that inadequate disaster reduction awareness and preparation repeatedly leads to preventable loss of life and damage in all major natural disasters. Preparation through education is less costly than learning through tragedy. There is strong need for experience and knowledge sharing at different levels as well as need for knowledge networking and partnership building to support policy making and recovery planning.

Knowledge is at its most effective when linked to community needs. Knowledge for implementing risk reduction activities at the individual, household, community and policy levels should be the ultimate target, keeping in mind that building a culture of safety and resilience requires time, effort, resources and continued cooperation and understanding amongst all actors. This calls for the application of knowledge and behavioral change on disaster risk promotion and information strengthening and dissemination on disaster risk and safety actions. This focuses on four themes:

- Education: formal, informal education;
- Increased Knowledge base: information management, multi-discipline, and cross sectoral cooperation, research and development;
- Information and public awareness: media, civil society involvement for dissemination and implementation;
- Community empowerment: capacity building, and community resilience by building knowledge bases.
- Tsunami recovery by public and private sector partnerships can benefit to (IBM Crisis Response Team, 2005):
- Identify Gaps: lack of service, support, and resources compared against victim, community, and government needs;
- Examine local available skill base - keep as much work local as possible;
- Identify minimal standards and best practices;
- Examine rebuilding issues including priorities, cost, resources, and labor;
- Understand the social, political, and environmental impact;
- Learn from prior disasters and mistakes to reduce exposures;
- Communicate and share information with partners on a regular basis.

Knowledge sharing has to be developed in regional and national levels in disaster recovery phases. As Sri Lanka reviews its coastal zone management and development plans in the light of lessons learned from the tsunami, it would be wise as well to find out as much as possible about the manner in which other tsunami-prone and typhoon-prone countries in the Asia-Pacific region undertake coastal zone planning. Various governments have been working for some time on ecological restoration in their coastal zones. Practical knowledge on what works can be made accessible to Sri Lanka through exchange visits and study tours with these countries. Since other countries affected by the tsunami may also conclude that they need to take similar measures in their own coastal zones, sharing of relevant knowledge would increase the effectiveness of the whole regional process, with benefits for each country (UNEP, 2005).

In Sri Lanka, regional knowledge sharing of development planning would be enhanced through exchange among experts and institutions that have experience of ecological reconstruction, planning and construction of sustainable urban environments, use of digital terrain mapping to guide investment in coastline defence, and in waste management. Environmental education and awareness is needed to increase public understanding of the environments where communities live, so that they can be encouraged and enabled to participate in their own development.

The sharing of experience during reconstruction, which is considered as an educational process play an important role. Awareness rising on people's participation to respond to early warning

system is also of utmost importance. Therefore, the combination of high-tech knowledge with low or no-tech disaster education will be required in most cases. A world list on disaster reduction technologies (with specific relevance to implementation) might be a good database for field practitioners. Therefore the primary issues on knowledge are to identify, recognize the importance of traditional and indigenous knowledge bases, and utilize these bases effectively.

In the countries affected by Asian tsunami the lack of knowledge management is apparent. Food is not reaching the affected victims, logistics is a nightmare and coordination is needed among the nations offering aid. It would be timely to proactively design such a knowledge system that could be used in any kind of disaster - natural or manmade. A sound knowledge management system would help tremendously. This knowledge system would be a coordination framework that could be put up immediately no matter where disaster strikes. Affected countries can immediately plug in local information - maps, population demographics, hospital locations and so on - into this coordination framework. The resources of countries offering aid can also be plugged into the system, and the logistics mapped out by the system, aided by observation satellites that can give visuals of altered coastlines and the extent of the damage.

In the countries suffering from various natural disasters there is a conscious effort for Disaster Risk Reduction at national, provincial and sub-provincial level. Thousands of organizations are supporting the effort from last few decades. However there is a felt gap in information coordination and sharing. The knowledge and experiences of disaster practitioners are remaining in individual or institutional domain. There is an urgent need of an organized common platform to capture, organize and share this knowledge and to create a versatile interface among policy-makers in the Government and disaster managers' at all administrative level (National/State/District/Sub-District/ Community). Acknowledging the need for a disaster knowledge networking platform to facilitate interaction and have simultaneous dialogue with all related expertise dealing with disaster management, the knowledge management initiative should be thoughtfully envisaged as a tool to store, retrieve, disseminate and manage information related to disaster management.

In order to enhance the information sharing and management of the knowledge generated in these institutions, it is highly essential to closely knit the organizations/ institutions and moreover people. The network of these institutions would create a common platform and enable its stakeholders and people to capture, organize, share and reuse the knowledge generated in the area of disaster management. The network would use various tools to connect the Government, Institutions and people.

Some trends of the best practice for post disaster management as based on the actual conditions are following:

Integrate disaster risk reduction into education at all levels. Disaster risk reduction should be integrated into education at all levels and public awareness initiative and including school curricula, dissemination of knowledge, especially local knowledge.

Provide easily understandable information on disaster risks and protection options, especially to citizens in high-risk areas, to encourage and enable people to take action to reduce risks and

build resilience. The information should incorporate relevant traditional and indigenous knowledge and culture heritage and be tailored to different target audiences, taking into account cultural and social factors.

Improve land use planning. Governments bare prime responsibilities for enforcing and improving land use planning through risk mapping. Practices to include participatory approaches, risk mapping and conflict resolution at all levels.

Strengthen networks among disaster experts, managers and planners across sectors and between regions, and create or strengthen procedures for using available expertise when agencies and other important actors develop local risk reduction plans.

Appropriate warning systems for communities. National government bodies to cooperate with local government and community organizations to promote timely dissemination to communities establish and maintain monitoring systems and provide appropriate shelters and escape routes.

Promote and improve dialogue and cooperation among scientific communities and practitioners working on disaster risk reduction, and encourage partnerships among stakeholders, including those working on the socioeconomic dimensions of disaster risk.

Integrated explicit and tacit analysis provides the exhaustive knowledge about various aspects of a post-disaster management:

- economical,
- legislative,
- social,
- management,
- ethical,
- technical,
- technological,
- infrastructural,
- Qualitative (architectural, aesthetic, comfortability, etc.).

By using of Knowledge Base of Experts it is possible to search for experts and facilitates communication with those experts by using internet technology. Logging into Knowledge Base of Experts, stakeholders can search for an expert with the relevant knowledge, and will connect with him in real time by using instant messaging, e-mail, telephone, or Internet conferencing. As a result, stakeholder could receive direct tacit help from an expert who had recently experienced a similar problem. At the time of communication, experts' tacit knowledge will be transferred in the most appropriate forms and applied in business processes. Their dialogue would be audited and stored in enterprise database systems to be searched by others. In this way, the stakeholder extracts valuable tacit knowledge from employees' human brains and applies those assets to the work process. In this way, higher performance levels theoretically can be achieved by accelerating the knowledge transfer processes.

NATIONAL DISASTER MANAGEMENT PLAN

The **Disaster Management Bill 21 of 2002**was promulgated as the Disaster Management Act 57 of 2002**,** published in Government Gazette 24252 of 15 January 2003, and will come into operation on a date to be proclaimed. The Bill has important implications for all organizations in both the public and the private sector and for non-governmental organizations.

Significantly, the Bill calls for a countrywide, integrated system of public and private sector disaster management through the development of disaster management centres at the municipal, provincial and national government levels.

It sets out the establishment of a National Disaster Management Centre falling under the Minister for Provincial and Local Government,Mr. Sydney Mufumadi, "to promote an integrated and coordinated system of disaster management, with special emphasis on prevention and mitigation, by national, provincial and municipal organs of state, statutory functionaries, other role players involved in disaster management and communities".

The newly created National Centre will specialize in issues concerning disasters and disaster management, will monitor whether the organs of state and statutory functionaries comply with this Bill as well as whether any progress with post-disaster recovery and rehabilitation has been made, and will act as a repository of, and conduit for, information concerning disasters, impending disasters and disaster management.

It may also act as an advisory and consultative body on issues concerning disasters and disaster management to:

- Organs of state and statutory functionaries;
- The private sector and non-governmental organizations;
- Communities and individuals; and
- Other governments and institutions in southern Africa.

Another key responsibility will be to make recommendations regarding the funding of disaster management and initiating and facilitating efforts to make sure such funding is available.

From a human resources context the National Centre will also be charged with promoting the recruitment, training and participation of volunteers in disaster management, including capacity

building and training programmes in schools and tertiary institutions and promoting research into all aspects of disaster management.

As one of its first tasks, the National Centre will be developing and monitoring a directory of institutional role-players that are or should be involved in disaster management in southern Africa, while at the same time establishing communication links with foreign management agencies performing similar functions to itself.

The electronic database developed by the National Centre will contain extensive information not only on where and how disasters have occurred in southern Africa, but also on a whole host of management issues including research and training facilities for disaster management disciplines. The database will be electronically accessible to everyone free of charge.

Whilst in the past each organization has developed its own disaster management plan (and many have no plans in place to cope with a disaster), the National Centre will be tasked to assist in coordinating the implementation of these plans and strategies by the respective organs of state and other role-players. Furthermore, these will be integrated with national, provincial and municipal development plans, programmes and initiatives.

What is of particular interest is the new Bill specifically creates a disaster management framework at provincial and municipal levels, which includes setting up disaster management centres and advisory forums. Central to the work of both these bodies, however, is the preparation of a disaster management plan setting out:

- The way in which the concept and principles of disaster management are to be applied in its functional area;
- Its role and responsibilities in terms of the national, provincial or municipal disaster management framework;
- Its role and responsibilities regarding emergency response and post disaster recovery and rehabilitation;
- Its capacity to fulfill its role and responsibilities;
- Particulars of its disaster management strategies; and
- Contingency strategies and emergency procedures in the event of disaster, including measures to finance those strategies.

Thus each province is now charged with the responsibility of preparing a disaster management plan for the province as a whole, coordinating and aligning the implementation of its plans with those of other organizations of state and multinational role-players and regularly reviewing and updating its plan.

Likewise each metropolitan and each district municipality will be called upon to establish and implement a framework for disaster management in their municipalities aimed at ensuring an integrated and uniform approach to disaster management in their respective areas.

With regard to specially created disaster management advisory forums at both provincial and municipal levels, representatives will be drawn from a variety of sources ranging from government representation, organized business and labour, and experts in disaster management.

It is envisaged that both the municipal and provincial disaster management centres will work closely with the National Centre by identifying and establishing communication links with disaster management role players in their respective areas, developing and maintaining a national disaster management electronic data base, reviewing existing plans and strategies and integrating the concept and principles of disaster management with development plans and programmes.

Annual reports will be prepared at each level and submitted at the municipal level to municipal councils, at the provincial level to the MEC and provincial legislatures, and at national level to the Minister. He in turn will have to submit his report to Parliament within 30 days after receipt of a combined report from the National Centre.

Players in Disaster Operation

The Minister of Minerals and Energy is responsible for national policy on nuclearmatters and administration of both nuclear acts namely the Nuclear Energy Act, 1999 (Act No. 46 of 1999) and the National Nuclear Regulator Act, 1999 (Act No. 47 of 1999). The Department of Minerals and Energy is responsible to service the Minister's obligations arising from these acts related to the governance of the nuclear industry in South Africa and internationally in the specific areas of nuclear technology, nuclear safety and nuclear non-proliferation. In terms of the Disaster Management Act, 2002 (Act No. 57 of 2002) the DME is therefore also the “National Organ of State” for coordination and management of matters related to nuclear disaster management at national level.

Section 25 of the Disaster Management Act places the following obligations on DME:“(1) Each national organ of state indicated in the national disaster management framework must—
(a) Prepare a disaster management plan setting out—
(i) The way in which the concept and principles of disaster management are to be applied in the function area;
(ii) Its role and responsibilities in terms of the national disaster management framework;

(iii) Its role and responsibilities regarding emergencyresponse and post-disaster recovery and rehabilitation;
(iv) Its capacity to fulfill its role and responsibilities;
(v) Particulars of its disaster management strategies; and
(vi) Contingency strategies and emergency procedures in theevent of a disaster, including measures to finance thesestrategies;
(b) Co-ordinate and align the implementation of its plan with those of other organs of state and other institutional role-players; and
(c) Regularly review and update its plan.
(2) The disaster management plan of a national organ of state referred to in subsection (1) must form an integral part of its planning.
(3) (a) A national organ of state must submit a copy of its disaster management plan and of any amendment to the plan to the National Centre."
The Minister of Minerals and Energy is also responsible for making the followingemergency planning related regulations under the National Nuclear Regulator Act:
a) Establishment of a Public Safety Information Forum by the Holderof a Nuclear Installation Licence to inform the public about thearrangements for nuclear emergency planning
b) Specifying the level of financial security to be provided by the
Holder of a Nuclear Installation Licence in case of nuclear damage
c) Safety standards related inter alia to nuclear emergency planningThe NNR Act also specifically places a responsibility on the Minister of Mineralsand Energy relating to claims in excess of financial security following an accident at anuclear installation.
It should be noted that with regard to certain other radioactive materials (Group IVhazardous substances) the Department of Health will be the responsible NationalOrgan of State in terms of the Disaster Management Act. The Department of Health(Directorate Radiation Control) regulates Group IV hazardous substances under theHazardous Substances Act, 1973 (Act No. 15 of 1973). Group IV hazardoussubstances are radioactive material outside a nuclear installation and which does notform part of, or is used in, the nuclear fuel cycle and which is used or intended to beused for medical, scientific, agricultural, commercial or industrial purposes.
As a signatory to the international "Convention on early notification of a nuclearaccident" South Africa will also notify the International Atomic Energy Agency incase of a nuclear accident. The South African Nuclear Energy Corporation (NECSA)has been designated by DME as the National Competent Authority to service thisConvention and to be the designated Contact Point using the 24 hour NECSAEmergency Control Centre.

Concepts and Principles

Application of the Disaster Management Act to nuclear emergencies

Section 2 of the Disaster Management Act determines that the Act does not apply toan occurrence falling within the definition of "disaster" to the extent that thatoccurrence can be dealt with effectively in terms of other national legislation.
Although most aspects of nuclear emergency planning at nuclear installations caneffectively be dealt with in terms of the provisions of the NNR Act it must be notedthat a nuclear emergency requiring off-site emergency management cannot beeffectively dealt with in terms of that Act alone for the following reasons:
• The nuclear emergency planning provisions of the NNR Act are limited torequirements on the holder of the nuclear authorization and as such the NNRAct has no provision obliging the three

levels of government to implement offsiteemergency management in the case of an off-site impact of a nuclearemergency – such obligations however arise directly from the provisions ofthe Disaster Management Act and only indirectly from a provision in the NNRAct, which obliges the Holder of a Nuclear Authorisation to enter into anagreement with the relevant municipal and provincial authorities to establishan emergency plan.
• The NNR Act has no provision to ensure that resources are made available atnational level to respond to a nuclear emergency affecting the public living inthe vicinity of a nuclear installation. Again this is provided for in terms of the
Disaster Management Act whereby national resources & personnel can bemade available following the declaration of a "national disaster" (contingencybasis) or declaration of a "National State of Disaster" (legal directive) via theNational Disaster Management Centre.
It should be noted that other disaster management aspects, that may be required interms of the Disaster management Act (and its regulations) are effectively dealt within terms of the NNR Act, for example risk analysis/assessment and risk limitation, etc.
In terms of nuclear emergency planning required under the NNR Act a declared "Site Emergency" is limited to the nuclear site (not affecting the public) and themanagement of such an on-site emergency is the responsibility of the operator (holderof the nuclear authorization) as per the regulatory requirements under the NNR Act.

However, the managing of the off-site emergency (affecting the public) is theresponsibility of the government authorities under the Disaster Management Act. Thedeclaration of a "General Emergency" (in terms of the nuclear licence under the NNRAct) implies a threat to the off-site public which requires the implementation of offsiteprotective actions. Although a Local Municipality is primarily responsible tomanage a local disaster (irrespective of whether a local state of disaster has beendeclared), it must be realized that, due to the nature of a nuclear disaster, it is knownthat it cannot be effectively dealt with by the local/provincial authorities alone andtherefore it will require the declaration of a "National Disaster" to ensure that nationalresources are made available. It is therefore important that a "General Emergency"must equate to a "National Disaster". For purposes of this Disaster Management Planit is essential that the declaration of a General Emergency at a nuclear installation(e.g. Koeberg Nuclear Power Station, Safari Reactor) must result in the declaration ofa "National Disaster" under the Disaster Management Act, and subsequentlyconsideration for a "National State of Disaster". In the case of such a NationalDisaster it would be essential that there be Joint Coordination, Decision-making andManagement as soon as possible by all three levels of Government at the relevantJoint Coordinating Centre. (Note: For the meaning of terms, reference should be madeto the relevant legislation). It is recognized that in the case where there is a need for urgent protective actions inthe public domain, and where the local authority is not yet in a position to order suchprotective actions, the holder of the nuclear authorisation should as a priority act inthe interest of the public by advising/recommending such urgent protective actions. Iftime permits this should be done in consultation with the standby Disaster Manager ofthe relevant local government authority.

Scope of the plan
The scope of this Plan focuses on nuclear disaster management at nationalgovernment level and relates to oversight in the following areas:
a) Nuclear Reactors and other Nuclear Fuel Cycle facilities requiring nuclearemergency plans

b) Nuclear powered vessels
c) Transport of radioactive material within the nuclear fuel cycle (air, land & sea)
d) Radioactive contamination from nuclear powered satellites
e) Radioactive fallout from nuclear weapons

RESPONSE

Objectives and Principles of nuclear emergency response

The primary objectives for protection are as follows:

All possible efforts should be made to prevent serious early health effects(deterministic effects). Examples are vomiting, cataract, sterility,hypothyroidism, deformity of the foetus and death. For these early healtheffects the severity increases with increasing dose whilst an initiatingthreshold exists for each effect.

All possible effort should be made to reduce the incidence of late healtheffects (stochastic effects). Examples are cancer and hereditary defects. Forlate health effects there is no demonstrable initiating threshold and theprobability of the effect occurring increases with dose.

Achieving these objectives is based on the following principles:

Any protective action (intervention) must be justified and optimized, that is, itshould do more good than harm and it should produce the maximum netbenefit.

In order to comply with these objectives it follows that the threshold dose levels,which would cause early health effects, must be avoided and the dose accrued belowthe threshold must be kept as low as possible. This requires that protective actionsmust be implemented before the threshold dose levels (for early health effects) havebeen accrued by members of the public. Protective actions based on prescribedprotective action levels are therefore particularly urgent during the early phase whenthere is a threat of release of radioactivity or when a radioactive plume is approachinga residential area.

The typical Protective Actions that may be employed are
a) Notification (Authorities & Affected Public)
b) Isolation of Affected Area
c) Sheltering
d) Evacuation
e) Use of Thyroid Prophylaxis
f) Relocation
g) Control of foodstuff & water

Objectives of nuclear emergency preparedness

The objectives of emergency response are most likely to be achieved by ensuring asound programme for nuclear emergency preparedness. The objective of nuclearemergency preparedness is to ensure that arrangements are in place for a timely,managed, controlled, coordinated and effective response at the scene, and at the local,regional, national and international level.

OVERVIEW OF KEY RESPONSIBILITIES

National Executive

The National Executive is primarily responsible for the coordination and managementof any national disaster and must deal with such a disaster in terms of existinglegislation and contingency arrangements. These obligations of theNational Executive will be serviced by the relevant officials and infrastructure of thethree levels of government.

National Disaster Management Centre

The Centre is responsible to declare a National Disaster on the recommendation of theaffected municipality or province (DM Act S23). The Centre will execute its powersand duties as per the DM Act.

Minister of Provincial and Local Government (PLG)

The Minister may declare a National State of Disaster if existing legislation andcontingency arrangements is inadequate to effectively deal with a National Disaster. The Minister (PLG) may then make regulations or issue directivesafter consultation with the responsible Cabinet member in connection with the releaseof national resources and personnel, etc.

Minister of Minerals and Energy

The Minister makes regulations related to nuclear emergency planning and willassume a leading role in the National Executive's oversight during a nuclear disaster.The Minister is responsible to address claims in excess of the financial securityprovided by the holder of the nuclear authorization.

Department of Minerals and Energy

The Chief Directorate Nuclear is specifically responsible to service the followingDME obligations with regard to nuclear disaster management and response.

a) Service the Minister's (M&E) obligations regarding nuclear emergencyplanning matters under the NNR Act (Issue regulations on Financial Security,Public Safety Information Forum and Safety Standards).

b) Ensure compliance with section 25 of the DM Act regarding the obligations of the National Organ of State to prepare and maintain a National Nuclear Disaster Management Plan and coordinate its implementation.

c) Ensure establishment and Chair Nuclear Emergency Planning Steering and Oversight Committees (EPSOC) for relevant nuclear installations as per aformal Terms of Reference.

d) Represent DME at meetings of the Intergovernmental Committee on Disaster Management established in terms of the DM Act.

e) In case of a National Disaster declared as a result of a nuclear emergency,deploy a DME representative to the Joint Operations Centre (JOC) of therelevant local government authority (or other appropriate centre) and deploy aDME representative to the National Disaster Management Centre. At thesecenters DME will participate in Joint decision making and management of theemergency in accordance with the procedures at these facilities.

f) Responsible for Joint Coordination of post-disaster recovery and rehabilitationwith other two levels of government and with the necessary input from theholder of the nuclear authorisation and the nuclear regulator .

g) Responsible for notifying, through official channels, South Africa's borderingStates about a nuclear emergency.

h) Responsible for establishing any procedures required in terms of this plan.

Provincial Government
Establish and implement a Provincial Disaster Management Plan and establish aProvincial Disaster Management Centre. Execute powers and duties as per the DMAct. In terms of the DM Act the responsible Provincial Government for the KoebergNPS is the Western Cape Province and for the Safari Reactor and other facilities at theNECSA (Pelindaba) site it is the North West Province (this may change to Gauteng).

Municipal Government
Establish and implement a Municipal Disaster Management Plan and establish aMunicipal Disaster Management Center. Execute powers and duties as per the DMAct and formal procedures. In terms of the DM Act the responsible Municipality forthe Koeberg NPS is the City of Cape Town and for the Safari Reactor and otherfacilities at the NECSA (Pelindaba) site it is Madibeng (this may change to Tshwane).

Holder of the Nuclear Authorisation
Where the possibility exists that a nuclear accident affecting the public may occur theholder of a nuclear authorization must enter into an agreement with relevantmunicipalities and provincial authorities to establish a nuclear emergency plan andsubmit such plan for approval by the National Nuclear Regulator (NNR Act S38).

The holder is responsible for technical and radiological assessment during all phasesof the emergency and based on such assessment the holder is responsible forimplementing on-site protective actions and recommending off-site public protectiveactions to the relevant government authority (ies) based on formal procedures.The holder is responsible for providing financial security as per regulations in case ofnuclear damage.

It should be noted that the obligation of "prevention" under the Disaster Management Act is addressed by the operator (holder of the nuclear authorisation) through theimplementation of the regulatory requirements under the NNR Act.

National Nuclear Regulator
In terms of the NNR Act the regulator must ensure that the nuclear emergency plan,of the holder of a nuclear autorisation, is effective for the protection of persons shoulda nuclear accident occur. The regulator must recommend standards for the protectionof the worker and the off-site public to be published as regulations by the Minister ofMinerals and Energy. The NNR Act provides for certain duties of the regulatorregarding nuclear accidents (section 37) and the keeping of records of nuclearaccidents.

SA Nuclear Energy Corporation (Necsa)
Necsa acts as the National Competent Authority and Contact Point (24 hoursEmergency Control Centre) for the following International Atomic Energy AgencyConventions:
• Convention on early notification of a nuclear accident
• Convention on assistance in the case of a nuclear accident or radiologicalemergencyNecsa must establish a formal procedure to implement these obligations.

Other National Departments & Institutions
Other National Departments and Institutions will be involved as appropriate in termsof their legislation, functions and as directed in terms of a National State of Disaster.

International Atomic Energy Agency (IAEA)
In terms of the international Conventions referred to in 3.10 the IAEA will inform andprovide information to any State party to the Conventions. On request from SouthAfrica the IAEA will

also provide assistance in case of a nuclear emergency or theIAEA may request assistance from South Africa in case of a nuclear emergencyelsewhere.

Nuclear disaster management strategies

a) Ensuring integrated nuclear disaster management planning and, following thedeclaration of a "National Disaster", ensuring Joint Coordination, Decisionmakingand Management by all three levels of Government. In practical termsit must be recognized that the relevant local government authority will be thefirst responder. However, the other two levels of government must report atthe Joint Operations Centre of the local authority as soon as possible.

b) Ensuring oversight at national level of institutional nuclear emergencypreparedness in accordance with state of the art international principles. Thenature and extent of emergency arrangements shall be commensurate with thepotential magnitude and nature of the potential threat associated with thefacility or activity.

c) Ensuring ongoing human resource capacity in DME to serve obligations

d) Ensuring training of DME staff with responsibilities in emergency response

e) Conduct nuclear emergency exercises and participate in institutional exercisesat frequencies agreed with stakeholders

f) Keep line management & ministry informed about nuclear disastermanagement plan

g) Ensuring that procedures are in place to request resources at national andinternational level.

h) Ensuring that procedures are in place to deal with radioactive waste arising from decontamination

Evacuation Planning Partners

- Emergency Management Agency
- Law Enforcement
- Emergency Medical Services
- Fire Department
- Transportation
- Public Works
- Traffic Engineering
- Transit Agency
- Health Department
- Human Service Agencies
- Agriculture Department
- Environmental Department
- National Guard
- Department of Defense
- Public School Districts
- City Planning Authorities
- People from Vulnerable Areas
- Red Cross
- Salvation Army
- Citizen Corps
- Power Companies
- Humane Society/American
- Society to Prevent Cruelty to
- Animals

- Chamber of Commerce
- Hotel/Motel Association

Evacuations occur to safeguard lives and property and reduce personal suffering. A successful evacuation relies on human, material, financial, technological, and equipment resources being available at the right time, at the right place, and in the right quantity. Success also depends upon information, communication, coordination, and knowledge to make the process work. The personnel involved must know what to do and when to do it, and must have the information, materials, and equipment available to execute their responsibilities. These resources may vary depending upon the role that the individuals play in the evacuation response.

Effective evacuation planning requires a partnership among all stakeholders. Evacuees are the most important stakeholders in any evacuation operation. In addition, many government and non-government personnel may be involved in the planning process and eventual execution of an evacuation operation. Evacuation planning at the local, regional, and State levels should involve representatives of all departments and organizations that have a role in an evacuation. This includes the potential evacuees (people from high-risk areas) as well as non-traditional partners, such as transportation and transit organizations, public schools, city planners, the Chamber of Commerce, and adjacent communities who may be impacted by an evacuation.

The State or local emergency management agency usually leads the evacuation planning process. Emergency managers must include transportation agencies—particularly the right mix of subject matter experts and those with appropriate authorities—in the evacuation planning process as keystakeholders since most people use the highways to evacuate whether they are traveling in their own vehicle, or on a bus, or using the roadway to access a train or plane. Transportation professionals can provide a wealth of information to support evacuation planning such as traffic counts, roadway capacity, planned highway construction, maps, and other such data necessary to develop a good plan and can access a wide variety of tools to facilitate the evacuations along roadways. Transportation officials should work with traditional disaster planners or operations staff, including those that:

- Make decisions
- Generate, collect, and/or analyze information
- Design strategic, operational, and contingency plans
- Manage operations and resources for the response
- Execute emergency (including evacuation) orders and response operations.

Disaster operation skills

In-depth knowledge of complex Disaster Management operations coordination which includes;
a) Problem solving skills
b) Strong project coordination skills
c) In-depth understanding of Federation financial processes and budgeting
d) Ability to work in a cross-cultural and cross-functional environment
e) Strong interpersonal skills and good understanding of the global organization
f) Excellent communications skills and public diplomacy

g) Ability to work to tight deadlines and handle multiple tasks
h) Drive for change and improvements and ability to deliver strategies in a challenging environment

CONCLUSION

Disasters have resulted in significant morbidity, mortality and economic loss. Public health is concerned with two objectives in disaster management;

- The elimination of the preventable consequences of the disaster
- The prevention of losses due to disaster mismanagement

Appropriate disaster relief follows a specific pattern;

- Gathering information on the situation
- Analysis of this information
- Developing and implementing an appropriate response
- This pattern occurs at various levels;
  - immediate assessment,
  - short-term assessment
  - ongoing assessment,

Through study of the past disasters, their effects and their relief efforts [what has been effective and what have been mismanaged] better plans are now available for effective disaster management as well as for the reduction of preventable losses.

- The disaster proneness varies widely from State to State.
- The country will have to pay more attention towards creating public awareness and preparedness in respect of people living in known disaster prone areas.
- Special training is required to the medical, paramedical, voluntary workers in the relief and rescue work.
- Any Disaster is an emergency situation and the health sector alone cannot tackle it in isolation.
- It must have Coordination with the local community, civil defense, army, police, fire brigade and with various governmental and non-governmental bodies including voluntary organizations like Red Cross.

REVISION QUESTIONS

1. Explain the meaning of disaster operations
2. Explain the players in disaster operation
3. Discuss the role of stakeholders in disaster operation
4. Practice disaster operation skills

CHAPTER SIX

EMERGING TRENDS IN DISASTER MANAGEMENT

Specific Objectives

By the end of this topic, the trainee should be able to;

a) Discuss the emerging trends in disaster management

INTRODUCTION

Meaning of Emerging trends in disaster management

More than 90 per cent of natural disaster related deaths are to be found in developing countries. Disaster impact statistics show the global trend - there are now more disasters but fewer people die in proportion, even though more population is affected and economic losses are increasing, as discussed in the next section.

Closely linked and influenced by changing perception, hazards and vulnerability is constantly shaped by dynamic and complex socio-economic and ecological processes. They are compounded by stresses felt within individual societies.

The current aspects of physical exposure of human beings and economic assets have been partly shaped by historical patterns of settlements. Beneficial climatic and soil conditions that have spurred economic activities are in many cases also associated to hazard-prone landscapes. Both volcanic slopes and flood plains areas have historically attracted human activities. Where settlement patterns have contributed to configure risk scenarios, new forces, such as population growth and increased rural/urban migration, act as dynamic pressures contributing to changing patterns in increasing people's exposure to hazards.

The processes through which people and goods become more exposed to hazards are also socioeconomic conditioned. In particular, poverty levels and the impact of development processes, especially those associated with an increasingly globalised society, are reflecting, to some degree, current trends in socio-economic vulnerability to disasters. The pace of modern life has also introduced new forms of vulnerabilities related to technological developments. In addition to discouraging poverty levels, the emergence of virulent biological threats has revealed even greater vulnerability.

Systemic ecological and localized environmental degradation is becoming highly influential as well, lowering the natural resilience to disaster impact, delaying recovery time and generally weakening the resource base on which all human activity is ultimately dependent.

At the ecosystem level, phenomena like El Niño/La Niña, climate change and the potential for rising sea levels, are affecting the patterns and intensity of hydrometeorological hazards. Environmental degradation influences the effects of natural hazards, by exacerbating their impacts and limiting the natural absorptive capacity and resilience of the areas affected.

Biological hazards in the forms of plant or animal contagion, extensive infestations, human disease epidemics and pandemics, continue to factor into the disasters-development scenario in new and unpredictable ways. They exert considerable socio-economic impacts on food security and human mortality, health and economic productivity, among other things.

Disaster triggered by technological hazards often resulting from major accidents associated with industrialisation and forms of technological innovation, have significant socio-economic and environmental impact. Although technological hazards have been part of society for hundreds of years, the trends are showing an increasing impact. Technological advancements, specifically in the energy, transport and industrial sectors, are developing innovations with associated risks that are not always understood or heeded. The adverse effects of some technological disasters, both on society and on the environment, can considerably outlast the impacts associated with natural disasters.

Trends in disaster impact

While no country in the world is entirely safe, lack of capacity to limit the impact of hazards remains a major burden for developing countries, where more than 90 per cent of natural disaster related deaths are to be found.

Twenty-four of the 49 least developed countries (LDCs) still face high levels of disaster risk. At least six of them have been hit by between two and eight major disasters per year in the last 15 years, with long-term consequences for human development (*UNDP, 2001*). These figures do not include the consequences of the many smaller and unrecorded disasters that cause significant loss at the local community level.

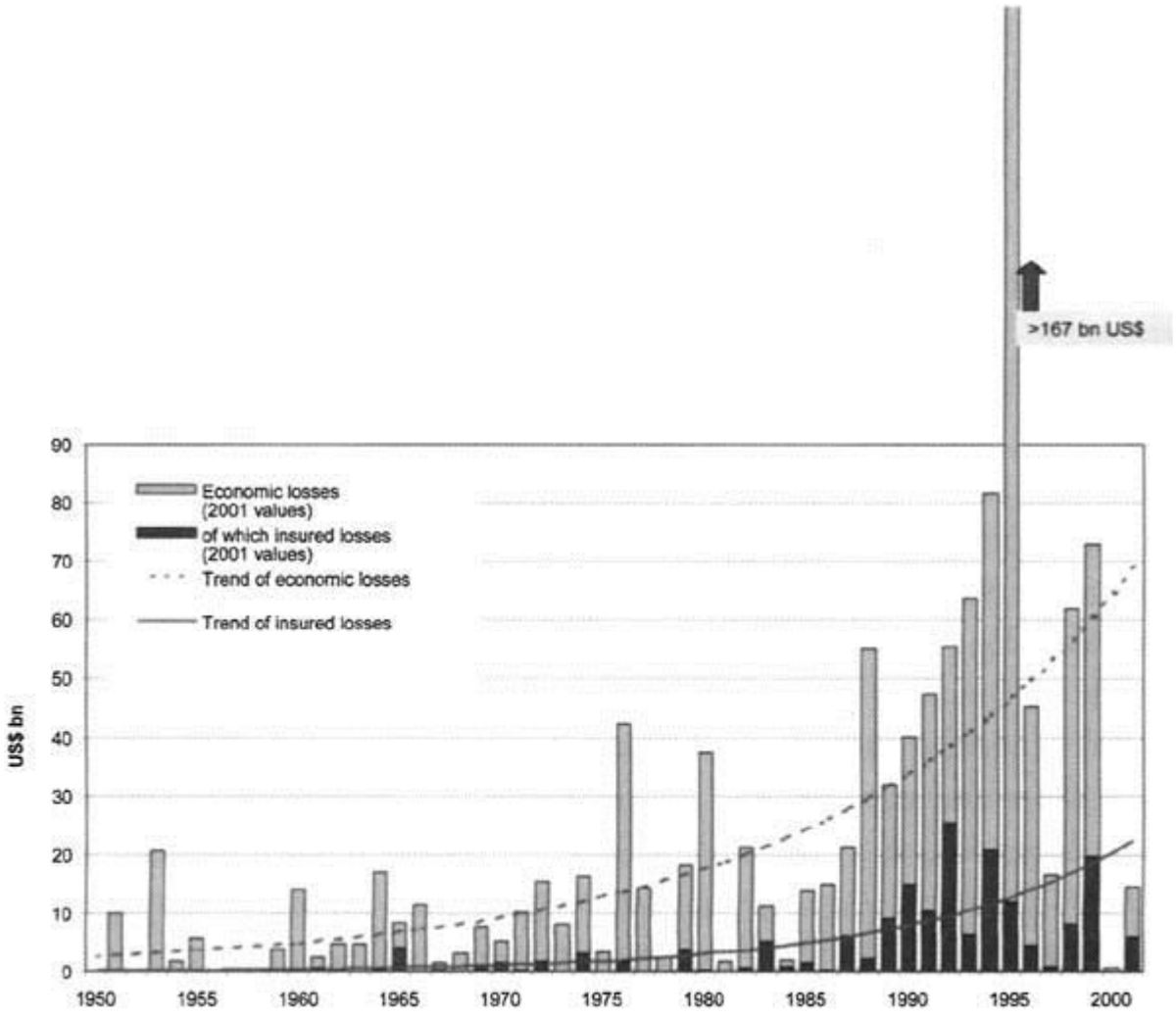
The re-insurance giant Munich Re, a member of the ISDR Inter-agency Task Force, in its annual publication *Topics* for 2000, looked at the trend of economic losses and insurance costs over a 50 year period linked to what it calls “great natural catastrophes”.

There were 20 of these, costing the world US$ 38 billion (at 1998 values) between 1950 and 1959. However, between 1990 and 1999, there were 82 such major disasters and the economic losses had risen to a total of US$ 535 billion. That is, disasters had multiplied fourfold but economic losses were 14 times higher. And in each decade between, both the number of great disasters and the economic loss involved had risen steadily. However, losses in 2000 and 2001 were down.

These are absolute figures of economic loss, most of them to be found in developed and industrialized countries. But seen as losses by percentage of GDP, it is developing countries that lose most in relative terms, as shown in the graphic based on figures provided by MunichRe. For example, the economic losses of the United States from the 1997-98 El Niño event were estimated to US$ 1.96 billion or 0.03 per cent of GDP. The economic losses in Ecuador were US$ 2.9 billion, but this represented 14.6 per cent of GDP (*ECLAC 2000*).

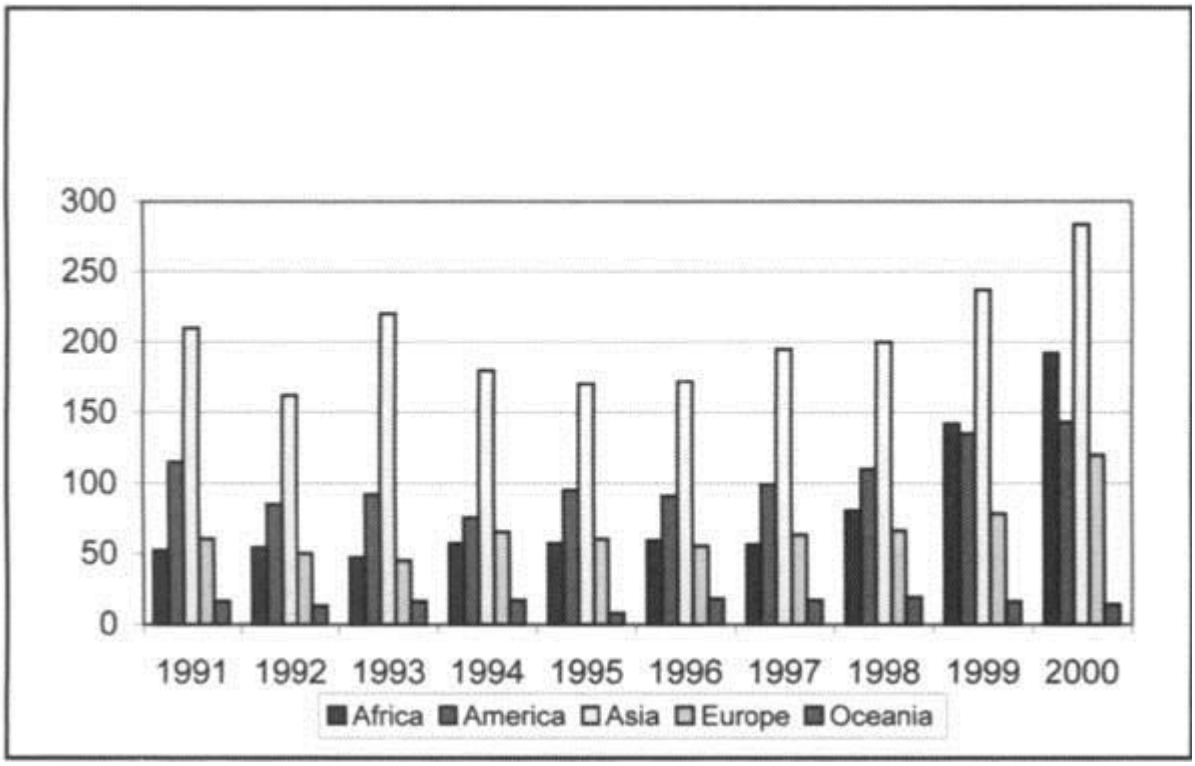
The International Federation of Red Cross and Red Crescent Societies, another ISDR Task Force member, confirms the worsening trend of human suffering and economic loss during the last decade. The total number of people each year affected by natural disaster - that is, who at least for a time either lost their homes, their crops, their animals, their livelihoods, or their health, because of the disaster - almost doubled between 1990 and 1999, by an average of 188 million people per year.This is six times more than the average of 31 million people affected annually by conflict.

Comparing the last three decades, the trend shows an increase in the number of natural hazard events and of affected populations. Even though the number of disasters has more than tripled since the 1970s, the reported death toll has decreased to less than half (see grahpic page 12). This is among other factors due to improved early warning systems and increased preparedness. This statistic varies enormously depending on region and figures used. One needs to bear in mind that large disasters are rare events that defeat any statistical analysis in the short term. Perhaps more significant in the life of many are those daily disasters, generally underreported and not reflected at all in global figures on losses, but accumulating to probably large tolls of both economic and health losses.



Economic Losses, great natural catastrophes 1950 - 2001

There is a considerable geographic variation in the occurrence and impact of natural hazards. Asia is disproportionately affected with approximately 43 per cent of all natural disasters in the last decade. During the same period, Asia accounted for almost 70 per cent of all lives lost due to natural hazards. During the two El Niño years of 1991-92 and 1997-98, floods in China alone affected over 200 million people in each year. Nevertheless, in relative terms and counted per capita, Africa is the most heavily affected country, in particular when drought, epidemics and famine are included.



Total Number of Reported Disasters, (1991-2000)

The single most terrible year in human loss during the last decade was 1991, when a cyclone devastated Bangladesh killing 139,000 people, bringing the global total of deaths for that year to 200,000. Cyclones are cyclical events and they continue to hit the Bangladesh coasts but no such catastrophe has happened again. This is at least in part because the machinery of warning and preparedness - watchful officials, an aware public and a stronger sense of community responsibility - came into play.

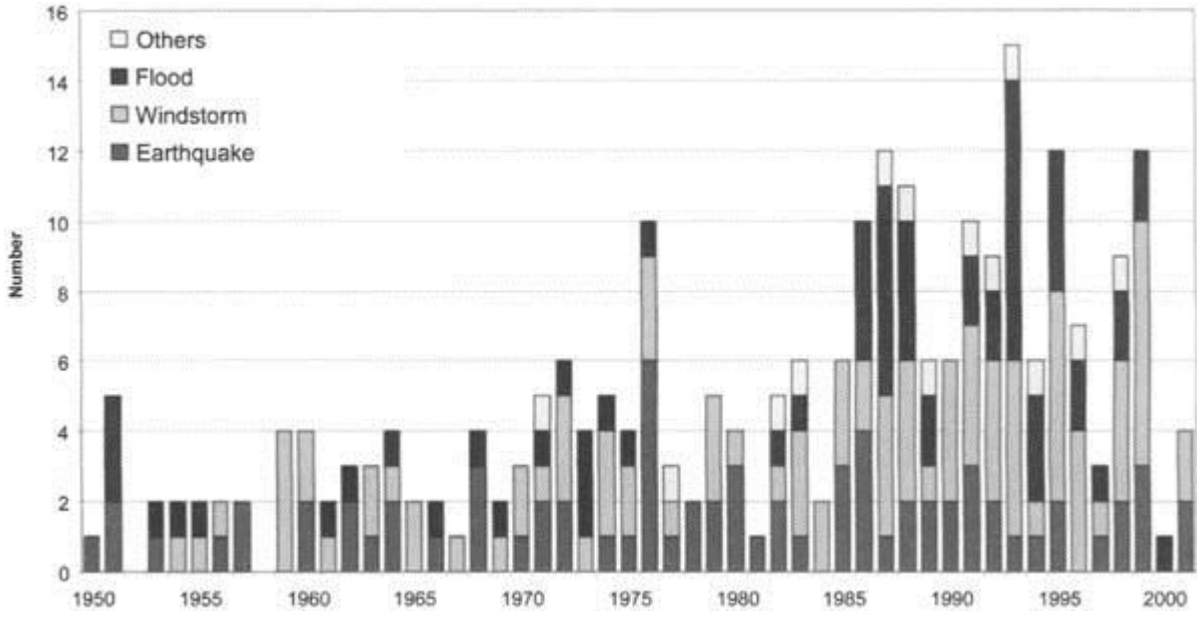
The worst global economic loss during last decade occurred in 1995, due to the Great Hanshin-Awaji earthquake in Kobe, Japan. A highly developed, prepared and economically strong nation faced serious set backs economically by loosing important facilities of its primary port. Even seven years after that disaster, the amount of shipping trade in Kobe has dropped by 15 per cent. But now Kobe is rebuilt and modernised.

Trends in hazards

Until recently, the intensity and frequency of natural hazards, as events, whether geological or hydrometeorological in nature, only varied on very long time-scales due to natural variation in global temperatures and variation in the intensity of seismic activity.

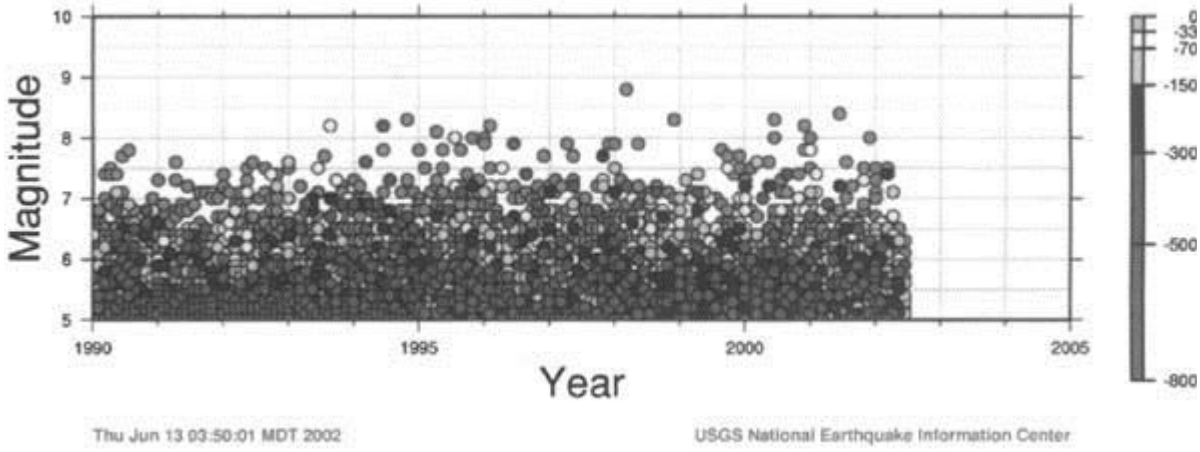
Today, in particular hydrometeorological hazards are increasing due to human activities. The findings of the Intergovernmental Panel on Climate Change (IPCC) provide a new outlook about the changing patterns related to hazards themselves. Certainly, the scale of

volcanic or seismic activity is not altered by human-induced sources, but it appears that our changing climate is affecting both the frequency and intensity of hydrometeorological hazards and related mass movements. Although it is very difficult to show scientific evidence of these changes, projections for the future invite concern.



Great natural catastrophes 1950 - 2001

The figure below shows that there is currently no major change in the frequency and intensity of reported earthquakes. Nevertheless, the economic losses caused by earthquakes are increasing.



Earthquakes Located by the NEIC, Magnitude 5 and greater

Volcanic Hazards

About 50 to 60 volcanoes erupt every year worldwide. Large eruptions endanger lives, human settlements and livelihoods of the almost 500 million people estimated to live near active volcanoes in 2000. That number will increase in the future as today more than 60 large cities are located near potentially active volcanoes, threatened by volcanic eruption.

Volcanoes with high activity are located predominantly in developing countries, particularly in Latin America, the Caribbean, parts of Asia and in the southwest Pacific. In these countries, despite the improvements in many national civil defense agencies' capacities to manage volcanic emergencies, eruptions are becoming increasingly risky because of rising population density and intense interweaving of infrastructure in the areas surrounding volcanoes.

As the physical characteristics and chemical properties of a specific volcano become better known, it can be more easily monitored. However, the prediction of an impending eruption can still remain a major challenge for volcanologists. Therefore, predicting future volcanic eruptions and related hazards must also be matched with a series of other forms of mitigation, including the following:

- Volcanic risk analysis.
- Early warning and short-term forecast of eruptions.
- Timely and effectively organized evacuation of people from hazardous areas.
- Development and application of land-use and contingency plans to minimize future volcanic disasters.
- Sustained information and educational programs for the population.

Major volcanic eruptions do not occur spontaneously and are preceded by a variety of physical, geological and chemical changes, which accompany the rise of magma toward the surface. The monitoring and measurement of these changes with well established scientific techniques provide the best opportunity to develop a warning system. Recent volcanic disasters show that the cost of monitoring volcanic activity and pre-disaster planning is very small when compared to the potential losses.

For early warning to be effective, sustained public education and information is necessary. This includes understanding results of volcanological studies and analysis, the possible dangers and the local plans to address them prior to the occurrence of emergency conditions. It can be done through the use of brochures, lectures, or courses although the best prepared communities also conduct regular disaster warning and prevention exercises.

In 1990, the International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI) launched a program to support the IDNDR and to promote the reduction of risks related to volcanoes. The initiative selected 16 volcanoes for monitoring and research with the aim of directing attention to a small number of active volcanoes, and to encourage the

establishment of a range of research and public-awareness activities aimed at enhancing an understanding of the volcanoes and the hazards they pose.

That commitment demonstrated a concentrated effort within the scientific community to publicize the realistic aspects of disaster reduction by working in close association with communities at risk from volcanic hazards. Such collaborative scientific activities continue to show benefits as quite a lot of work continues with those same volcanoes. As a result of improvements in monitoring made during the IDNDR, better data has been developed, especially as those volcanoes continue to be restless. Ongoing work that would not have occurred were it not for this earlier concentrated attention includes, ongoing German-Indonesian cooperation at Merapi Volcano, on the Indonesian island of Java.

Climate related hazards

Societies are increasingly dependant on medium to long term variations in the climate, such as El Niño/La Niña (see box "El Niño outlooks"), which affect precipitation and temperatures over time-scales of two to three years. These regional climatic shifts, the specific character of which is still very much unknown, develop their own variation in hazard trends, in particular hydro-climatic hazards associated with climate variability. The prevalence of droughts and floods as leading hazards shows that many countries are particularly vulnerable in dealing with current natural variability and extremes, let alone climate change.

The projected changes in climate will adversely affect many regions, in particular tropical and sub-tropical regions of the planet. When dealing with the complex issue of climate change there are some observations that can now be accepted as fact. It is now established that temperatures are increasing globally, although these increases are not evenly distributed around the planet. As the atmosphere becomes warmer throughout the world it can absorb more water vapour, leading to a general increase in humidity. As a result there is the probability that tropical storms and cyclones will be accompanied by extreme precipitation increases.

Unfortunately, these factors have a compound effect on the occurrence and impact of disasters. On the one hand, they affect the intensity and frequency of extreme hydrometeorological events, and on the other hand, they increase the vulnerability of societies. As we know, change in precipitation patterns, soil moisture and vegetation cover, are linked to the occurrence of floods, droughts, but also landslides and debris flow events. Climate change is also resulting in slight sea level rise and may cause more devastating storms and hurricanes in coastal areas. The only natural hazards that are not directly influenced by climate change are, possibly, volcanic eruptions and earthquakes.

The Inter-Agency Task Force on Disaster Reduction (IATF/DR) of the ISDR has a working group dealing with climate and disasters (WG1) and another with wildland fires (WG4). In the area of drought preparedness and mitigation, there are a number of coordinated and collaborative initiatives that are foreseen to be undertaken within the framework of the

ISDR Task Force involving all its working groups.

Drought distinction

Absence of a precise and universally accepted definition of drought adds to the confusion as to whether it exists, and if it does the degree of its severity. Thus, drought is often forgotten once it ends, and everybody seems to be caught unawares again by the next one. Most of the drought definitions have therefore been application (impact) specific. Other drought definitions have been regional specific. The discussions of drought here are focused on three types of drought - meteorological, agricultural, and hydrological. Meteorological drought is principally defined by the deficiency of precipitation from expected or normal levels over an extended period of time. Hydrological drought is best defined by deficiencies in surface and subsurface water supplies, leading to a lack of water for meeting normal and specific water demands. Agricultural drought may be characterized by deficiency in the water availability for specific agricultural operations such as deficiency of in soil moisture, which is one of the most critical factors in defining crop production potential.

During the coming decade and century, it is expected that drought vulnerability will increase, mainly due to development pressures, population increases, and environmental degradation that could itself lead to climate change. Several efforts have therefore been made at international, regional and national levels to address drought challenges. The international and regional efforts include the programmes and activities of the organizations and the Drought Monitoring Centres in Africa, of Columbia University and USGS that have established programmes to deal with drought monitoring, prediction, early warning and disaster preparedness. They are also covered by the work of the UN sustainable development conventions.

Drought, unlike sudden-onset disasters, has some unique characteristics that may require different approaches to effectively address how to reduce their impacts:

- Drought does not directly destroy food in storage, shelter or infrastructure.
- Its effects are cumulative.
- It is often very difficult to detect its onset until some major impacts such as lack of water or food become discernible.
- Impacts can be spread over a larger geographical area than the damages that result from most of the other natural disasters, and hence quantification of impacts and provision of disaster relief is far more difficult.

"AmartyaSen, the Nobel prize winning economist of Cambridge University, famously pointed out that 'in the terrible history of famines in the world, no substantial famine has ever occurred in an independent and democratic country with a relatively free press'. The Human Rights Watch took this to heart, and asserts that 'the best way to prevent famine today is to secure the right to free expression - so that misguided government policies can be brought to public attention and corrected before food shortages become acute'"

Source: The Economist, 18 August 2001

Further, there are several social and economic parameters that affect the severity of drought including food prices, wars, various intervention methods, human activity, vegetation, water supplies and demands, making it extremely difficult to quantify its severity and also provide universal definition and indicators of drought. Drought risk is a product of a region's exposure to the natural hazards and its vulnerability to extended periods of water shortage. To reduce serious consequences, affected nations must improve understandings of hazards and the factors that influence vulnerability, and establish comprehensive and integrated early warning systems.

Case: Zimbabwe

Drought is the most common hazard in Zimbabwe, a country whose economy is dependent on agriculture. The incidence of drought is often linked to the occurrence of El Niño episodes and has worsened since the 1980s. Floods frequently occurring in the southern and northern provinces of the country compound drought conditions in other parts of the country. In 1996, there were localized floods resulting from abnormally heavy downpours. However, in 2000, flooding associated with Cyclone Eline caused considerable infrastructure and environmental damage in the country. The livelihoods of more than 250,000 people were affected in rural areas, with 100 fatalities and more than US$ 7.5 million in losses recorded.

Drought has been a recurrent feature in most parts of Southern Africa, with five major periods of drought since 1980: 1982-83, 1987-88, 1991- 92, 1994-95 and 1997-98. Three of these events were regional in scale, with the 1991-92 drought considered the "worst in living memory", placing more than 20 million people at serious risk.

Case: Central Asia

The persistent multi year drought in Central and Southwest Asia is an example of climatic variability that has affected up to 60 million people in parts of Iran, Afghanistan, Tajikistan, Uzbekistan and Turkmenistan, since November 2001. Chronic political instability in many parts of the region and the recent military action in Afghanistan have further complicated the situation. A recent study by the International Research Institute for Climate Prediction (IRI) concludes that Central and Southwest Asia represent the largest region of persistent drought over the last three years in the world. In Iran alone, 37 million people are affected. Water reserves in the country were down by 45 per cent in 2001, 800,000 heads of livestock were lost in 2000, and 2.6 million hectares of irrigated land and 4 million hectares of rain-fed agriculture were affected. Damage to agriculture and livestock has been estimated by the UN at US$ 2.5 billion in 2001 and US$ 1.7 billions in 2000. Afghanistan and Pakistan are affected on a similar scale.

Climate change, sea level rise and coastal systems

Coastal zones are characterized by much diversity of ecosystems and a variety of socio-economic activities. An estimated 46 million people per year, living in coastal areas, are at risk of flooding from storm surges, and sea-level rise. Climate change will exacerbate these trends with significant impact upon the ecosystems and populations. A growing number of people will, continue to be located in coastal areas. Many traditional communities and subsistence level populations also rely on the resource wealth of coastal areas and continue to be drawn to these higher risk coastal regions.

For example, indigenous coastal and island communities in the Torres Strait of Australia and in New Zealand's Pacific Island Territories are especially vulnerable. Although adaptation options do exist, such measures are not easily implemented on low-lying land. Also, climate change and sea-level rise issues are not as yet well incorporated into current models and frameworks for coastal zone management.

There is a direct link between tropical sea temperature in the oceans and the frequency of tropical cyclones, hurricanes or typhoons. More heat in the atmosphere means more evaporation which means more rainfall and more flooding in some places, more frequent drought in others, more violent windstorms or heavier snows elsewhere.

Table: Examples of impacts resulting from projected changes in extreme climate events Report of Working Group 2 of the Intergovernmental Panel on Climate Change, 2001

Projected changes during the 21st century in extreme climate phenomenaand their likelihood[a]	**Representative examples of projected impacts[b]all high confidence of ocurrence in some areas[c]**
Simple extremes	
Higher maximum temperatures: more hot days and heat wavesd over nearly all land areas (very likely[a]).	• Increased incidence of death and serious illness in older age groups and urban poor. • Increased heat stress in livestock and wildlife. • Shift in tourist destinations. • Increased electric cooling demand and reduced energy supply reliability.
Higher (increasing) minimum temperatures: fewer cold days, frost days, and cold wavesd over nearly all land areas (very likely[a]).	• Decreased cold-related human morbidity and mortality. • Decreased risk of damage to a number of crops and increased risk to others. • Extended range and activity of some

	pest and disease vectors. • Reduced heating energy demand.
More intense precipitation events (very likely[a] over many areas).	• Increased flood, landslide, avalanche, mudslide and debris flow. damage. • Increased soil erosion. • Increased flood runoff could increase recharge of some floodplain aquifers. • Increased pressure on government and private flood insurance systems and disaster relief.
Complex extremes	
Increased summer drying over most mid-latitude continental interiors and associated risk of drought (likely[a]).	• Decreased crop yields. • Increased damage to building foundations caused by ground shrinkage. • Decrease water resource quantity and quality. • Increased risk of forest fire.
Increase in tropical cyclone peak wind intensities, mean and peak precipitation intensities (likely[a] over some areas[c]).	• Increased risks to human life, risk of infestious disease and epidemics. • Increased coastal erosion and damage to coastal build- ings and infrastructure. • Increased damage to coastal ecosystems such as coral reefs and mangroves.
Intensified droughts and floods associated with El Niño events in many different regions (likely[a]).	• Decreased agricultural and rangeland productivity in drought and flood-prone regions. • Decreased hydro-power potential in drought-prone regions.
Increased Asian monsoon precipitation variability (likely[a]).	• Increased flood and drought magnitude and damages in temperte and tropical Asia.
Increased intensity of mid-latitude storms (little agreement between current models[b]).	• Increased risks to human life and health. • Increased property and infrastructure losses.

a) Likelihood refers to judgmental estimates of confidence used by TAR EGI: very likely (90-99% chance); likely (66-90% chance). Unless otherwise stated, information on climate phenomena is taken from the Summary for Policymakers, TAR WGI.

b) These impacts can be lessened by appropriate response measures.

c) High confidence refers to probabilities between 67 and 95% as described in Footnote 6.

d) Information from TAR EGI, Technical Summary,

e) Information from TAR EGI, Technical Summary,

Wildland fire as an environmental hazard

Throughout the world and in many different types of vegetation, fire is part of agriculture and pastoral livelihoods. Natural wildfires are established elements in traditional land-use systems and have beneficial effects in natural ecosystem processes and in bio-geo-chemical cycles. However, the excessive use or incidence of fire due to rapid demographic and land-use changes leads to the destruction of property and reduction of natural productivity by reducing the carrying capacities, biodiversity and vegetation cover of the landscape. Climate variability such as the periodic occurrence of extreme droughts or the protracted effects associated with the El Niño/La Niña phenomenon add to the severity of fire impacts. Projected demographic and climate change scenarios suggest that these situations will become more critical during coming decades.

ISDR working group 4: wildland fires (WG4)

The overall objective of WG4 of the Inter-agency Task Force on Disaster Reduction is to propose means and to facilitate the creation of mechanisms that can share information and undertake tasks to reduce the negative impacts of fire on the environment and humanity. It brings together both technical members of the fire community and authorities concerned with policy and national practices in fire management to realise their common interests of fire risk management and disaster reduction at a global scale.

WG4 is chaired and coordinated by the Global Fire Monitoring Centre (GFMC) at the Max Planck Institute for Chemistry, in Freiburg, Germany. WG4 attends to the existing programmes being implemented by its members to ensure complementary work plans. Its priorities are to:

• Establish, and determine operational procedures for a global network of regional and national focal points for the early warning of wildland fire, fire monitoring and impact assessment, with the intention to enhance existing global fire monitoring capabilities and facilitate the functioning of a global fire management working programme or network.

• Propose internationally agreed criteria, common procedures, and guidelines for the collection of fire data and related damage assessments in order to generate knowledge required by the various user communities at global, regional, national and local levels.

• Strengthen the existing regional, national and local capabilities in fire management and policy development through the dissemination of information and increased networking opportunities to meet the information needs of such international initiatives as the

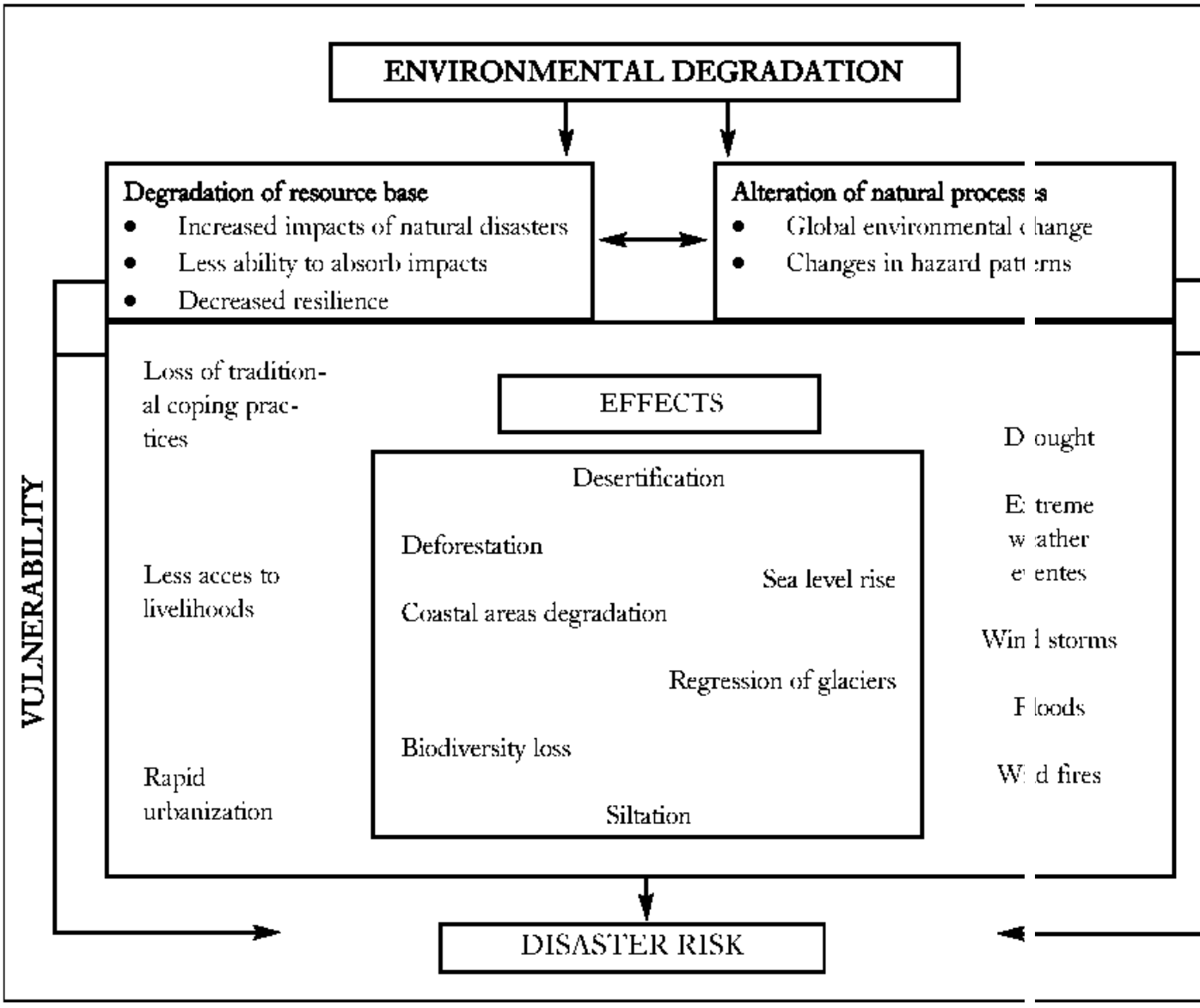
Convention on Biological Diversity, the Convention to Combat Desertification, the UN Framework Convention on Climate Change, the United Nations Forum on Forests, the FAO Global Forest Resources Assessment and the ongoing international criteria and indicators processes of the Collaborative Partnership on Forests, as well as the overall scope of work of the UN agencies and programmes concerned.

• Transfer knowledge to local communities to advance their participation and utilization of appropriate tools that contribute to wildfire prevention, fire disaster preparedness and fire disaster mitigation.

Environmental degradation

As human activity continues to alter the biosphere, changes result in the environment in specific places and at ecosystem levels. Environmental degradation compounds the actual impact of disasters, limits an area's ability to absorb the impact, and lowers the overall general natural resilience to hazard impact and disaster recovery. In addition, environmental degradation that occurs and is significant enough to alter the natural patterns in an ecosystem, also affects the regular temporal and spatial occurrence of natural phenomenon. Climate change is currently the most obvious example.

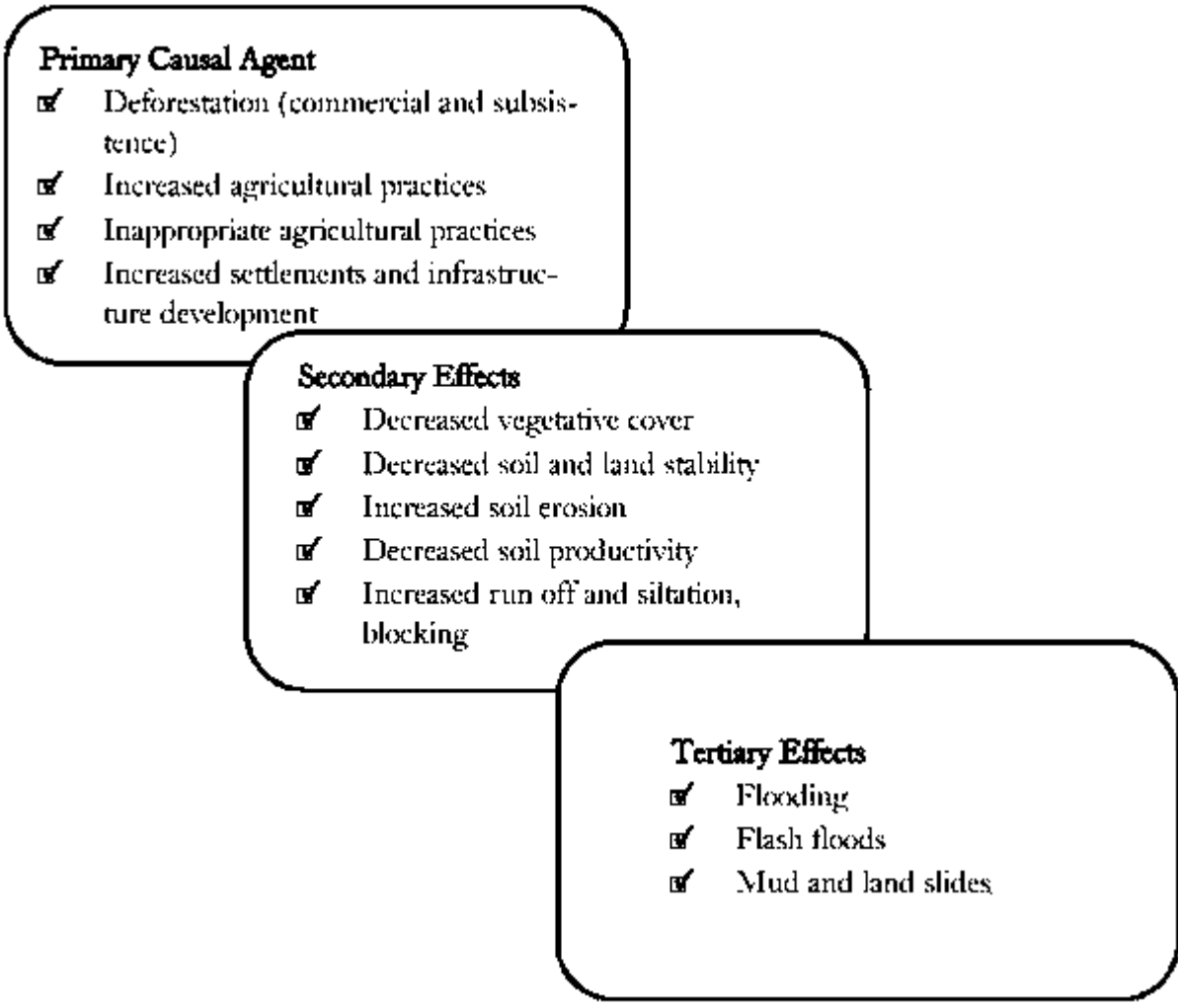
The figure illustrates the inter-linking nature of environmental degradation, natural disasters and vulnerability. It should be noted that environmental degradation is described in terms of diminished resources. Toxification and other imbalanced forms of altering the natural environment also add to environmental degradation.



The interconnectedness between environmental degradation and progressive impact of natural disasters can be illustrated by the case of the Yangtze River Basin, in China, where concerns related to environmental vulnerability have been incorporated in watershed management.

Viet Nam offers another example of the complex links between deforestation and floods/landslides. Viet Nam's forest cover dropped from 43 per cent to 28 per cent in 50 years. This is due to a combination of many years of war, with the use of deforestation as a tool of war, legal and illegal trade in timber as Viet Nam's economy became more open to international investment and trade, and, it is also quite likely, climate change. Reduced forest cover will make the people of Viet Nam more vulnerable to floods and landslides.

The chart below, shows how primary and secondary effects of environmental degradation result in increased impacts of natural disasters - in this case in relation to watershed management and floods.



• Land degradation and flash floods

According to UNEP data, two thirds of Africa is dry land over 70 per cent of which is classified as degraded. About 90 per cent of pasture land and 85 per cent of crop lands in the countries closest to the Sahara have been affected and there is some evidence that the desert is advancing towards the south and east. Deforestation is an important catalyst of land exhaustion and soil erosion. In Africa, more than 90 per cent of all wood is used for cooking and other energy needs and the demand for fuel wood has grown considerably since the oil price rise in 1974. Since kerosene is expensive to buy, there is an urban shadow of stripped land around most settlements. In effect, economic and social pressures - made worse by drought - have caused the breakdown of the traditional system of land use which was adapted to this fragile environment.

Flood risk, especially flash floods, is also exacerbated by increasing land degradation. In Southern Africa, escalating land degradation is strongly associated with overgrazing, which accounts for more than half the soil degradation in the region.

• Technological hazards

Technological hazards are related to quickly occurring, high-impact events such as hazardous spills and nuclear accidents, and are therefore more linked with exposure, than long-term environmental degradation. In the case of hazardous materials - chemical and toxic waste leakage - exposure is the critical factor. That was the case in Bhopal, India, in 1984, where material leaked to form a deadly cloud that killed and injured a huge number of people - most of whom came from poor families allowed to settle around the chemical plant. The fatal consequences of this chemical release were directly related to modernization efforts introduced as a complex and poorly managed industrial production system into a society unable to cope with it.

A very important aspect of exposure to technological hazards is the fact that they are not exclusively confined to urban-industrial societies. Virtually every modern product and process is disseminated to most countries and social settings. Of 25 nations with operating nuclear power stations, at least 14 are in developing countries. Great oil spills and releases of nuclear radiation are associated with the dominant energy and transportation technologies. Chernobyl, Exxon Valdez, Minimata and Bophal, are some well known examples of technological disasters.

• Biohazards and vulnerability

HIV/AIDS can be considered a biological hazard. However, due to its enormous real and potential impact on the human community, it also constitutes a major vulnerability factor to the impact of other natural hazards. In particular, HIV/AIDS exacerbates vulnerability to drought conditions. Household size and income diversification, which count as key strategies to cope with droughts, are severely affected by HIV/AIDS, both by reducing the labour force and diverting vital economic resources towards medication and treatments. Moreover, infected people living in cities, usually return to their home villages to die, reinforcing the already higher vulnerability in rural environments in most African countries.

• Trends in physical vulnerability

Ninety per cent of the global population growth is taking place in least developed countries (LDCs). In these countries, exposure to hazards is already high through dense concentrations of population in largely unsafe human settlements. Vulnerability levels are also exacerbated by socio-economic and environmental conditions. In 1980, sub-Saharan Africa had a population of 385 million. This figure is expected to at least double by 2005. Population growth is outstripping food production that represents 40 per cent of GDP in some instances. But even this figure is precarious given less reliable rainfall patterns.

The long term trends of demographic growth for LDCs are creating environmental, as well

as political, refugees. As many as 10 million people have emigrated during recent years but there may eventually be even greater redistributions of the African population in response to the deteriorating food situation. Some of this redistribution will likely concentrate even greater numbers in hazardous areas.

Due to the urban concentration of population, the greatest potential for disaster exists in the hundred most populous cities. Over threequarters of these are exposed to at least one natural hazard. No less than seventy of these cities can expect, on average, to experience a strong earthquake at least once every fifty years. The greatest concern is for the fifty fastest growing cities, all of which are located in developing countries. Cities were often founded on accessible locations with inherent risks such as coastlines, to facilitate transport or floodplains because of their fertility and ample space for growth. Urbanization and increasing competition for land, results in the creation of unregulated construction which spills over into high risk areas, such as along hill sides, into low lying areas, next to industries, or on flood plains.

Cities now hold disproportionate amounts of material wealth in terms of both residential and commercial buildings and infrastructure. This infrastructure is critical to the functioning of the city. The impact of disasters on cities can devastate national economies and industrial markets at an international level. This is especially important true for nation states, or emerging economies, where one or perhaps two primary urban areas will account for the vast majority of economic and social activity.

The dynamic growth of coastal areas evident in the Andean sub-region is also seen elsewhere. Nearly 3 billion people live in coastal zones, and 13 of the 15 largest cities are also located on the sea.

Not only is the exposure of people exacerbated by the occupation of hazard-prone areas, the concentration of industrial infrastructure and critical facilities are also affected. Communication networks and educational and health infrastructure are becoming more vulnerable to the potential impact of natural hazards.

Behind the rapid urbanization process, rural displacement accounts for the rapid growth of informal, illegal settlements in the most dangerous places near cities like Mexico City, Rio de Janeiro and Manila, amongst others. Disaster risk concerns go hand in hand with other equally pressing urban issues, such as decaying infrastructure, poor housing and homelessness, hazardous industries, inadequate services, unaffordable and poor transport links, and unemployment.

Trade corridors are formed as a result of trade agreements. In Latin America we find the Central American highway, the Quito-Guayaquil corridor, the Pan-American Highway in the Andean region, the Buenos Aires-Mendoza-Santiago-Valparaiso corridor, and Brazilian coastal corridors with maritime connections to Asian and European destinations. The development of trade corridors has political, economic, social and environmental implications. Their resilience to the impact of natural hazards is particularly relevant to enhance the sustainable development of cities and regions.

Trends in socio-economic vulnerability

The relation of disaster risk and development offers a good starting point to identify macro trends in socio-economic vulnerability. To some degree, socio-economic and environmental vulnerability is shaped by development processes and *vice versa*. Understanding how patterns of social change and development set the scene for future disasters become crucial to improving disaster risk assessment and analysis, and therefore essential for disaster risk reduction as a whole.

• Development and vulnerability

The analysis of disaster impact shows that an estimated 97 per cent of natural disaster related deaths each year occur in developing countries. Although smaller in absolute figures, the percentage of economic loss in relation to the GNP in developing countries far exceeds those in developed countries. This fact becomes even more relevant for SIDS. Between 1985 and 1999, the world's wealthiest countries sustained 57.3 per cent of the measured economic losses to disasters, representing 2.5 per cent of their combined GDP. During the same years, the world's poorest countries endured 24.4 per cent of the economic toll of disasters, representing 13.4 per cent of their combined GDP.

Some of the vulnerability factors or processes are closely associated with certain types of development models and initiatives. The links between disaster and development are explored in detail in the World Vulnerability Report, currently being developed by UNDP.

Increasing or permanent levels of poverty remain as a relevant issue for the analysis of vulnerability trends.

In Southern Africa, poverty levels remain high, especially among the rural poor, with 63.7 per cent, 36 per cent and 37 per cent of Zambians, Zimbabweans and Mozambicans respectively, living on less than US$ 1 per day. Their GDP falls far short of per capita GDP in developing countries. Moreover, GDPs for Zambia and Mozambique are around half of those for sub-Saharan Africa. In addition, high levels of foreign debt have discouraged investment and growth; with Zambia shoul- dering external debts that constitute 181 per cent of its GNP. Under these conditions, it is unrealistic to expect significant investments at household or national level to mitigate the impact of natural or other threats.

• Globalisation as a dynamic force

Globalisation has a number of distinctive characteristics that have had a profound influence on the structure of international socioeconomic relations. The impact of globalisation on patterns of vulnerability is critical to identify new trends in disaster risk. The economic dimensions of globalisation include the dominance of a global market, as one of its main features. The combined impacts of economic adjustment measures to encourage greater efficiencies and global competitiveness have been reflected in significant job losses and unemployment. In South Africa alone, between 1996-2000 more than 500,000 formal sector jobs were lost. Between 1997-2000 more than 140,000 miners became unemployed and

50,000 primarily female workers lost their jobs in textile industries. This is an increasingly relevant area which will require further analysis and focus.

• **Traditional knowledge at risk**

The pace of technological change and the cultural implications of globalisation pose a real threat to the wealth of local knowledge, and related skills and resources, preserved among indigenous people and in many rural communities.

Economic vulnerability is increasing as local livelihoods are transformed from relying on traditional forms of production to using more intensive or modern methods of agriculture and land use systems.