



**SEA DISASTERS, PREVENTION, RESCUE OPERATION
AND MANAGEMENT OF VICTIMS**

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1.0 INTRODUCTION

- Since time immemorial, man has been battling with the forces of the environment.
- Consequently, a trend rooted on the actions and inactions of man has paved way to the reduction in the quality of the environment.
- The importance of the sea to man can not be overemphasised. However man has also received adverse effects from the sea.
- Perhaps, the oldest record on sea disaster is the Bible where red sea swallowed Pharaoh's army.
- Unfortunately, man has had to cope with environmental disasters, many of which are simply the result of environmental processes at work.
- Our reliance on the environment has been graphically displayed in a series of major environmental disasters.

1.0 INTRODUCTION CONT

- For instance the Indian ocean Tsunami, 2004;
- Egypt ship-sinks in Red sea, 2006;
- East Asian ferry disaster, 2009
- And Antarctica sinking ship which struck iceberg, 2009 (WSDT, 2009), just to mention but a few.
- With the incessant occurrence of environmental disasters in the world, awareness has evolved and broadened.
- The general public has woken up to the general environmental impacts of their own actions and inactions.
- Individuals now understand that it is our collective responsibility to protect the environment from further degradation and disaster (Park, 1997).

2.0 SEA DISASTER

- Sea is the great body of salt water that covers a large portion of earth or a body of salt water that is surrounded by land on all or most sides e.g Mediterranean sea, Caribbean sea etc.
- Disaster is a sudden damaging or destructive event that causes serious loss, destruction, suffering, unhappiness or death.
- It could be natural or caused by actions and inactions of man (artificial) and occurs on land, air and water (sea).
- Sea disasters are some events that occur in the sea causing damage to life, health, properties and the environment with an overall negative impact to the society (Barton, 1969).

Miller (1992) predicted that the frequency of occurrence are expected to increase because of climate change due to global warming all over the world.

Major sea disasters are accidents in sea and cyclones.

3.0 ACCIDENTS IN SEA

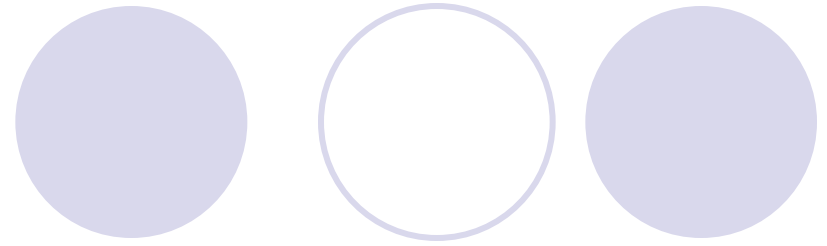
- These include all sort of accidents in the sea for instance drowning, oil spillage, ship capsized, ship wreck etc.
- This could be as a result of mechanical problems on the means of transportation or action and inactions (carelessness) on the part of individuals.
- Whatever the situation they could be disastrous leading to lost of life and properties.

Accidents

- Accident is a sudden unforeseen occurrence usually resulting in physical, mental and social injuries.

Types

- Transportation: Ships and canoes.
- Recreation: Swimming.



Distribution

- Age:** Younger groups have higher cases victims than older age groups.

Sex: More common in males than females.

•**Life style:** More common in alcohol/drug addicts than non-alcohol/non-drug addicts.

•**Occupational:** Common among drivers

•**Season:** Common during rainy season and during adverse weather conditions than at other times.

Temporal

- More common at night than during the day.

Human factor

- Drowning.

Causes of sea accidents

(a) Human factors

- These include poor vision, poor mental state, bad behaviour, chronic diseases for example epilepsy, loss of concentration, fatigue, sleep, stress etc.

(b) Mechanical factors

- Poor design of means of transportation.
- Poor maintenance of means of transportation.
- Mechanical failure of means of transportation.

(c) Environmental factor

- Bad weather: Harmattan, haze, heavy down pour.

Control of Accidents

- Availability and use of safety corps.
- Availability and use of first aid.
- Availability and use of ambulance services.
- Availability and use of emergency supplies of facilities.
- Prompt evacuation and treatment of victims

Prevention

(a) Individuals

- Avoidance of driving when sleepy, fatigue or under the influence of alcohol.
- Maintenance of safety precaution/occupational safety laws.



(b) Means of sea transportation

- Proper design and manufacturing of means of sea transportation.
- Proper use and handling of means of sea transportation.
- Provision and use of safety device/gadgets.

(c) Environmental

- Employment of sensitive facilities to monitor and forecast weather
- Use of anti-adverse weather devices

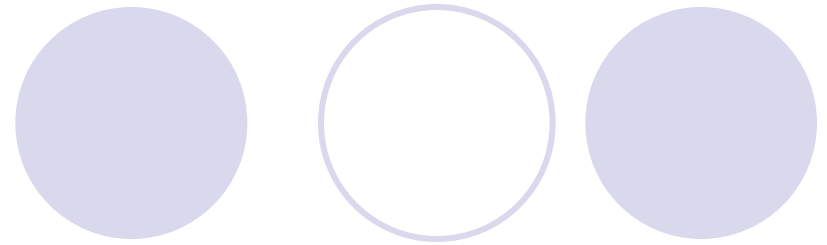
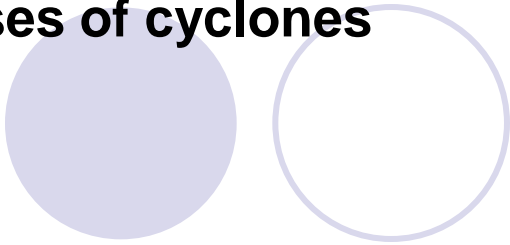
4.0

CYCLONES

- Most sea disasters that occur naturally are referred to as cyclones (Smith, 1997).
- Cyclones are meteorology large-scale storm systems.
- This occur with heavy rain with winds that rotate counter clockwise in the Northern Hemisphere.
- Clockwise in the Southern Hemisphere around and towards a low pressure centre.
- The precise classification depends on the wind force, wind speed, and manner of creation.
- Smith (1997) classified the following sea disasters as cyclones:

Classes of cyclones

- Flood
- Tsunami
- Hurricane
- Storm sludges



5.0 FLOOD

Flood is an overflow of water that submerges the floodplain.

It is a high flow of water that overtops either the natural or artificial banks of a river.

For the hydrologist flood magnitude is best expressed in terms of instantaneous peak river flow (discharge).

FLOOD CONT



- The hazard potential relates to the maximum height (stage) that the water reaches.
- Flooding may result from the volume of water within a body of water, which overflows or breaks levees, with the result that some of the water escapes its normal boundaries. (Park, 1997).
- A flood is significant only when it endangers land, lives and properties.
- Flooding is one of the most common of all environmental disasters.
- Every year flood claims 20,000 lives and adversely affects 75 million people worldwide.
- The reason lies in the wide spread geographical distribution of river floodplain, and low lying coasts, together with their long-standing attractions for human settlement (Smith, 1997).

Principal Types of Flood

- **River floods**

Slow kinds:

- This occurs when runoff from sustained rainfall or snow melt rapidly exceeds the capacity of a river's channel.
- This could be caused by heavy rains and hurricanes.

Fast kinds:

- This includes flash floods resulting from precipitation or sudden release from obstruction upstream.

- **Coastal floods**

Caused by severe sea storms, or as a result of another hazard e.g. tsunami or hurricane.

Estuarine floods

Commonly caused by a combination of sea tidal surges and storm-force winds.

Catastrophic floods

- Caused by a significant and unexpected event e.g. dam breakage, or as a result of another hazard e.g. earthquake or volcanic eruption.

•Muddy floods

- A muddy flood is generated by run off on crop land. Sediments are then detached by runoff and carried as suspended matter.

Causes of River Floods

- Smith (1998) studied the causes of flood which mainly results from human activities, climatological forces and urbanisation.

Human activities

- Cultivation of floodplain
- Deforestation
- Overgrazing
- Mining that removes water absorbing vegetation and soil.

• **Climatological forces:**

• Rainfall

• Snowmelt

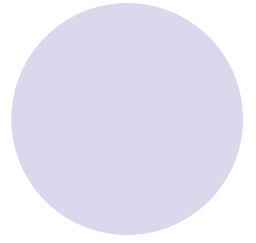
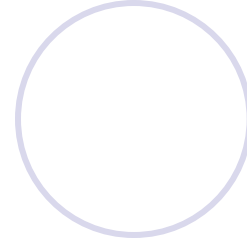
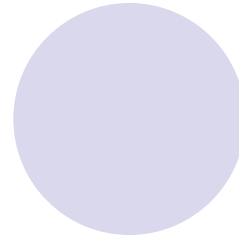
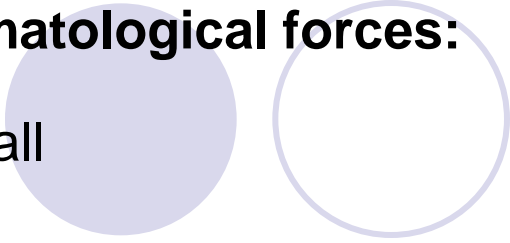
• Ice jam

• Dam failures

• Landslides

• Storm surges

• Tsunamis



•Urbanisation

- Rural urban migration, driven by local land pressure and global economic forces, concentrates people into badly built and over clouded cities.
- This results in the replacement of vegetation and soil with highways, parking slot, shopping centres, office buildings, homes and other structures that lead to rapid runoff of rain water.
- This process has increased flooding even with moderate rainfall (Park, 1997).
- Fig. 1 shows the physical causes of flood in relation to other environmental disasters.

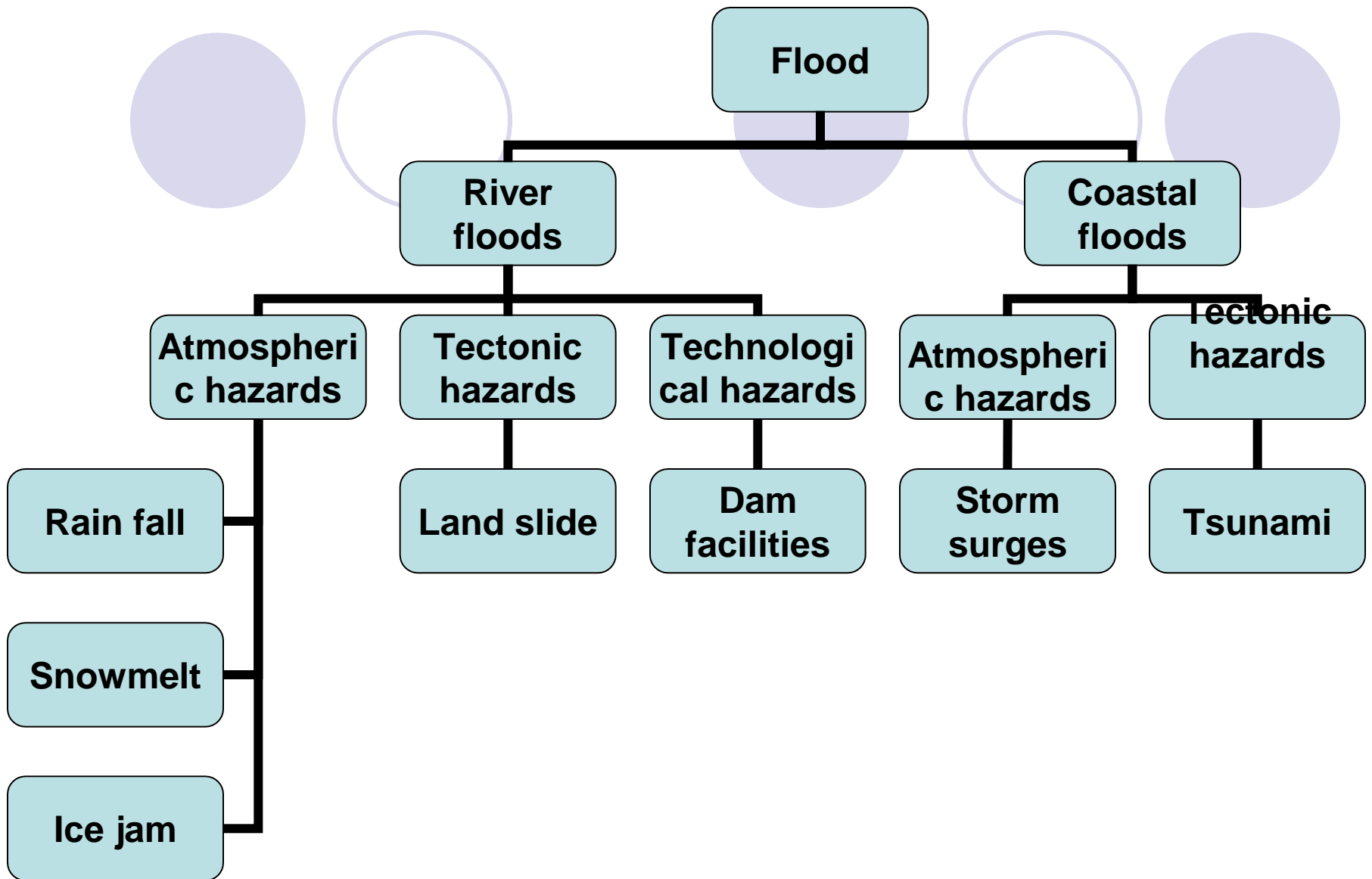


Fig.1: Physical Causes of Flood in Relation to Environmental Hazards

6.0 FLOOD FREQUENCY ANALYSIS

- It determines the recurrence interval or return period for floods of a given size at a particular location in a river system.
- The recurrence interval is the average period of time between two successive floods of the same magnitude (discharge).
- It allows hydrologists to predict when the flood will occur.
- Analyses of flood hydrographs records reveal important properties about the magnitude and frequency of floods.
- The flood hydrograph records the passages of flood water over time at a given point in the river system.
- Studies revealed that that rivers flood with remarkable regularity.
- Most natural rivers have a recurrence interval of between 1.5 and 2.3 years above which flow spills out on to the floodplain and causes flooding.
- Many countries are now investing heavily in developing better amenities to forecast when floods are likely to occur.
- So that flood warnings could be issued and people advised to evacuate high-risk areas (Park, 1997).

7.0 TSUNAMI

- The word 'Tsunami' is Japanese word for 'harbour wave'.
- They are giant waves that are triggered by submarine earthquakes or volcanic eruptions
- They move across the ocean at speeds of more than 700.00 km per hour.
- In the open ocean, these giant waves have long wavelengths and short height (perhaps about a metre).
- When they arrive in shallow water they slow down and build up.
- This creates large, powerful waves that can sweep inland and cause widespread damage and destruction, with great loss of life (Park, 1997).
- Attempts had been made to control Tsunami for instance some Tsunami prone countries have taken some earthquake engineering measures to control the process.
- This involves building Tsunami prevention walls to protect areas. For instance the Japanese built Tsunami walls of up to 4.50 metres to protect populated coastal areas.

8.0 HURRICANE

- Hurricanes are powerful storms that form at sea with wind speeds of 74.00 miles per hour or greater.
- It covers a circular area between 200.00 and 480.00 miles in diameter.
- In the storm, strong winds and rain surround a central, calm "eye," which is about 15.00 miles across.
- Winds in a hurricane could sometimes reach 200.00 miles per hour.
- A distinctive characteristic of hurricanes is the increase in sea level which results from low-pressure central area of the storm creating a vacuum.
- The storm winds pile up water, and the speed of the storm is tremendous.
- Owing to its violent nature, its potentially prolonged duration, and the extensive area that could be affected, the hurricane is the most devastating of all storms.

HURRICANE CONT

- However, the greatest damage to life and property is not from the wind but from tidal surges and flash flooding.
- The severity of a storm's impact on humans is more when there is deforestation, due to population pressure (Park, 1997).
- The hurricane season lasts from June 1 through November 30, but most occur in August and September.
- They could be noted by satellites from the moment they begin to form, so warnings can be issued three to four days before it strikes.
- Scientists have developed a relatively good understanding of the nature of hurricanes through observation, weather satellites, and computer models (Park, 1997).

9.0 STORM SURGE

- This phenomenon could be expressed as a large mass of sea water pushed along by the storm with great force.
- Storm surges are created by high winds with a long path without obstructions over water.
- A storm surge has high water levels accompanied by strong winds which are often associated with the passage over the coast of a hurricane.
- The surface of the sea rises as a response to falling atmospheric pressure which raises the water level but the problem is made worse by the strong winds, which generate large waves.
- However, the greatest damage to life and property is not from the wind but from tidal surges and flash flooding.
- A 1.00 meter rise in sea level during a violent storm might produce a storm surge 6.00 meters high, which crashes against the shore and can flood a large area along low lying coast lines.

STORM SURGE CONT

- Rare storm surges have risen as much as 14.00 meters (45.9318 feet) above normal sea level.
- Storm surges are extremely powerful; and the combination of high water and strong wind can cause extensive damage over a wide area.
- Some are power enough to flatten everything that lies in their path, including buildings, structures, trees and electricity lines.
- Many storm surges also cause rapid changes and adjustments to coastal landforms, particularly to beaches, which could be severely eroded and take a long time to regain equilibrium after the storm surge has passed (Park, 1997).
- Some deadliest floods and their death toll are presented in Table 1.

Table 1: Some Deadliest Floods and their Death Toll

Date	Events	Location	Death Toll
1530	St. Felix's storm surge flood	Netherlands	more than 100,000
1887	Yellow River (Huang He) flood	China	900,000–2,000,000
1911	Yangtze River flood	China	100,000
1931	China flood	China	2,500,000–3,700,000
1935	Yangtze River flood	China	145,000
1938	Yellow River (Huang He) flood	China	500,000–700,000
1971	Hanoi and Red River Delta flood	North Vietnam	100,000
1975	Banjiano Dam failure flood	China	231,000
2004	Indian Ocean tsunami	China	230,000

10.0 BENEFITS OF FLOOD

- Water and nutrients are stored on the floodplain.
- Deposits on the floodplain contribute to the formation of nutrient rich soils.
- Wetlands on the floodplain provide an important habitat for many birds, animals, plants and other living organisms.
- The floodplain functions as a natural greenbelt that is distinctly different from adjacent environment and produces environmental diversity.

11.0 EFFECTS OF SEA DISASTERS

Bratkovich *et al.*, (1993) grouped effects of sea disaster into primary, secondary and tertiary effects.

Primary Effects

- **Physical damage:** This includes destruction of bridges, cars, buildings, sewer systems, roadways, canals and any other type of structure.
- **Casualties:** People and livestock die due to drowning. It could also lead to epidemics and waterborne diseases.

Secondary Effects

- **Water supplies:** Contaminated and scarcity of clean water.
- **Diseases:** Unhygienic conditions which leads to spread of water-borne disease.
- **Crops and food supplies** - Shortage of food crops.
- **Trees:** Non-tolerant species could die from suffocation.

Tertiary/Long-Term Effects

- **Economic**

Decline in tourism, rebuilding costs, food shortage leading to price increase etc.

12.0 SEA DISASTER CONTROL

Prevention

- This involves trying to reduce the build up of flood which involves planting forests, replacing crops with grass and channel management.

Water Diversion Schemes

- This involves building river diversion schemes, which are designed to redirect flood away from built up areas normally by constructing artificial channels.

Protection

- This is the more common approach.
- It involves structural (engineering) measures.
- One option is to construct embankments (levees) and flood walls (Petroski, 2006).
- This is often done using alluvial deposits excavated on site. Embankments along Nile are of this type.
- Another option is channel improvements which involves decreasing channel roughness by lining the channel with smooth concrete beds.
- Banks widening.
- Deepening the channel by dredging.
- Shortening the channel by straightening it.

13.0 NATIONAL OR COMMUNITY PREPAREDNESS FOR DISASTER

- Disaster preparedness is the prearranged emergency measures taken to minimize the loss of life and properties during the onset of disaster.
- It involves the detailed planning and testing of prompt and efficient responses to disaster threats.
- Once a threat has been identified, various groups of people and officials, representing various interests must become involved in the assembly and transfer of relevant information.
- This phase, reflects the degree to which a nation or community is alert immediately before the disaster strikes.
- It covers short term emergency planning.
- Hazard warning.

NATIONAL OR COMMUNITY PREPAREDNESS FOR DISASTER CONT.



- Evacuation procedures.
- Stockpiling of supplies.
- Long term programmes have proved successful in reducing deaths from disaster.
- Appropriate loss reduction measures, depending on the nature of the disaster, must be put in place (Smith, 1997).

Pre Disaster Stage



In readiness for this stage the following should be carried out:

- Preserve all up-dated charts of water bodies' coastal areas, offshore coastal islands and disaster prone areas.
- Promulgate warning signals to all concerned.
- Maintain up-date list of airfields and helipads.
- Promulgate standing order for the safety of aircraft, equipments and response to assist Disaster management officials.
- Keep all transport air craft, helicopters and rescue operator in readiness for emergency.
- Provision of medical aid and the preparation of emergency food and shelter.
- Alerting the media and the public of the impending threat.

During Disaster or Emergency Stage



During disaster the following must be observed:

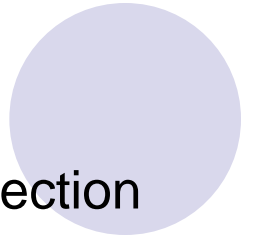
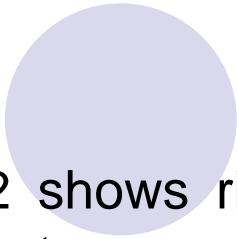
- Keep a constant watch over sea disaster situation.
- Furnish any meteorological information to authorities and individuals.
- Keep all transport aircraft and helicopters ready for flight, if weather permits to undertake rescue operation and to assess the damages.
- Disaster management officials should be assisted in conducting air drops of food and relief materials.
- Divers should be available to rescue drowning victims
- Health workers must be ready to administer first aid to rescued victims

Post Disaster Stage



This is the relief period which covers the first few hours or days after the disaster impact. It is necessary to performed following:

- Carryout survey of the affected areas, assess nature and amount of damages and report findings to the appropriate authorities.
- Evacuate casualties to nearest hospitals.
- Provide transport vehicles and aircraft/helicopter for survey/visit of high government officials, journalist and concerned personnel to the affected areas.
- Carry essential relief supplies especially food, clothing, shelter, medical care and drinking water to ensure no further loss of life.
- Seek for aids from individuals, interest groups, international organizations, non-governmental organizations to assist victims.



•Fig. 2 shows risk drastic reduction through pre-disaster protection and post recovery activities.

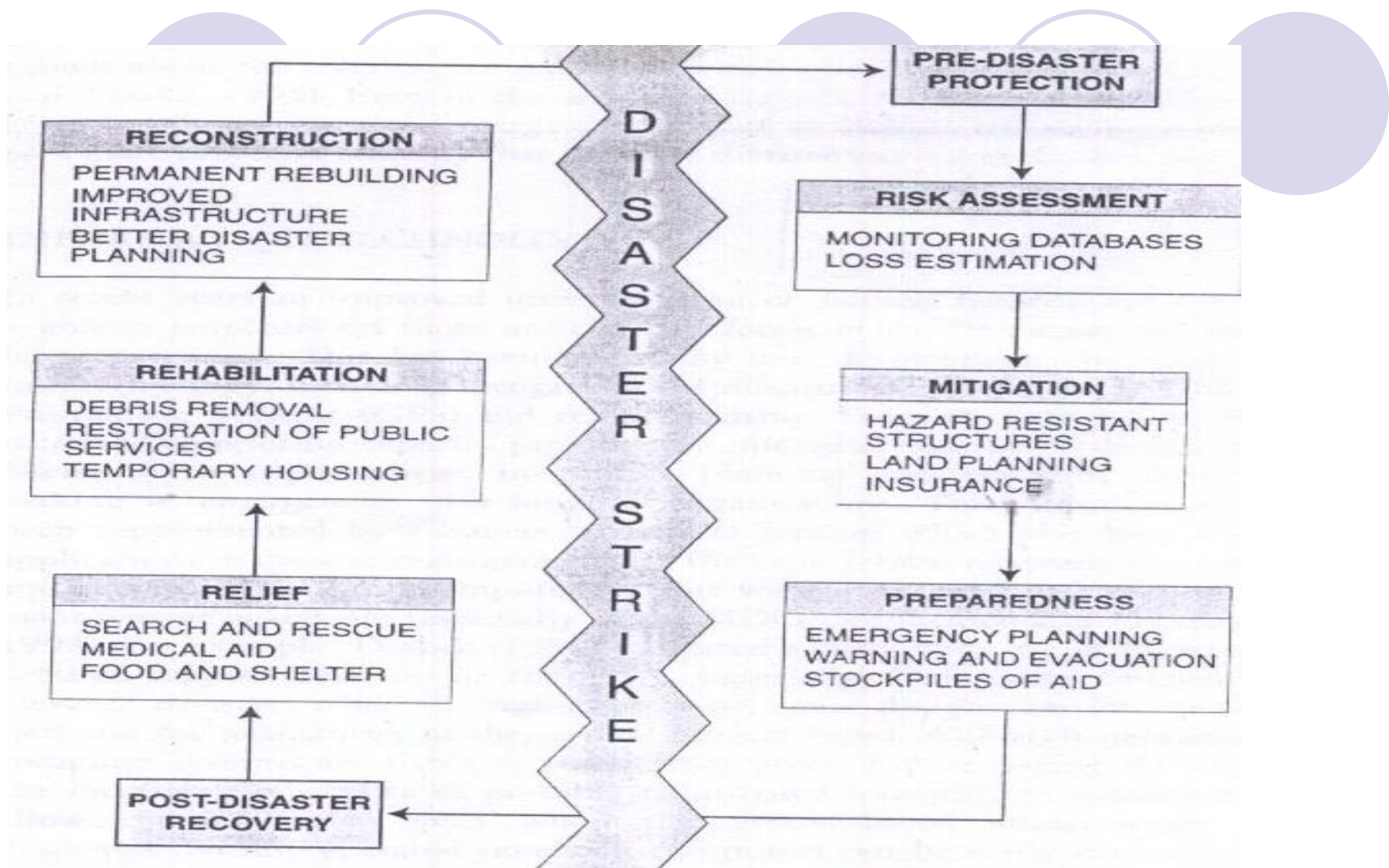
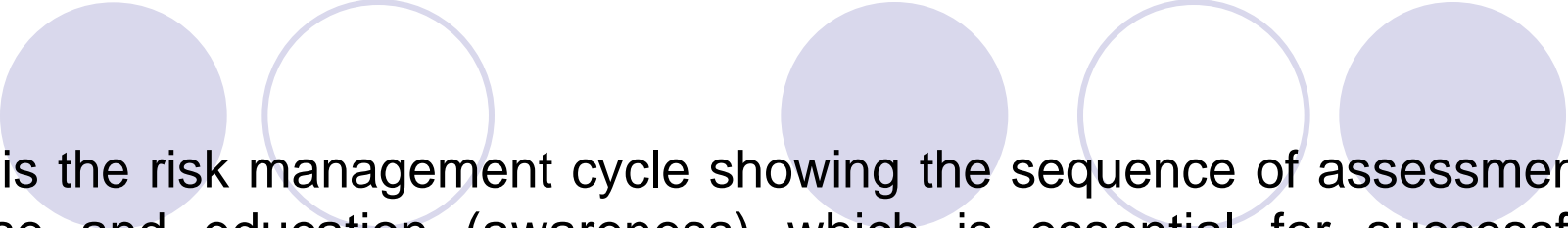


Fig. 2: Risk Reduced by Pre-Disaster Protection and Post-Recovery Activities



•Fig. 3 is the risk management cycle showing the sequence of assessment, response and education (awareness) which is essential for successful disaster reduction.

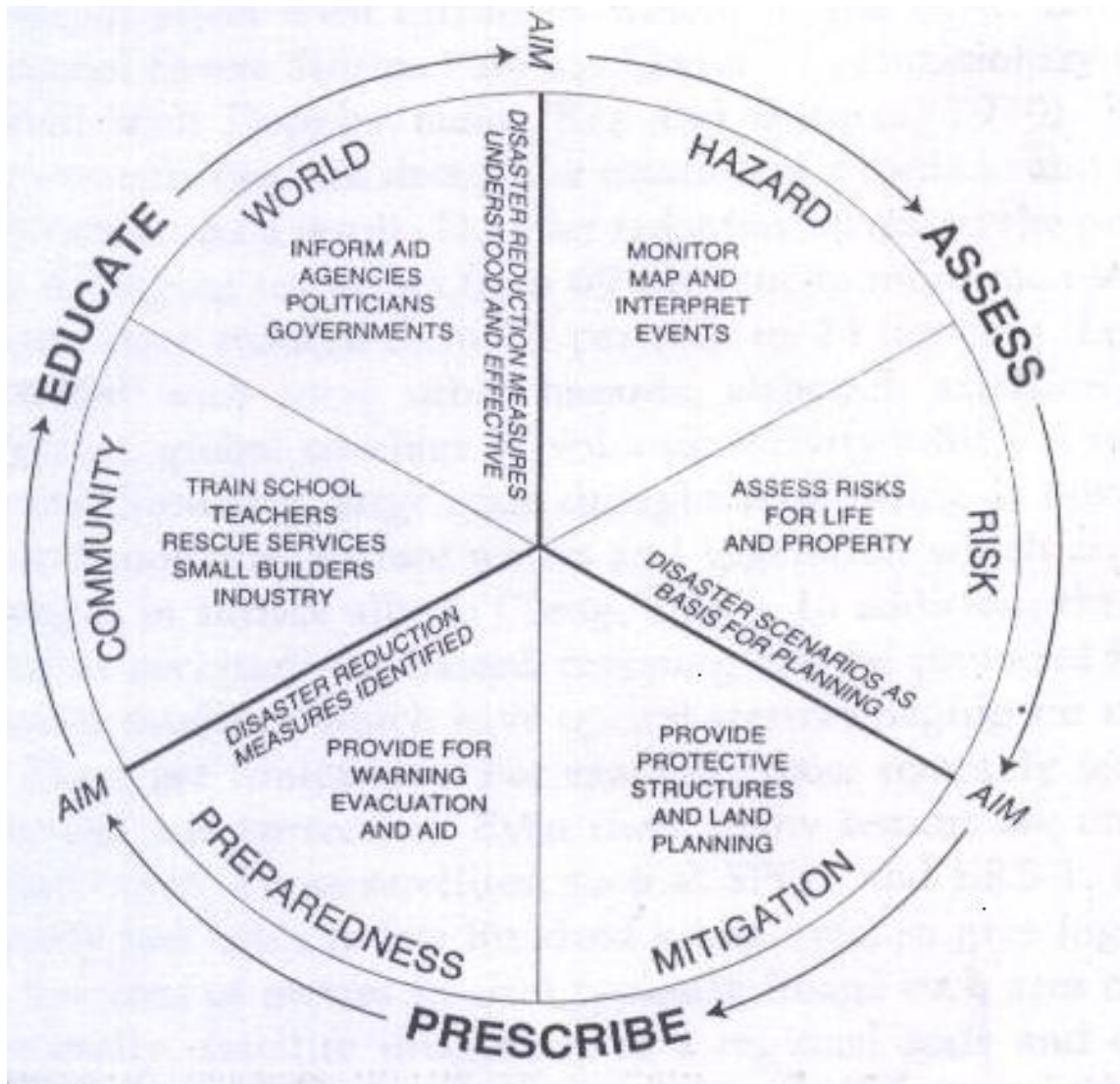


Fig. 3: Risk Management Cycle showing the Sequence of Assessment, Response and Education

Rescue options to reach the drowning victim in the water

In a near-drowning emergency, the sooner the rescue and first aid begin, the greater the victim's chance of survival. The goal is to safely rescue the victim and begin first aid.

Rescue options to reach the drowning victim in the water

- Throw a rope with a buoyant object.
- Use a long stick.
- Bring a canoe alongside the victim and tow the victim to shore.
- Do not haul the victim into the boat because it may cause the boat to capsize, and both of you will be in the water.
- Cold water may render the victim too hypothermic to grasp objects within their reach or to hold while being pulled to safety.
- As a last resort, you can attempt a swimming rescue if you are sufficiently trained in water rescue.

Rescue options to reach the drowning victim in the water cont.

- Do not attempt a rescue beyond your capabilities. Otherwise, you may harm yourself.
- For a swimming rescue, approach the person from behind while trying to calm the victim as you move closer.
- A panicked victim can pull you down.
- Grab a piece of clothing or cup a hand or arm under the victim's chin.
- Pull the victim face up to shore while providing special care to ensure a straight head-neck-back alignment especially if one suspects spine injuries.
- The best option would be to float the victim on a board while towing to shore.

First aid for a near-drowning victim

- The focus of the first aid for a near-drowning victim in the water is to get oxygen into the lungs without aggravating any suspected neck injury.
- If an unconscious victim is found in the water with no witnesses, always assume the victim has a neck injury.
- If the victim's breathing has stopped, begin mouth-to-mouth rescue breathing as soon as you safely can. This could mean starting the breathing process in the water.
- Continue to breathe for the person every 5 seconds while moving the victim to the shore.
- If the airway is obstructed making breathing impossible, perform the Heimlich maneuver to clear it

First aid for a near-drowning victim cont.

Heimlich maneuver

- Hug the victim from behind with your arms around the victim's stomach.
- Using the thumb side of a closed fist with your other hand on top of the fist to pull in and up.
- Continue these thrusts until the airway is cleared.
- Chest compression in the water is difficult to do without a flat surface that does not give way.
- Chest compression should be reserved until such a surface is available.
- Once on shore, reassess the victim's breathing and circulation (heartbeat and pulse).

First aid for a near-drowning victim cont.

- If there is breathing and circulation without suspected spine injury, place the person in recovery position (lying on the stomach) to keep the airway clear and to allow the swallowed water to drain. If there is no breathing.
- Begin and continue mouth-to-mouth breathing and chest compressions until help arrives or the person revives.
- Keep the person warm by removing wet clothing and covering with warm blankets to prevent hypothermia.
- Keep the person warm by removing wet clothing and covering with warm blankets to prevent hypothermia.
- All victims of near drowning need medical attention. Water in the lungs, even small amounts, can lead to their "dry drowning," this condition can be fatal.
- Remain with the recovering person until emergency medical personnel have arrived.

Universal Precautions during rescue

- Drowning victims are probably the most dangerous to try to rescue.
- In a panic, drowning victims are likely to claw at rescuers and climb to the surface at all costs.
- **NEVER** attempt a direct rescue of a conscious drowning victim without proper training. Professional rescuers practice universal precaution when providing medical care to victims.
- Universal precautions are steps used to reduce the potential for victims to infect rescuers.
- Practicing universal precautions requires personal protective equipment such as gloves or eye protection.
- To be better protected, it is necessary that the first aid kit is adequately stocked with personal protective equipment necessary to practice universal precaution.

Staying Safe



- By its very nature, an emergency is an unstable situation.
- There is a primal instinct in many people to dash to the rescue of those in need.
- Safety is an ongoing concern that must never leave ones thoughts.
- Regardless of the dire circumstances of whatever terrible accident or injury one may witness, it's urgent that individual keeps conscious of safety and stay safe.
- Safety is an awareness of the surroundings and a healthy fear of unstable situations.
- Remember always: reach, throw, but only go with training and equipment!**

15.0 MANAGEMENT OF VICTIMS BY PUBLIC HEALTH WORKERS

- Morbidity during sea disaster results from drowning, electrocution, lacerations or punctures from flying debris, and trauma from falling trees or other objects.
- Heart attack and stress-related disorders could arise during the storm or its aftermath.
- Gastrointestinal, respiratory, vector-borne, and skin diseases.
- Accidental paediatrics poisoning can all occur.
- Injuries from improper use of power equipment.
- Disrupted wildlife (e.g., bites from animals, snakes, or insects), and fires are common.
- Public health professionals' workers should prepare people to evacuate and to turn off their utilities.

MANAGEMENT OF VICTIMS BY PUBLIC HEALTH WORKERS CONT

- To avoid injury, residents should be advised to wear proper clothing, including long sleeved shirts, and safety shoes or boots.
- Furthermore, they should learn proper safety precautions for example, Operating instructions before operating gas-powered or electric appliances to avoid electrical shock.
- They should always wear gloves and safety face shield or eyeglasses.
- Evacuees should be advised against moving in water as there may be downed power lines, broken glass, metal fragments, or other debris beneath the surface.
- First phase priority would be to provide immediate emergency relief to people in form of food, medicines and basic survival kits (tarpolines, tents, jerry cans, salt, milk, blanket, soap, kitchen utensils, and buckets).

MANAGEMENT OF VICTIMS BY PUBLIC HEALTH WORKERS CONT

- Phase two should be designed to provide displaced families with materials to rebuild their houses and agricultural seeds and tools to help farmers to start farming as quickly as possible (Park, 1997).
- During the recovery period, it must be ensured that there is adequate supply of safe water and food for the displaced population.
- In addition to offering acute emergency care, community plans should provide for the continuity of care for homeless residents with chronic conditions.
- When returning to the dwellings after a disaster, residents should check for structural and electrical damages.
- They should return to homes during the daytime and only use battery-powered flashlights and lanterns to provide light rather than candles, gas lanterns (APHA, 2005).

16.0 GOVERNMENT INTERVENTIONS

Government should intervene as follows:

- Conduct needs assessment for affected communities, including a review of public health infrastructure.
- Establish active and passive surveillance systems for deaths, illness, and injuries.
- Educate the public about maintaining safe and adequate supplies of food and water.
- Establish environmental controls.
- Monitor infectious diseases and make determinations about needed immunizations (e.g., tetanus).
- Institute multifaceted injury control programs.

GOVERNMENT INTERVENTIONS CONT



- Establish protective measures against potential disease vectors.
- Assure evacuation plans for people with special needs in nursing homes, hospitals, and home care.
- Work with local communities to improve building codes (e.g., developing improved designs for wind safety).

17.0 CONCLUSION

- The environment has been greatly violated by man.
- Although disaster could be natural, yet impact could be controlled by the actions and inactions of man.
- Despite the fact that knowledge about the environment and environmental protection is increasing rapidly.
- Disaster continues to take its toll on human life and property worldwide.
- Knowledge about disaster and disaster management must be better applied in order to reduce death and destruction.
- The sea region faces a great number of disasters related to types, health and major vulnerabilities.

CONCLUSION CONT.

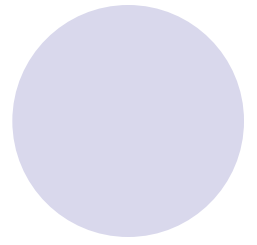
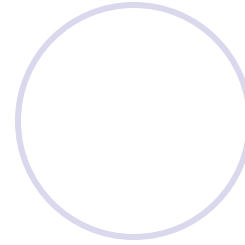
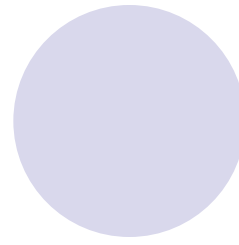
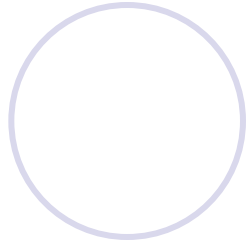
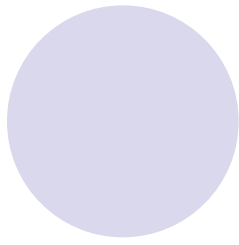
- The construction of levees often leads to a false sense of security.
- During the 1993 flood of Mississippi about 70% of the levees failed because they were not designed to withstand a flood that lasted for two months.
- Most sea disasters could be virtually eliminated by moving away from water bodies.
- There should be land use planning that avoids developing buildings on floodplains.
- This is the most desirable from an environmental perspective.

18.0 RECOMMENDATIONS

Development of plans of action by the Federal Government should be integrated into the overall disaster preparedness, mitigation and considered in the overall regional and national nutrition and food safety policy and programmes.

The disaster management structure should be set up as follows:

- Legislation
- Agency
- Specific agency
- Action plan
- Specific action plan
- Health coordinator



THANK YOU FOR LISTENING!