C405A.1 UNIT I INTRODUCTION TO DISASTERS

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.-Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change-Dos and Don' ts during various types of Disasters.

PART-A

1. **Define disaster management.(Nov/Dec 2021)**

Disaster management can be defined as the organization and management of resources and responsibilities for dealing with all humanitarian aspects of emergencies, in particular preparedness, response and recovery in order to lessen the impact of disasters

2. What is a disaster?

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".

3. List the types of disaster. .(Nov/Dec 2021)

Disasters are broadly classified into Natural disasters and Man-made Disasters

1. **Natural Disasters**: are the consequences or effects of natural hazards on human life. They represent a serious breakdown in sustainability and disruption of economic and social progress . Example: Earthquake, landslides, cyclones, floods etc.

2. Man- made disasters: are also known as anthropogenic disasters and they occur as a result of human intent, error or as a result of failed systems.
 Example : Urban fire, rail and road accidents, bomb blasts etc.

4. **Define natural disaster.9Nov/DEC 2020)**

A natural disaster is the effect of a natural hazard (e.g., flood, tornado, hurricane, volcanic eruption, earthquake, heat wave, or landslide). It leads to financial, environmental or human losses. The resulting loss depends on the vulnerability of the affected population to resist the hazard, also called their resilience

5. What is a manmade disaster?(Nov/Dec 2020)

A man-made disaster results from man-made hazards (threats having an element of human intent, negligence or error, or involving a failure of a man-made system). They differ from natural disasters that result from natural hazards.

6. What do you understand by hazard?(Nov/Dec 2019)

A **hazard** is a situation that poses a level of threat to life, health, property, or environment. Most hazards are dormant or potential, with only a theoretical risk of harm; however, once a hazard becomes "active", it can create an emergency situation. A hazard does not exist when it is not happening. A hazardous situation that has come to pass is called an incident. Hazard and vulnerability interact together to create risk.

7. **Define Vulnerability.(Nov/Dec 2019)**

Vulnerability refers to the inability to withstand the effects of a hostile environment. A **Window of Vulnerability** (WoV) is a time frame within which defensive measures are reduced, compromised or lacking .There are two types of vulnerability

Social vulnerability

Military vulnerability

8. Can you classify hazard. (Nov/Dec 2018)

Based on the origin, hazards are classified into geological, hydro-metrological and Anthropogenic hazards. Examples of geological hazards include earthquakes, geological fault activity, volcanic activity and emissions and tsunamis etc. Examples of hydro-metrological hazards include flood, debris and mud flows: tropical cyclones, storms and rain. Examples of Anthropogenic hazards include global warming, acid rain, technological hazard etc.

9. What is meant by Risk?(Nov/Dec 2018)

Risk can be said to be a measure of the expected losses due to a hazard event occurring in a given area over a specific time period. Risk is a function of the probability of particular hazard event and the losses it would cause.

10. Define tropical cyclones.(Nov/Dec 2018)

A tropical cyclone is composed of a system of thunderstorms that shows a cyclonic rotation around a central core or eye. A tropical cyclone is a generic term for a storm with an organized system of thunderstorms that are not based on a frontal system.

11. Define emergency.(Nov/Dec 2017)

Sudden, unexpected, or impending situation that may cause injury, loss of life, damage to the property, and/or interference with the normal activities of a person or firm and which, therefore, requires immediate attention and remedial action.

12. What is an avalanche? (Nov/Dec 2017)

An avalanche can be composed of many different kinds of snow depending on the region, temperature and weather. It could be compiled of loosely packed light fluffy snow, which can still be very dangerous even though it may not appear threatening. It could also consist of a thick "slab" which is an area of tightly packed together snow that separates itself from the surroundings.

13. Define land use planning. (Nov/Dec 2016)

The process by which lands are evaluated and assessed to become a basis for decisions involving land disposition and utilization. This involves studies on the environmental effects of land use and its impact on the community.

14. What is flood? (Nov/Dec 2016)

A form of natural disaster when there is more water than the lakes, rivers, oceans, or ground can hold. There are three types of flood

1. Fluvial Flooding 2. Pluvial Flooding 3. Coastal Flooding.

15. Define mangroves. (Nov/Dec 2015)

A mangrove is a tree, shrub, palm or ground fern, generally exceeding one half metre in height that normally grows above mean sea level in the intertidal zone of marine coastal environments and estuarine margins. A mangrove is also the tidal habitat comprising such trees and shrubs.

16. Define landslides. (Nov/Dec 2015)

A landslide or landslip is a geological phenomenon which includes a wide range of ground movement, such as rock falls, deep failure of slopes and shallow debris flows, which can occur in offshore, coastal and onshore environments. Although the action of gravity is the primary driving force for a landslide to occur, there are other contributing factors affecting the original slope stability.

17. Mention the typical effects of deforestation. (Nov/Dec 2014)

Humans have always and probably always will depended on forests to a lesser or greater degree. Trees provide food, shelter from the elements and predators not just to humans but the vast majority of life on land. Unfortunately the forests resources and appeal is its downfall.

18. Define SOP. (Nov/Dec 2014)

- d Operating Procedures may be prepared for any function that fire service organizations perform, including administration (hiring, equipment maintenance, building inspections, rehabilitation, etc.) and emergency response operations (fire suppression, medical services, hazardous materials response, etc.). The procedures can be organized and presented in many different ways, depending on the department's needs and preferences Immature process

19. What is biological weapon? (Nov/Dec 2013)

Biological weapons are toxic materials produced from pathogenic organisms (usually microbes) or artificially manufactured toxic substances that are used to intentionally interfere with the biological processes of a host. These substances work to kill or incapacitate the host. Biological weapons may be used to target living organisms such as humans, animals or vegetation. They may also be used to contaminate nonliving substances such as air, water and soil.

20. Discuss about chemical weapon. (Nov/Dec 2013)

Chemical warfare (CW) involves using the toxic properties of chemical substances as weapons. This type of warfare is distinct from nuclear warfare and Biological warfare, which together make up NBC, the military acronym for Nuclear, Biological, and Chemical (warfare or weapons). Neither of these falls under the term conventional weapons which are primarily effective due to their destructive potential. Chemical warfare does not depend upon explosive force to achieve an objective.

21. Define drought and Classify droughts. (Nov/Dec 2013)

Drought is a normal, recurrent feature of climate, although many erroneously consider it a rare and random event. It occurs in virtually all areas, whatever their normal climate may be, and the characteristics of a drought may be very different from one region to another. The different types of droughts are as follows: 1. Meteorological, 2. Hydrological, 3. Agricultural 4. Socioeconomic

22. What is meant by oil well fires?

Oil well fires are the common term for oil or gas wells that have caught on fire and burn. Oil well fires can be the result of human actions, such as accidents or arson, or natural events, such as lightning. They can exist on a small scale, such as an oil field spill catching fire, or on a huge scale, as in geyser-like jets of flames from ignited high pressure wells.

23. What is a pandemic?

A pandemic is a disease epidemic that has spread across a large region, for instance multiple continents or worldwide. The current pandemics include HIV/AIDS and Corona virus diseases.

24. Define terrorism.

Terrorism is "the systematic use of cock especially as a means of coercion." There is no internationally agreed definition of terrorism. Most common definitions of terrorism include only those acts which are intended to create fear (terror), are perpetrated for an ideological goal (as opposed to a lone attack), and deliberately target or disregard the safety of non-combatants

25. List the types of terrorism.

Types of Terrorism are

- X State Terrorism
- **Bioterrorism** М
- **Cyber terrorism**
- Eco terrorism \square
- X Nuclear terrorism
- - Narco terrorism X

PART-B

Explain in detail about the causes of various types of disaster natural and man 1 made disaster. (Nov/Dec 2021)

Disasters are primarily classified as:

- Natural disasters and 1.
- 2. Man-made disasters

Natural disasters are caused due to natural phenomena. Examples are:

- Floods X
- Droughts Х
- Cyclones М
- Earthquakes X
- Tsunamis X
- Volcanoes \square
- Landslides \square
- Avalanche X
- Blizzard (Snow storm) X
- Wind chill M
- Sand storms X

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Man-made disasters are caused primarily due to human negligence. Examples are:

Explosions

- Leakage of toxic chemicals
- Pollution
- Deforestation, Forest fires
- Dam failure
- Wars, Weapons of mass destruction (WMD), Biological weapons, Chemical weapons, etc.

Natural disasters can further be divided into

- B Hydro meteorological based disasters and
- Geological based disasters

Hydrometeorology is the study of exchange of energy and water between the lower atmosphere and Earth's surface. Examples of hydro meteorological disasters are: Cyclone, Flood, Drought, Windchill, Snowstorm, Sand storms. Etc

Geology is the science of study of the Earth. Examples of geological based disasters are Earthquake ,Volcano, Landslide, Tsunami, etc

Earthquake:

The Earth is made-up of rocks, tectonic plates and molten magma at the core. The tectonic plates are in constant motion relative to each other. As the plates move against each other, any irregularity causes an abrupt jerk resulting in tremendous energy being released which is experienced on the surface as an Earthquake. **Volcano:**

The Earth's core is made up of molten magma under pressure. When this molten magma finds its way to the surface of the Earth through cracks or fissures it erupts with great force spewing red hot lava. Volcanoes occur under the oceans on the sea bed also. They cause severe damage to life and property. Sometimes volcanoes remain dormant for several years before becoming active again. In the past, volcanoes have occurred in Italy(Mount Etna), Indonesia(Mount Merapi), Japan(Sakurajima), United States(Mount St. Helens), Ethiopia(Erta Ale), etc. Landslide:

Landslide refers to a type of mass wasting. Examples include:

- \blacksquare Rock falls
- Deep seated slope failures
- $\blacksquare \quad \mathsf{Mud} \ \mathsf{flow} \ \mathsf{and} \ \mathsf{flow} \ \mathsf{and} \ \mathsf{flow} \ \mathsf{and} \ \mathsf{flow} \ \mathsf{flow} \ \mathsf{and} \ \mathsf{flow} \ \mathsf{flow} \ \mathsf{and} \ \mathsf{flow} \ \mathsf{flow$
- Debris flow

Tsunami:

Tsunami is Japanese meaning tidal wave or a harbor wave. It occurs due to disturbances in the sea floor. It is a series of waves in a water body caused by displacement of large volume of water in an ocean.

Disasters are also classified as:

Extraterrestrial disasters: These types of disasters are caused by collision of celestial bodies. Space telescope data reveals 4700 potentially hazardous asteroids with diameter greater than 330 feet are present near the Earth. Other

types of extraterrestrial hazards are:

- Magnetic storms
- Image: ImageImageImage: ImageImageImage: Image<trr>Image
- Meteorite Impacts and
- Impacts from near-earth objects

Man-made disasters:

Man-made or human induced disasters are caused primarily due to human activities leading to loss of life and property along with causing damage to the regions economy and productive capacity. Examples disasters are:

- Environmental pollution
- Terrorism
- Destruction of property
- Road & rail accidents
- Explosions
- Chemical spills
- Industrial accidents
- Nuclear accidents, etc.

Physical hazards that are caused due to developmental activities. Examples include:

Deforestation, Desertification, Loss of natural resources, Pollution, Waste disposal, etc.

Technological hazards that are caused due to interaction of society, technology and the natural environment. Examples include: Explosions, Wars, Release of toxic substances into the environment, Oil spills, etc

Environmental have further categorized technological hazards into:

- Industrial Hazards
- Structural collapse hazards
- Nuclear hazards
- Computer hazards and
- Transportation hazards

Biological hazards or biohazards:

These type of hazards originate from biological sources. Examples are:

AIDS, Malaria, Severe epidemics in plants and animals (SARS)

Biohazards are further categorized into:

- Pathogens (Example: Anthrax, Small Pox, Influenza, Plague etc)
- **Toxins**

Social hazards originate from social systems such as:

- Population explosion
- Famine
- ⊠ Warfare
- Conflict
- I Terror attacks
- **Holding people hostage etc**

Causes of disasters:

- Earthquakes are mainly caused by slippage within geological faults but also due to volcanic activity, landslides, mine blasts and nuclear tests.
- Landslide is a geological phenomenon that includes a wide range of ground movements like rock falls, deep failure of slopes and shallow debris flow that occurs offshore, coastal and onshore environments. Gravity is the primary driving force along with contributing factors like slope stability.
- Tsunami is a series of water waves caused by displacement of large body of water. The 2004 Indian ocean tsunami was the deadliest in human history causing the death of 2,30,000 people in the countries surrounding the Indian ocean.
- A volcano is a rupture in the Earth's crust that allows hot magma and volcanic ash from the Earth's interior to erupt on the Earth's surface.
- A flood is an overflow of water that submerges vast areas of land. Floods occur in rivers when flow capacity exceeds the capacity of the channel
- Landslides also called a landslip or mudslide occurs when the slope changes from a stable to an unstable condition due to groundwater pressure, weakening of a slope due to saturation from snow melt or heavy rainfall. Landslides are also caused due to deforestation, mining at the foot of the slope, excess withdrawal of ground water, construction activity and explosive activity in the vicinity
- Droughts are caused due to less or no rainfall combined with excessive withdrawal of groundwater.
- $\ensuremath{\mathbb{N}}$ Snow storms and sand storms occur in cold and desert regions

respectively. Snow storms occur in the cold mountainous regions and consist of freezing winds combined with snow reducing visibility and related hazardous conditions. Sand storm is a meteorological phenomena in arid and semi-arid regions. Sand storms may cause asthma and other related respiratory problems. Sand storms or dust storms involve transport of fine sand particles from one place to another. A sand storm can transport and carry large volumes of sand unexpectedly.

2 **Discuss about the types of natural disaster? Explain in detail. (Nov/Dec 2021)** Disasters are primarily classified as:

- Natural disasters
- Man-made disasters

Natural disasters are caused due to natural phenomena. Examples are:

Floods :A flood is an overflow of an expanse of water that submerges land.[9] The EU Floods directive defines a flood as a temporary covering by water of land not normally covered by water.[10] In the sense of "flowing water", the word may also be applied to the inflow of the tide. Flooding may result from the volume of water within a body of water, such as a river or lake, which overflows or breaks levees, with the result that some of the water escapes its usual boundaries.[11] While the size of a lake or other body of water will vary with seasonal changes in precipitation and snow melt, it is not a significant

flood unless the water covers land used by man like a village, city or other inhabited area, roads, expanses of farmland, etc.

Droughts: Drought is unusual dryness of soil, resulting in crop failure and shortage of water for other uses, caused by significantly lower rainfall than average over a prolonged period. Hot dry winds, high temperatures and consequent evaporation of moisture from the ground can contribute to conditions of drought. Well-known historical droughts include:

- In 1900 India killing between 250,000 to 3.25 million.
- In 2006, Sichuan Province China experienced its worst drought in modern times with nearly 8 million people and over 7 million cattle facing water shortages.
- I2-year drought that was devastating southwest Western Australia, southeast South Australia, Victoria and northern Tasmania was "very severe and without historical precedent".

Cyclones: Cyclone, tropical cyclone, hurricane, and typhoon are different names for the same phenomenon a cyclonic storm system that forms over the oceans. Extra tropical cyclones, sometimes called mid-latitude cyclones, are a group of cyclones defined as synoptic scale low pressure weather systems that occur in the middle latitudes of the Earth (outside the tropics) not having tropical characteristics, and are connected with fronts and horizontal gradients in temperature and dew point otherwise known as "baroclinic zones".

Earthquakes :An earthquake is the result of a sudden release of energy in the Earth's crust that creates seismic waves. At the Earth's surface, earthquakes manifest themselves by vibration, shaking and sometimes displacement of the ground. The vibrations may vary in magnitude. Earthquakes are caused mostly by slippage within geological faults, but also by other events such as volcanic activity, landslides, mine blasts, and nuclear tests. The underground point of origin of the earthquake is called the focus. The point directly above the focus on the surface is called the epicenter. Earthquakes by themselves rarely kill people or wildlife. It is usually the secondary events that they trigger, such as building collapse, fires, tsunamis (seismic sea waves) and volcanoes, that are actually the human disaster. Many of these could possibly be avoided by better construction, safety systems, early warning and planning

Tsunamis :Tsunamis can be caused by undersea earthquakes as the one caused by the 2004 Indian Ocean Earthquake, or by landslides such as the one which occurred at Lituya Bay, Alaska.

- The 2004 Indian Ocean Earthquake created the Boxing Day Tsunami.
- On March 11, 2011, a tsunami occurred near Fukushima, Japan and spread through the Pacific.

Volcanoes: Volcanoes can cause widespread destruction and consequent disaster in several ways. The effects include the volcanic eruption itself that may cause harm following the explosion of the volcano or the fall of rock. Second, lava may be produced during the eruption of a volcano. As it leaves the volcano, the lava destroys many buildings and plants it encounters. Third,

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volcanic ash generally meaning the cooled ash - may form a cloud, and settle thickly in nearby locations. When mixed with water this forms a concrete-like material. In sufficient quantity ash may cause roofs to collapse under its weight but even small quantities will harm humans if inhaled. Since the ash has the consistency of ground glass it causes abrasion damage to moving parts such as engines. The main killer of humans in the immediate surroundings of a volcanic eruption is the pyroclastic flows, which consist of a cloud of hot volcanic ash which builds up in the air above the volcano and rushes down the slopes when the eruption no longer supports the lifting of the gases

- I Landslides
- Avalanche

Blizzard (Snow storm)

Blizzards are severe winter storms characterized by heavy snow and strong winds. When high winds stir up snow that has already fallen, it is known as a ground blizzard. Blizzards can impact local economic activities, especially in regions where snowfall is rare. Significant blizzards include:

- The Great Blizzard of 1888 in the United States in which many tons of wheat crops were destroyed.
- The 2008 Afghanistan blizzard
- The North American blizzard of 1947
- The 1972 Iran blizzard resulted in approximately 4,000 deaths and lasted for 5 to 7 days.

Sand storms :Sand storms occur desert regions . Sand storm is a meteorological phenomena in arid and semi-arid regions. Sand storms may cause asthma and other related respiratory problems. Sand storms or dust storms involve transport of fine sand particles from one place to another. A sand storm can transport and carry large volumes of sand unexpectedly.

3 Describe manmade (anthropogenic disaster) disaster and list out the natural disaster: (Nov/Dec 2020)

A man-made disasters is a disaster resulting from human intent, negligence, or error. Manmade disasters can be both intentional and unintentional. It results in huge loss of life and property. It further affects a person's mental, physical and social well-being.

Reasons For Man-Made Disasters

here are multiple factor that may relate to manmade disasters

- Ignorance
- ☑ Unawareness
- ☑ Illiteracy
- ☑ Carelessly handling danger
- ☑ Weapons

Types of Man Made Disasters

Nuclear Disaster

Nuclear disaster are the types of disaster that falls in this category is nuclear bomb. When this occurs, it is often as a result of intent and the end results are even more catastrophic with a large percentage of those involved losing their lives. **Chemical Disasters/Industrial Disasters**

By their nature, the manufacture, storage, and transport of chemicals are accidents waiting to happen. Chemicals can be toxic, and they may react, often explosively. The impacts of chemical accidents can be deadly, for both human being environments.

Fire disasters Bush fires, forest fires, and mine fires are generally started by lightning, but also by human negligence or arson. They can burn thousands of square kilometers

Deforestation Forest is an important source for satisfying people's demands and needs. Thus, undoubtedly people would try to exploit forest resources. This process of exploiting forest is called deforestation.

4 Examine the environmental impact of disaster. (Nov/Dec 2020)

Environmental impact of Earthquake

Deformed Ground Surface: The earthquake tremors and the resultant vibrations, resulting in the deformation of the ground surface, due to the rise and subsidence of the ground surface and faulting activity . The alluvium filled areas of the flood plains may get fractured at several places.

Damage to man-made structures: Man-made structures such as buildings, roads, rails, factories, dams, bridges, etc. get severely damaged. • Damage to towns and cities: The towns and cities are the worst affected due to a high density of buildings and population. Under the impact of tremors, large buildings collapse and men and women get buried under the debris. Ground water pipes are damaged and thus water supply is totally disrupted.
Devastating fires: The strong vibrations caused by an earthquake can cause fire in houses, mines and factories due to the bursting of gas cylinders, contact with live electric wires, churning of blast furnaces, displacement of other electric and fire related appliances.

Landslides: The tremors in hilly and mountainous areas can cause instability of unconsolidated rock materials. This ultimately leads to landslides, which damage settlements and transport systems.

Flash floods: Very strong seismic events result in the collapse of dams and cause severe flash floods. Floods are also caused when the debris produced by tremors blocks the flow of water in the rivers. Sometimes the main course of the river is changed due to the blockage.

Tsunamis: When the seismic waves travel through sea water, high sea waves are generated, which can cause great loss to life and property, especially in the coastal areas.

Environmental impact of Drought:

• Moisture Stress. • Drinking Water Shortage. • Damage to Natural Vegetation

and Various Ecosystems. • Increased Air and Water Pollution.

Environmental impact of Landslide

Landslides affect the following elements of the environment:

(1) the topography of the earth' s surface;

(2) the character and quality of rivers and streams and groundwater flow;

(3) the forests that cover much of the earth's surface; and

(4) the habitats of natural wildlife that exist on the earth' s surface, including its rivers, lakes, and oceans.

Environmental impact of Flood

- Destruction of basic infrastructural capacities such as sanitation and \square transportation leading to isolation and risk of spread of diseases.
- Destruction of ecology and biodiversity of an area that may take years and Х even decades to recuperate.
- Riverbank erosion is caused by high and fast moving water that exceeds \square riverbanks. The impact of riverbank erosion is most felt in developed areas.
- Sediment may act as a form of non-point source water pollution that can X clog riverbeds and streams as well as reduce storage capacity for reservoirs and wetlands. Flood waters can carry large amounts of sediment and leave deposits behind once flood waters recede. If extreme enough, sedimentation can degrade water quality and temporarily affect municipal, industrial and recreational water supply

Environmental impact of Volcano

Volcanic eruptions can be extremely damaging to the environment, particularly because of a number of toxic gases possibly present in pyroclastic material. It typically consists mainly of water vapour, but it also contains carbon dioxide and sulphur dioxide gas. Other gases typically found in volcanic ashes are hydrogen sulphide, hydrogen chloride, hydrogen fluoride, carbon monoxide, and volatile metal chlorides.Carbon dioxide emitted from volcanoes adds to the natural greenhouse effect. Sulphur dioxides cause environmental problems, because they are converted to sulphuric acid in the stratosphere; the main cause of acid rain. Furthermore, sulphate aerosols are formed, which reflect solar radiation and absorb heat, thereby cooling the earth. Sulphate aerosols also take part in chemical reactions, forming zone, destructive material.

5 Describe the Social and Economical and political impact of Disaster. (Nov/Dec 2019)

The primary impact of disasters is destruction of the environment. Environment encompasses the physical environment with all the natural sources and the living environment covering all the plants, animals and microorganisms. The social, economic, political, environmental, human health and psychosocial impacts of disasters are discussed below.

SOCIAL IMPACTS OF DISASTERS

Disasters can be extremely stressful, disruptive and traumatic for the affected

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people in a community. Social impacts of disasters is reflected in people experiencing increased mental health issues, alcohol misuse, domestic violence, chronic diseases, unemployment, family violence and environmental damage. Disasters entail social costs larger than direct financial impacts. Social impacts of disasters can be unbelievably stressful, disruptive and traumatic for the affected people. Entire communities can be uprooted, friends and family divided along with loss of homes, livelihoods and lives. People may experience shock and disbelief, fear and apprehension, anger, shame and guilt in the early days after a disastrous event. The social impacts of disasters can be summarized as:

- Changes in individual's role
- Disruption of social fabric
- Isolation
- Change in marital status
- Sexual abuse and domestic violence
- Orphans
- Single parent children
- Family and social disorganization
- Migration
- Lifestyle changes
- Breakdown of traditional social status

ECONOMIC IMPACTS OF DISASTERS

On the surface, natural disasters cause serious damage and appear to be bad for the economy. They destroy tangible assets as well as the human capital. Sometimes, the damage is severe enough to cause closure of companies and manufacturing facilities. However, the academic evidence concerning the economic impacts of disasters is mixed. Certain studies report that natural disasters may promote growth. This is because of improvement of productivity of the corporate sector of the economy due to Updation of capital stock coupled with adoption of new technologies. This is called 'creative destruction'. If natural disasters expel inefficient firms (following the law of natural selection), the average corporate productivity increases. In conclusion, the recovery of the economy after natural disasters is closely intertwined with policy measures taken and the underlying economic conditions. The economic impacts of disasters can be summarized as:

- ☑ Loss of life
- **Unemployment**
- \blacksquare Loss of livelihood
- ☑ Loss of property or land
- Loss of household articles
- ☑ Loss of Crops
- ☑ Loss of public infrastructure

POLITICAL IMPACTS OF DISASTERS

Natural disasters generally affect an individuals political trust and satisfaction with the government. Past research has studied the impact of disasters on long-

term political impact of government and its policies. This has been achieved by way of examining retrospective voting and changes in attitudes towards civic engagement. At times, the effects on political trust occur immediately after a natural

6 Illustrate the global trends in disaster management. (Nov/Dec 2019)

The term, "Global Trends" refers to a change in the situation that affects many countries of the world. Generally, the world has been witness to an increasing in the number of disasters as listed below-

- According to statistics from United Nations International Strategy for Disaster Reduction (UNISDR), the number of disasters has increased significantly in recent years. This has been possible due to accurate recordings and better communication technology.
- Population growth has led to more people living in potentially hazardous locations.
- Countries in the developing world are more vulnerable because of their low coping capacity.
- The number of Earthquake events has not increased in the past decades and is fairly stable.

An increase in number of floods and wind storms has is seen. This may be due to global environmental changes or climate change.

Around fifty to seventy volcanoes erupt every year. Eruptions of a very large magnitude are rare. The trend also shows an increase in the number of people affected indicating the growing population density in the developing world.

An increase in the hurricane activity in the Atlantic has been linked to global warming.

It has also been proposed that a natural cycle in the Atlantic called Atlantic Multi-decadal Oscillation (AMO) to explain the high number of major hurricanes.

The USA has a long term trend of falling hurricane related deaths and increasing economic costs

People living along the coast are at risk from hurricanes.

Increasing coastal populations causes increased risk from hurricanes

Scientists believe that increased global warming will lead to more unpredictable weather and an increase in weather events.

Hazards associated with El-Nino are well known such as drought in Indonesia and flood in Peru

Summer of 2007 witnessed wide spread flooding in the UK. This was linked to La Nina conditions in the pacific.

However, with respect to specific disasters, the global trend observed is discussed below

Urban disasters

The term 'urban disaster' is misleading. It could refer to a natural disaster like flood or earthquake occurring in an urban area or man-made disaster like

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overpopulation in an urban area or an industrial accident like an explosion or chemical leakage seiously affecting an urban area. Whichever the case, the impact is loss of economy, loss of jobs and destruction of natural resources. There has been a steady increase in the number of urban disasters leading to destruction of infrastructure. Unplanned and unscientific methods of mining and construction has led to sporadic but steady increase in number of Earthquakes, landslides and land subsidence incidents throughout the world. Overpopulation has led to conflicts and wars between countries over natural resources. Global environmental issues like global warming and sea level rise are primarily affecting urban areas resulting in them being termed as urban disasters. Spread of urban areas causing 'urban sprawl' and 'heat island effect' are primarily environmental issues of concern and if these issues are not addresses in time before they will actually become 'urban disasters'. Hence the global trend concerning urban disasters steadily is increasing.

Pandemics

A pandemic is defined as a sudden outbreak that very widespread and affects a whole region, a continent, or world due to a susceptible population. A pandemic causes a high degree of mortality. Ex- small pox and tuberculosis. A pandemic is basically a global epidemic. It is an epidemic that spreads to more than one continent. A pandemic is a global disease outbreak. HIV/AIDS is an example of one of the most destructive global pandemics in history. Influenza pandemics occurred in-

-Spanish	influenza	(1918)	killed	40	-	50	million	people
-Asian	influenza	(1957)	kil	led	2		million	people

-Hongkong influenza (1968)killed million 1 people Evidence suggests that the possibility of pandemics has increased over the past century because of increased global travel and integration, urbanization, changes in land use and greater exploitation of the natural environment. It is predicted that these trends will continue and intensify in future. A few pandemics in the recent past were malaria, HIV/AIDS, Tuberculosis, SARS in 2003, Ebola virus in 2013 and avian flu pandemics has seen sporadic outbursts in the past. Pandemics appear to be increasing in frequency because of increasing emergence of viral disease from animals. Some geographic regions with a high risk of origin of a pandemic (spark risk) lack in preparedness to handle the disease. Influenza is the most likely pathogen to cause a severe pandemic.

Global Emergency

The term 'complex emergency' has no clear definition. It is often the result of a combination of political instability, conflict, social inequity, underlying poverty and violence. Complex emergencies are essentially political in nature and erode cultural, civil, political and economic stabilities of society. They can be worsened by natural hazards. Cities in the developing world exhibit the characteristics of complex emergencies. Complex emergencies have been defined as crises resulting from a combination of instabilities interacting with each other. Complex emergencies complex emergencies complex emergencies complex emergencies interacting with each other.

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mass famine and food shortage and fragile or failing economic, political and social institutions. Complex emergencies display four main types of instability-

Political instability

Economic instability

Environmental instability and

Demographic instability

Complex emergencies are present virtually in every part of the world. However, they are prevelant in areas without proper governance, poverty, lack of education unhygenic living the community, conditions, in etc. Armed conflicts have been a major cause of disruption in the last decade. There has been an increase in the number of political conflicts has increased from 2006 to 2016 as per statistics published by United Nations Office for the Coordination of Human Affairs (UNOCHA).

Climatechange

Climate change refers to a change in the global or regional climate patterns. A direct relationship exists between climate and health. Climate change will be responsible for almost 250,000 additional deaths due to malnutrition, malaria, diarrhea and heat stress. Climate change has also contributed to increased frequency of natural disasters. The current warming trend is of the human activity since the mid 20th century. The increased levels of green house gases has caused the Earth to warm up in response. The current warming is occurring around ten times faster than the rate of ice-age-recovery warming. Rapid climate change is evident through

-Global temperature rise

-Warming oceans -Shrinking ice sheets -Glacial retreat -Decreased snow cover -Sea level rise -Declining arctic sea ice -Extreme events and -Ocean acidification

Trends show an increase in warming of the world's climate. This temperature will not be uniform across the globe over time. This implies a shorter and milder winter followed by longer and hotter summers. This adversely affects agriculture and ecosystems. Climate change also results in an increase in frequency and duration in rainfall. Increasing frequency and intensity of heat waves result in drought. Climate change also causes frequent intense storms (cyclone).

7 Show the disaster development project like impact of dam, on embankment(Nov/Dec 2019) Disasters derail development. According to the United Nations (UN), over the past two decades, disasters from natural hazards have affected more than 4 billion

people, claimed more than 1 billion lives, and caused almost U.S. \$ 2 trillion in economic losses. Disasters have a devastating effect on development. Apart from loss of human life and economy, the psychological impact of disasters on the mental health of the affected people leads to low attendance at work and retards the economic growth of the region in general. The impact of disasters on specific development projects is discussed below-IMPACT ON DAMS

The drive for economic growth has exposed populations to increased risk. Destruction has been exacerbated by the development of dams in fragile ecosystems. Hence, disasters reveal boundaries and limits to development. All countries suffer from disasters but their impact is felt to the maximum extent in poor countries.

In case of development project involved in construction of dams, the disasters like flash floods, earthquakes and landslides can delay the project and adversely affect the finances allocated to the project as additional expenditure will be required in operations like clearing of debris, redesigning the project to suit the changed landscape, salvaging the usable construction material and disposal of incomplete structure. The ongoing progress of the project is pushed back and the project is delayed considerably.

IMPACT ON EMBANKMENTS

An embankment is a wall of brick or stone built to prevent flooding. The natural disasters that can affect its development are Earthquakes, landslides, floods as all these disasters result in affecting the surface of the Earth. Earthquakes destabilize the foundation of the embankment causing it to collapse. Floods may

- weaken the bonds between the bricks and stones by dissolving the cement or water may act as a lubricant between stones causing the stones to slide against each other leading to collapse of the structure. Flood water may be absorbed into bricks and swelling of bricks may lead to cracking and ultimately collapse of the structure. Earthquakes cause embankments to collapse as the entire structure is built on land. Landslides cause a section of land to slide over another and this disturbance of land also collapses the embankments.
- 8 **Disaster impacts differential groups at various levels. Justify. (Nov/Dec 2018)** The term, 'differential impacts' refers to the discriminatory impacts experienced by different individuals, groups or communities when faced with an event with damaging consequences. With respect to the consequences of disasters (natural or man-made), a community or society can be broadly classified into the following groups-
 - Females
 - Males
 - ☑ Affluent
 - **Poor**
 - In Labourers
 - Disabled

- Children
- Old people.

Each group has their weaknesses that make them vulnerable to disasters. Another aspect that complicates the issue of diiferential impacts is that the above classification is not rigid. A certain group can be sub-divided into groups or may fall within another group. For example, the group called 'females' consists of babies, girls, young ladies or old and infirm women. Also, all the groups fall under one broad group called 'human beings'. Hence the effects of a damaging event has different impacts on different individuals in different groups.

A simple list of different impacts on different people is listed below-

- Old people, the disabled and babies will not be in a position to save themselves against any disaster without support. This group of people are extremely vulnerable (health-wise) to the slightest adverse conditions
- Young males can easily resist adverse conditions and help save others along with playing an important role in response, rescue, recovery and reconstruction work. The labourers could be male or female and have better survival instincts due to extensive physical work in the open
- Among the affluent and the poor, the poor are continuously exposed to stressful living conditions and are better adapted to face the hardships encountered in disasters while the affluent are adapted to a luxurious lifestyle and will not be able to adjust to the harsh environment in the aftermath of a disastrous event.

9 Brief about do' s and don' t during various types of disasters. (Nov/Dec 2018)

Do's and Don't during Landslide

- \blacksquare Keep drains clean
- Direct storm water away from slopes
- Inspect drains for litter, leaves, plastic bags, rubble etc.
- ☑ Keep the weep holes open
- Don't let the water go waste or store above your house
- Grow more trees that can hold the soil through roots
- Identify areas of rock fall and subsidence of buildings, cracks that indicate landslides and move to safer areas. Even muddy river waters indicate landslides upstream.
- Notice such signals and contact the nearest District Head Quarters
- Ensure that the toe of the slope is not cut, remains protected, don't uproot trees unless revegetation is planned
- Do's and Don't during Earthquake
- Do drop to the ground instantly when you are indoors. You can drop below a sturdy table or another furniture for cover.

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- Do stay away windows, glass walls, and anything that can fall or break during the shaking.
- Do stay in bed if your are lying when the quake happened. Cover your head with a pillow.
- Do stop if you are driving when the quake started.
- Do cover your mouth with handkerchief.
- Don't go and run outside when you are indoor when the quake started. Wait until the shaking stops or when it is safe to go outside.
- Don't use the elevator in going down as the electric power may be interrupted.
- Don't stay near the street lights and utility wires when you are outdoors.
- Don't get near to bridges when you are driving when the quake began.
- Don't stop near the trees, buildings, and overpasses when you are driving and the quake started

Do's during floods

Do's

- Put sandbags in the toilet bowl and cover all drain holes to prevent sewage back flow.
- Use bleaching powder and lime to disinfect the surroundings
- Eat freshly cooked or dry food. Always keep your food covered
- Drink boiled water or use chlorine tablets to purify water before drinking as advised by Health Department
- After the flood recedes, watch out for broken electric poles, damaged bridges, broken glass, sharp objects and debris
- Use mosquito nets/ repellants to prevent malaria
- Keep your mobile phones charged
- Listen to radio or watch television for the latest weather bulletin and flood warnings
- Keep strong ropes, a lantern, battery operated torches, extra batteries ready
- Keep the First Aid Kit Ready with extra medication for snake bite and diarrhoea

Don't during flood

- $\ensuremath{\mathbbmath$\mathbbms$}$ Don't enter flood waters. If you need to enter, then wear suitable footwear
- Don' t walk through moving water. If you have to walk in water, walk where the water is not moving. Use a stick to check the firmness of the ground in front of you. Don' t get near the electric poles and fallen power-lines to avoid electrocution
- Don't get near the sewage line, gutters, drains, culverts etc.
- Don't let children remain on empty stomach
- Don't leave the safe shelter until the local officials declare normalcy
- Don't allow children to play in or near flood waters
- Don't use any damaged electric goods, get it checked by an electrician before using it
- Don't use the toilet or tap water if the water lines or sewage pipes are

damaged

- Don't eat food which has been in flood waters
- Do's and Don'ts during cyclone
 - Leave early before your way to high ground or shelter gets flooded
 - Do not delay and run the risk of being marooned
 - If your house is securely built on high ground take shelter in the safe part of the house. However, if asked to evacuate do not hesitate to leave the place.
 - Board up glass windows or put storm shutters in place.
 - Provide strong suitable support for outside doors.
 - If the centre of the cyclone is passing directly over your house there will be a lull in the wind and rain lasting for half an hour or so. During this time do not go out; because immediately after that, very strong winds will blow from the opposite direction.
 - Switch off the electrical mains in your house

10 Summarize the health and psychosocial impact of disaster. (Nov/Dec 2018) **HEALTH IMPACTS OF DISASTERS**

Any disaster natural or man-made invariably has an adverse effect on human health. Health impacts due to disasters may be broadly classified as:

Physical injuries and

Infectious diseases due to inhalation of contaminated (particulate matter or toxic gases) air or ingestion of contaminated (particulate matter or toxins or infectious worms/microorganisms/parasites) water

Other hazardous situations (slippery terrain, etc)

PSYCHOSOCIAL IMPACTS OF DISASTERS

Any disastrous event is beyond the scope of normal human experience causes traumatic stress

More than 90% of the people affected by a disaster show untoward psychological effects

The extent and severity of the event affect the likelihood of people suffering from the effects of the disaster

Some of the vulnerability factors include:

- Witnessing death \square
- Being trapped \square
- Stigmatization of victims X
- Lack of availability of social support networks \square
- People may suffer from psychological and behavioural syndrome X
- People may be affected with psychological disorders \square
- People may suffer from persistent insomnia, anxiety, PTSD and \square depression
- self-destructive coping skills that include excessive alcohol and X substance use and excessive work
- Despair, panic, survival guilt \square



- Inappropriate anger or resentment \square
- Aggressive or assaultive behaviour Ø
- Lack of regard for other's comfort or dignity X
- Being uncooperative, defiant, rigid when dealing with problems or \square responding to requests for help
- Unprofessional demeanor \square
- **Recurrent conflicts** X
- Difficulty with authority \square
- Inability to ask for or receive help \square
- Irritability, moodiness, verbal abuse Ø
- Isolation Ø
- Physical deterioration \square
- Distress \square
- Flashback Ø
- Intrusion/Avoidance \square
- Hatred/Revenge \square
- Dependence/Insecurity \square
- Grief/Withdrawal/Isolation Ø
- Guilt feeling \square
- Hypervigilance \square
- Lack of trust X
- Helplessness \boxtimes
- Hopelessness \square

C405A.2 UNIT II APPROACHES TO DISASTER RISK REDUCTION (DRR)

Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities ofcommunity, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders-Institutional Processes and Framework at State and Central Level-State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies. .

PART-A

Define operations management in disaster. (Nov/Dec 2021) 1.

Operation management is the organization and management of the resources and responsibilities for dealing with all humanitarian aspects of emergencies (preparedness, response, mitigation, and recovery). The aim is to reduce the harmful effects of all hazards, including disasters.

How to assess risk? (Nov/Dec 2021) 2.

Risk assessment is a step in a risk management procedure. Risk assessment is the determination of quantitative or qualitative value of risk related to a concrete situation and a recognized threat (also called hazard). Quantitative risk assessment requires calculations of two components of risk , the magnitude of the potential loss, and the probability that the loss will occur. In all types of engineering of complex systems sophisticated risk assessments are often made within Safety engineering and Reliability engineering when it concerns threats to life, environment or machine functioning.

3. Define NGO. (Nov/Dec 2020)

A Non-Governmental Organization (NGO) is a legally constituted organization created by natural or legal persons that operates independently from any government. The term originated from the United Nations (UN), and is normally used to refer to organizations that do not form part of the government and are not conventional for-profit business. In the cases in which NGOs are funded totally or partially by governments, the NGO maintains its non-governmental status by excluding government representatives from membership in the organization.

4. State about the disaster response. (Nov/Dec 2020)

Disaster response is a phase of the disaster management cycle. Its preceding cycles aim to reduce the need for a disaster response, or to avoid it altogether. The level of disaster response depends on a number of factors and particular situation awareness.

5. List the phases of disaster management cycle. (Nov/Dec 2019)

There are three stages of the disaster risk management which are collectively called Disaster Management Cycle. Broadly, there are six phases in Disaster Management Cycle viz. Prevention, Mitigation, Preparedness, Response, Recovery and Reconstruction

6. Tell about mitigation disaster management cycle. (Nov/Dec 2019)

Mitigation (prevention) is the effort to reduce loss of life and property by lessening the impact of disasters. This is achieved through risk analysis, which results in information that provides a foundation for mitigation activities that reduce risk, and flood insurance that protects financial investment. Example: Building codes and zoning, vulnerability analysis and public education..

7. Analyse about disaster preparedness. (Nov/Dec 2018)

Disaster Preparedness is the process of ensuring that an organization

(1) has complied with the preventive measures,

(2) is in a state of readiness to contain the effects of a forecasted disastrous event to minimize loss of life, injury, and damage to property,

(3) can provide rescue, relief, rehabilitation, and other services in the aftermath of the disaster

(4) has the capability and resources to continue to sustain its essential functions without being overwhelmed by the demand placed on them.

8. What is community-based disaster preparedness? (Nov/Dec 2018)

Community Based Disaster Preparedness is a process of bringing people together within the same community to enable them to collectively address a common disaster risk and to collectively pursue common disaster preparedness. Community Based Disaster Preparedness is a process that mobilizes a group of people in a systematic way towards achieving a safe and resilient community/group.

9. **Highlight the structural measures of cyclone. (Nov/Dec 2017)** Engineering measures such as cyclone shelter is one of the key cyclone mitigation

measure adapted. For effective employment and management of cyclone shelters, multipurpose versions have been built in carefully selected locations, identifying uses for both normal and disaster periods. Cyclone shelters demonstrate an excellent dual-purpose use during non disaster periods and cyclones.

- 10. What are the structural measures taken for flood risk reduction? (Year 2021) Structural measures aim at protecting an area up to certain level of flooding. It can be divided into five categories:
 - Storage reservoir or basins to restrict overflow.
 - Retarding basins to lower the flow of flooding
 - Levees and floodwalls to confine floodwaters
 - Improvement of channel capacity

Some structural measures such as Flood Embankment, Channel Improvement, River Training, Coastal Embankment etc. to combat the flood sufferings

11. State the non-structural measures taken for flood risk reduction. (Year 2021)

Non-Structural Measure to reduce loss or damage by administrative measures. It does not control or affect the process of inundation. Some of the non structural measures are

- Flood Plain Zoning & Management;
- Policies for infrastructure Planning and Development in the flood plains;
- Flood Proofing & Flood insurance
- Disaster Preparedness & Response Planning and
- Flood Forecasting and Warning.
- Flood fighting, & Evacuation and shelter management
- 12. Highlight the roles and responsibility of NDMA? (Nov/Dec 2016)
 - National disaster Management Authority **(NDMA)** is responsible for framing policies, laying down guidelines and best-practices for coordinating with the State Disaster Management Authorities (SDMAs) to ensure a holistic and distributed approach to disaster management. It is headed by the Prime Minister of India and can have up to nine other members.

13. Outline the function of SDMA. (Nov/Dec 2016)

The function of SDMA is Framing of Disaster Management Policy and the preparation of the State Disaster Management Plan, reviewing the preparedness, prevention, mitigation and capacity building measures in the State..

14. Write about early warning system in disaster. (Nov/Dec 2015)

An Early Warning System can be defined as a set of capacities needed to. generate and disseminate timely and meaningful warning information of the. possible extreme events or disasters (e.g. floods, drought, fire, earthquake and. tsunamis) that threatens people's lives

15. List the roles and responsibilities of community group and voluntary agencies. (Nov/Dec 2015)

Local community groups and voluntary agencies including NGOs should actively assist in prevention and mitigation activities under the overall direction and supervision of the District Disaster Management Authority (DDMA). They should actively participate in all training activities as may be organized and should familiarize themselves with their role in disaster management.

16. Define risk identification. (Nov/Dec 2015)

The first step in risk management is identifying the risks that we will see in our project. These are the things that threaten to stop us from delivering what we have promised on the schedule we promised for the budget we promised. If we were completely certain about everything in the project and how it was going to turn out, we would not have to worry about risk management.

17. What are the steps involved in disaster management cycle?(Nov/Dec 2014)

The steps involved in disaster management cycle are

- 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.

18. Mention about risk sharing. (Nov/Dec 2014)

Risk management method in which the cost of the consequences of a risk is distributed among several participants in an enterprise, such as in syndication.

19. What is the goal of disaster management? (Nov/Dec 2013)

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.

20. What are State Disaster Response Fund ? (Nov/Dec 2013)

The State Disaster Response Fund (SDRF), constituted under Section 48 (1) (a) of the Disaster Management Act, 2005, is the primary fund available with State Governments for responses to notified disasters. SDRF shall be used only for meeting the expenditure for providing immediate relief to the victims.

21. What is the role of government in disaster management?

The role of government in disaster management is to act as a focal point for command and control between agencies, set standards, delegate authority to states and municipalities, and to bring whatever resources are necessary during and after an incident to bear.

22. Brief about District Disaster Management Authority (DDMA).

DDMA will act as the planning, coordinating and implementing body for disaster management at the district level. It will prepare the District Plan for disaster management in accordance with instructions by NDMA and SDMA. The DDMA will also ensure that the guidelines for prevention, mitigation, preparedness and response measures laid down by the NDMA and the SDMA are followed by all the Departments of the State Government at the District level and the local authorities in the District.

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23. Outline the role of community in disaster management in India.

The framework for community based disaster management (CBDM) in India is provided by the National Disaster Management Agency (NDMA). The NDMA recognises the community as the first responder in the event of a disaster, which means that it has invested significantly in ensuring that communities know what, where, when, and how they should be planning for, responding to, and recovering from disasters. The NDMA decided to produce the National Policy Guidelines on Community-based Disaster Management to better inform communities and those working with them in this regard.

Eg: Public Distribution Centres (fair price shops) should set up special mechanisms to ensure that food supplies are not disrupted and discontinued. Cultural groups should engage in awareness building for disaster preparedness.

24. Distinguish between mitigation and prevention.

Mitigation means to reduce the severity of the human and material damage caused by the disaster. Prevention is to ensure that human action or natural phenomena do not result in disaster or emergency.

25. What is the principle objective of mitigation?

Principal Objectives of Mitigation are

- 1. To save lives
- 2. To reduce economic disruption
- 3. To decrease vulnerability/increase capacity
- **4.** To decrease chance/level of conflict

PART-B

1. Discuss in detail about disaster Management cycle(Nov/Dec 2021)

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 need not necessarily occur in isolation or in this precise

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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.

<u>Preparedness</u> - 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 .

<u>Recovery</u> - Returning the community to normal. Examples: temporary housing; grants; medical care. **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 education. public 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 lists; mutual aid personnel/contact 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

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.

2. Explain structural and non-structural mitigation measures for various types of disasters. (Nov/Dec 2021)

Structural solutions include engineered solutions such as redesigning buildings and designing physical barriers to disaster events to reduce damage. Non-structural solutions include social solutions such as early warning, evacuation planning, and emergency response preparedness.

Structural groups, which are often comprised of engineers insist that only structural solutions can surely prevent countries from economic loss and can contribute to the development of the nation.

Structural measures are any physical construction to reduce or avoid possible impacts of hazards, or the application of engineering techniques or technology to achieve hazard resistance and resilience in structures or systems.

Common structural measures for disaster risk reduction include dams, flood levies, ocean wave barriers, earthquake-resistant construction and evacuation shelters

Structural solutions can protect peoples lives and property

Structural measures refer to any physical construction to reduce or avoid possible impacts of hazards, or application of engineering techniques to achieve hazard-resistance and resilience in structures or systems

Non-structural groups rely on early warnings, quick evacuations and emergency response

Common non-structural measures include building codes, land-use planning laws and their enforcement, research and assessment, information resources and public awareness programmes.

Non-structural measures include any measure not involving physical construction that uses knowledge, practice or agreement to reduce risks and impacts, in particular through policies and laws, public awareness raising, training and education.

Immediate emergency response after a disaster through non-structural solutions is a popular " investment" to get support without any financial expense

Flood Prevention, Preparedness and Mitigation

Structural measures

• Reservoirs, Dams, Other Water Storages : By constructing reservoirs in the courses of rivers could stores extra water at the time of flood. Such measures adopted till now however, have not been successful. Dams built to control floods of Damodar could not control the flood.

- Embankments/Flood Levees/Flood Walls : By building flood protection embankments, flood water can be controlled from overflowing the banks and spreading in nearby areas. Building of embankments on Yamuna, near Delhi, has been successful in controlling the flood.
- Drainage improvement: Drainage system is generally choked by the construction of roads, canals, railway tracks etc. Floods could be checked if the original form of drainage system is restored.
- Channel Improvement/Desilting/Dredging of Rivers: A channel can be made to carry flood discharge at levels lower than its prevailing high flood level by

improving its discharge carrying capacity. It aims at increasing the area of flow or velocity of flow (or both) to increase its carrying capacity. Selective desilting/dredging at outfalls/confluences or local reaches can, however, be adopted as a measure to tackle the problem locally.

- Diversion of Flood Water: Diverting all or a part of the discharge into a natural or artificially constructed channel, lying within or in some cases outside the flood plains is a useful means of lowering water levels in the river.
- Catchment Area Treatment/Afforestation : Watershed management measures such as developing the vegetative cover i.e. afforestation and conservation of soil cover in conjunction with structural works like check dams, detention basins etc. serve as an effective measure in reducing flood peaks and controlling the suddenness of the runoff. Non-structural measures
- Flood forecasting and warning.
- Floodplain zoning: Flood plain zoning and management is the effective means of regulating habitat construction and agricultural use with minimum interference to the natural condition prevailing in the flood plains. Due to a swell in population in the flood plains, the governments are bound to undertake more and more development projects in the flood plains.
- Flood fighting.
- Flood proofing : Flood proofing is a measure, which has been found to have less adverse effects. In most of the flood prone areas in India, the people used to flood proofing technique in such a way that people build their houses on the built up earthen mounds. This is being in practice for centuries. Community participation and awareness are very important in the flood proofing measures.
- Flood insurance.
- 3. Illustrate about Drought Management Framework in India(Nov/Dec 2020)

The Government of India has devised many short-, medium- and long-term strategies to mitigate and overcome adverse effects of drought.

Drought management mechanism includes:

- Institutional mechanisms.
- Employment generation and social welfare practices.
- Assistance/support by Central and State Governments.
- Operation of EWS.

Institutional Mechanisms:

- The Drought Management Group coordinate the efforts to deal with drought in various states.
- The National Disaster Management Cell, monitors the drought situation in different states and resource availability.
- The National Agricultural Drought Assessment and Monitoring System, 1989 provides scientific information at district level for most of the states and sub-district levels in a few states.

Drought-Prone Area Development Programme and Desert Development Programme:

• Use the plans prepared on the basis of the integrated estimation.

• IMD and the National Centre for Medium Range Weather Forecasting offer meteorological information support for drought preparedness and early warning **Consequences of Drought:**

Droughts have cascading effects on various aspects such as:

- Crop failure.
- Shortage of water which leads to large scale death of cattle and other animals.
- Migration of human and livestock.
- Scarcity of water compels people to consume contaminated water resulting in the speed of many water borne diseases.

Mitigation of Droughts

- Provision for the distribution of safe drinking water.
- Medicines for the victims.
- Availability of fodder and water for the cattle.
- Shifting of the people and their livestock to safer places. NDMA guidelines to control Drought
- Identification of groundwater potential in the form of aquifers.
- Transfer of river water from surplus to deficient areas.
- Rainwater harvesting.
- Interlinking of rivers and construction of reservation and dams.
- Remote sensing and satellite imagery can be useful in identifying the possible river basin and in identifying the groundwater potential.
- Dissemination of knowledge about drought resistant crops at proper training to practice the same can be some of the long-term measures that will be helpful in drought mitigation on The watershed development energy on his on important.

in drought mitigation. • The watershed development approach is an important facet drought management initiatives, taken up through the programs of GOI.

• Automatic weather station and rain-gauges shall be put in place at appropriate spacing to enable micro level analysis and forecasting.

State Drought Monitoring Cells (DMCs) shall undertake on a priority basis, the preparation of vulnerability maps for their respective states.

Drought Crisis Management Plan, 2015

The NDMA manual sets out four important measures that a State government should take at the time of drought, with the Union government's help.

- MGNREGA to provide immediate employment to drought-affected people.
- The public distribution mechanism should be strengthened to provide food and fodder.

• Initiate actions to recharge the groundwater table by building check dams and providing pipeline water and other irrigation facilities.

- The government should either waive off or defer `farmer loans and arrange for crop loss compensation.
- 4. Explain about community based disaster risk reduction. (Nov/Dec 2020)

Community Based Disaster Risk Reduction (CBDRR) - A process whereby a community systematically manages its disaster risk reduction measures towards becoming a safer and resilient community". Community Based Disaster Risk Reduction (CBDRR) initiates a process involving sequential stages that can be operationalized to reduce disaster risk at the community level.

The different stages in CBDRR are Hazard, Vulnerability, Capacity and Risk assessment, risk reduction planning, early warning systems, post disaster relief and participatory monitoring and evaluation. CBDRR by its very nature demands a decentralized bottoms-up approach with intensive, micro interventions at the local panchayat, ward or village level. This is to develop confidence, awareness, knowledge, partnership and ownership for planning and rolling out local disaster management plans encompassing all levels of disaster management continuum.

Equity and inclusion of marginalized segments of the society and bringing the vulnerable groups to the center stage of planning and implementation of the CBDRR, has to be prioritized to make the efforts participatory and inclusive. Disasters affect the entire community, however, persons with disability, women and children, under-privileged, older persons and pregnant women need special attention at the implementation level. Capacity building and training of community is the mainstay of community based disaster risk reduction for building disaster resilient community. Considering the large number of stakeholders and community representatives that needs to be sensitized and trained, it is important that capacity building and training interventions be meticulously planned and decentralized.

The 73rd and 74th Constitutional Amendments recognize Panchayati Raj Institutions (PRI) and Municipalities as " institutions of self – government" . They were put in place to decentralize and devolve financial and administrative powers through a tiered structure from the district downwards right up to the Gram Sabha level. In the case of urban self- government, the devolution is to be up to the ward level. The paradigm of CBDRR is entirely in keeping with this constitutional recognition of the importance of decentralization and devolution of powers. It, further, intends to extend it to the arena of disaster management. The community-based organizations shall work in overall partnership with local authorities in States/UTs. The elected representatives of these local bodies are the key stakeholders through whom effective participation and ownership by local communities can be achieved in CBDRR. Sustainability Social mobilization, awareness generation and proactive participation of communities are crucial components of many important flagship programmes being funded by central or state governments.

These interventions tend to become polarized without establishing synergies with other complementary programmes reaching out to the same segment of people. A targeted CBDRR strategy calls for integration with other major non-government stakeholders such as NGOs, community-based organizations, human rights organizations, community leaders, volunteers, business and industry groups, etc. All these stakeholders must see their roles as

2023-2024

mutually complementary and should share common views and goals regarding CBDRR.

5. Explain the roles & responsibilities of Community in disaster Management. (Nov/Dec 2019)

The community that faces a disaster should be a part of the complete disaster management process. The community knows its environment better than anyone else. Additionally, senior citizens will be aware of incidents that had occurred in the past. The community should be made aware of its history with respect to disasters along with providing necessary inputs to identify hazards and risks. The responsibilities of the community towards disaster management are listed below-

Engage in public awareness campaigns about disasters.

In case of any disaster, the community should act as the first responder before external help reaches the victims. This will reduce the work load on external agencies coming to help Communities should be responsible to raise public awareness and bring about a behavioral change in disaster preparedness and mitigation

Communities should be responsible for deployment of stable, reliable and effective warning systems

It is the responsibility of the community to partner with media (radio & TV) in improving disaster awareness. The community is responsible for communicating and disseminating disaster warning to vulnerable people and set-

up a community emergency operations centre (EOC).Community Disaster Response Team (CDRT) is responsible for strengthening the existing role of District Emergency Organization (DEO)

Capacity building at social, economic and environmental levels

The roles of the community towards disaster management are listed below-

Training Planning Early warning Communication Shelter Search and rescue Arrangement of food Set-up of Public Distribution Centres

Set-up cultural groups to engage in awareness to build disaster preparedness

Fire prevention

Initial damage assessment

Shelter management

Psychosocial support

6. State the roles & responsibilities of State, Center for disaster management in

detail. (Nov/Dec 2019)

Roles & Responsibilities of state in disaster management

- The State Disaster Management Authority (SDMA) is set up under the chairmanship of chief minister.
- The responsibility of rescue, relief and rehabilitation lies with the state government.
- When the calamity is of a severe nature and the Calamity Relief Fund (CRF) is not sufficient the states may approach the central government for additional assistance from the National Calamity Contingency Fund (NCCF).
- Work is delegated to the relief commissioner who is in-charge of relief and rehabilitation measures. He functions under the directive of the state level committee.
- Below the state government is the district level disaster management authority (DDMA) which is responsible for actual the ground work relief.
 The district magistrate, district collector and deputy commissioner coordinate and supervise the relief work.
- The district disaster management committee comprising of officers from health, irrigation, veterinary, police, fire services, water and sanitation takes decisions on relief measures and these decisions are carried out by the disaster management team.

Roles & Responsibilities of centre in disaster management

- In the central government supplements the efforts of the state government by providing financial and logistic support in case of major disasters.
- Depending on the gravity of the situation, the centre decides the scale of operations.
- All natural disasters are coordinated by the ministry of home affairs. Only drought is taken care of by the ministry of agriculture
- Different types of man-nade disasters are handled by the respective central government ministries. For example Air accidents are handled by ministry of civil aviation, railway accidents are handled by ministry of railways, chemical, biological and nuclear disasters are handled by ministry of home affairs and epidemics are handled by ministry of health and family affairs.
- The prime minister, ministers of the union cabinet and the National Crisis Management Committee are collectively responsible for the decisions taken for disaster management.

Roles & Responsibilities of other stakeholders in disaster management Other stakeholders refers to people or entities who have a financial interest. They can be affected by actions, objectives and policies. Some examples of stakeholders are creditors, company directors, employees, owners (shareholders), suppliers and unions from which the business draws its resources. The stakeholders may be internal (employees, manager, owner) or external (Suppliers, Society, Government, Creditors, Shareholders, Customers). When a disaster strikes an area causing extensive damage to private company buildings and or manufacturing industries, the stakeholders have a few roles and responsibilities as listed below-

- The stakeholders should engage in contingency planning taking worst case scenario under consideration
- Disaster Risk Management (DRM) present mechanisms for emergency coordination that should be practiced/rehersed for familiarity with the role and processes to be followed
- Communication, Interoperability and Interagency coordination are critical and essential to everyday Disaster Risk Management (DRM)
- B Each stakeholder has responsibilities in different phases of disaster
- Stakeholders promote disaster prevention and mitigation using a risk-based and all-hazards approach
- In The community is the most important stakeholder in the disaster management process
- Mock drills and exercises for different disasters are essential for role clarity of stakeholders and for synergising coordination of various emergency support functions
- Coordination of efforts amongst various government departments and stakeholders generates synergy and involves bringing together agencies and functionaries to ensure effective performance
- 7. Highlight the roles and responsibilities of Panchayati Raj Institutions/Urban

Local Bodies (PRIs/ULBs) in disaster management. (Nov/Dec 2018)

The PRI is a statutory body elected by the local people through a well defined democratic process with specific responsibilities and duties. Elected members are accountable to the people of the ward, rural community, block and the district. The PRI being a representative body of the people, is the most appropriate institution from the village to the district level in view of its proximity, universal coverage and enlisting people's participation on an institutionalized basis. Their close involvement is crucial in getting people prepared for countering natural disasters as well as involving people in all possible preventive and protective activities so that the impact of the disasters are mitigated and the people save their lives and property. PRI's act as catalysts to social mobilization process an tap the traditional wisdom of local communities to complement modern practices in disaster mitigation efforts. PRI's also provide a base for integration of various developmental activities at the grassroots level.

If PRI's are not consulted for preparedness, planning, relief and rehabilitation work, it leads to lack of accountability and transparency resulting in loss of money. Activities like distribution of immediate relief in the form of money, food grains, medical care, clothes, tent, vessels, drinking water and other necessities, activities of restoration, rehabilitation and reconstruction efforts of damaged villages and towns can be implemented better with the involvement of local bodies. PRI plays a crucial role in mobilizing people in various situations of crisis. The impact of disasters on people living in vulnerable areas and losses to their property can be minimized by a pro-active role played by PRis at the grassroots level.

PRI members can play a role of leadership in disaster management at all stages. Role played by PRI's at various levels of disaster management is given below:

PRE-DISASTER

-Organizing awareness campaign and promoting community education on disaster

preparedness

-Articulation of community need for developing preparedness plan through community involvement and panchayat ownership

-Identifying the resource gaps both physical and manpower and replenish the same through capacity building

-Establishing synergy with local agencies including NGOs / CBOs -Dovetailing risk reduction into various development programs of national and state governments

-Establish convergence with local institutional structures created for implementing education, health, livelihood, social justice, etc

-Activating the disaster management plans with the participation of the community

-Formation of task forces and their capacity building

DURING DISASTER

through communication available -Arranging emergency resources -Evacuation to temporary shelter and running relief camps

-Supplementing rescue and relief efforts in coordinating different agencies -Monitoring of relief distribution

-Safe disposal of carcass along with setting sanitation facilities and safe drinking water

POST DISASTER

-Damage assessment particularly assisting in identifying victims for compensation and its distribution

-Formulating rehabilitation and reconstruction plan of houses and other local infrastructure

-Enforce minimum specification for safe reconstruction

-Supervise and monitor long term reconstruction and mitigation projects

-Mobilizing special funds to use disaster resistant construction technology in vulnerable areas.

ROLE OF URBAN LOCAL LOCAL BODIES IN DISASTER MANAGEMENT

Urban local bodies refers to governance of an urban area by the people through their elected representatives. The tenure of urban local self-governing bodies is fixed at five years. Urban Local Bodies (ULBs) play a very important role in planning and development of urban areas. Urban local bodies form an important stakeholder at the town level. Urban Local Bodies are classified into four major categories

- Municipal corporation \square
- Municipality Х
- Town area committee and М
- Notified area committee М

Urban Local Bodies are not well equipped both administratively and financially to mitigate any natural or man-made hazard. They require help from the state government to deal with any hazard. Urban Local Bodies have the highest stake in disaster mitigation but have the least power in administrative hierarchy. In December 2005, the prime minister launched the Jawaharlal Nehru National Urban Renewal Mission(JNNURM) to provide assistance to state governments and Urban Local Bodies. ULB's perform analysis of the city's susceptibility to floods, earthquakes and other disasters.

The role of Urban Local Bodies (ULBs) in disaster management is to

- develop, review and assess effective disaster management practices X
- help local goverment to prepare a local disaster management plan and X
- ensure the community knows how to respond in a disaster. \square
- Explain in detail about State Disaster Management Authority(SDMA) (Nov/Dec 8. 2018)

At the State level, the State Disaster Management Authority (SDMA), headed by the

Chief Minister, will lay down policies and plans for DM in the State. It will ,inter alia in accordance with the guidelines laid down by the approve the State Plan DMA, coordinate the implementation of the State Plan, recommend provision of funds

for mitigation and preparedness measures and review the developmental plans of the

different Departments of the State to ensure the integration of prevention, preparedness and mitigation measures. The State Government shall constitute a State Executive Committee (SEC) to assist the SDMA in the performance of its functions. The SEC will be headed by the Chief Secretary to the State Government and coordinate and monitor the implementation of the National Policy, the National Plan and the State Plan. The SEC will also provide information to the NDMA relating to different aspects of DM. SDMA with eight members to be nominated by the Chief Minister and the Chairperson of the State Executive Committee. One of the members may be designated as the Vice Chairperson of the State Authority by the Chief Minister. SDMA may constitute an Advisory Committee of experts, as and when necessary. SDMA shall be responsible for laying down the policies and plans for disaster management in the State. SDMA shall recommend guidelines for providing minimum standards of relief to persons affected by disaster in the State, not less than the minimum standards in the guidelines set by the National Authority. SDMA will be assisted by the State Executive Committee. The Key functions of SDMA are

- Development of awareness campaign strategy and its implementation in the state.
- Development of Human Resource Plan for implementation thereof development of training modules and material
- Preparation or updation of state disaster management plan to ensure that the issues of DRR have been addressed
- It is a not consistent of annual vulnerability assessments and preparation of annual vulnerability and risk reduction reports.
- Laying down guidelines to integrate DRR into development process
- Follow up with various line departments to ensure that DRR issues have been addressed in their development plans.
- **Preparation of Disaster Risk Reduction Projects in various sectors.**
- Carrying out DRR Audit of the development plans prepared by line departments.
- Developing a Recovery framework for the state.
- Development of Knowledge and information sharing platform in DRR
- Conceptualizing and formulating projects and programs as a part of the national initiatives/schemes.
- **Preparation of Minimum Standards of Relief**
- Preparation of Disaster Management Policy
- Preparation of Mitigation plans vis a vis various hazards
- Coordinate and monitor the implementation of National Policy, National Plan and State Plan
- Lay down guidelines for the preparation of DMP by various departments
- Lay down guidelines for safe construction practices and ensure compliance thereof
- Provide necessary technical assistance or give advice to District Authorities.
- Lay down, review and update state level response plans and guidelines
- Ensuring the communication system is in order setting up and strengthening of EOCs
- Ensuring the conduct of mock drills regularly.
- 9. Summarize about the importance of early warning system. (Nov/Dec 2017) An Early Warning System (EWS) can be defined as a set of capacities needed to generate and disseminate timely and meaningful warning information of the
possible extreme events or disasters (e.g. floods, drought, fire, earthquake and tsunamis) that threatens people's lives. The purpose of this information is to enable individuals, communities and organizations threatened to prepare and act appropriately and in sufficient time to reduce the possibility of harm, loss or risk

Elements of Early warning

Early warning is the integration of four main elements:

1. Risk Knowledge: Risk assessment provides essential information to set priorities for mitigation and prevention strategies and designing early warning systems.

2. Monitoring and Predicting: Systems with monitoring and predicting capabilities provide timely estimates of the potential risk faced by communities, economies and the environment.

3. Disseminating Information: Communication systems are needed for delivering warning messages to the potentially affected locations to alert local and regional governmental agencies. The messages need to be reliable, synthetic and simple to be understood by authorities and public.

4.Response: Coordination, good governance and appropriate action plans are a key point in effective early warning. Likewise, public awareness and education are critical aspects of disaster mitigation.

Need of Early Warning System

Early Warning for disaster reduction is a legitimate matter of public policy at the highest national levels for two main reasons:

The first one, clearly, is public safety, and the protection of human lives.

The second is the protection of the nation's resource base and productive assets (infrastructure and private property or investments) to ensure long term development and economic growth. Conversely, by reducing the impact of disasters, a government avoids the financial – and political-burden of massive rehabilitation costs.

Investing in early warning and other measures of disaster reduction is neither simple nor inexpensive, but the benefits of doing so, and the costs of failing to, are considerable. For instance:

In terms of reducing economic losses, early warning and disaster preparedness _ pay for themselves' many times over the life of the warning system.

- The reduction of environmental losses can, if properly managed and publicized, have both long-term benefits to the economy, and short-term benefits for the administration in-charge. - A country can strengthen its stature and influence in international relations by a good handling of _ externalities' , or indirect effects, on neighboring nations.

Communication of early warning information

Early warning communication systems are made of two main components:

- communication infrastructure hardware that must be reliable and robust, especially during the natural disasters;

- appropriate and effective interactions among the main actors of the early

warning process such as the scientific community, stakeholders, decision makers, the public, and the media.

Many communication tools are currently available for warning dissemination such as Short Message Service (SMS) (cellular phone text messaging), email, radio, TV, and web service. Information and communication technology (ICT) is a key element in early warning. ICT plays an important role in disaster communication and dissemination of information to organizations in charge of responding to warnings and to the public during and after a disaster. Redundancy of communication systems is essential for disaster management, while emergency power supplies and back-up systems are critical in order to avoid the collapse of communication systems after disasters occur.

Key elements for successful implementation of early warning(Nov/Dec 2017)

- Understand the most likely threats, likelihood of disasters and their potential consequences
- **Establish proper priorities**
- Developing institutional networks with clear responsibilities
- Bestablish or strengthen the legislative/legal framework and mechanisms
- Developing effective communication strategies
- ☑ Securing resources

Nodal agencies for forecasting and early warning dissemination

Disaster	Agency	Ministry				
Cyclone	Indian Meteorological	Earth Sciences				
	Department					
Tsunami	Indian National Centre for	Earth Sciences				
	Oceanic Information Services					
Earthquake	Indian Meteorological	Earth Sciences				
	Department					
Floods	Central Water Commission	Water Resources				
Landslides	Geological Survey of India	Mines				
Avalanche	DRDO	Defence				

ON RECEIPT of 1st warning

- Set up control room at district level
- Alerting of officers/ARMY/NDRF/NAVY/ FIRE/POLICE Wide publicity through print/ electronic media

ON RECEIPT of 2nd warning

- In The officers in-charge for the areas/ mandals should proceed to respective areas
- ☑ The officers on leave should return to duty
- Evacuation of fisher men/ low-lying
- Area people to relief camps
- Positioning of ndrf/army/navy/ sdrf/poce/fire personnel in requied places
 - positioning of essential commodities

10. Analyze the role of advisory Agencies in the disaster Management. (Nov/Dec 2016)

In December 1999, UN General Assembly vide Resolution 54/219 created the United Nations Office for Disaster Risk Reduction (UNISDR), as a successor of the secretariat of the International Decade for Natural Disaster Reduction, in 2001. The Government of India had contributed US\$ 1 million in November, 2016 in the sideline of 7th Asian Ministerial Conference for Disaster Risk Reduction and signed a Statement of Cooperation to promote regional capacity buildings for the Asia Pacific Region in the field of Disaster Risk Reduction (DRR).

UNISDR has established following mechanism/ vehicles to achieve its objectives: **The World Conference on Disaster Risk Reduction (WCDRR):**

The World Conference on Disaster Risk Reduction (WCDRR) is a series of United Nations conferences focusing on disaster risk reduction and climate risk management in the context of sustainable development. The World Conference have been hosted by Japan: in Yokohama in 1994, in Kobe in 2005 and in Sendai in 2015. UNISDR served as the coordinating body for the Second and Third UN World Conference on Disaster Reduction in 2005 and 2015. The conferences bring together government officials and other stakeholders across the world to discuss how to strengthen the sustainability of development by managing disaster and climate risks. The Third UN World conference held in March 2015 adopted the Sendai Framework for Disaster Risk Reduction (2015–2030).

Global Platform for Disaster Risk Reduction (GPDRR):

It acts as the main global forum for continued and concerted emphasis on disaster risk reduction. Open to all Countries and the UNISDR stakeholders, it primarily assesses the progress made in the implementation of the Hyogo Framework for Action (HFA) now Sendai Framework for Disaster Risk Reduction (SFDRR), enhances awareness of disaster risk reduction, share experiences and learn from good practices, also identify remaining gaps and necessary actions to accelerate national and local implementation. It meets biannually and India attends its meeting regularly.

Asian Ministerial Conference for Disaster Risk Reduction (AMCDRR):

To monitor and share the country' s progress at a regional platform for Asian-Pacific region, AMCDRR was conceptualized. AMCDRR provides a platform for engagement of Ministers of about 61 countries, dealing with Disaster Management for plan and policy making at regional level in line with the global framework on disaster risk reduction. It meets biannually.

United Nations Disaster Assessment and Coordination (UNDAC):

The United Nations Disaster Assessment and Coordination (UNDAC) is a stand by team of disaster management professionals which are nominated and funded by member governments, OCHA, UNDP and operational humanitarian UN Agencies such as WFP, UNICEF and WHO. The UNDAC system is designed to assist the disaster affected country and the UN in meeting international needs for early and qualified information during the first phase of a sudden emergency, in the coordination of incoming international relief and in responding to a short notice

The Government of India joined the membership of UNDAC and paid, an amount of US \$50,000 in 2001, with UNOCHA, the implementing body of UNDAC programmes.

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International Search and Rescue Advisory Group (INSARAG):

International Search and Rescue Advisory Group (INSARAG) is a global network of more than 80 countries and disaster response organizations under the United Nations umbrella. INSARAG deals with urban search and rescue (USAR) related issues. INSARAG aims at establishing standards for international USAR teams and methodology for international coordination in earthquake response. Members of INSARAG are both earthquake-prone and responding countries and organisations.

Global Facility for Disaster Reduction and Recovery (GFDRR)

The Global Facility for Disaster Reduction and Recovery (GFDRR) is a global partnership program administered by the World Bank Group. GFDRR supports developing countries to: (i) mainstream disaster risk management and climate change adaptation in development strategies and investment programs, and (ii) improve the quality and timeliness of resilient recovery and reconstruction following a disaster. GFDRR was launched on September 29, 2006 to support implementation of the Hyogo Framework for Action 2005-2015 (HFA). On March 18, 2015, the Sendai Framework for Disaster Risk Reduction 2015-2030 (Sendai Framework) was adopted.

SAARC Disaster Management Centre

The 13th SAARC Summit at Dhaka in November 2005 considered the issues of regional cooperation for preparedness and mitigation of national disasters and approved the offer of India to set up a SAARC Disaster Management Centre (SDMC) in New Delhi. The Centre was inaugurated on 10th October 2006 at the premises of National Institute of Disaster Management (NIDM) in New Delhi.

Asian Disaster Preparedness Centre (ADPC)

Asian Disaster Preparedness Centre (ADPC) is established in 1986 at Bangkok, Thailand. It is a non- profit, non-political, autonomous, regional organization serving as a regional centre in Asia-Pacific for promoting disaster preparedness, disaster mitigation, awareness generation, exchange of information, community participation etc. India is a member of the Board of Trustees (BoT), since August 2000.

Asian Disaster Reduction Centre (ADRC)

The mission of ADRC is to enhance disaster resilience of the member countries, to build safe communities and to create a society where sustainable development is possible. The centre works to build disaster resilient communities and to establish networks among countries through many programmes including personnel exchange in this field. Currently, there are 29 member countries of ADRC. Each member country has to bear the annual contribution calculated on the basis of GDP.India is one of the founder members of ADRC. Presently, India contributes about US\$28,100 annually to ADRC as membership fee.

C405A.3 UNIT III INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation-IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

PART-A

1. Show the factors that affects vulnerability.(Nov/Dec Year 2021)

The main factors affecting vulnerability are

Wealth: The poor are less able to afford housing and other infrastructure that can withstand extreme events.

Education: Even without literacy, it is possible to educate a population about hazards in order to help it reduce its vulnerability.

Governance: The nature of both formal governments and informal governance in a population is another important factor. Governments can advance policies that reduce vulnerability

Technology: Technology can improve our ability to forecast extreme events, withstand the impacts of the events, and recover afterwards.

Age: Children and the elderly have fewer financial resources and are frequently dependent on others for survival

The major levels of Testing are as follows:

Unit testing (testing individual component), integration testing(testing integrated component), system testing(testing the entire system), and acceptance testing (testing the final system)

2. Mention the impacts of disaster on economy.(Nov/Dec Year 2021)

The term defines that any calamity which is beyond the capability of local community. It means that sources of income are meager and new opportunities to invest and flourish the business are remote. Rather focus is more on recovery than on prosperity. The economy indicators have to be change and new indicators has to be placed. Though there is a vast requirement of everything but priorities would make it difficult to divert resources on economic and business

activities as foremost requirement is to provide immediate relief assistance to the victims.

3. What are the impacts of disaster on ecology and environment? (Nov/Dec Year 2020)

The immediate affect a disaster makes is the change of ecology and environment of the affected area. Some new geological features like lakes can be formed which disturbs the ecological and environmental balance of the area. Destruction of roads, buildings and other infrastructure has its impact on the ecology and environment beside economic impacts.

Identify the environmental impacts of dams? (Nov/Dec Year 2020) 4.

The environmental impacts of dams are terrestrial ecosystem and biodiversity, green house emissions, downstream aquatic ecosystem and biodiversity, impacts of changes in flow regimes, impacts of trapping sediments and nutrients behind a dam and blocking migration of aquatic organisms.

5. Mention the causes of dam failure. (Nov/Dec Year 2020)

The causes of dam failure are earthquakes, extreme inflow, poor maintenance

- especially of outlet pipes, human or computer design error, internal erosion, sliding of mountain into reservoir, sub-stranded construction material, spill way design error and poor surveying
- What is meant by land use, land cover and zoning? (Nov/Dec Year 2019) 6. Land use is characterized by the arrangements, activities and inputs people undertake in a certain land cover type to produce, change or maintain it. Land cover is the physical material at the surface of the earth. Land cover include grass, asphalt, trees, bare ground, water etc. Zoning is the term used for designating permitted uses of certain parcels of land by local governments. Generally, in urban areas, zoning will be divided five major categories: residential, mixed residential-commercial, commercial, industrial, and special (e.g., power plants, sports complexes, airports, shopping malls etc.).
- What is the need of land use assessment? (Nov/Dec Year 2019) 7.
 - Land use information can be used to develop solutions for natural resource management issues such as salinity and water quality. More recent significant effects of land use include urban sprawl, soil erosion, soil degradation, salinization and desertification.
- State the effects of climatic change. (Nov/Dec Year 2018) 8.

The effect of climate change leads : Change in rain fall pattern and flooded area, Rise in sea level, Extreme heat, Soil erosion, Forest fire, Frequent drought and water shortage

9. What is adaptation in climate change? (Nov/Dec Year 2018)

Adaptation refers to adjustments in ecological, social or economic systems in response to actual or expected climatic stimuli and their effects or impacts. It refers to changes in processes, practices, and structures to moderate potential damages or to benefit from opportunities associated with climate change.

10. List the components for adaptation in climate change? (Nov/Dec Year 2017) The components are Observation of climatic and non-climatic variables,

Assessment of climate impacts & vulnerability, Planning & implementation, Monitoring & Evolution, Knowledge sharing & learning and Stockholders engagement.

11. What is IPCC? (Nov/Dec Year 2017)

The Intergovernmental Panel on Climate Change (IPCC) is a United Nations body, founded in 1988, which evaluates climate change science. The IPCC provides regular assessments of the scientific basis of climate change, its impacts and future risks, and options for adaptation and mitigation.

12. What is UNFCCC? (Nov/Dec Year 2016)

The United Nations Framework Convention on Climate Change (UNFCCC) defines climate change as " a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods".

13. What are IPCC climatic impacts for India? (Nov/Dec Year 2016)

The climatic impacts for India are changes in weather patterns, cyclonic disturbances, sea-level rise, changes in agricultural yields, changes in fresh water supply, impacts on forests and natural ecosystems and impacts on human health.

14. What is the need of indigenous knowledge in disaster management?(Nov/DecYear 2015)

The social and natural scientists are convinced that in many matters there is a need of integrating the indigenous knowledge into the modern scientific approaches, to anticipate natural hazards more effectively. Therefore, in the fast

growing risks of natural disasters worldwide, the mechanism of management is studied by many experts, and has come to the conclusion that indigenous knowledge is one of the key parameters for developing early warning systems (EWS), for disaster risk management.

15. Define displaced person. (Nov/Dec Year 2015)

The term refers to situations where people are forced to leave their homes or places of habitual residence as a result of a disaster or in order to avoid the impact of an immediate and foreseeable natural hazard.

16. Mention the factors contributing to Vulnerability. (Nov/Dec Year 2014)

The factors contributing to vulnerability are poverty, livelihoods, cultural belief, gender, weaker social group, equity. Example: The principal livelihoods of communities living in rural flood plains are mainly farming and fishing. However, recurring floods threaten their stability of their livelihoods owing to the loss of farm products or limited access to the markets for their products in the absence of adequate transport infrastructure. The landless poor, working as hired labourers, particularly during long flood seasons, have trouble finding jobs to meet their basic needs.

17. What is the IPCC? (Nov/Dec Year 2014)

The Intergovernmental Panel on Climate Change (IPCC) is an intergovernmental body of the United Nations that is dedicated to providing the world with objective,

scientific information relevant to understanding the scientific basis of the risk of human-induced climate change, its natural, political, and economic impacts.

18. What are the roles of IPCC? (Nov/Dec Year 2014)

The IPCC is an intergovernmental body sponsored by UNEP and WMO. The main decision-making body is the "Panel" which meets at regular intervals in plenary sessions at the level of government representatives of all 194 IPCC member countries. Its role is to assess on a comprehensive, objective, open and transparent basis the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts and options for adaptation and mitigation.

19. Mention some measures for mitigating and adapting to climatic change. (Nov/Dec Year 2013)

Some measures for mitigating and adapting to climatic change are

- Improving energy efficiency and opting for renewable energy over fossil fuels.
- Promoting public transport and sustainable mobility by increasing the numbers of journeys in towns by bicycle, reducing the number of flights and taking more trips by train or in shared cars.
- Promoting ecological industry, agriculture, fishing and livestock farming, food sustainability, responsible consumption and the 3Rs rule (reduce, reuse, recycle).
- By taxing the use of fossil fuels and CO2 emissions markets.

20. What is climate change adaptation? (Nov/Dec Year 2013)

Climate change adaptation refers to actions that reduce the negative impact of climate change, while taking advantage of potential new opportunities. It involves adjusting policies and actions because of observed or expected changes in climate.

21. Specify the role of technology in disaster management?

Land sat, SPOT Satellite, Satellite Radar System, Advanced Very High Resolution Radio & GIS can also be used in carrying out search and rescue operations in a more effective manner by identifying areas that are disasters prone and zoning them accordingly to risk magnitudes.

22. What is differential impact?

The term, 'differential impacts' refers to the discriminatory impacts experienced by different individuals, groups or communities when faced with an event with damaging consequences. Example: Among the affluent and the poor, the poor are continuously exposed to stressful living conditions and are better adapted to face the hardships encountered in disasters while the affluent are adapted to a luxurious lifestyle and will not be able to adjust to the harsh environment in the aftermath of a disastrous event.

23. Mention 3 examples of climatic change adaption

Some examples of climate change adaptation are

Predicting climate change related trends based on assessment of current risk, vulnerability and climate variability

- Integrate long-term sustainable development and poverty reduction strategies
- Strengthening existing capacities and Developing robust mobilization mechanisms and ensure financial and technical support to local disaster management officials
- Arrange improved and tested early warning systems, contingency plans along with integrated response to ensure effective community based adaptation and risk reduction.

24. What is Indigenous knowledge?

Indigenous knowledge is a unique way of gaining information about important facets of world's cultural diversity and is an important source of locally-appropriate sustainable development. Indigenous knowledge has proved to be of significance in reducing risk from disasters caused by natural phenomena like earthquake, cyclone, droughts, landslide, tsunami etc. Indigenous knowledge is culture specific and represents people's lifestyle.

25. List few examples of the use of indigenous knowledge to manage or mitigate the effects of disasters

Few examples of the use of indigenous knowledge to manage or mitigate the effects of disasters are

Indigenous construction practices for earthquake safe housing in Kashmir known as "Taq" and "DhajjiDewari" have earthquake resistant qualities

Bamboo plantation along canal bunds by villagers in Assam has protected embankments, bridges and roads from damage during heavy rains

The traditional and indigenous knowledge of the people of Sri Lanka helped the people build a village tank cascade system for drought mitigation and rural-well being in the drought-prone Purana villages of Sri Lanka

PART-B

1. Critically examine the various factors affecting vulnerability in disaster risk management. ? (Nov/Dec Year 2021)

The various factors affecting vulnerability in disaster risk management are

Poverty:

The widening gap between rich and poor, rural and urban incomes and hence the disparity in living standards can be witnessed in the flood plains of developing countries. For small landowners with marginal, degraded land, frequent flooding can decrease the returns from cultivating the land, thus reducing food security. The rural poor who depend on incomes from farming or other agricultural activities, with no reserves to help them them get back on their feet after a disturbance or pay for basic needs, are often obliged to migrate to the cities and are driven into debt. Newcomers to an urban setting, not being able to afford safe locations in the city, are obliged to settle in makeshift dwellings in informal settlements on marginal lands near the river or other drainages where they are extremely vulnerable to flooding.

Livelihoods:

The principal livelihoods of communities living in rural flood plains are mainly farming and fishing. However, recurring floods threaten their stability of the their livelihoods owing to the loss of farm products or limited access to the markets for their products in the absence of adequate transport infrastructure. The landless poor, working as hired labourers, particularly during long flood seasons, have trouble finding jobs to meet their basic needs.

Cultural beliefs:

Some cultural beliefs and fatalistic attitudes contribute to a community' s vulnerability. In some societies, natural disasters are considered to be acts of God and taken as if there is nothing human beings could do to prevent hazards from turning into disasters. Lack of faith in the social system and lack of confidence in the ability to manage flood risks manifests itself in resistance to any such change.

Equity:

Unequal distribution of resources and access to human rights can lead to conflicts and discontent, and in turn, the deterioration of social systems. For example, individuals who are denied the right to freedom of association and access to information may be precluded from discussing issues related to flood preparedness and mitigation planning, receiving essential fundamental services and taking preventive measures to protect themselves from flood hazards.In areas where flood diversion works are in place it may so happen that flood water are redirected into areas where poorer sections of the society with less political influence settle.

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Gender:

In societies where the decision-making power resides solely with the men of the family, ignoring the wisdom and experience of women and denying or limiting them the adequate access to knowledge and capacity development schemes, which otherwise may be available to men, can deny the society the use of such human resources and contribute to women' s vulnerability in terms of personal security, health and well being, economic security and livelihoods.

Weaker social groups:

In a society made up of various social groups, the needs of each group differ. Children, women, elderly and disabled people have unique group features that may add to their vulnerabilities in particular situations, such as during evacuation, sheltering, relief distribution and the rehabilitation process.

2. How disaster affect the developmental activities in a society. ? (Nov/Dec Year 2021)

Disasters derail development. According to the United Nations (UN), over the past two decades, disasters from natural hazards have affected more than 4 billion people, claimed more than 1 billion lives, and caused almost U.S. \$ 2 trillion in economic losses. Disasters have a devastating effect on development. Apart from loss of human life and economy, the psychological impact of

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disasters on the mental health of the affected people leads to low attendance at work and retards the economic growth of the region in general. The impact of disasters on specific development projects is discussed below-IMPACT ON DAMS

The drive for economic growth has exposed populations to increased risk.Destruction has been exacerbated by the development of dams in fragile ecosystems. Hence, disasters reveal boundaries and limits to development.All countries suffer from disasters but their impact is felt to the maximum extent in poor countries.In case of development project involved in construction of dams, the disasters like flash floods, earthquakes and landslides can delay the project and adversely affect the finances allocated to the project as additional expenditure will be required in operations like clearing of debris, redesigning the project to suit the changed landscape, salvaging the usable construction material and disposal of incomplete structure. The ongoing progress of the project is pushed back and the project is delayed considerably.

IMPACT ON EMBANKMENTS

An embankment is a wall of brick or stone built to prevent flooding. The natural disasters that can affect its development are Earthquakes, landslides, floods as all these disasters result in affecting the surface of the Earth. Earthquakes destabilise the foundation of the embankment causing it to collapse. Floods may weaken the bonds between the bricks and stones by dissolving the cement or water may act as a lubricant between stones causing the stones to slide against each other leading to collapse of the structure. Flood water may be absorbed into bricks and swelling of bricks may lead to cracking and ultimately collapse of the structure. Earthquakes cause embankments to collapse as the entire structure is built on land. Landslides cause a section of land to slide over another and this disturbance of land also collapses the embankments.

IMPACT ON CHANGES IN LAND-USE

Land-use refers to a particular purpose for which a parcel of land is used. Change in land-use refers to using a particular area of land for a different purpose than which it was being used. Examples of this are:

- 1. Clearing a forest area for residential purpose
- 2. Clearing a forest area for agriculture
- 3. Clearing a residential area for industries
- 4. Clearing agricultural land for industries etc

Disasters will have a profound impact on any change in land-use. This happens primarily because the local community will have experienced the area and will have the knowledge regarding the do's and don'ts in specific areas as a result of previous experience. Whenever there is a change in land-use pattern as listed above takes place activities of the new community might not be in synchronicity with the ecological cycle of resource withdrawal. This might result in disasters. Change in land-use has been the most common factor in recent natural disasters. Few examples are listed below:

Mangroves in coastal areas act as natural barriers to strong winds and

storm surge associated with land falling tropical cyclones. Cutting these mangroves for agriculture removes the natural barrier and thereby increases the intensity of land falling cyclones.

Mangrove ecosystems along the *mithi* river and *mahim* creek in Mumbai were destroyed and replaced with haphazard construction. Sewage and garbage dump also destroyed the mangroves. The Mumbai floods of July 26, 2005 is a classic example of modifying land-use contributing to a major disaster where more than 1000 lives were lost.

Chennai floods of 2015 and floods in Bengaluru and Hyderabad have demonstrated that haphazard change in land-use has become a major source of disasters caused by natural hazards

Major floods in Uttarakhand in 2014 and Kashmir have shown that land-use change and unplanned development have been the real cause of large-scale disasters.

3. Explain in detail climate change adaptation in India. ? (Nov/Dec Year 2020)

Climate change adaptation is a response to global warming in order to reduce the vulnerability of social and biological systems to relatively sudden change and thus offset the effects of global warming. Global warming and its effects are bound to last many years, and adaptation would be necessary to the resulting changes in climate. Adaptation is especially important in developing countries since those countries are predicted to face the effects of global warming. This capacity and potential for humans to adapt is unevenly distributed across different regions and populations. The developing countries generally have less capacity to adapt. Adaptation requires the situational assessment of sensitivity vulnerability environmental impacts. and to Adaptive capacity is closely linked to social and economic development. The economic costs of adaptation to climate change are likely to cost billions of dollars annually for the next several decades. The 2010 United Nations Climate Change Conference, called COP 16 was held in Cancún, Mexico where several donor countries promised an annual \$100 billion by 2020 through the Green Climate Fund for developing countries to adapt to climate change. However, although the fund set up during COP16 in Cancún, concrete pledges by developed countries have not been readily available as major donors like the USA have decided contributing the fund. to stop to However, the adaptation challenge grows with the magnitude and the rate of climate change. In another response to climate change called climate mitigation suggests reduction of Green House Gases (GHG) emissions or removal of these gases from the atmosphere through carbon sinks. It is now evident that reduction in emissions would not prevent further climate change impacts. Hence climate adaptation is the only option left. In the absence of mitigation efforts, the effects of climate change would make adaptation for some natural ecosystems impossible. Climate adaptation programs may interfere with existing development programs leading to unintended consequences for vulnerable groups. Some examples of climate

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change

adaptation

are-

Prioritizing adaptation efforts in communities that have higest vulnerability

Predicting climate change related trends based on assessment of current risk, vulnerability and climate variability

Integrate long-term sustainable development and poverty reduction strategies

Strengthening existing capacities

Developing robust mobilization mechanisms and ensure financial and technical support to local disaster management officials

Arrange improved and tested early warning systems, contingency plans along with integrated response to ensure effective community based adaptation and risk reduction

Disaster risk reduction and climate change adaptation cannot managed as individual events. They are inevitably interlinked

The community should be aware of relevant risks that should be quantifiable

Climate change adaptation and disaster risk reduction should be factored in all divisions

Capacity building efforts should take place at local, regional, national and international levels

Workers at the site help in achieving rescue efforts on the ground while international donors, agencies along with national governments play an important role in establishing an environment conducive to channel resources and technical support wher it is required.

International agencies like the red cross, help at the local level by their extensive volunteer base and long presence in communities

4. Outline the importance of indigenous knowledge. How is it helpful in disaster management. ? (Nov/Dec Year 2020)

According to the United Nations Educational, Scientific and Cultural Organization (UNESCO), indigenous knowledge refers to the understandings, skills and philosophies developed by societies with long histories of interaction with their natural surroundings. This knowledge (indigenous), influences the decision-making of day-to-day life for the local people.

Indigenous knowledge is essentially a complex mixture of:

-language

-systems of classification

-resource use practices

-interactions rituals and

-spirituality

Indigenous knowledge is a unique way of gaining information about important

facets of world's cultural diversity and is an important source of locally-appropriate sustainable development.

Indigenous knowledge has proved to be of significance in reducing risk from disasters caused by natural phenomena like earthquake, cyclone, droughts, landslide, tsunami etc. Indigenous knowledge is culture specific and represents people's lifestyle.

Local communities use indigenous knowledge to reduce risk, cope and survive natural disasters. Indigenous knowledge refers to methods and practices developed by a group of people who have an advanced knowledge of the local environment that has accumulated from several generations of habitations. The important characteristics of this type of knowledge that distinguish it from other types of knowledge is that it originates within the community, has as non-formal means of dissemination, is collectively owned, is developed over several generations and is subjected to adaptation. It is embedded in the community's way of life as a means of survival.

A few examples of the use of indigenous knowledge to manage or mitigate the effects of disasters are listed below:

Indigenous construction practices for earthquake safe housing in Kashmir known as "*Taq*" and "*DhajjiDewari*" have earthquake resistant qualities

Bamboo plantation along canal bunds by villagers in Assam has protected embankments, bridges and roads from damage during heavy rains

The rich collection of indigenous knowledge uses local resources is cost efficient in the case of locals of Philippines who use it to master the damages by seasonal typhoons

The traditional and indigenous knowledge of the people of Sri Lanka helped the people build a village tank cascade system for drought mitigation and rural-well being in the drought-prone Purana villages of Sri Lanka

Indigenous knowledge (*Mokken knowledge*) helped several people survive the *killer Tsunami* of 2007 in Thailand

Indigenous knowledge for weather forecasting is extensively used in the drought prone areas of Vietnam. In this case, farmers use moon observations and observe the habits of insects to cultivate crops. This indigenous knowledge is passed on through thousands of years from generation to generation by the community

The '*Karez*' technology is used in China to combat droughts. This is an indigenous knowledge in Xinjiang area of China that makes use of underground water efficiently. It takes advantage of topography for gravity irrigation and is still in use. This indigenous technology can be used in the face of a severe drought disaster.

5. Write in detail about the IPCC report scenario in the context of India. ? (Nov/Dec Year 2019)

The IPCC synthesis report, released on November 1, outlines the effects of

climate change on all regions of the world. Given below are the implications of climate change specifically for India and Asia, with observations from the synthesis report and the draft IPCC Assessment Report (AR5)

In India, the estimated countrywide agricultural loss in 2030 is over \$7 billion. It will severely affect the income of 10 per cent of the population.

Monsoon sorghum grain yield is projected to decline by 2-14 per cent by 2020, with worsening yields by 2050 and 2080. Wheat yields in the Indo-Gangetic plains are expected to experience a 51 per cent reduction in the most high-yielding areas due to heat stress. This region currently produces 14 to 15 per cent of the world's wheat and feeds around 200 million people of the region.

With current temperatures approaching critical levels in North India in October, South India in April and August and in East India from March to June, rice development will accelerate and reduce the time required for growth. A third of forest areas in India are projected to change by 2100, with deciduous forests changing into evergreen ones due to increased precipitation. Human pressures are, however, expected to slow these changes. With India' s GDP growth, transport emissions are growing much faster than the value of trade, leading to a further increase in greenhouse gas emissions.

Health

- Pollution-induced changes in air and water quality, as well as changing weather patterns, are expected to have wide-reaching effects on the health of Indians, according to the report.
- In addition to flood deaths, contamination of urban flood waters will increase the risk of water-borne diseases.
- Mental disorders and post traumatic stress syndrome have also been seen in extreme weather events and disaster-prone areas.
 - High temperatures are associated with mortality rates in India and heat waves will especially affect outdoor workers. Air pollution in combination with increased temperatures will also affect the health of people.
 - Studies have found correlation between the prevalence of vector-borne diseases like malaria and rainfall in India.

Adaptation

Based on extensive research, the report recommends mitigation measures to conserve agriculture, water supply and air quality.

- Agricultural losses could be reduced by 80 per cent if cost-effective climate resilience measures are implemented.
- Reservoirs will partly address the problem of water scarcity. Water management in the Indus, Ganga, Brahmaputra and Meghna river basins would benefit from integrated coordination among Bangladesh, India, Nepal and Pakistan.
- Efforts to decarbonizes electricity production in India is projected to decrease mortality due to reduced PM5 and PM2.5 particulates.
- Policies to increase public transportation, promote walking and cycling, and reduce private cars will increase air quality and decrease the health

an improvement in respiratory and cardiac health among women and children in India.

6. illustrate the differential impacts in detail. ? (Nov/Dec Year 2019)

The term, 'differential impacts' refers to the discriminatory impacts experienced by different individuals, groups or communities when faced with an event with damaging consequences. With respect to the consequences of disasters (natural or man-made), a community or society can be broadly classified into the following groups-

- **Females**
- **Males**
- ☑ Affluent
- **Poor**
- ☑ Labourers
- **Disabled**
- Children
- **Old people**.

Each group has their weaknesses that make them vulnerable to disasters. Another aspect that complicates the issue of differential impacts is that the above classification is not rigid. A certain group can be sub-divided into groups or may fall within another group. For example, the group called 'females' consists of babies, girls, young ladies or old and infirm women. Also, all the groups fall under one broad group called 'human beings'. Hence the effects of a damaging event has different impacts on different individuals in different groups.

- A simple list of different impacts on different people is listed below-Old people, the disabled and babies will not be in a position to save themselves against any disaster without support. This group of people are extremely vulnerable (health-wise) to the slightest adverse conditions
- Young males can easily resist adverse conditions and help save others along with playing an important role in response, rescue, recovery and reconstruction work. The laborers could be male or female and have better survival instincts due to extensive physical work in the open
- Among the affluent and the poor, the poor are continuously exposed to stressful living conditions and are better adapted to face the hardships encountered in disasters while the affluent are adapted to a luxurious lifestyle and will not be able to adjust to the harsh environment in the aftermath of a disastrous event.
- 7. Discuss the effects of global warming in climatic change. ? (Nov/Dec Year 2018)

The temperature of the troposphere is now slightly under 1° C above the pre-industrial and is continuing to rise due to increasing emission of greenhouse gasses. This warming is characterised by less predictable, increasingly severe weather events, which include the following:

Temperatures: temperature extremes are setting new record highs and fewer days of extreme cold, though these do occur in the northern hemisphere due to distortion of the polar vortex.

Droughts: affecting farmland and habitat are becoming longer lasting – in many cases lasting over 5 years and reducing river flows.

Evaporation: Increased evaporation of water from soil and lakes occurs because the troposphere is getting warmer and able to hold more water in the form of vapour.

Wind Events such as cyclones and tornados may be less frequent but are more powerful and destructive, their strength increased by rising sea surface temperature.

Rainfall: In some areas rainfall has become less frequent but heavier and of longer duration, while hail storms have become more severe, often with larger hail stones.

On-going global warming will cause these events to become more frequent, last longer and become more severe. Alone or in combination they will continue to cause increasing damage to the environment in the following ways:

Rising temperatures are the principal cause of coral reefs dying, the loss of fish habitat and the protection they provide to low-lying coastal land from erosion by ocean wave action, making them vulnerable to flooding. On-shore temperature extremes are already setting new record highs resulting in declining food production and premature deaths. Droughts and evaporation of surface water produce similar effects, converting some food bowls to dust bowls, increasing the rate of desertification and killing flora and fauna. Droughts in some parts of Australia have lasted over 8 years, causing rivers to run dry, preventing crop sowing, forcing destocking and overland transport of water to enable survival of town populations.

Combined, these events result in ferocious bushfires which are increasingly difficult to control, causing huge losses of trees, vegetation, fauna and property

– including livestock – all becoming more and more costly to replace, more often forcing abandonment. They also enable pathogens and pests such as mountain pine beetles to invade and kill millions of trees and the spread of vectors carrying human diseases into areas hitherto free of them.

Wind events, often accompanied by heavy rainfall, are becoming more frequent and often result in flooding, loss of human life, damage to property, the environment and crop losses. They produce tidal surges which erode coastlines and flood low lying land.

8. Write note on appropriate knowledge and local resources in disaster management. ? (Nov/Dec Year 2018)

The word 'appropriate' refers to apt or suitable. and therefore, the phrase 'appropriate knowledge' refers to knowledge that is regarding any particular subject. In the context of disaster management, 'appropriate knowledge' refers to knowledge of importance that will help in understanding the causes of the event, techniques to prevent recurrence of such disastrous events and most importantly knowledge to save lives of the people needing help. Appropriate knowledge in the context of disaster management encompasses knowledge regarding the local conditions, history of disastrous events in the past and the techniques employed to survive them. Appropriate knowledge can vary depending on the disaster. In case of earthquakes, volcanoes, tsunamis and landslides the expertise of a geologist will prove invaluable. The knowledge of a meteorologist is extremely valuable to predict storms and cyclones. Knowledge of a hydrologist, agricultural scientist and a meteorologist can help predict the occurrence of a drought or famine. Hence, different types of disasters require the expertise of different specialists. For a field as broad and unpredictable as disaster management, there might be a requirement of an expert from any field. This emphasizes the need for appropriate knowledge in order to tackle any disaster

Local resources in disaster management

Disasters always occur at the local level. The local government maintains control over all assets used in response and recovery efforts.

People from the local community for the local resources when a disaster strikes

Local people from the community act as the first primary provider of

emergency response service

Local people activate the Emergency Operations Center (EOC) and comprehensive emergency management plan

Local resources coordinate the response with public and private organizations and agencies

The local resources notify the state emergency management agency of the situation by regularly submitting situation reports

The local resources activate necessary local governments and organizations that are signatories to mutual aid contracts

The local resources can request the state to provide assistance

9. Explain climatic change adaptive capacity in various section sectors. ? (Nov/Dec Year 2017)

Climate change adaptation refers to actions that reduce the negative impact of climate change, while taking advantage of potential new opportunities. It involves adjusting policies and actions because of observed or expected changes in climate. Adaptation can be reactive, occurring in response to climate impacts, or anticipatory, occurring before impacts of climate change are observed. In most circumstances, anticipatory adaptations will result in lower long-term costs and be more effective than reactive adaptations.

Water Resources

Water managers have experience adapting to change. Many techniques exist to assess and implement adaptive options. However, the pervasiveness of climate change may preclude some traditional adaptive strategies, and available adaptations often are not used.

- Adaptation can involve management on the supply side (e.g., altering infrastructure or institutional arrangements) and on the demand side (changing demand or risk reduction). Numerous no-regret policies exist that will generate net social benefits regardless of climate change.

Climate change is just one of numerous pressures facing water managers.
 Nowhere are water management decisions taken solely to cope with climate change, although it is increasingly considered for future resource management.
 Some vulnerabilities are outside the conventional responsibility of water managers.

- Estimates of the economic costs of climate change impacts on water resources depend strongly on assumptions made about adaptation. Economically optimum adaptation may be prevented by constraints associated with uncertainty, institutions, and equity. - Extreme events often are catalysts for changes in water management, by exposing vulnerabilities and raising awareness of climate risks. Climate change modifies indicators of extremes and variability, complicating adaptation decisions.

- Ability to adapt is affected by institutional capacity, wealth, management philosophy, planning time scale, organizational and legal framework, technology, and population mobility.

 Water managers need research and management tools aimed at adapting to uncertainty and change, rather than improving climate scenarios

Ecosystems and Their Services

Adaptation to loss of some ecosystem services may be possible, especially in managed ecosystems. However, adaptation to losses in wild ecosystems and biodiversity may be difficult or impossible.

- There is considerable capacity for adaptation in agriculture, including crop changes and resource substitutions, but adaptation to evolving climate change and interannual variability is uncertain.

- Adaptations in agriculture are possible, but they will not happen without considerable transition costs and equilibrium (or residual) costs.

- Greater adverse impacts are expected in areas where resource endowments are poorest and the ability of farmers to adapt is most limited

. – In many countries where rangelands are important, lack of infrastructure and investment in resource management limit options for adaptation.

- Commercial forestry is adaptable, reflecting a history of long-term management decisions under uncertainty. Adaptations are expected in both land-use management (species-selection silviculture) and product management (processing-marketing).

- Adaptation in developed countries will fare better, while developing countries

and countries in transition, especially in the tropics and subtropics, will fare worse.

Coastal Zones

Without adaptations, the consequences of global warming and sea-level rise would be disastrous.

- Coastal adaptation entails more than just selecting one of the technical options to respond to sea-level rise (strategies can aim to protect, accommodate, or retreat). It is a complex and iterative process rather than a simple choice.

– Adaptation options are more acceptable and effective when they are incorporated into coastal zone m a nagement, disaster mitigation programs, land-use planning, and sustainable development strategies

- Adaptation choices will be conditioned by existing policies and development objectives, requiring researchers and policymakers to work toward a commonly acceptable framework for adaptation.

- The adaptive capacity of coastal systems to perturbations is related to coastal resilience, which has m o rphological, ecological, and socioeconomic components.

Enhancing resilience—including the technical, institutional, economic, and cultural capability to cope with impacts—is a particularly appropriate adaptive strategy given future uncertainties and the desire to maintain development opportunities.

- Coastal communities and marine-based economic sectors with either low exposure or high adaptive capacity will be least affected. Communities with less economic resources, poorer infrastructure, less developed communications and transportation systems, and weak social support systems have less access to adaptation options and are more vulnerable.

Human Settlements, Energy, and Industry

- The larger and more costly impacts of climate change occur through changed probability of extreme weather events that overwhelm the design resiliency of human systems.

- There are many adaptation options available to reduce the vulnerability of settlements. However, urban managers, especially in developing countries, have so little capacity to deal with current problems (housing, sanitation, water, and power) that dealing with climate change risks is beyond their means)

 Lack of financial resources, weak institutions, and inadequate or inappropriate planning are major barriers to adaptation in human settlements.

- Successful environmental adaptation cannot occur without locally based, technically competent, and politically supported leadership. Uncertainty with respect to capacity and the will to respond hinder the assessment of adaptations and vulnerability.

Insurance and Other Financial Services

- Adaptation in financial and insurance services in the short term is likely to be to changing frequencies and intensities of extreme weather events.
- Increasing risk could lead to a greater volume of traditional business and the

development of new financial risk management products, but increased variability of loss events would heighten actuarial uncertainty.

- Financial services firms have adaptability to external shocks, but there is little evidence that climate change has been incorporated into investment decisions.

- The adaptive capacity of the financial sector is influenced by regulatory involvement, the ability of firms to withdraw from at-risk markets, and fiscal policy regarding catastrophe reserves.

Adaptation will involve changes in the roles of private and public insurance.
 Changes in the timing, intensity, frequency, and/or spatial distribution of climate-related losses will generate increased demand on already overburdened government insurance and disaster assistance programs.

- Developing countries seeking to adapt in a timely manner face particular difficulties, including limited availability of capital, poor access to technology, and absence of government programs.

Insurers' adaptations include raising prices, nonrenewal of policies, cessation of new policies, limiting maximum claims, and raising deductibles — actions that can seriously affect investment in developing countries.

- Developed countries generally have greater adaptive capacity, including technology and economic means to bear the costs.

Human Health – Adaptation involves changes in society, institutions, technology, or behaviour to reduce potential negative impacts or to increase positive ones. There are numerous adaptation options, which may occur at the population, community, or personal levels.

The most important and cost-effective adaptation measure is to rebuild public health infrastructure— which, in much of the world, has declined in recent years. Many diseases and health problems that may be exacerbated by climate change can be effectively prevented with adequate financial and human public health resources, including training, surveillance and emergency response, and prevention and control programs. Adaptation effectiveness will depend on timing.
 " Primary" prevention aims to reduce risks before cases occur, whereas " secondary" interventions are designed to prevent further cases.

- Determinants of adaptive capacity to climate-related threats to health include the level of material resources, the effectiveness of governance and civil institutions, the quality of public health infrastructure, and the pre-existing burden of disease.

- Capacity to adapt also will depend on research to understand associations between climate, weather, extreme events, and vector-borne diseases.

10. Explain about United Nations Framework Convention on Climate Change (UNFCC)? (Nov/Dec Year 2017)

The 1992 United Nations Framework Convention on Climate Change (UNFCCC) develops a global response to stabilizing greenhouse gas concentrations in the atmosphere.

The primary objective of the UNFCCC is to achieve stabilization of greenhouse

gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

UNFCCC commitments made by New Zealand along with other developed country parties (referred to as Annex I Parties) include:

adopt national policies to mitigate climate change through limiting anthropogenic (human-induced) emissions of greenhouse gases and protecting and enhancing our greenhouse gas sinks and reservoirs

report detailed information on greenhouse gas inventories, national actions and projected human-induced greenhouse gas emissions and removal by sinks, according to timeframes set in the UNFCCC

take into account climate change considerations, in relevant social, economic and environmental policies and actions

promote, and cooperate in, relevant scientific and technological research and exchange information in such areas (including transferring technology to developing countries)

provide additional financial resources to meet the agreed full costs incurred by developing countries in complying with their obligations under the UNFCCC

promote public awareness of, and education about, climate change issues. **Kyoto Protocol**

The international community recognized that more urgent action, with more powerful and legally binding measures than what was required under the UNFCCC, was needed. Negotiations on a subsidiary agreement under the UNFCCC, now known as the Kyoto Protocol, began in 1995. The Kyoto Protocol came into force in 2005 after 55 countries ratified it (including those responsible for 55 per cent of global emissions).

C405A.4 UNIT IV DISASTER RISK MANAGEMENT IN INDIA

Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

PART-A

1. What is a multi-hazard? ? (Nov/Dec Year 2021)

Multi-hazard is to describe the independent analysis of multiple different hazards (e.g., landslides, earthquakes, volcanic eruptions, flooding) relevant to a given area.

2. Write a note on India' s natural vulnerability to disaster. (Nov/Dec Year 2021)

- India's natural vulnerability to disaster are as follows
 - ☑ 57% land is vulnerable to earthquakes. Of these, 12% is vulnerable to severe earthquakes.
 - 68% land is vulnerable to drought.

- \blacksquare 12% land is vulnerable to floods.
- 8% land is vulnerable to cyclones.
- Apart from natural disasters, some cities in India are also vulnerable to chemical and industrial disasters and man-made disasters.

3. Define disaster relief. (Nov/Dec Year 2020)

Disaster Relief refers to the provision of essential, appropriate and timely humanitarian assistance to those affected by a disaster, based on an initial rapid assessment of needs and designed to contribute effectively and speedily to their early recovery. It consists of the delivery of a specific quantity and quality of goods to a quantified group of beneficiaries, according to selection criteria that identify actual needs and the groups that are least able to provide them for themselves.

4. Highlight the components of disaster relief. (Nov/Dec Year 2020)

The main components of disaster relief are water, food, sanitation, shelter, heath and waste management. A disaster can easily disrupt the food supply at any time. Hence plans must be made to have at least three days of food readily available. Water is essential for all living organisms. During disaster relief operations ,arrangements for at least three and a half liters (3.5l) of potable water per person per day should be made. Sanitation is an essential component during relief since disasters pose significant health threats in the form of contaminated drinking water and spread of infectious diseases. In the event of a disaster, the agency responding to the disaster should make arrangements to provide temporary shelter to the affected community

5. Mention emergency risk management for health. (Nov/Dec Year 2019)

- Emergency risk management for health is multi sectoral and refers to the systematic analysis and management of health risks, posed by emergencies and disasters, through a combination of (i) hazard and vulnerability reduction to prevent and mitigate risks (ii) preparedness (iii) response (iv) recovery measures
- 6. List the features of an Emergency situation in disaster management? (Nov/Dec Year 2019)

The features of an Emergency situation in disaster management are

- Sense of urgency in decision-making under constraints
- Limited information or overload of information
- Multiplicity of stake-holders and responders
- ☑ Complexities of co-ordination
- The capacity of the local community and government to respond effectively often overwhelmed..
- 7. What are the institutional disaster arrangements for enhanced quality of life? (Nov/Dec Year 2018)

The institutional disaster arrangements for enhanced quality of life are:

Revitalizing local economy · Improved public safety ,Equity and civic engagement · Disaster resilience · Improved governance · Greater accountability and ownership · Enhanced spaces for ideation and civic discourse · Housing · Quality Education · Mobility · Health Care · Employment and Livelihood Protection

8. What is NDRF? (Nov/Dec Year 2018)

The National Disaster Response Force (NDRF) is an Indian specialised force constituted for the purpose of specialist response to a threatening disaster situation or disaster" under the Disaster Management Act, 2005. The head of the NDRF is designated as Director General. The Director Generals of NDRF are IPS officers on deputation from Indian police organisations.

- 9. What do you understand by disaster resilience? (Nov/Dec Year 2017) Disaster resilience is the ability of individuals, communities, organizations and states to adapt to and recover from hazards, shocks or stresses without compromising long-term prospects for development
- Outline the disaster risk reduction legislation? (Nov/Dec Year 2017)
 Laws and regulations serve as a foundation for building community resilience.
 They are essential to reducing existing risks posed by natural hazards, preventing new risks from arising and making people safer.

11. Identify the role of GIS.(Year Nov/Dec 2021)

GIS is a tool that allows users to create interactive queries (user created searches), analyze the spatial information, edit data, maps, and present the results of all these operations. GIS provides environment for effective and efficient storage and manipulation of remotely sensed or other spatial and non-spatial data types for both scientific management and policy oriented information. The specific applications in Risk Assessment are Hazard mapping to show earthquake, floods, landslide or fire. These maps are used for warning system

12. Specify the objectives of disaster damage assessment. (Nov/Dec Year 2016)

The basic objectives of damage assessment could be summarized as follows:

- To make a rapid assessment of areas affected to know the extent of impact for purpose of immediate rescue and relief operations;
- To prepare estimates for the amount of relief to be provided and the mode of relief, be it food, clothing, medicines, shelter or other essential commodities;
- To make a detailed assessment regarding requirements for long-term relief and rehabilitation planning;
- It To identify focus areas for the purpose of 'retrofitting' actions in similar future situations.
- 13. Name the man-made hazard vulnerability of India. (Nov/Dec Year 2016) Urban Fires (due to human errors and technical faults, mostly short-circuit) Terrorist Related Disasters.

Civil Disorder

Rail, Road and Air accidents etc.

Boat Capsizing/Ship wreck

Industrial Accidents& Building Collapses Epidemics Stampedes

14. Write a note India's disaster on flood. (Nov/Dec Year 2015)

India is highly vulnerable to floods and out of the total geographical area of 329 mha, more than 40 mha is flood prone while the average area affected by floods

annually is about 8 million hectares. Floods are recurrent phenomenon, which cause huge loss of lives and damage to livelihood system, property, infrastructure and public utilities.

15. List the three main interlinked components of disaster risk. (Nov/Dec Year 2015)

Disaster risk is a function of three interlinked components: hazards, Exposure and vulnerability.

(i)Hazard refers to the likelihood and intensity of a potentially destructive natural phenomenon, such as ground shaking induced by an earthquake or extreme winds associated with a cyclone.

(ii)Exposure refers to the location, attributes, and value of people and assets (such as buildings, agricultural land, and infrastructure) that are exposed to the hazard. (iii)Vulnerability is the potential extent to which physical, social, economic, and environmental assets may become damaged or disrupted when exposed to a hazard event..

16. Write about Disaster Management Act? (Nov/Dec Year 2014)

The Disaster Management act came into effect on 23rd December 2005 and it applies to the whole of India. For the purpose of disaster management, the centre shall set-up a body called the National Disaster Management Authority (NDMA) with the Prime Minister of India holding the position of chairperson, exofficio. The Chairperson shall nominate a maximum of nine members to the NDMA and designate one of the nine members as the vice-chairperson. The NDMA is responsible for laying down policies, plans and guidelines for disaster management to ensure timely and effective response to a disaster. The NDMA can recommend provision of funds for disaster mitigation

17. What is Crisis Management Group (CMG)? (Nov/Dec Year 2014)

The CMG coordinates activities of central ministries and state governments in relation disaster preparedness and relief In the event of a natural disaster, the CMG meets frequently to review relief operations and extend all possible to overcome the situation effectively. All the secretaries of concerned ministries are the members of CMG and they implement the decisions of the cabinet committees .

18. Mention some programs related to disaster management. (Nov/Dec Year 2013) The National Disaster Management Authority (NDMA) hosts several programs for mitigation and responsiveness for specific situations. A few of the programs include:

- National Cyclone Risk Management Project
- School Safety Project
- Decision Support System
- Scheme for training of community volunteers for disaster response in thirty most flood prone districts in India
- Sustainable reduction in disaster risk in ten multi-hazard prone districts in five states of India

Capacity building on disaster management for IAS and central service officers at Lal Bahadur Shastri National Academy of Administration (LBSNAA), Mussoorie

19. Define Sendai Framework. (Nov/Dec Year 2013)

The Sendai Framework for Disaster Risk Reduction (2015–2030) is an international document which was adopted by UN member states between 14th and 18th of March 2015 at the World Conference on Disaster Risk Reduction held in Sendai, Japan and endorsed by the UN General Assembly in June 2015.

20. Write note on Legislation for disaster management.

Laws and regulations serve as a foundation for building community resilience. The Hyogo Framework for Action (HFA) highlighted the importance of good legislation for effective disaster management. The Sendai framework adopted in 2015 insists for a renewed focus on reviewing and strengthening legal frameworks.

21. Define Disaster response

Disaster response refers to actions taken during and immediately after a disaster to ensure that its effects are minimized, and that people affected are given immediate relief and support. These include providing food, water, shelter, and medical aid, removing people from danger, among other outreach efforts.

22. What is DDMA?

DDMA means District Disaster Management Authority. The vision of the District Disaster Management Authority (DDMA) is to create a dedicated body for mitigation of disasters at the district level. The DDMA should ensure that areas in the district vulnerable to disasters are identified and mitigation measures are

taken up by the concerned authorities.

23. Write note on Disaster Management Act 2005.

The Disaster Management act came into effect on 23rd December 2005 and it applies to the whole of India. According to Disaster Management Act 2005, for the purpose of disaster management, the centre shall set-up a body called the National Disaster Management Authority (NDMA) with the Prime Minister of India holding the position of chairperson, exofficio. The Chairperson shall nominate a maximum of nine members to the NDMA and designate one of the nine members as the vice-chairperson. The members shall meet as necessary as deemed by the chairperson of the NDMA. The NDMA is responsible for laying down policies, plans and guidelines for disaster management to ensure timely and effective response to a disaster.

24. What is NIDM?

The NIDM (National Institute for Disaster Management) has been mandated by the Govt. of India to be a deemed University and institute of excellence on higher learning and capacity building. Under the Disaster Management Act 2005, NIDM has been assigned nodal responsibilities for human resource development, capacity building, training, research, documentation and policy advocacy in the field of disaster management.

25. List some programs related to disaster management.

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The National Disaster Management Authority (NDMA) hosts several programs for mitigation and responsiveness for specific situations. A few of the programs include:

- National Cyclone Risk Management Project
- School Safety Project
- Decision Support System
- Scheme for training of community volunteers for disaster response in thirty most flood prone districts in India
- Sustainable reduction in disaster risk in ten multi-hazard prone districts in five states of India.

PART-B

1. How will you assess the loss and damage to human life in disasters? Assessing the loss and damage to human life. (Nov/Dec Year 2021)

Safety of human life is one of the prime objective of any humanitarian action. The life of any human being is invaluable for the family, friends and for the larger community and social groups. Risk to human life during natural disasters varies depending on factors such as gender, age, social status, etc. The inequalities, poverty and other social imbalances contribute to this risk. The disaster may not cause deaths but injury or disability and stress and trauma to the affected persons. This has grave ramifications on the lives of the affected, their relatives and

friends.

Besides such impact, the loss of human lives may affect other aspects of the lives of the survivors that may be necessary for dignified living such as ability of the families to earn and the loss of care and protection providers. This loss due to the natural disasters is most overwhelming and brings focused attention to the region. The loss of human life shapes the humanitarian response, as this is the greatest loss that any affected region has to bear. The loss of human life, therefore, is the most critical part of any damage assessment. The following section focuses on varying degrees of such losses in the event of natural disaster.

What we need to know and why

The first information regarding this loss is to determine the baseline data related to the number of families residing in the affected area, where the damage assessment is being undertaken. The loss and damage to human life can be understood by its varying extent such as i) deaths, ii) permanent disabilities, iii) major injuries, iv) minor injuries and v) missing. Details of minor injury, major injury and permanent disability are essential to formulate immediate care and support system; as well as to plan long-term support and follow-up mechanisms. In cases of death or injury, information like death certificate by police or authorities, injury certificate by hospital or the government doctor is needed for government support or compensation. Similarly, in case of missing people, it is important to understand if legalities like police complaint have been registered or not, which may be essential for the affected families to access government assistance. It is also important to know whether they have received government assistance or compensation to cope with the distress.

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Data should be segregated gender wise, age wise or occupation wise to develop deeper understanding. Details of occupation also provide a hint of economic status of families. Similarly, details of family members of the affected person are essential; as it enables us to determine the number of earning members and dependents within the family. It might be possible that a person, who has died or has become permanently disabled, was the only earning member of the family. It would enable us to understand the family structure (nuclear family or joint family) and their support system. It also gives information relating to woman headed family or old age family.

When we assess loss of life, it is important to pay attention to certain special groups of people who tend to get left out in the enumeration process. Migrant workers, tourists and travelers or unregistered informal sector workers may be difficult to estimate because of the lack of such records. After disasters, it may be difficult to ascertain the accurate figures of such groups. In the aftermath of disaster, sometimes locals leave or evacuate the place for long time, even such people sometimes are left out in enumeration due to the lack of reliable sources of information. All this information helps in the effective targeting of the humanitarian response.

Assessment methodology and tools

Though assessing the loss of life should not be such a complex task, reality suggests otherwise. Past experience shows that usually the official figures about the loss are either underestimated or overestimated. After the Gujarat earthquake, it was mentioned that nearly 100000 deaths had occurred; which was soon corrected by the Government to be around 30000. The Government of India, after one month, put this figure at 19727. However, the Gujarat State Disaster Management Authority states the number of reported deaths to be 13805. It is, therefore, essential to have an assessment methodology that uses the community information and is credible for the humanitarian response planners. Following assessment tools and methodologies are proposed for assessing loss of human life.

Informal discussions

Assessing loss of life is a difficult task for the field practitioners because at the time of assessment, the community may be under severe trauma. It is, therefore, very important to have an empathetic attitude and support the people in such difficult times. Instead of making the assessment through structured participatory tools, it is best to go around in the village and meet people informally, to understand the extent of the loss. It is important to transect through the village and go to areas inhabited by different community groups to be with them. It is very important to understand the demographic context of the village, particularly with regard to informal workers, travelers, visitors and migrants to get an idea of the death toll. Informal discussions with the people about the tragic event will slowly reveal the number of human lives lost. At the time of making such

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assessments after disaster, it is important to ensure that any social-cultural ritual, if being undertaken by the community, during such period is respected and empathy expressed. Similarly, an empathetic attitude is necessary even while enquiring about injuries and the injured. It is also necessary that the field practitioners do not hurry finishing the assessment; and instead proceed at a pace that does not disturb the affected community.

Secondary sources

Collecting information from secondary sources is also important. Loss of life is estimated by community institutions, media and the Government and many a time they may come up with different figures. It is important that the damage assessment report mentions all the figures published under different sources. These figures may be based on community's own estimate, media assessment, local government functionary's report, etc. As the time passes, the number of deaths and missing becomes clearer. The purpose of the damage assessment tools is not to arrive at one particular number by applying any logic or rationale, but to understand the context and extent. The accurate numbers in a specific location may be found out through a community based survey once the community has begun to recover and is in a position to deal with the loss.

Information compilation

From these sources - informal discussions and secondary reports, the information about various human life damages should be compiled. The government data that is available from the district or local officials should be obtained and shared with the village to ensure appropriate confirmation. As the community may be under severe trauma due to bereavement and injuries to their loved ones, any dialogue must be conducted sensitively. Addition of more information may be useful for the entitlement and monitoring of the response programme by the community. This stage of compilation can go a long way in ensuring inclusion of the marginalized community members.

	Name of	Detail of G										Gov	ern	
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m	survivor of		missing										sist	
ily	the family		and injury a									anc	ance	
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2. Enumerate the possible risk reduction measures in flood. (Nov/Dec Year 2021)

Flood is a state of high water level along a river channel or on the coast that leads to inundation of land, which is not usually submerged. Floods may happen gradually and also may take hours or even happen suddenly without any warning due to breach in the embankment, spill over, heavy rains etc. There are different types of floods namely: flash flood, riverine flood, urban flood, etc.

Flash floods can be defined as floods which occur within six hours of the beginning of heavy rainfall, and are usually associated with cloud bursts, storms and cyclones requiring rapid localized warnings and immediate response to reduce damage. Wireless network and telephone connections are used to monitor flood conditions. In case of flash floods, warnings for timely evacuation may not always be possible.

Causes: There are several causes of floods and differ from region to region. The causes may vary from a rural area to an urban area. Some of the major causes are: a. Heavy rainfall

b. Heavy siltation of the river bed reduces the water carrying capacity of the rivers/stream.

- c. Blockage in the drains lead to flooding of the area.
- d. Landslides blocking the flow of the stream.
- e. Construction of dams and reservoirs

f. In areas prone to cyclone, strong winds accompanied by heavy down pour along with storm surge leads to flooding

Typical Adverse Effects: The most important consequence of floods is the loss of life and property. Structures like houses, bridges; roads etc. get damaged by the gushing water, landslides triggered on account of water getting saturated, boats and fishing nets get damaged. There is huge loss to life and livestock caused by drowning. Lack of proper drinking water facilities, contamination of water (well, ground water, piped water supply) leads to outbreak of epidemics, diarrhoea, viral infection, malaria and many other infectious diseases. Flooding also leads to a large area of agricultural land getting inundated as a result there is a huge crop loss. This results in shortage of food, and animal fodder. Floods may also affect the soil characteristics. The land may be rendered infertile due to erosion of top layer or may turn saline if sea water floods the area Distributional Pattern of floods in India Floods occur in almost all the river basins of the country. The Vulnerability Atlas of India shows pictorially the areas liable to floods. Around 12 per cent (40 million hectare) of land in India is prone to floods. Most of the flood affected areas lie in the Ganga basin, Brahmaputra basin (comprising of Barak, Tista, Torsa, Subansiri, Sankosh, Dihang and Luhit), the northwestern river basin (comprising Jhelum, Chenab, Ravi, Sutlej, Beas and the Ghagra), peninsular river basin (Tapti, Narmada, Mahanadi, Baitarani, Godavari, krishna, Pennar and the

Kaveri) and the coastal regions of Andhra Pradesh, Tamilnadu, orissa and Kerela. Assam, Uttar Pradesh, Bihar and Orissa are some of the states who have been severely prone to floods. Our country receives an annual rainfall of 1200 mm, 85% of which is concentrated in 3-4 months i.e June to September. Due to the intense and periodic rain, most of the rivers of the country are fed with huge quantity of water, much beyond their carrying capacity.

Warning: Flood forecasting and warning has been highly developed in the past two decades. With the advancement of technology such as satellite and remote-sensing equipments flood waves can be tracked as the water level rises. Except for flash floods there is usually a reasonable warning period. Heavy precipitation will give sufficient warning of the coming river flood. High tides with high winds may indicate flooding in the coastal areas. Evacuation is possible with suitable monitoring and warning. Warning is issued by the Central Water Commission (CWC), Irrigation & Flood Control Department, and Water Resources Department. CWC maintains close liaison with the administrative and state engineering agencies, local civil authorities to communicate advance warning for appropriate mitigation and preparedness measures.

Possible Risk Reduction Measures:

Mapping of the flood prone areas is a primary step involved in reducing the risk of the region. Historical records give the indication of the flood inundation areas and the period of occurrence and the extent of the coverage. Warning can be issued looking into the earlier marked heights of the water levels in case of potential threat. In the coastal areas the tide levels and the land characteristics will determine the submergence areas. Flood hazard mapping will give the proper indication of water flow during floods Land use control will reduce danger of life and property when waters inundate the floodplains and the coastal areas. The number of casualties is related to the population in the area at risk. In areas where people already have built their settlements, measures should be taken to relocate to better sites so as to reduce vulnerability. No major development should be permitted in the areas which are subjected to high flooding. Important facilities like hospitals, schools should be built in safe areas. In urban areas, water holding areas can be created like ponds, lakes or low-lying areas. Flood shelters like this are just one example of how communities can protect themselves from the worst of the floods. Banks of earth are raised by up to 5 metres and cover an area of several kilometres. The people dig a huge pond in the middle and use this earth to raise the ground. Whenever the floods come, people can bring their livestock, possessions – even their homes – to safety. The pond in the middle becomes an important source of food, as it is used to farm fish.

Construction of engineered structures in the flood plains and strengthening of structures to withstand flood forces and seepage. The buildings should be constructed on an elevated area. If necessary build on stilts or platform.

Flood Control aims to reduce flood damage. This can be done by decreasing the amount of runoff with the help of reforestation (to increase absorption could be a

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mitigation strategy in certain areas), protection of vegetation, clearing of debris from streams and other water holding areas, conservation of ponds and lakes etc. Flood Diversion include levees, embankments, dams and channel improvement. Dams can store water and can release water at a manageable rate. But failure of dams in earthquakes and operation of releasing the water can cause floods in the lower areas. Flood Proofing reduces the risk of damage. Measures include use of sand bags to keep flood water away, blocking or sealing of doors and windows of houses etc. Houses may be elevated by building on raised land. Buildings should be constructed away from water bodies.

Flood Management In India, systematic planning for flood management commenced with the Five Year Plans, particularly with the launching of National Programme of Flood Management in 1954. During the last 48 years, different methods of flood protection structural as well as nonstructural have been adopted in different states depending upon the nature of the problem and local conditions. Structural measures include storage reservoirs, flood embankments, drainage channels, antierosion works, channel improvement works, detention basins etc. and non-structural measures include flood forecasting, flood plain zoning, flood proofing, disaster preparedness etc. The flood management measures undertaken so far have provided reasonable degree of protection to an area of 15.81 million hectares throughout the country.

3. Write a note on disaster management act 2005. (Nov/Dec Year 2020)

The Disaster Management Act 2005 defines disaster as: " a catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or man-made causes, or by accident or negligence, which results in substantial loss of life or human suffering or damage to, destruction of property, or damage to, or degradation of environment, and of such a nature or magnitude as to be beyond the coping mechanism of the community of the affected area". This definition also puts people at the center and recognizes that communities likely to be affected by a disaster have certain coping mechanism in place.

The Disaster Management Act 2005 is applicable to the whole country. According to this Act:

Disaster Management is " a continuous and integrated process of planning, organizing, coordinating and implementing measures which are necessary or expedient for:

Prevention of danger or threat of any disaster;

Mitigation or reduction of risk of any disaster or its severity or consequences;

Capacity building;

Preparedness to deal with any disaster;

Prompt response to any threatening disaster situation or disaster;

Assessing the severity or magnitude of effects of any disaster;

Evacuation, rescue and relief;

Rehabilitation and reconstruction" (Source: The Disaster Management

Act

2005).

Purpose: To provide for the effective management of disasters in the country. The Act extends to the entire India and is applicable from December 26, 2005. There are 13 chapters in the Act and the full text is available on the internet. CHAPTER I

It deals with the definitions of terminologies used in the Act like:

" Central Government" means the Ministry or Department of the Government of India having administrative control of disaster management. Disaster means, " catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or man-made causes, or by accident or negligence, which results in substantial loss of life or human suffering or damage to, and destruction of, property, or damage to, or degradation of environment, and is of such a nature or magnitude as to be beyond the coping capacity of the community of

the affected area". " Disaster Management" means a continuous and integrated process of planning, organizing, coordinating and implementing measures which are necessary. This

consists of the following steps: prevention of danger or threat of any disaster; mitigation or reduction of risk of any disaster or its severity or consequences; capacity building; preparedness to deal with any disaster; prompt response to any threatening disaster situation or disaster; assessing the severity or magnitude of effects of any disaster; evacuation, rescue and relief; rehabilitation and reconstruction.

CHAPTER II

This chapter deals with the National Disaster Management Authority (NDMA), which was established for the purpose of this Act. The chairperson of the NDMA is the Prime Minister, ex officio and there are not more than 9 members. It will meet as and when necessary. In the absence of the Prime Minister, the vice chairperson will preside over the meeting. According to the provisions of this Act, the national authority shall have the responsibility for laying down the policies, plans and guidelines for disaster management for ensuring timely and effective response to disaster. The national authority will have the responsibilities to: THE NATIONAL DISASTER MANAGEMENT AUTHORITY

- Establishment of National Disaster Management Authority.
- Meetings of National Authority.
- Appointment of officers and other employees of the National Authority.
- Powers and functions of National Authority.
- Constitution of advisory committee by National Authority.
- Constitution of National Executive Committee.
- Constitution of sub-committees.
- Powers and functions of National Executive Committee.
- National plan.
- Guidelines for minimum standards of relief.

Relief in loan repayment, etc.

CHAPTER III

STATE DISASTER MANAGEMENT AUTHORITY

Establishment of State Disaster Management Authority.

Meetings of the State Authority.

Appointment of officers and other employees of State Authority.

Constitution of advisory committee by the State Authority.

Powers and functions of State Authority.

Guidelines for minimum standard of relief by State Authority.

Constitution of State Executive Committee.

Constitution of sub-committees by State Executive Committee.

Functions of the State Executive Committee.

State Plan.

Powers and functions of State Executive Committee in the event of threatening disaster situation.

CHAPTER IV

DISTRICT DISASTER MANAGEMENT AUTHORITY

Constitution of District Disaster Management Authority.

Powers of Chairperson of District Authority.

Meetings.

Constitution of advisory committees and other committees.

Appointment of officers and other employees of District Authority.

Powers and functions of District Authority.

District Plan.

Plans by different authorities at district level and their implementation. Requisition by the District Authority.

Powers and functions of District Authority in the event of any threatening disaster situation or disaster.

CHAPTER V

MEASURES BY THE GOVERNMENT FOR DISASTER MANAGEMENT

Central Government to take measures.

Responsibilities of Ministries or Departments of Government of India.

Disaster management plans of Ministries or Departments of Government of India.

State Government to take measures.

Responsibilities of departments of the State Government.

Disaster management plan of departments of State.

CHAPTER VI

LOCAL AUTHORITIES

Functions of the local authority.

CHAPTER VII

NATIONAL INSTITUTEOF DISASTER MANAGEMENT

National Institute of Disaster Management.

Officers and other employees of the National Institute.

CHAPTER VIII

NATIONAL DISASTER RESPONSE FORCE

National Disaster Response Force.

Control, direction, etc.

CHAPTER IX FINANCE, ACCOUNTS AND AUDIT

National Disaster Response Fund.

National Disaster Mitigation Fund.

Establishment of funds by State Government.

Allocation of funds by Ministries and Departments.

Emergency procurement and accounting.

CHAPTER X OFFENCES AND PENALTIES

- Punishment for obstruction, etc. •
- Punishment for false claim. ٠
- Punishment for misappropriation of money or materials, etc. ۲
- Punishment for false warning. •
- Offences by Departments of the Government. •
- Failure of officer in duty or his connivance at the contravention of the ۲ provisions of this Act.
- Penalty for contravention of any order regarding requisitioning. •
- Offence by companies. •
- Previous sanction for prosecution. •
- Cognizance of offences. •

Prohibition against discrimination. •

CHAPTER XI MISCELLANEOUS

- Power to issue direction by Central Government.
- Powers to be made available for rescue operations. •
- Making or amending rules, etc., in certain circumstances. •
- Power of requisition of resources, provisions, vehicles, etc., for rescue operations, etc.
- Payment of compensation.
- Direction to media for communication of warnings, etc. ۲
- Authentication of orders of decisions. ۲
- Delegation of powers. ۲
- Annual report. •
- Bar of jurisdiction of court. •
- Act to have overriding effect. •
- Action taken in good faith. •
- Immunity from legal process. •
- Power of Central Government to make rules. ٠
- Power to make regulations. •
- Rules and regulations to be laid before Parliament. •
- Power of State Government to make rules. •

Power to remove difficulties.

4. Examine the purpose of damage assessment? What factors influence the assessment methods and the tools used to assess damage. (Nov/Dec Year 2020)

Damage assessment is an important tool for retrospective and prospective analysis of disasters to assimilate the extent of impact of a disaster. This forms the basis for future disaster preparedness and preventive planning. It is essential in determining: what happened, what the effects were, which areas were hardest hit, what situations must be given priority and what types of assistance are needed, for example, Local, State, or Union? Emergency response can be more effective, equipment and personnel can be better used, and help can be provided quicker if a thorough damage assessment is performed beforehand. The basic objectives of damage assessment could be summarised as follows:

To make a rapid assessment of areas affected to know the extent of impact for purpose of immediate rescue and relief operations;

To prepare estimates for the amount of relief to be provided and the mode of relief, be it food, clothing, medicines, shelter or other essential commodities;

To make a detailed assessment regarding requirements for long-term relief and rehabilitation planning; and

To identify focus areas for the purpose of ' retrofitting' actions in similar future situations.

Damage Assessment is therefore a prerequisite for effective disaster response effort. For effective decisions, officials responsible for organising post-disaster relief operations should be properly informed of the damage/possible damage should the event repeat itself sometime in the future, so that they can know the needs, current, as well as prospective, in precise terms. They must have appropriate and timely information about: what happened, what needs to be done, and what resources are available? Their decisions can save lives; minimise injury, damage and loss; prevent any further escalation; prevent secondary hazards and inform people who need to know. Well-organised response will also help in building confidence and enhancing the credibility of the administration. Relief operations are essentially about the management of information and resources, which is based on assessments and reports carried out from time to time. Information is needed at all levels of administration but the nature of the information required varies from one level to another. Good assessment and reporting require forethought; hence, the assessment and reporting system should be established during the preparedness planning stage. Damage assessment is also a multi-disciplinary exercise involving officials from a cross section of experts and administrators from police, fire, health, engineering, public works, social scientists, non-profit organisations, community et al to get a comprehensive account of losses for adequate future mitigation planning. Some of the data required is already available in the form of baseline data (maps,
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population statistic etc.), which however must also be supplemented by real time information regarding the extent/nature of ongoing damage during a disaster event, from the damage site (mostly in the form of incoming reports from various sources after the disaster, (from the disasters scene) as pre- disaster estimates, however accurate, may not provide sufficient information.

5. Illustrate the institution awareness and safety programmes. (Nov/Dec Year 2019)

' School Safety' has been defined as the creation of safe environments for children starting from their homes to their schools and back. This includes safety from large-scale 'natural' hazards of geological/climatic origin, human-made risks, pandemics, violence as well as more frequent and smaller-scale fires, transportation and other related emergencies, and environmental threats that can adversely affect the lives of children. The concept has evolved over the last couple of decades as the threat to the physical well being of children has become more visible both globally and in the country.

The National School Safety Policy Guidelines apply to all schools in the country – whether government, aided or private, irrespective of their location in rural or urban areas. They apply to all stakeholders involved in delivery of education to children in India. The Guidelines stand for a vision of India where all children and their teachers, and other stakeholders in the school community are safe from any kind of preventable risks due to natural hazards that may threaten their well-being during the pursuit of education. The guidelines also actively promote that educational continuity is maintained / resumed even in the immediate aftermath of a disaster so that children are physically, mentally and emotionally secure within their schools. Right to Education is a fundamental right enshrined in the Constitution of India. In order to facilitate access of all children in the country with respect to the Right to Education, it is important to ensure that children remain safe as they access and enjoy their Right to Education.

6. Explain about rapid Damage assessment and detailed damage Assessment? Implementation of safety actions (Nov/Dec Year 2019)

<u>Appropriate Siting, Design and detailing for structural safety in new schools and repairing of existing schools</u>

All existing as well as new schools need to conform to safety standards as per the National Building Code. In addition, any other norms prescribed by the state government need to be adhered to. (Refer Annexure 6) Some of these actions are given below:

- New schools should be located, on a site that has adequate mitigation measures already in place against any imminent natural hazards. Existing schools located in a vulnerable location should either be relocated at a safer site or they should be provided adequate support to mitigate the effect of any natural hazards that may affect the area.
- All new school constructions should include disaster resilient features. Existing

vulnerable schools need to be repaired to the desired level of resilience with regard to local disaster risks.

• Prescribed designs may be adapted to accommodate safety and child friendly features.

• For design of structural standards of school building and its components such as corridors, staircases, side areas, quality of construction should be as per the National Building Code 2005. Only non-combustible, fire-proof, heat resistant materials shall be used in school construction.

• Vertical expansion of existing schools shall not be carried out without a fitness certificate for the building from a certified civil / structural engineer.

• Additional classrooms or any other structures requiring horizontal expansion shall be designed taking into account the space availability and while constructing as a continuous unit to the existing structures, these should be designed to have less impact of seismic forces.

• Each class room should have two doors for easy evacuation; adequate openings for ventilation and lighting are some of the essential elements that need to be accommodated in the design.

• Doors opening outside, into open areas or corridors of adequate width are key details that need to be incorporated to make schools safer.

All of these and any other additional ones, require the guidance and support of a panel of technical agencies to be identified at the state level and designated to work in specific districts. In this manner location specific designs can be worked out with adequate attention to safety features as well as child friendly elements. Besides these details, other design solutions in line with the Whole School Development Concept need to be incorporated to promote safety and child friendly features. Elements pertaining to school safety should be included in the whole school development approach.

<u>Nonstructural safety measures in schools Besides structural safety measures, non</u> <u>structural elements within the school campus need to be addressed to ensure</u> <u>safety.</u>

These are mostly low cost, regular maintenance items that the school should address on a regular basis from their own funds. Some of these items have been listed below:

- All items of furniture such as almirahs, shelves, black boards etc., as well as any other items that may fall and cause injury to students and teachers such as ceiling fans, coolers, water tanks etc. need to be secured to the walls or floor.
- Any electrical items such as loose wires that may cause an exigency should be addressed promptly by the school.
- Chemical and any hazardous materials in the school laboratory should be handled and stored as per instructions to prevent any harm to students and school staff.

 Open areas including corridors and evacuation routes including staircases and ramps should be kept free from any hurdles and barriers so that evacuation is smooth and swift.
 Pots / planters in the play ground or corridors should be kept in a manner that does not affect smooth evacuation

• Any derelict or unused building, rubble, etc. should be removed to prevent any harmful animals or pests from accessing children.

• Traffic movement outside the school should be managed to minimize risk to students at the time of assembling and dispersal of school.

• During excursions, schools should carefully choose the location of excursion and the itinerary so that exposure to hazard is minimized. Extra precautions should be taken when students are being taken close to water bodies, narrow mountainous tracks etc.

• Buses or any other vehicles owned / hired by the school need to be maintained properly so that students are not at risk of accidents. Drivers need to be appropriately trained on speed limits, stoppage of vehicles as well as crisis management so that children remain safe during their travel to and from schools.

• Emergency equipment such as fire extinguishers, first aid kits, ropes etc. need to be procured and maintained regularly by the School Authorities. Fire Prevention and Fire Safety Fire Prevention and Fire Safety measures should be part of initial school design, and also require regular maintenance and testing. The following must be ensured:

Flammable and hazardous materials sources are limited, isolated, eliminated, or secured. This includes electrical lines and appliances, heaters and stoves, natural gas pipelines and LPG canisters, flammable or combustible liquids;
Exit routes are clear to facilitate safe evacuation in case of fire or other emergency;

- Detection and alarm systems (especially urban set ups) are working;
- Fire extinguishers are regularly refilled;
- Other fire materials and equipment are regularly maintained;
- Electrical systems are maintained and operable, in compliance with fire safety design criteria (Source: Adapted from IFC EHS Guidelines)

Levels of Assessment

Damage Assessment is required at two basic levels of intervention. Firstly, it is required for emergency relief measures in which quick assessment of damage is the basis for the amount of relief material and food stocks that reach the disaster area. This type of an assessment is called Rapid Damage Assessment. At the second level would be, a detailed technical analysis of damage for long-term restoration and rehabilitation works. From a long-term perspective, damage assessment scrutinises the mechanisms of failure that took place during the disaster. It is called Damage Assessment. These studies are very useful for all prevention and mitigation efforts for disasters in the future.

Rapid Damage Assessment

The official agency for reporting estimates of disaster damages is usually the Revenue and Relief Department of the state government, as they are also the

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authority for distributing relief to affected persons. As usual, there is a hierarchy of officials who report from the lowest level of Villages/Panchayats through Blocks/Revenue Circles, Tehsils/ Talukas, and Sub-divisions and finally to the districts and then to the state headquarters. However, relief agencies including NGOs also have their own damage assessment systems and teams to carry out the assessments. The basic items covered in rapid assessment are:

Name of the place

The causative disasters

- Date and time of disaster strike
- Area affected

Total number of villages or neighbourhoods affected

Total population

Population affected in terms of number of people and households

Details of local bodies (panchayats or wards/municipalities) affected

In case of floods, area still under water

In case of an earthquake or cyclone, buildings damaged

Infrastructure affected (transportation, power, social infrastructure)

Estimated number of deaths and injuries

Estimated loss of property

Closest sources of emergency aid.

Detailed Damage Assessment

Detailed damage assessment goes further than the rapid assessment, and it includes the following additional information regarding disaster damage:

Verified number of human lives lost and number of injuries

Livestock lost

- a. Number
- b. Estimated Value

Details of damage to crops in hectares and estimated loss of produce in quintals

- Hectares completely damaged а.
- b. Hectares partially damaged
- c. Hectares likely to be replanted or re-sown
- d. Extent affected in percentage
- e. Crops lost in quintals
- Estimated value of crops lost in rupees f.

Houses damaged or destroyed

- Number а.
- b. Estimated value

Loss to public works and utilities including local bodies property

- Name of the work and utility a.
- b. Nature of damage
- c. Estimated value of damage
- d. Estimated cost to restore work or/and utility

Rough estimate of the total financial loss in rupees

7. Discuss about the role of GIS in disaster management. (Nov/Dec Year 2019) GEOGRAPHIC INFORMATION SYSTEM (GIS)

A geographic information system (GIS), geographical information system, or geospatial

Information system is a system designed to capture, store, manipulate, analyze, manage,

and present all types of geographically referenced data. In simple terms, GIS is the merging of cartography, statistical analysis, and database technology.

Therefore, in a general sense, the term describes any that integrates, stores, edits, analyzes, shares and displays information for informed g. GIS applications are the tools that allow users to create interactive queries, analyze I information, edit data, maps, and present the results of all these operations. is the science underlying the geographic concepts, applications and systems.

GIS technology can be used for:

Earth surface based scientific investigations.

Resource management.

Reference and projections of geospatial nature, both man-made and natural.

Asset management and location planning.

Environmental impact assessment.

Urban planning.

Logistics.

Population and demographic studies.

Statistical analysis. Disease surveillance.

Role of GIS in disaster management:

Disasters are spatial in nature as they strike at a specific location and influence a particular area. Hence, location intelligence plays a critical role in disaster management. GIS coupled with remote sensing provides a basic framework that helps in all the stages of disaster management starting from preparedness, to response and recovery. Through advanced wireless technologies and web-based GIS applications, disaster management by governments and other agencies is being revolutionized and is enhancing the coordination of response efforts as well as planning for disaster risk reduction. GIS decision support systems for disaster have been applied in several parts of the world for effective management. For assessing disaster risks, one needs an understanding of key disaster event characteristics such as location of impact (for example, earthquake epicenter, cyclone landfall), physical characteristics (magnitude in case of earthquakes, central pressure in case of cyclones), local conditions like land use and type and height of structures.

These characteristics require an understanding of the geography of the impacted area in order to model the hazard intensity and severity and to understand the impact on buildings, infrastructure and population, and at the same time respond to the disaster for evacuation and rehabilitation works. Use of GIS and remote sensing, helps conduct all these tasks in a planned an efficient manner.

Earlier, when the concept of GIS did not exist, response decisions during disasters were taken mostly on the basis of prior experience and intuition rather than any live information. But today, live data on many parameters such as topography, geographic features, population, infrastructure, demographics can be crucial to the response and recovery activities. GIS has the power to integrate data from various sources into a common platform and make it readily accessible to various stakeholders for disaster management. It enables dissemination of critical information in a timely manner in cases of emergencies. Further, the visualization of this data helps in analyzing a situation and taking quick decisions. In advanced countries of the world, GIS has been successfully utilized to address all phases of disaster management— preparedness, mitigation, response, and recovery. It is very helpful to lay a foundation of GIS as all these stages are interconnected. The output of one stage serves as input to the next stage.

AWARENESS & PREPAREDNESS

Some critical questions that arise during awareness and preparedness for disaster management are: What is the population of the area, location of buildings and infrastructure, social and structural characteristics of the area, population at risk, evacuation time and technique, location of the safe structures that could be used as shelters and others? GIS and remote sensing techniques can be used to build database of critical facilities such as hospitals, ambulances, fire stations, police stations, schools and other places which can be helpful for

planning purposes.

Disaster maps can be prepared to show the risk zones as well as disaster impact zones. From a mitigation point of view, hazard maps can be created for various natural and manmade hazards such as floods, earthquakes, cyclones, forest fires etc., that help in understanding the risk of a location and planning accordingly for the same.

For e.g., in areas with high earthquake vulnerability, retrofitting of structures and enforcing strict building codes is a must. The governments and local agencies can preplan and improve preparedness by mapping evacuation routes, shelter planning, debris removal planning, stocking enough supplies, conducting mock drills etc.

PLANNING & MITIGATION

Earlier, the role of governments during natural calamities was limited to rescue, relief and rehabilitation. With changing times, mitigation and main streaming of disaster risk reduction has become a crucial activity requiring government intervention. GIS is enabling development of decision support systems capable of assessing risk from natural disasters and helping governments in mitigation and planning.

RMSI has developed an innovative ' Decision support system for disaster risk reduction' that utilizes the outcomes of multi-hazard risk assessment for

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activities performed for mitigation, preparedness, response and recovery. This framework has been successfully implemented in several nations of the world and has proven to be an impactful tool for mainstreaming disaster risk reduction. Mathematical modeling and GIS analytics form the backbone of this framework.



RESPONSE & RECOVERY

Responding to a disaster adequately requires critical information like the location where the disaster has occurred, intensity and severity of the event in various disaster zones, areas of maximum damage, location of impacted population and the kind of resources needed to evacuate the trapped population. GIS and remote sensing techniques coupled with technologies like satellite imagery, aerial photography using aircraft or drones can help find answers to many such questions.

Soon after a disaster strikes, use of remote sensing technologies (such as aerial photographs or satellite images) can be used to map the affected locations and compare the data to historical information to assess the overall damage. While remote sensing aids in map preparation, GIS can be used for storage of digitized maps, their visualization and analysis. There is a greater need for liaisoning of the public and private sector. GIS organizations such as RMSI are equipped to turn around such tasks at a faster rate, provided high resolution satellite imagery is made available by the government bodies or private companies. Further, this is supported by on ground sample damage assessment surveys conducted by experts. RMSI experts have participated multiple times in such post disaster surveys, including the Gujarat earthquake, Mumbai floods in 2005, Surat floods in 2006 and Krishna river floods in 2008. Damage assessment helps in estimating the number of households damaged and families displaced along with casualties and injured in short term, as well as the damaged infrastructure. It also helps in re-establishing communication so that it performs better in future or laying foundation for an emergency communication network that could activates immediately in the aftermath of a disaster. At the same time, estimates of economic impacts and social impacts can be traced as the information would help in identifying the most affected families, particularly widows, single parent children, orphans, differently-abled persons and senior citizens. Furthermore, GIS platforms have proven to be very useful in connecting dislocated families. Open applications with abilities to upload the photographs of missing family members and tagging the location of other family members have been applied for several disasters worldwide.

With natural hazards becoming more frequent and severe, disaster risk reduction is the need of the hour. Global governments and GIS companies should work in tandem to devise innovative tools & methods to plan an effective disaster management strategy and make the most of the geospatial technology.

8. Explain disaster risk reduction in detail. (Nov/Dec Year 2018)

The policy objective of anticipating and reducing risk is called disaster risk reduction (DRR). Although often used interchangeably with DRR, disaster risk management (DRM) can be thought of as the implementation of DRR, since it describes the actions that aim to achieve the objective of reducing risk. Disaster risk is an indicator of poor development, so reducing disaster risk requires integrating DRR policy and DRM practice into sustainable development goals. What is disaster risk reduction?

Historically, dealing with disasters focused on emergency response, but towards the end of the 20th century it was increasingly recognised that disasters are not natural (even if the associated hazard is) and that it is only by reducing and managing conditions of hazard, exposure and vulnerability that we can prevent losses and alleviate the impacts of disasters. Since we cannot reduce the severity of natural hazards, the main opportunity for reducing risk lies in reducing vulnerability and exposure. Reducing these two components of risk requires identifying and reducing the underlying drivers of risk, which are particularly related to poor economic and urban development choices and practice, degradation of the environment, poverty and inequality and climate change, which and exacerbate conditions of hazard, exposure and vulnerability. create Addressing these underlying risk drivers will reduce disaster risk, lessen the impacts of climate change and, consequently, maintain the sustainability of development

We need to manage risks, not just disasters.

DRR is a part of sustainable development, so it must involve every part of society, government, non-governmental organizations and the professional and private sector. It therefore requires a people-centred and multi-sector approach, building resilience to multiple, cascading and interacting hazards and creating a culture of prevention and resilience. Consequently DRM includes strategies designed to:

avoid the construction of new risks

address pre-existing risks

share and spread risk to prevent disaster losses being absorbed by other development outcomes and creating additional poverty

Although DRM includes disaster preparedness and response activities, it is about much more than managing disasters.

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Successful DRR results from the combination of top-down, institutional changes and strategies, with bottom-up, local and community-based approaches. DRM programmes should not be standalone but instead be integrated within development planning and practice, since disasters are an indicator of failed or skewed development, of unsustainable economic and social processes, and of ill-adapted societies (UNISDR, 2009b, 2011, 2013 and 2015a). Approaches need to address the different layers of risk (from intensive to extensive risk), underlying risk drivers, as well as be tailored to local contexts. There is no ' one-size fits all' approach to DRM, but there exist a number of approaches and frameworks, which have been effectively implemented to reduce disaster risk. But, before being able to reduce risk, we need to understand the hazards, and the exposure and vulnerability of people and assets to those hazards.

How do we reduce risk?

Disaster risk management involves activities related to:

Prevention

Activities and measures to avoid existing and new disaster risks (often less costly than disaster relief and response). For instance, relocating exposed people and assets away from a hazard area.

<u>Mitigation</u>

The lessening or limitation of the adverse impacts of hazards and related disasters. For instance, constructing flood defenses, planting trees to stabilize slopes and implementing strict land use and building construction codes.

<u>Transfer</u>

The process of formally or informally shifting the financial consequences of particular risks from one party to another whereby a household, community, enterprise or state authority will obtain resources from the other party after a disaster occurs, in exchange for ongoing or compensatory social or financial benefits provided to that other party. For instance, insurance.

<u>Preparedness</u>

The knowledge and capacities of governments, professional response and recovery organisations, communities and individuals to effectively anticipate, respond to, and recover from the impacts of likely, imminent or current hazard events or conditions. For instance, installing early warning systems, identifying evacuation routes and preparing emergency supplies.

Implementation of these activities and measures is rarely done in isolation and includes a number of associated activities, including:

Identification and measuring disaster risk

Education and knowledge development

Informing people about their risk (awareness raising)

Incorporating DRM into national planning and investment

Strengthening institutional and legislative arrangements

Providing financial protection for people and businesses at risk (finance and contingency planning)

Integrating DRR across multiple sectors, including health, environment, etc.

Activities for reducing risk can be described as structural, for instance land use planning and implementation of building codes, and non-structural, for instance awareness raising, policy-making and legislation. How governments, civil society and other actors organize DRM, for example through institutional arrangements, legislation and decentralization, and mechanisms for participation and accountability is termed risk governance. There is clear evidence to suggest that low-income countries with weak governance are more vulnerable and less resilient to disaster risk.

Fundamentally, DRR succeeds in reducing risk by building the strengths, attributes and resources available within a community, society or organization – collectively known as their capacity. DRM activities are designed to increase the resilience of people, communities, society and systems to resist, absorb, accommodate and to recover from and improve well-being in the face of multiple hazards. Activities for reducing and managing risks can therefore provide a way for building resilience to other risks. In addition to development, DRM should therefore be integrated across a number of sectors, including climate change and conflict.

Identifying and understanding risk: the foundation of risk reduction

Awareness, identification, understanding and measurement of disaster risks are all clearly fundamental underpinnings of disaster risk management. Disaster risk reduction is about decisions and choices, including a lack of, so risk information has a role in five key areas of decision making:

Risk identification

Because the damages and losses caused by historical disasters are often not widely known, and because the potential damages and losses that could arise from future disasters (including infrequent but high-impact events) may not be known at all, DRM is given a low priority. Appropriate communication of robust risk information at the right time can raise awareness and trigger action.

Risk reduction

Hazard and risk information may be used to inform a broad range of activities to reduce risk, from improving building codes and designing risk reduction measures (such as flood and storm surge protection), to carrying out macro-level assessments of the risks to different types of buildings (for prioritizing investment in reconstruction and retrofitting, for example).

<u>Preparedness</u>

An understanding of the geographic area affected, along with the intensity and frequency of different hazard events, is critical for planning evacuation routes, creating shelters, and running preparedness drills. Providing a measure of the impact of different hazard events—potential number of damaged buildings, fatalities and injuries, secondary hazards— makes it possible to establish detailed and realistic plans for better response to disasters, which can ultimately reduce the severity of adverse natural events.

Financial protection

Disaster risk analysis was born out of the financial and insurance sector' s need

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to quantify the risk of comparatively rare high-impact natural hazard events. As governments increasingly seek to manage their sovereign financial risk or support programs that manage individual financial risks (e.g., micro-insurance or household earthquake insurance).

Resilient reconstruction

Risk assessment can play a critical role in impact modeling before an event strikes (in the days leading up to a cyclone, for example), or it can provide initial and rapid estimates of human, physical, and economic loss in an event' s immediate aftermath. Moreover, risk information for resilient reconstruction needs to be available before an event occurs, since after the event there is rarely time to collect the information needed to inform resilient design and land-use plans.

If those exposed to hazards are unaware of the risks they face, it is difficult to see how or why households, businesses or governments would invest in reducing their risk levels. However, while risk awareness may be a precondition, the importance people attach to managing their risks can only be understood in the context of the full range of social, economic, territorial and environmental constraints and opportunities they face - see the story of Ratnapura and the Chao Phraya River below.

We have over 30 years of research into disaster risk, but much of this is not available in a form that is understandable or useful to those who need it the most. There is therefore a need for risk scientists and researchers to shift their focus to the production of risk information that is understandable and actionable for different kinds of users: in other words, risk knowledge. Such a shift requires more collaboration and partnerships between scientists and researchers and those involved in DRR, ranging from governments to local communities. Governments need to invest in the collection, management and dissemination of risk information, including disaster loss and impact statistics, hazard models, exposure databases and vulnerability information. At the same time, they need to put standards and mechanisms in place to ensure openness and transparency so that users not only have access to the information they need but are aware of its underlying assumptions and limitations. The generation of understandable and actionable risk information needs to be particularly sensitive to extensive risk, which, because it is configured to a large extent by social, economic and environmental vulnerability, can be reduced effectively through risk management and sustainable development practices

Are we reducing disaster risk?

While we have made some progress in reducing disaster mortality associated with intensive risks, increasing exposure of people and economic assets means that mortality and economic losses from extensive risk are trending up and absolute global economic losses from disasters are increasing, although not relative to GDP. Some low and middle-income countries may not have the financial resilience to accommodate the likely average annual losses from future disasters, which threaten the very economic existence of many small island development states.

We' ve been generating risk faster than we have been reducing it.

More needs to be done to prevent new risks, which are already emerging owing to increasing urbanisation, the threat of climate change and other risk drivers. In an increasingly interconnected world, we are seeing that disasters can also result in synchronous failures. Development can be sustainable, it is just a question of whether we can change our approach in time to prevent disaster risk from reaching dangerous levels .We have made more progress in managing disasters than in reducing our disaster risk.

Over the last 10 years, there has been significant progress in strengthening disaster preparedness, response and early warning capacities and in reducing specific risks, according to the HFA Monitor. However, progress has been limited in most countries when it comes to managing the underlying risks.

Although we know how to reduce disaster risk, there is often a lack of incentive to do so.

Both individuals, governments and businesses tend to discount low-probability future losses and seem reluctant to invest in DRM. Despite the magnitude of disaster costs, reducing risks is often perceived as less of a priority than fiscal stability, unemployment or inflation . New evidence demonstrates, however that the opportunity cost of disasters is high and that many low and middle-income countries, and small island development states are financially unable to cope with the predicted future losses from disasters while also maintaining their capacity to develop. In other words, they are not resilient.

The costs and benefits of disaster risk management need to become fully encoded into public and private investment at all levels, into the financial system and into the design of risk-sharing and social protection mechanisms. Cost-benefit analyses can be expanded to highlight the trade-offs implicit in each decision, including the downstream benefits and avoided costs in terms of reduced poverty and inequality, environmental sustainability, economic development and social progress. They can also help to identify who retains the risks, who bears the costs and who reaps the benefits. Such a broad approach to cost-benefit analysis can increase the visibility and attractiveness of investments in disaster risk reduction.

The good news is that we can achieve great things when we invest in DRR. There are countless success stories of reducing disaster risk ranging from community-based participatory approaches to the global reduction in disaster mortality associated with intensive risks.

However, we need to recognize that the impact of some DRM measures may not be immediate. It may take decades for the outcome of improved planning regulations and building standards to translate into reduced disaster losses, as a critical mass of new, risk-sensitive building and urban development has to be achieved.

The future of DRR requires that we assess the costs and benefits of DRM, reform risk governance, move from risk information to knowledge and strengthen accountability.

9. Analyze the role of different types of media in disaster management(Nov/Dec Year 2018)

The media forges a direct link between the public and emergency organizations and plays a very important role in disseminating vital information to the public before, during and after disasters. The media assists in the management of disasters by educating the public about disasters; warning of hazards; gathering and transmitting information about affected areas; alerting government officials, relief organizations and the public to specific needs; and facilitating discussions about disaster preparedness and response for continuous improvement. To help the media fulfil these roles, direct and effective working relationships between the media and disaster management organizations should be established and maintained. Experience shows that regular interactions with the media before a disaster strikes, aids the effective flow of information and lays the groundwork for effective working relationships in the aftermath of a disaster.

MEDIA AND EMERGENCY RESPONSE - A REVIEW:

In managing disaster - the necessity of "right information at right time" has not changed for centuries. People need warnings ahead of the disaster and then, in its aftermath, data on - casualties, damage, the supplies and skills that are needed, the best ways to bring in these resources, the help that is available and is being provided, and so on.

There are many examples where - public education and the rapid, widespread dissemination of early warnings saved thousands of lives. In November 1970, for example, a tropical cyclone, combined with a high tide, struck southeastern Bangladesh, leaving more than 300,000 people dead and 1.3 million homeless. In May 1985, a comparable cyclone and storm surge hit the same area. "This time there was better local dissemination of disaster warnings and the people were better prepared to respond to them. The loss of life, although still high, was 10,000 or about 3 percent of that in 1970. When a devastating cyclone struck the same area of Bangladesh in May 1994, fewer than 1,000 people died. 1977 cyclone in Andra Pradesh, India killed 10,000 people, while a similar storm in the same area 13 years later killed only 910. The dramatic difference - was due to the fact that a new early-warning system connected with radio stations to alert people in low-lying areas, was put into place. On the other side - there are many examples where absence of an alert and warning system resulted into huge number of casualties and extensive damage of property. Bhopal gas leak, 1999 super cyclone in Orissa and 2004 Indian Ocean tsunami are few of the recent example in India where "timely alert" could have saved millions of lives and enormous property. These and many other examples make it clear that media, with its instantaneous outreach, throughout the world play a vital role in educating the public about disasters; warning of hazards; gathering and transmitting information about affected areas; alerting government officials, relief organizations, and the public to specific needs; and facilitating discussions about disaster preparedness and

response.

The media can assist in pre-disaster education. They may be crucial to an effective warning process. They can provide information and advice to victims and others in the wake of disasters. They can help activate the local disaster response. They can assist in stimulating effective disaster relief.

All this is not to say the media do not, on occasion, cause problems. They can help increase convergence to the scene both by the curious and by those with genuine concerns. By their own convergence, both in person and by telephone, they can create pressures on managers for information to the point where media demands interfere with effective response.' They can spread rumors,' and so alter the reality of disaster, at least to those well away from it, that they can bias the nature of the response." They can and do create myths about disasters, myths which will persist even among those with contrary disaster experience.

Public administrators sometimes decry the mass media. They see a more relaxed working atmosphere if the media were not there to record their actions, question their decisions, and air the remarks of their critics. But in time of disaster the media, on balance, are actually helpful.

Rather, their absence can create enormous difficulties. In addition, media can be a way in which individuals or organizations can ask for information. While the media cannot usually have answers to public queries directly (though they may try to do so), they can be a link between the public and the central / state disaster management authority. There are examples when media (a radio station) helped mobilize relief and in mobilizing effective .

There are two major types of media that exists – 1. Electronic media and 2. Print media. Radio, (both satellite as well as wireless), and Television (cable, DTH etc) are prominent player in electronic media, where as newspapers, magazines, journals are part of the print media.

Technology has a crucial role in information acquisition, analysis, forecasting and dissemination. New technological advances in communications offer the prospect of considerable improvement, both in the anticipation of sudden-onset disaster, and in dealing with after-effects once disaster occurs. Communication underlies virtually all elements of the hazard-mitigation process. The capabilities of communications, data-gathering, and data-management technology have leaped forward in parallel with our increasing knowledge about the origins and behavior of natural hazards and the mitigation of their effects. Indeed, advances in telecommunications and computer sciences are among the major contributors to the recognition that technology can do much to blunt the effects of natural hazards.

In meteorology, the deployment of geosynchronous satellites for telecommunications and for Earth observation, combined with the use of supercomputers to analyze the data gathered from space, has led to highly sophisticated models of tropical storm formation and behavior, providing earlier and far more reliable information with which to plan evacuations and other hazard-mitigation strategies. Similarly, remote sensing from space can now identify

insect infestations by detecting changes in the color of the Earth's surface. Seismological devices, also linked to supercomputers, are greatly improving our understanding of earthquake propagation. The hope is that this increased knowledge will enable us, in time, to provide reasonably early warnings about earthquakes in the same way as we can increasingly do so for volcanic eruptions, tsunamis, and various meteorological events.

Table-I: Linkages between Communication Technology and Management of Various Classes of Hazards

		Satellite			Terrestr
Hazards	Satellite Sensors	Remote	Radio and TV	Print Media	ial
		Telemetry			Sensors
EARTHQUAKE		Linking sensors to central facility and reverse	Transmitting warning and protection information / data	Education for protection, including Evacuation and building techniques	Strain gauges vibration sensors
LANDSLIDES	Meteorological monitoring of soil wetness	Transmitting data to central facility and reverse	Transmitting warning and protection information / data	Education for protection, including evacuation and building techniques	Strain gauges wetness sensors
TSUNAMIS	Wave surge detection	Transmitting data to central facility and reverse	Transmitting warning and protection information / data	Education for protection, including evacuation and building techniques	Subsea vibration sensors
VALCANOS	Optical and thermal sensors	Transmitting data to central facility and reverse	Transmitting warning and protection information / data	Education for protection, including Evacuation and location techniques	Vibration and thermal sensors
FLOODS	Optical Monitoring and meteorology	Transmitting data to central facility and reverse	Transmitting warnings and protection data	Education for protection, including evacuation and location techniques	Flow, rain and river high sensors
CYCLONES	Meteorology	Transmitting data to central facility and reverse	Transmitting warnings and protection data	Education for protection, including evacuation, and construction location techniques	Meteorol ogical monitori ng for storm surge
WILDFIRES	Optical and thermal monitoring	Transmitting data to central facility and reverse	Transmitting warnings and protection data	Education for protection, including Prevention and resistant construction	Optical and thermal sensor to support visual

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In Japan (one of the most frequently struck countries by earthquakes and tsunamis), reported earthquakes are broadcasted on television within 30 seconds of the event, and dependent on the nature of the earthquake, tsunami warnings can follow very rapidly. For this, the Japan Meteorological Agency has well-coordinated working procedures with the Japan Broadcasting System (NHK) that automatically and seamlessly insert earthquake and tsunami information upon receipt from the warning centre.

A major tsunami warning was issued by the Japan Meteorological Agency (JMA) within 3 minutes of 11 March 2011 Tsunami, but the initial warning underestimated the size of the tsunami. JMA subsequently updated the warnings, however in some locations public communication systems were damaged by the earthquake hindering dissemination.

Knowledge can be life saving, especially in an emergency, and much of what people know is learnt through the mass media. With the most advanced tsunami warning system in the world, Japan is a global standard setter. But with the death toll of the March 2011 tsunami nearing 20,000, it is also at the forefront of reflections on how to improve risk preparedness.

The forecasters, these days, have gained the ability to predict -the media have covered the near-term prediction and relief planning phases of the event in the developed countries. The media have significantly improved the level and sophistication of their pre- and post-disaster coverage in recent years by using new technology and consulting technical experts better able to describe the causes and mitigation of disaster. The development of news satellites has speeded up the pace at which distressful news is spread, particularly in television. With or without official blessing, cameras are likely to be on the scene within hours rather than days. News agencies and satellite news services further accelerate that dissemination. Technology advancements have given access to news agencies to local / regional/ national and global incidents in real time - bypassing borders and boundaries. Perhaps the main reason for the enhanced media coverage is that technology has made remote television transmission technologically and economically feasible. Satellite technology frees the communicators from the limitations of "hard" wires. Further, television's recently enhanced audio and video quality, the instantaneous availability of footage occasioned by the shift from film to electronic photography, the reduced weight and bulk of equipment, and the greatly reduced cost of both the equipment and of access to communications channels have led to a proliferation of information and greatly enhanced the media's capability to report on hazardous events whenever and wherever they occur.

AREAS WHERE MEDIA CAN CONTRIBUTE:

Since disasters are a significant source of news and capture the attention of

populations worldwide, the media provides tremendous visibility for disaster-related issues and, if used properly, can aid the process of disaster management very effectively. Some of the areas where media can contribute include:

Aid prioritization of Disaster Risk Issues - The media can influence the government to prioritize disaster risk issues, thereby ensuring that "self serving" political interests are not emphasized at the expense of the wider population. For example, the media may expose excessive and inefficient expenditure to relocate persons from vulnerable areas just before a general election with a view to secure votes, while little or no attention is given to replenishing the stock of relief supplies in the national warehouse for distribution in the event of a disaster. This kind of exposure facilitates more prudent and balanced prioritization of disaster risk issues.

Facilitate creation of Early Warning Systems:

Owing to the extensive outreach - the media can help disaster mitigation experts create Early Warning Systems by providing information on risks and existing technologies that can aid the development of useful concepts and systems. Emergency Alert System (EAS), which uses radio, TV and cable services across the country in United States for transmitting early warning, has been very effective. Increase international donations:

The media can trigger donations from the international community subsequent to the occurrence of national disasters, as well as push the government to increase budgetary allocations for disaster response programmes.

Improve coordination of risk assessment activities:

The media can improve the coordination of risk-assessment activities between policymakers and donor communities. This integration of effort should result in increased availability of resources and improved work programmes geared towards saving lives of affected populations and vulnerable communities.

IMPACT OF MEDIA:

The media is a mere tool in the hands of the disaster management professional and can, therefore, yield positive or negative results depending on how it is used.

Positive effects of the media:

The media is usually the first to define the event as an official disaster. They inform the public about it and therefore heighten awareness. This resulting awareness influences public opinion about how the disaster is being managed and often determines the level of attention that relief agencies pay to a particular disaster.

The media provides instantaneous information and are considered to be trusted sources specially at the local level, where the news media have a "vested interest" in the home town.

The network' s continuous and factual coverage of incidents and post-disaster events can aid decision making and response immediately after a disaster, thereby saving lives and property.

The media is an invaluable asset in times of a disaster by disseminating

information about public safety, giving useful details on areas such as impassable roadways and downed utility lines etc.

Other important public health concerns are usually addressed by issuing water safety advisories and providing information about sites where medical help is available for the public.

In the absence of telephones and other mechanisms for communicating with the world outside an affected area, the news media provides:

the affected population with much needed information and

the outside world with a glimpse of what that affected community is dealing with.

Negative effects of the media:

The media may exaggerate some elements of the disaster and create unnecessary panic.

The media' s inaccurate portrayal of human behavior during and after disasters may create a very dramatic and exciting, but only partially truthful story. For instance, it is not uncommon to see footage of people looting after a disaster on all news networks, but most viewers may not realize that all the networks were covering the same store being looted. As a result, people may feel that widespread and uncontrollable looting is taking place in the affected area(s) which may not be true at all.

Influential politicians may manipulate the media for personal or political gains. For example, Hurricane Dean significantly affected the island of Jamaica a few weeks before the 2007 general elections. The electronic media consistently showed members of a particular political party issuing relief items to the poor, which sent a subliminal message that the political party in question was more responsive to the needs of the people than the other. Incidentally, the political party (that was portrayed in a positive light by the media) won the elections and now forms the new government of Jamaica. News reporters may provide biased coverage for purposes of sensationalism by capturing horrific devastation on a street, choosing to ignore that on the opposite side of the street all the houses are intact with minor damage. This kind of " irresponsible journalism" may lead to the deployment of unnecessary and inappropriate resources to moderately affected areas thereby depriving the more severely affected areas of much needed aid.

Media representatives often converge on a high-profile event creating tremendous "congestion" in the affected area. This influx of individuals with their own needs into an already burdened area can be overwhelming, which may hinder or compromise search and rescue operations, jeopardize rescuer safety and hamper the provision of care needed by the critically ill and injured.

The advancement in communication technology has added unimaginable value to the mass communication service produced and provided by media. Mass communications technology has already made significant impact on how the public learns of and perceives various socio-cultural issues in Indian society. Systematic dissemination of education, awareness and alerts on disaster management CAN be an add-on mass media service at a very low cost.

We see from the above discussion that the media can play a very positive and important role in times of disaster, but can likewise, if not managed properly, hinder the response and recovery process. With this in mind, it is important to recognize that convergence of the media generally occurs after major disasters and, as such, a plan to effectively manage the media should be part of every disaster management plan and standard operating procedures.

10. State the application of science and Technology in Disaster management. (Nov/Dec Year 2017)

Science and technology in disaster management

A disaster is an event or series of events that leads to sudden disruption of normal life, causing severe damage to life and property to an extent, that available social and economic protection mechanism are inadequate to cope.

Disasters could be, natural (geological, hydro-meteorological and biological) or induced by human processes (environmental degradation and technological hazards).

While we cannot prevent an earthquake or a hurricane from occurring, or a volcano from erupting, we can apply the scientific knowledge and technical know-how to issue early warnings on volcanoes and cyclones and organize proper community response to such warnings.

Science and technology help us to understand the mechanism of natural hazards of atmospherical, geological, hydrological, and biological origins which are made up of an orderly system of facts that have been learned from study, experiments, and observations of floods, severe storms, earthquakes, landslides, volcanic eruptions and tsunamis, and their impacts on humankind and his works. The scientific and technological disciplines which are involved include basic and engineering sciences, natural, social and human sciences. They relate to the hazard environment (i.e., hydrology, geology, geophysics, seismology, volcanology, meteorology, and biology), to the built environment (i.e., engineering, architecture, and materials), and to the policy environment (i.e., sociology, humanities, political sciences, and management science).

Application of technology in disaster management

Though it is not possible to completely avoid the natural disasters, but the sufferings can be minimized by creating proper awareness of the likely disasters and its impact by developing a suitable warning system, disaster preparedness and management of disasters through application of information technology tools. There are mainly applications we can use to manage disasters:

• GIS and remote sensing

GIS provides a tool for effective and efficient storage and manipulation of remotely sensed data and other spatial and non-spatial data types for both scientific management and policy oriented information. This can be used to facilitate measurement, mapping, monitoring and modeling of variety of data types related to natural phenomenon.

The specific GIS application in the field of Risk Assessment are:- Hazard Mapping

to show earthquake, landslides, floods or fire hazards. Theses map could be created for cities, districts or even for the entire country and Tropical Cyclone Threat Maps are used by meteorological departments to improve the quality of the tropical storm warning services and quickly communicate the risk to the people likely to get affected by the cyclone.

Remote sensing makes observation of any object from a distance Remote sensing comprises Aerial Remote Sensing which is the process of recording information, such as photographs and images from sensor on aircrafts and Satellite Remote Sensing which consists of several satellite remote sensing system which can be used to integrate natural hazard assessments into development planning studies. These are: Land sat, SPOT Satellite, Satellite Radar System, Advanced Very High Resolution Radio.

GIS can also be used in carrying out search and rescue operations in a more effective manner by identifying areas that are disasters prone and zoning them accordingly to risk magnitudes.

• Internet

In the present era of electronic communication, the internet provides a useful platform for disaster mitigation communications. Launching of a well-defined website is a very cost-effective means of making an intra-national and international presence felt. It provides a new and potentially revolutionary option for the rapid, automatic, and global dissemination of disaster information. A number of individuals and groups, including several national meteorological services, are experimenting with the Internet for real-time dissemination of weather observation, forecasts, satellite and other data. In the most critical phase of natural disasters electronic communication have provided the most effective and in some instances perhaps the only means of communication with the outside world.

Warning and forecasting system

An advance system of forecasting, monitoring and issuing early warnings plays the most significant role in determining whether a natural hazard will assume disastrous proportions or not.

IMD provides cyclone warnings from the Area Cyclone Warning Centers (ACWCs) It has developed the necessary infrastructure to originate and disseminate the cyclone warnings at appropriate levels. It has made operational a satellite based communication system called Cyclone Warning Dissemination System for direct dissemination of cyclone warnings to the cyclone prone coastal areas.

Seismological observations in the country are made through national network of 36 seismic stations operated by the IMD, which is the nodal agency.

These stations have collected data over long periods of time.

Flood forecasts and warnings are issued by the Central Water Commission (CWC), Ministry of Water Resources. These are used for alerting the public and for taking appropriate measures by concerned administrative and state engineering agencies in the flood hazard mitigation. Information is gathered from the CWC's vast network of Forecasting Stations on various rivers in the country

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It may be observed that advancement in Information Technology in the form of Internet, GIS, Remote Sensing, Satellite communication, etc. can help a great deal in planning and implementation of hazards reduction. For maximum benefit, new technologies for public communication should be made use and natural disaster mitigation messages should be conveyed through these measures. GIS can improve the quality and power of analysis of natural hazards assessments, guide development activities and assist planners in the selection of mitigation measures and in the implementation of emergency preparedness and response action. Remote Sensing, on the other hand, as a tool can very effectively contribute towards identification of hazardous areas; monitor the planet for its changes on a real time basis and give early warning to many impending disasters. Communication satellites have become vital for providing emergency communication and timely relief measures. Integration of space technology inputs into natural disaster monitoring and mitigation mechanisms is critical for hazard reduction. It is absolutelynecessary to create awareness amongst the public as well as decision makers for allocating resources for appropriate investments in information technology. Awareness and training in Information technology in a much greater measure is required to develop human resources, particularly in the developing countries, who are chronically suffer from natural disasters.

The disasters usually occur in the well-defined areas, even though the community does not know the coping mechanism for the disaster. The disaster mitigation programmes must be extensively taken up covering various aspects at national level to minimise the disaster damages. There should be a greater emphasis on development of new technologies in disaster mitigation. The disaster preparedness and awareness is the only effective way of mitigating the impact of future disasters. Therefore, without science and technology, and their blending with other disciplines, there can be no world safer from natural disasters. Thanks to science and technology, we already know much about natural hazards and about the ways and means to avoid or reduce many of their effects. Success in significantly reducing disasters is within our reach. Now is the time to act within the International Strategy for Disaster Reduction.

C405A.5 UNIT V DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS

Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

PART-A

1. State the contribution of ISRO in disaster management in India. (Nov/Dec Year 2021)

ISRO disseminates relevant information in interactive geo-spatial domain through various geoportals like Bhuvan, National Database for Emergency Management and MOSDAC for the administrators to better understand the impact and for improved decision support during disasters. ISRO provides the satellite based near real time information support to Central Ministries / Departments and State Ministries / Departments, prior during and after major natural disasters. In addition, ISRO also provides capacity building in use of Space technology inputs in Disaster Management Support..

2 What is a fluvial flood? (Nov/Dec Year 2021)

Fluvial (River Flood) Fluvial, or riverine flooding, occurs when excessive rainfall over an extended period of time causes a river to exceed its capacity. It can also be caused by heavy snow melt and ice jams.

3. **Describe disaster mitigation. (Nov/Dec Year 2020)**

Disaster 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. Disaster 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.

Describe disaster preparedness. (Nov/Dec Year 2020)

- 4. Disaster preparedness 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.
 - 5. List out the role of media in disaster. (Nov/Dec Year 2019)

The media assists in the management of disasters by educating the public about disasters;

- ☑ warning of hazards
- gathering and transmitting the information about the affected areas
- alerting government officials, relief organizations and the public to specific needs
- facilitating discussions about the disaster preparedness and response for continuous improvement
- 6. What are the effects of forest fire? (Nov/Dec Year 2019)

The effects of forest fires are

Fauna and flora upset by forest fires

- Forest fires increase carbon dioxide levels in the atmosphere, contributing to the greenhouse effect and climate change. In addition, ashes destroy much of the nutrients and erode the soil, causing flooding and landslides.
- 7. How human activities increase the chance of coastal flooding ? (Nov/Dec Year 2018)

Human factors increasing flood risk:

I Urbanisation - because towns and cities have more impermeable surfaces.

Deforestation-removing trees reduces the amount of water intercepted and increases.

- 8. Mention some short term gain generated by disaster. (Nov/Dec Year 2018)
 Disasters may generate short-term gains from:
 - Changes in future production, employment, and income and/or changes in these flows outside the damaged area. Current production outside the immediate area of impact or future production within the affected region may compensate for initial disaster-induced losses.
 - Income gains outside the impact area to owners of commodities inflated in price by disaster-induced shortages. Both agricultural commodities lost in a disaster and construction materials demanded during reconstruction are particularly likely to generate these windfall profits outside the region.
 - Positive economic stimuli of jobs and production generated from cleaning up and rebuilding and the multiplier effect of those increases.
- 9. **Specify some flood mitigation plan. (Nov/Dec Year 2017)**

Flood mitigation plan involves:

- Floodplain zoning by the respective state governments. Even after the recommendations of the RashtriyaBarhAyog (RBA) in 1976, only three such states have passed these acts – Rajasthan, Manipur and Uttarakhand and even in these states, the implementation is lax.
- Planting of the tree and mangrove belts along river banks and coastlines.
- Shared flood warning mechanisms with both upstream and downstream neighbours across international boundaries.
- Recharge and rejuvenation of wetlands and prevention of any encroachment upon their areas.

10. What is Seismograph and Seismogram? (Nov/Dec Year 2017)

- A seismograph is the device that scientists use to measure earthquakes. The goal of a seismograph is to accurately record the motion of the ground during a quake. A seismogram is a graph output by a seismograph. It is a record of the ground motion at a measuring station as a function of time.
- 11. What is an Early warning systems? (Nov/Dec Year 2016)

An early warning system (EWS) is technology and associated policies and procedures designed to predict and mitigate the harm of natural and

human-initiated disasters and other undesirable events. Early warning systems for natural hazards include those designed for floods, earthquakes, avalanches, tsunamis, tornadoes, landslides and drought.

12. What are the five earthquake hazards? (Nov/Dec Year 2016)

The five earthquake hazards are

Ground Shaking. If an earthquake generates a large enough shaking intensity, structures like buildings, bridges and dams can be severley damaged, and cliffs and sloping ground destabilised.

- Tsunami.
- □ Landslides and Rockfalls.
- Subsidence and Lateral Spreading.
- Liquefaction.

13. Mention indirect losses in disaster. (Nov/Dec Year 2015)

Disasters can produce indirect losses and the losses include

- $\ensuremath{\mathbb{N}}$ Induced losses in sales, wages, and/or profits due to loss of function.
- Input/output losses to firms forward-linked or backward-linked in production to businesses closed as a result of direct physical damage or infrastructure failure. Slowdowns or shutdowns are induced by reductions in demands for inputs and supplies of outputs from damaged firms.
- Spending reductions from the income losses triggered by firm closures or cutbacks— so-called multiplier, or ripple, effects. Employees of the firms experiencing reduced production and sales suffer income losses and subsequently curtail their own expenditures, initiating a new round of firm cutbacks.
- 14. What is Pluvial flooding? (Nov/Dec Year 2015)

Pluvial flooding is when rainfall or snowmelt is not absorbed into the ground forcing the water to flow overland. The area will remain flooded until water has drained away through stormwater systems or waterways

- 15. What is the role of WHOin global health security ? (Nov/Dec Year 2014) World Health Organization WHO contributes to global health security by:
 - strengthening national surveillance programmes, particularly in the field of epidemiology and laboratory techniques;
 - disseminating verified information on outbreaks of diseases, and also by providing technical support for response;
 - Collecting, analyzing and disseminating information on diseases likely to cause epidemics of global importance.

16. Idenfiy the consequence of drought. (Nov/Dec Year 2014)

The consequence of drought are

- Crop failure.
- Shortage of water which leads to large scale death of cattle and other animals.
- Migration of human and livestock.

Scarcity of water compels people to consume contaminated water resulting in the speed of many water borne diseases.

17. List some flood prone areas in India. (Nov/Dec Year 2013)

The most flood prone areas are the Brahmaputra, Ganga and Indus basins. As far as the states are concerned, Uttar Pradesh, Bihar, West Bengal and Orissa are the most flood affected states followed by Haryana, Punjab and Andhra Pradesh. Nowadays Rajasthan and Gujarat also feel the fury of floods. Karnataka and Maharashtra are no longer immune to floods.

18. How is a Tsunami formed? (Nov/Dec Year 2013)

Seismicity generated tsunamis are the result of abrupt deformation of sea floor resulting vertical displacement of the overlying water. When earthquakes occur beneath the sea level, the water above the reformed area is displaced from its equilibrium position. The release of energy produces tsunami waves which have small amplitude but a very long wavelength. It may be caused by a non-seismic event such as a landslide or impact of a meteor.

19. Mention the two types of biological disaster.

The two types of biological disasters are

1.Epidemic -level biological disasters affect large members of people within a given community or area. Example : cholera

2.Pandemic - level biological disasters affect a much larger region, sometimes spanning entire continents or the globe. Example: Swine flu, Covid 19

20. What is biological warfare?

Biological warfare is the use of biological toxins or infectious agents such as bacteria, viruses, and fungi with intent to kill or incapacitate humans, animals or plants as an act of war. NBC is the military acronym for nuclear, biological, and chemical warfare using weapons of mass destruction. This can also be termed as bioterrorism.

21 Brief about Landslide Mitigation.

Landslide mitigation plans are as follows

- Restriction on construction and other developmental activities such as roads and dams.
- In Limiting agriculture to valleys and areas with moderate slopes.
- Control on the development of large settlements in the high vulnerability zones '
- Promoting large scale afforestation programs.
- Hazard mapping should be done to locate areas commonly prone to landslides
- Terrace farming should be encouraged in the north eastern hill states replacing Jhumming or shifting cultivation measures to deal with landslides.
- Retaining walls can be built of mountain slopes to stop land from slipping
- 22 Write note on Drought Crisis Management Plan, 2015

Based on Drought Crisis Management Plan, 2015, the NDMA manual sets out four important measures that a State government should take at the time of drought, with the Union government' s help.

- MGNREGA to provide immediate employment to drought-affected Х people.
- public distribution mechanism should be strengthened to The М provide food and fodder.
- Initiate actions to recharge the groundwater table by building М check dams and providing pipeline water and other irrigation facilities.
- The government should either waive off or defer farmer loans and М arrange for crop loss compensation.

23. Write note on earthquake mitigation.

Earthquake mitigation plan are as follows.

a.National earthquake Risk Mitigation Project: The project aims at strengthening the structural and non-structural earthquake mitigation efforts in reducing the vulnerability in high risk districts prone to earthquakes.

b.National Building Code: The salient features of the NBC 2005 include meeting the challenges posed by natural calamities and reflecting the state-of-the-art and contemporary applicable international practices.

c.Seismic retrofitting : It is the modification of existing structures to make them more resistant to seismic activity, ground motion, or soil failure due to earthquakes.

What are the Challenges for Earthquake Mitigation in India? 24.

The challenges for earthquake mitigation in India are

- Inadequate enforcement of earthquake-resistant building codes Xand town planning by laws. Absence of earthquake-resistant features in constructions in urban and rural areas.
- Lack of formal training among professionals in earthquake-resistant Х construction practices.
- Lack of adequate preparedness and poor response capacity of М various stakeholder Groups

What is Level 1 and Level 2 Disaster? 25

- : The level of disaster that can be managed within the capabilities Level-L1 resources at the District level, However the state authorities will and readiness to provide assistance if needed. remain in
- Level-L2: This signifies the disaster situations that require assistance and active mobilization of resources at the state level and deployment of agencies for disaster management. The central agencies state level must remain vigilant for immediate deployment if required by the state.

PART-B

1. What was the flood that affected Kerala recently? Critically evaluate the risk reduction strategies followed during the disaster. (Nov/Dec Year 2021) On August 2018, Severe floods affected the south Indian state Kerala, due to unusually high rainfall during the monsoon season. It was the worst flood in Kerala in nearly a century. Over 483 people died, and 140 are missing. About a million people were evacuated, mainly from Chengannur, Pandanad, Edanad, Aranmula, Kozhencherry, Ayiroor, Ranni, Pandalam, Kuttanad, Malappuram, Aluva, Chalakudy, Thrissur, Thiruvalla, Eraviperoor, Vallamkulam, North Paravur, Chellanam, Vypin Island and Palakkad. All 14 districts of the state were placed on red alert. According to the Kerala government, one-sixth of the total population of Kerala had been directly affected by the floods and related incidents. The Indian government had declared it a Level 3 Calamity, or "calamity of a severe nature". It is the worst flood in Kerala after the great flood of 99 that took place in 1924.

Thirty-five out of the fifty-four dams within the state were opened, for the first time in history. All five overflow gates of the Idukki Dam were opened at the same time, and for the first time in 26 years 5 gates of the Malampuzha dam of Palakkad were opened.Heavy rains in Wayanad and Idukki have caused severe landslides and have left the hilly districts isolated.The situation was regularly monitored by the National Crisis Management Committee, which also coordinated the rescue and relief operations.

Cause:

Kerala received heavy monsoon rainfall, which was about 116% more than the usual rain fall in Kerala, on the mid-evening of 8 August, resulting in dams filling to their maximum capacities. In in the first 48 hours of rainfall the state received 310 mm (12 in) of rain

Risk Reduction Strategies Followed During The Disaster:

- Airport authorities suspended operations of the flood-affected Cochin International Airport till 15:00 (IST) on 11 August 2019
- Kerala's State Disaster Management Authority, Kerala police along with the Indian Air Force, civilians, volunteers, fishermen from coastal Kerala are actively taking part in the rescue operations in flood-affected regions.
- 83 National Disaster Response Force(NDRF) teams were deployed in addition to the 173 teams of Army, Navy, Air Force, and Coast Guard to take part in the relief operations.
 - o Kerala Fire and Rescue Services: 4,100 individuals and the entire rescue
 - o equipment deployed
 - o National Disaster Response Force (NDRF): 58 teams, 207 boats
 - o Army: 23 columns, 104 boats
 - o Navy: 94 rescue teams, one medical team, nine helicopters, two fixed wing
 - o aircrafts and 94 boats
 - o Coast Guard: 36 teams, 49 boats, two helicopters, two fixed wing and 27 hired
 - o boats

- o Air Force: 22 helicopters from Air Force and 23 fixed wing aircrafts
- o Central Reserve Police Force: 10 teams
- o Border Security Force: Two companies and one water vehicle team.
- Animal rescue was carried out by local NGOs and activists on ground mainly in places like Wayanad and Nilambur

The Kerala State Disaster Management Authority (KSDMA) has operationalised its new disaster preparedness guidelines for the rainy season after August 2018 rainfall

The 'Monsoon preparedness and emergency response plan,' a first-of-its kind document for the State for handling emergencies during the two monsoons, has been sent to all District Collectors, heads of State government departments/agencies and Central agencies, including defence forces stationed in the State.

Guidelines on dams

- Initial warning at least 36 hours before releasing water from dams
- 24-hour gap between the sounding of first and third alert
- No discharge of water from dams between 6 p.m. and 6 a.m.

Others include

- The Kerala Dam Safety Authority should inspect all dams ahead of the monsoons and submit reports to the government.
- The PWD should conduct structural audits of all bridges ahead of the monsoons. Recommendations on traffic regulations on weak bridges should be submitted to district-level disaster management authorities.
- The Fisheries Department has been asked to ensure the availability of speed boats to enable quick search and rescue at sea.
- The Local Self-Government Department should ensure the removal of trees, hoardings and old utility posts that pose a threat during heavy rains and winds.
- The Health Department should take steps to prevent epidemics and stock medicines in all hospitals. Similarly, the Animal Husbandry Department should prevent the emergence of zoonotic diseases during the monsoon months.
- The Revenue Department has been asked to appoint an officer not below the rank of deputy tahsildar at its State-level control room. Among other things, the department should also identify buildings that can be used as shelters in an emergency.

2. How to mitigate the risk of floods in future? (Nov/Dec Year 2021)

Introduce better flood warning systems

giving people more time to take action during flooding, potentially saving lives.Advance warning and pre-planning can significantly reduce the impact from flooding.

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Modify homes and businesses to help them withstand floods X

The focus should be on "flood resilience" rather than defence schemes.Concreting floors and replacing materials such as MDF and plasterboard with more robust alternatives. waterproofing homes and moving electric sockets higher up the walls to increase resilience.

Construct buildings above flood levels М

construct all new buildings one metre from the ground to prevent flood damage,

Tackle climate change Х

Climate change has contributed to a rise in extreme weather events

Protect wetlands and introduce plant trees strategically Х

The creation of more wetlands – which can act as sponges, soaking up moisture – and wooded areas can slow down waters when rivers overflow. These areas are often destroyed to make room for agriculture and development. Halting deforestation and wetland drainage, reforesting upstream areas and restoring damaged wetlands could significantly reduce the impact of climate change on flooding, according to the conservation charity.

Restore rivers to their natural courses Х

Many river channels have been historically straightened to improve navigability. Remaindering straightened rivers by introducing their bends once more increases their length and can delay the flood flow and reduce the impact of the flooding downstream.

Introduce water storage areas

Improve soil conditions М

Inappropriate soil management, machinery and animal hooves can cause soil to become compacted so that instead of absorbing moisture, holding it and slowly letting it go, water runs off it immediately. Well drained soil can absorb huge quantities of rainwater, preventing it from running into rivers.

Put up more flood barriers М

3. Explain Rehabilitation strategy after a disaster(Nov/Dec Year 2020)

Rehabilitation is a medium-term activity aimed at putting the disaster-affected people back to productive activities that they were engaged in prior to the disaster. introducing new economic opportunities and improving land and water management processes so as to reduce people's vulnerability and enhance capacities to handle future calamities.

Organizations involved in post disaster recovery must share the following core values:

- All major destructions have seeds of construction in them. М
- People, however poor and vulnerable they may be, have the capacity to М

overcome the consequences of a disaster.

- Though people's vulnerability gets more pronounced after a disaster, this does not mean under any circumstance that they do not have the capacity to overcome
 - it.
- People, however poor they may be, when they come together, it generates

tremendous collective power and wisdom.

The poor are bankable (the success of the micro finance sector in India and

elsewhere has proved it); and hence input for productive activities should not

necessarily be a dole.

Believe in the dignity of people.

Re-establishing people's lives through rehabilitation efforts involves

Moving up the ladder from house to habitat to livelihood

- Local awareness creation including training for all so that people gain control over the housing process.
- Capacity Building and linking to enterprises-Livelihood support Devising livelihood interventions in the farm and non-farm sectors based on new economic opportunities to create economic surpluses (that can be directed to responsive housing)

Creating a basis for community access to institutional housing finance

Response to Cyclone

The affected people go back to their villages, even if they need to stay in temporary shelters there.

Electricity is restored - an electric bulb apart from giving the much needed light also sends a message that life goes on.

Schools reopen even if the books and the school buildings have been completely

destroyed. Being with peers acts as a psycho- social support to the children, it

also protects children from trafficking.

Markets reopen.

The affected people get back to the productive activities they were engaged in.

Response to Drought

Drought is a slow impact disaster. The international community's or civil societies respond to it when the worst symptoms of it: deaths due to hunger, surface. An area as large as a state, district or as small as a block is considered drought affected if the rainfall during monsoon is less than 25% of

the average annual rainfall. If it is less than 50%, the area is considered by the government as severely drought affected. This drought is called as **meteorological drought**.

The Government of India has been implementing Drought Prone Area Program(DPAP) in identified districts of the country. This is also true that 73% of the sugarcane produced in Maharashtra comes from drought prone areas.

Civil society response to drought is generally after media reports of starving children. International and national civil society organizations that have developed tools to monitor the situation in known drought prone areas. The tools used for the rainfall, the growth of crops, out migration of able bodied men, the cost of essential food items in the local market in comparison to previous years, etc.

The typical civil society response to drought

creating employment opportunities through cash food, or both create community assets that could store rain water to cater to the agricultural needs in the subsequent year.

Response to River Erosion

The most pressing immediate needs of the people affected by erosion are:

- **Rescue and evacuation**
- Shelter
- $\ensuremath{\mathbb{N}}$ $\ensuremath{\mathbb{F}}$ Food and water
- ☑ Clothes
- ☑ Sanitation
- **Hygiene kits**
- Protection of children and girls from trafficking

Rehabilitation of river erosion is the availability of appropriate land for resettlement of the people affected by it.

Response to Earthquake

Earthquake above 5 on the Richter scale can damage poorly constructed houses. The

destruction of houses is the main cause of mortality during earthquakes. The earthquake

resistance housing can reduce the damage

Earthquake resistant features like:

Tie-bonds: Wooden beams which literally bind together all the walls of a house

Tying inner and outer walls.

- ☑ Corner reinforcements
- ☑ Low roofs which drop the center of gravity.
- Small openings like doors and windows that enhance the rigidity of the house

The immediate response after an earthquake is:

- \square To search for survivors;
- In attend to the emergency medical needs of the injured; and

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- It To meet other needs like food, shelter, clothes for all ages, sanitation, hygiene
- kits, etc

Response After Tsunami

The immediate needs of the tsunami affected people would be similar to other high-impact disasters. These could be:

- Rescue of survivors.
- Care of the injured.
- Temporary shelter.
- **Removal and disposal of dead humans and animals.**
- Food and water.
- In Clothes for all age groups.
- Sanitation including environmental sanitation.
- B Hygiene kits.
- ☑ Psycho− social support.
- In Care and protection of children who may have lost both parents.

Rehabilitation after Tsunami Becomes Difficult For Two Reasons:

- The government would have to allot alternative land to the fisher folk at a safe
- distance but not very distant from the sea because their source of livelihood is the
- sea and they study the sea very closely and intensely through the day and night.
- Vast agricultural land may be inundated by the sea water making it difficult to
- \blacksquare grow crops immediately after a tsunami.
- 4. Explain the different types of man-made disasters with special reference to Bhopal gas leaked tragedy. (Nov/Dec Year 2020)

Man-made disasters are the consequence of technological or human hazards. Examples include stampedes, fires, transport accidents, industrial accidents, oil spills and nuclear explosions/radiation. War and deliberate attacks may also be put in this category. As with natural hazards, man- made hazards are events that have not happened, for instance terrorism.

Man- made disasters are examples of specific cases where man-made hazards have become reality in an event.

Types of Man Made Disasters

- **Nuclear disasters**
- **Biological disasters**
- Chemical disasters
- **Fire accidents Road accidents**
- ☑ Terrorism

Epidemic

Nuclear Disasters

It is a type of explosion deriving its force from nuclear reactions of fission and fusion . It is of two types fission and fusion . Egs. Of fission are atomic bombs , A-bombs , fission bombs . Egs. Of fusion bombs are hydrogen bombs , H-bombs , fusion bombs etc.

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Precautions of nuclear accident Common indicators of these disasters are vomiting , nausea , dizziness etc.

Don't look at fire as it causes instant blindness.

- Close all doors and windows as radioactivity doesn't penetrate into solid structures
- Cover all food and water and listen govt. orders

Biological disasters

These are referred as poor man's nuclear bomb as these are easy to manufacture, transport and have the ability to kill hundreds and thousands of people. They are delivered using dusting airplanes or small perfumes atomizers. They have ability to generate immediate effects. BIOLOGICAL DISASTERS.

Precautions of Biological disasters

The WHO should lay emphasis on prohibition against biological warfare We should immediately get away from an suspicious thing Cover your mouth with a wet cloth Listen to T.V. and Radio for further GOVT. instructions.

Chemical disasters

Disasters that are caused by the excessive use and misuse of chemicals in industries are called chemical disasters. The irresponsible handling of powerful chemicals can cause widespread devastation.

Precautions of Chemical disasters

Industries using harmful and powerful chemicals should be located far away

from residential areas There should be surveys to keep a check on their activity The govt. should formulate an emergency plan to in case of an accident Pollution levels should be checked and maintained

Fire Accidents

Accidents that are caused due to fire are quite common. Fire results in heavy damage both in terms of life and property. Loss of life is high in a crowded building.

Precautions of Fire Accidents

The main reason is poor wiring and faulty electrical equipment, leaking gas or carelessly thrown cigarettes and matches The main power supply source is good condition. Wire should be properly covered Inflammable things should be kept out of reach of children Power points shouldn't be overloaded

Travel accidents

Travel accidents are quite common. An accident which involves a no. of people becomes a disaster. Eg. of these disasters are air crashes , train or vehicles collisions , capsizing of boats etc

Precautions of Travel accidents

All efforts should be made to carry victims to nearby hospital If possible, first aid can be given to victims It is the duty of people present there to get trapped people out If we smell fuel at accident site , warn people and don't light fire.

Terrorism

This is another type of disaster that results in loss of life and property. Terrorists use violence and strike without warning. They use bombs, guns etc to terrorize people

Precautions of Terrorism

We must inform police if we come across any suspected group of people We must stay away from any suspicious things and inform police about that. Do not accept packages from strangers Do not leave luggage unattended while travelling **Epidemic**

Epidemic occurs when a disease attacks a large no of people at one time. It spreads at rapid rate among human population . Most of diseases are spread after natural disaster like tsunami , flood etc.

Precautions of Epidemic

Ensure safe drinking water, sanitation after a disaster. Health workers should be trained. Covering of all stored water containers A surveillance should be established to detect outbreaks

The Union Carbide Gas Leak

The Union Carbide Gas Leak On the night of December 2, 1984, the Union Carbide pesticide plant in Bhopal, India began to leak methyl isocyanate gas and other poisonous toxins into the atmosphere. Over 500,000 were exposed and there were up to 15,000 deaths at that time.

Causes of Bhopal Disaster

The plant in Bhopal where the disaster happened started to produce 'Carbaryl' in 1977. Carbaryl is mainly used as an insecticide. At first, the production was 2,500 tonnes per year. There was no problem, as the plant had been designed for an output of 5,000 tonnes. At the beginning of the 1980's, Carbaryl did not sell very well. For this reason, the owners of the plant started to cut the costs. This included employing fewer people, doing maintenance less frequently and using parts that were made of lower-grade steel. Closing the plant was being considered as well. When the disaster happened, there was no production at the plant because there was a surplus amount of material on the market.

There is also theory related to this which says that the owner of the Union Carbide Company (UCC) did this on purpose to just challenge the government to punish him. However, as we all know, he had escaped long ago using the corruption in the Indian government at that time to his advantage.

The disaster happened because water entered a tank containing Methyl isocyanate. This caused a chemical reaction which resulted in the buildup of much Carbon dioxide, among other things. The resulting reaction increased the temperature inside the tank to reach over 200 ° C (392 ° F). The pressure was more than the tank was built to withstand. The tank had valves to control the pressure. These were triggered in an emergency, which reduced the pressure. As a result, large amounts of toxic gases were released into the environment. The pipes were rusty. The rust in the iron pipes made the reaction faster. All the contents of the tank were released within a period of about two hours. The water had entered the tank because of a sequence of events. The tank had been maintained badly. When cleaning work was done, water entered the tank

5. Explain the causes and measures to prevent forest fires. . (Nov/Dec Year 2019)

The most common hazard in forests is forests fire. Forests fires are as old as

the forests themselves. They pose a threat not only to the forest wealth but also to the entire regime to fauna and flora seriously disturbing the bio-diversity and the ecology and environment of a region. During summer, when there is no rain for months, the forests become littered with dry senescent leaves and twinges, which could burst into flames ignited by the slightest spark. The Himalayan forests, particularly, Garhwal Himalayas have been burning regularly during the last few summers, with colossal loss of vegetation of region. cover that Forest fire causes imbalances in nature and endangers biodiversity by reducing faunal and floral wealth. Traditional methods of fire prevention are not proving effective and it is now essential to raise public awareness on the matter, particularly among those people who live close to or in forested areas.

CAUSES OF FOREST FIRE

Forest fires are caused by Natural causes as well as Manmade causes

Natural causes- Many forest fires start from natural causes such as lightning which set trees on fire. However, rain extinguishes such fires without causing much damage. High atmospheric temperatures and dryness (low humidity) offer favorable circumstance for a fire to start. Man made causes- Fire is caused when a source of fire like naked flame, cigarette or bidi, electric spark or any source of ignition comes into contact with inflammable material.

Traditionally Indian forests have been affected by fires. Themenace has been aggravated with rising human and cattle population and the consequent increase in demand for Forest products by individuals and communities. forest fires of be divided into broad Causes can two categories: environmental (which beyond control) are and human related (which are controllable).

Environmental causes are largely related to climatic conditions such as temperature, wind speed and direction, level of moisture in soil and atmosphere and duration of dry spells. Other natural causes are the friction of bamboos swaying due to high wind velocity and rolling stones that result in sparks setting off fires in highly inflammable leaf litter on the forest floor.

Human related causes aresult from human activity as well as methods of forest management. These can be intentional or unintentional, for example:

graziers and gatherers of various forest products starting small fires to obtain good grazing grass as well as to facilitate gathering of minor forest produce like flowers of *Madhuca indica* and leaves of *Diospyros melanoxylon*
the centuries old practice of shifting cultivation (especially in the North-Eastern region of India and inparts of the States of Orissa and Andhra Pradesh).

the use of fires by villagers to ward off wild animals

fires lit intentionally by people living around forests for recreation

fires started accidentally by careless visitors to forests who discard cigarette butts.

The causes of forest fire have been increasing rapidly. The problem has been accentuated by the growing human and cattle population. People enter forests ever more frequently to graze cattle, collect fuelwood, timber and other minorforest produce. It has been estimated that 90% of forest fires in India are man-made

Classification of Forest Fire

The types of forest fire are as follows

Surface Fire - A forest fire may burn primarily as a surface fire, spreading along the ground as the surface litter (senescent leaves and twigs and dry grasses etc) on the forest floor and is engulfed by the spreading flames.

Underground Fire - The fires of low intensity, consuming the organic matter beneath and the surface litter of forest floor are sub-grouped as underground fire. In most of the dense forests a thick mantle of organic matter is find on top of the mineral soil. This fire spreads in by consuming such materials. These fires usually spread entirely underground and burn for some meters below the surface. This fire spreads very slowly and in most of the cases it becomes very hard to detect and control such type of fires. They may continue to burn for months and destroy vegetative cover of the soil. The other terminology for this type of fire is Muck fires. **Ground Fire -** These fires are fires in the sub surface organic fuels, such as duff layers under forest stands, Arctic tundra or taiga, and organic soils of swamps or bogs. There is no clear distinction between underground and ground fires. The smoldering under ground fires sometime changes into Ground fire. This fire burns root and other material on or beneath the surface i.e. burns the herbaceous growth on forest floor together with the layer of organic matter in various stages of decay. They are more damaging than surface fires, as they can destroy vegetation completely. Ground fires burn underneath the surface by smoldering combustion and are more often ignited by surface fires.

Crown Fire - A crown fire is one in which the crown of trees and shrubs burn, often sustained by a surface fire. A crown fire is particularly very dangerous in a coniferous forest because resinous material given off burning logs burn furiously. On hill slopes, if the fire starts downhill, it spreads up fast as heated air adjacent to a slope tends to flow up the slope spreading flames along with it. If the fire starts uphill, there is less likelihood of it spreading downwards.

Firestorms - Among the forest fires, the fire spreading most rapidly is the firestorm, which is an intense fire over a large area. As the fire burns, heat rises and air rushes in, causing the fire to grow. More air makes the fire spin violently like a storm. Flames fly out from the base and burning ember spew out the top of the fiery twister, starting smaller fires around it. Temperatures inside these storms can reach around 2,000 degrees Fahrenheit.

EFFECT OF FOREST FIRE

Fires are a major cause of forest degradation and have wide ranging adverse ecological, economic and social impacts, including:

loss of valuable timber resources

degradation of catchment areas

loss of biodiversity and extinction of plants and animals

loss of wildlife habitat and depletion of wildlife

loss of natural regeneration and reduction in forest cover

global warming

loss of carbon sink resource and increase in percentage of CO2 in atmosphere

change in the microclimate of the area with unhealthy living conditions soil erosion affecting productivity of soils and production

ozone layer depletion

health problems leading to diseases

loss of livelihood for tribal people and the rural poor, as approximately 300 million people are directly dependent upon collection of non-timber forest products from forest areas for their livelihood.

The needs of the fire management

The incidence of forest fires in the country is on the increase and more area is burned each year. The major cause of this failure is the piecemeal approach to the problem. Both the national focus and the technical resources required for sustaining a systematic forest fire management programme are lacking in the country. Important forest fire management elements like strategic fire centres, coordination among Ministries, funding, human resource development, fire research, fire management, and extension programmes are missing. Taking into consideration the serious nature of the problem, it is necessary to make some major improvements in the forest fire management strategy for the country. The Ministry of Environment and Forests, Government of India,

has prepared a National Master Plan for Forest Fire Control. This plan proposes to introduce a well-coordinated and integrated fire-management programme that includes the following components:

Prevention of human-caused fires through education and environmental modification. It will include silvicultural activities, engineering works, people participation, and education and enforcement. It is proposed that more emphasis be given to people participation through Joint Forest Fire Management for fire prevention. Prompt detection of fires through a well coordinated network of observation points, efficient ground patrolling, and communication networks. Remote sensing technology is to be given due importance in fire detection. For successful fire management and administration, a National Fire Danger Rating System (NFDRS) and Fire Forecasting System are to be developed in the country.

Fast initial attack measures.

Vigorous follow up action.

Introducing a forest fuel modification system at strategic points.

Firefighting resources.

Each of the above components plays an important role in the success of the entire system of fire management. Special emphasis is to be given to research, training, and development

Integrated forest protection

The main objective of this scheme to control forest fires and strengthen the forest protection in Tamilnadu. The works like fireline clearing, assistance to Joint Forest Management committees, creating water bodies, purchase of vehicles and communication equipments, purchase of fire fighting tools, etc., are being undertaken.

Precautions

The followings are the important precautions against fire:

- To keep the source of fire or source of ignition separated from combustible and inflammable material.
- To keep the source of fire under watch and control.
- Not allow combustible or inflammable material to pile up unnecessarily and to stock the same as per procedure recommended for safe storage of such combustible or inflammable material.

To adopt safe practices in areas near forests viz. factories, coalmines,

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oil stores, chemical plants and even in household kitchens. To incorporate fire reducing and fire fighting techniques and equipment

6. Explain in details about the Causes, impact and NDMA Guidelines on Landslide Hazard Management. . (Nov/Dec Year 2019) Causes of LandSlide

and surfaces are held together by multiple forces. The most important of these is friction. Some soil particles, like clay, cling to each other tightly, while others, like sand, are only loosely joined. All landscapes are held together by friction between the sediment cover and the underlying bedrock, some more tightly than others. If something is introduced to disrupt the friction on an incline, a landslide slips into action. Landslides occur when **gravity** overcomes the force of **friction**.

Several common causes of landslides are:

Water: Perhaps the most common trigger of a landslide, water reduces the friction between the bedrock and the overlying sediment, and gravity sends the debris sliding downhill. In sand and clay soils, a small amount of water may increase stability. However, the sediment gets heavier as more water is added and that can cause it to flow downhill.

Earthquakes: If the Earth's crust vibrates enough to disrupt the force of friction holding sediments in place on an incline, a landslide can strike. Seismic activity can also make it easier for water to seep into the soil, further destabilizing the slope.

Wildfires: Plants help keep the soil stable by holding it together like glue with their roots. When this glue is removed, the soil loosens, and gravity acts upon it much more easily. The loss of vegetation after a fire makes the razed land susceptible to slides.

Volcanoes: Several characteristics of volcanoes make them fertile starting points for especially destructive landslides. Volcanoes have unstable surfaces, so landslides are likely even when the volcano is dormant. In addition to the fact that the surface is composed mostly of loose rock, the volcanic gases create acidic groundwater. This contributes to the rocks' breakdown, making them more likely to be carried away.

Lahars are powerful landslides that originate on the slopes of volcanoes. They're set off by water and don't necessarily occur during eruptions. The water could be delivered in the form of a rainstorm, melted snow and ice, or a glacier melted by lava flow. Along with the contributing water, lahars contain mud and rock. Sixty to 90 percent of a lahar's weight may come from rock debris, lending it grave force.

Impact of LandSlide

The impact of a landslide can be extensive, including loss of life, destruction of infrastructure, damage to land and loss of natural resources. Landslide material can also block rivers and increase the risk of floods. Deep landslides,

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triggered by major earthquakes or volcanic activity can destroy thousands of square kilometres of land and kill thousands of people. Landslides have a devastating effect on farmers' livelihoods as they can prevent access to land for years, destroy seed and food stocks and will commonly result in the loss of livestock and standing crops.

NDMA Guidelines

Structure of the Guidelines

The following nine major areas have been identified for systematic and coordinated management of landslide hazards:

- i) Landslide hazard, vulnerability, and risk assessment.
- ii) Multi-hazard conceptualization.
- iii) Landslide remediation practice.
- iv) Research and development; monitoring and early warning.
- v) Knowledge network and management.
- vi) Capacity building and training.
- vii) Public awareness and education
- Emergency preparedness and response. viii)
 - ix) Regulation and enforcement.
- 7. Discuss the factors responsible for occurrence of tsunami and its effects on life and economy. In the light of guidelines of NDMA (2010) describe the mechanisms for preparedness to reduce the risk during such events.

The word "tsunami" comprises the Japanese words"tsu" (meaning harbour) and "nami" (meaning wave). A tsunami is a series of enormous waves created by an underwater disturbance usually associated with earthquakes occurring below or near the ocean.

Volcanic eruptions, submarine landslides, and coastal rock falls can also generate a tsunami, as can a large asteroid impacting the ocean. They originate from a vertical movement of the sea floor with the consequent displacement of water mass.

Tsunami waves often look like walls of water and can attack the shoreline and be dangerous for hours, with waves coming every 5 to 60 minutes.

The first wave may not be the largest, and often it is the 2nd, 3rd, 4th or even later waves that are the biggest. After one wave inundates, or floods inland, it recedes seaward often as far as a person can see, so the seafloor is exposed. The next wave then rushes ashore within minutes and carries with it many floating debris that were destroyed by previous waves.

Factors of tsunamis

Earthquakes

It can be generated by movements along fault zones associated with plate boundaries.

Most strong earthquakes occur in subduction zones where an ocean plate

slides under a continental plate or another younger ocean plate.

All earthquakes do not cause tsunamis. There are four conditions necessary

for an earthquake to cause a tsunami:

The earthquake must occur beneath the ocean or cause material to slide into the ocean.

The earthquake must be strong, at least magnitude6.5 on the Richter Scale

The earthquake must rupture the Earth's surface and it must occur at shallow depth – less than 70km below the surface of the Earth.

The earthquake must cause vertical movement of the sea floor (up to several metres).

Landslides

A landslide which occurs along the coast can force large amounts of water into the sea, disturbing the water and generate a tsunami. Underwater landslides can also result in tsunamis when the material loosened by the landslide moves violently, pushing the water in front of it.

Volcanic Eruption

Although relatively infrequent, violent volcanic eruptions also represent impulsive disturbances, which can displace a great volume of water and generate extremely destructive tsunami waves in the immediate source area.

One of the largest and most destructive tsunamis ever recorded was generated in August 26, 1883 after the explosion and collapse of the volcano of Krakatoa (Krakatau), in Indonesia. This explosion generated waves that reached 135 feet, destroyed coastal towns and villages along the Sunda Strait in both the islands of Java and Sumatra, killing 36,417 people.

Extraterrestrial Collision

Tsunamis caused by extraterrestrial collision (i.e. asteroids, meteors) are an extremely rare occurrence. Although no meteor/asteroid-induced tsunamis have been recorded in recent history, scientists realize that if these celestial bodies should strike the ocean, a large volume of water would undoubtedly be displaced to cause a tsunami.

Effects of Tsunami

The amount of energy and water contained in a huge tsunami can cause extreme destruction when it strikes land.

The initial wave of a huge tsunami is extremely tall; however, most damage is not sustained by this wave. Most of the damage is caused by the huge mass of water behind the initial wave front, as the height of the sea keeps rising fast and floods powerfully into the coastal area. It is the power behind the waves, the endless rushing water that causes devastation and loss of life. When the giant breaking waves of a tsunami batter the shoreline, they can destroy everything in their path.

Destruction is caused by two mechanisms: the smashing force of a wall of water traveling at high speed, and the destructive power of a large volume of water draining off the land and carrying all with it, even if the wave did not look

large.

Objects and buildings are destroyed by the sheer weight of the water, often reduced to skeletal foundations and exposed bedrock. Large objects such as ships and boulders can be carried several miles inland before the tsunami subsides.

Tsunami waves destroy boats, buildings, bridges, cars, trees, telephone lines, power lines - and just about anything else in their way. Once the tsunami waves have knocked down infrastructure on the shore they may continue to travel for several miles inland, sweeping away more trees, buildings, cars and other man made equipment. Small islands hit by a tsunami are left unrecognizable.

NDMA Guidelines

The Guidelines include a wide range of approaches for strengthening the tsunami preparedness and mitigation, including

- Isunami warning systems,
- ☑ capacity building,
- \boxtimes education,
- building codes and safety standards,
- Iand use planning,
- \square other engineering solutions.
- 8. The frequency of urban floods due to high intensity rainfall is increasing over the years. Discussing the reasons for urban floods, highlight the mechanisms for preparedness to reduce the risk during such events. (Nov/Dec Year 2018)

Flooding in urban areas can be caused by flash floods, or coastal floods, or river floods, but there is also a specific flood type that is called urban flooding. Urban flooding is specific in the fact that the cause is a lack of drainage in an urban area. As there is little open soil that can be used for water storage nearly all the precipitation needs to be transport to surface water or the sewage system. High intensity rainfall can cause flooding when the city sewage system and draining canals do not have the necessary capacity to drain away the amounts of rain that are falling. Water may even enter the sewage system in one place and then get deposited somewhere else in the city on the streets. Sometimes you see dancing drain covers.

The same sort of thing can happen in rural areas and is then called ponding. Urban floods are a great disturbance of daily life in the city. Roads can be blocked, people can't go to work or to schools. The economic damages are high but the number of casualties is usually very limited, because of the nature of the flood. The water slowly rises on the city streets. When the city is on flat terrain the flow speed is low and you can still see people driving through it. The water rises relatively slow and the water level usually does not reach life endangering heights.

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Flooding and disruption have become the new normal for the monsoon season in urban India. Recent water logging in Gurgaon, urban flood in Mumbai and Srinagar shows the increasing intensity of urban flood disasters in India. These are some of the reasons of urban floods in case of Indian cities . A special feature in India is heavy rainfall during monsoons. There are other weather systems also that bring in a lot of rain. Storm surges can also affect coastal cities/ towns.

The urban heat island effect has resulted in an increase in rainfall over urban areas. Global climate change is resulting in changed weather patterns and increased episodes of high intensity rainfall events occurring in shorter periods of time.

Stormwater drainage systems in the past were designed for rainfall intensity of 12–20 mm. These capacities get easily overwhelmed whenever rainfall of higher intensity is experienced. Further, the systems very often do not work to the designed capacities because of very poor maintenance.

Encroachments are also a major problem in many cities and towns. The flow of water has increased in proportion to the urbanization of the watersheds. Ideally, the natural drains should have been widened (similar to road widening for increased traffic) to accommodate the higher flows of stormwater. But on the contrary, there have been large scale encroachments on the natural drains and the river flood plains. Consequently the capacity of the natural drains has decreased, resulting in flooding.

Improper disposal of solid waste, including domestic, commercial and industrial waste and dumping of construction debris into the drains also contributes significantly to reducing drainage capacities.

Presence of impervious cover near trees and on road pavements also reduces water runoff.

To reduce these risk following measure can be taken:

- Pre-Monsoon Desilting of drainage system.
- Solid waste disposal and its proper management has significant effect on drainage performance and reduces the chances of choking of drainage system.
- Protection and conservation of wetlands near urban habitats increase the water holding capacities and they also act as natural barriers against any surge in water level.

Rain water harvesting reduces the load of excess rain water of rain and help in mitigating urban floods.

9. What are the causes of tropical cyclones and local storms and also explain the steps to be adopted to mitigate the same. (Nov/Dec Year 2018)

A storm is any disturbed state of a body especially affecting its surface, and strongly implying a wind force. It may be marked by significant disruptions and lightning (a thunderstorm), heavy precipitation (snowstorm, rainstorm), heavy freezing rain (ice storm), strong winds (tropical cyclone, windstorm), or wind transporting some substance through the atmosphere as in a dust storm, blizzard, sandstorm, etc.

Storms have the potential to harm lives and property via storm surge, heavy rain or snow causing flooding or road impassibility, lightning, wildfires, and vertical wind shear. Systems with significant rainfall and duration help alleviate drought in places they move through. Heavy snowfall can allow special recreational activities to take place which would not be possible otherwise, such as skiing and snowmobiling.

Causes of Storms

Storms are created when a center of low pressure develops with the system of high pressure surrounding it. This combination of opposing forces can create winds and result in the formation of storm clouds such as cumulonimbus. Small localized areas of low pressure can form from hot air rising off hot ground, resulting in smaller disturbances such as dust devils and whirlwinds.

Tropical cyclones are rotating, intense low-pressure systems of tropical oceanic origin. "Hurricane-force" (63 knots or 117 kph) winds mark the most severe type of tropical storm.

They are called hurricanes in the Caribbean, the United States, Central America and parts of the Pacific; typhoons in the Northwest Pacific and East Asia; severe cyclonic storms in the Bay of Bengal and severe tropical cyclones in the South Indian, South Pacific and Australian waters. To facilitate identification and tracking, the storms are generally given alternating masculine and feminine names, or numbers which identify the year and annual sequence.

Tropical cyclones are the most destructive of seasonally recurring rapid onset natural hazards. Between 80 and 100 tropical cyclones occur around the world each year. Devastation by violent winds, torrential rainfall and accompanying phenomena including storm surges and floods can lead to massive community disruption. In the last decade, the official death toll in individual tropical cyclones reached 140,000 (Bangladesh, 1991) and damages approaching US\$ 10 billion in Hurricanes Gilbert (1988) and Hugo (1989).

Causes of Tropical cyclone

☑ ocean temperature

- atmospheric pressure \boxtimes
- wind shear X
- Coriolis force. X

Mitigation measures can help in effective disaster management during cyclones. They are as follows:

Early warning systems to alert the public in advance to move to safer locations.

Protecting the coast by planting trees and mangroves forests along the coast. They can reduce the intensity of cyclone falling on the land.

Proper urban planning in which the low lying areas are not heavily populated. As we have seen in Chennai floods, the urban planning in India is haphazard leading to problem of floods.

Drainage system in urban areas should be revamped so that the cyclone water can exit easily.

Wetlands should be conserved since they act as buffers in case of cyclones.

Trained and well equipped disaster management force to handle the disaster.

Since most often during cyclones, the normal communication lines are disrupted, the provision of satellite communication should be strengthened in the cyclone prone areas to effectively handle the cyclone disaster.

Provision of cyclones shelter houses to which people can take shelter during cyclones.

10 Write about NDMA Guidelines on Earthquake Management The Six Pillars of Earthquake Management (Nov/Dec Year 2017)

These Guidelines envisage the institution nalisation of stakeholder initiatives, by involving communities and other key stakeholders, covering pre-disaster components of mitigation and preparedness based on scientific and technical principles, as well as on indigenous technical knowledge and building techniques. They simultaneously address the incorporation of multihazard resistant features in the reconstruction of damaged buildings and outline the strategy for strengthening the post-disaster components of emergency response, rehabilitation and recovery.

Even though earthquake-resistant building codes and town planning bye-laws and regulations exist, these are not strictly enforced.

Given the high seismic risk and earthquake vulnerability in India, these Guidelines require all stakeholders to ensure that, hereafter, all new structures are built in compliance of earthquake- resistant building codes and town planning bye- laws. This will be taken up as a national resolve.

This is in recognition of the seriousness of the high seismic risk in India and the increasing trends of urbanisation and modernisation that demand the construction of flyovers, multi-storied buildings, super malls, techno parks, etc., in metropolitan cities thereby multiplying the risks manifold.

The fragile built environment in India, especially in moderate and high seismic risk zones, is a matter of serious concern. It is neither practical nor financially viable to implement strengthening and retrofitting of all existing structures in moderate and high seismic risk zones in India.

These Guidelines emphasise the need for carrying out the structural safety audit of existing lifeline structures and other critical structures in earthquake-prone areas, and carrying out selective seismic strengthening and retrofitting.

Apart from these two sets of initiatives which are aimed at improving the seismic safety of the built environment, these Guidelines also emphasise the need for strengthening enforcement and regulation, awareness and preparedness, capacity development (including education, training, R&D, and documentation) and earthquake response.

These Guidelines have been prepared through a series of consultations with key stakeholder groups in New Delhi, Kanpur and Mumbai. These consultations identified the critical factors responsible for the high seismic risk in India and prioritised six sets of critical interventions, which have been presented in these Guidelines as the six pillars of earthquake management. They will help to:

- 1. Ensure the incorporation of earthquake- resistant design features for the construction of new structures.
- 2 Facilitate selective strengthening and seismic retrofitting of existing priority and lifeline structures in earthquake-prone areas.
- 3. Improve the compliance regime through appropriate regulation and enforcement.
- 4. Improve the awareness and preparedness of all stakeholders.
- 5. Introduce appropriate capacity development interventions for effective earthquake management (including education, training, R&D, and documentation).
- 6. Strengthen the emergency response capability in earthquake-prone areas.

These Guidelines rest on the following six pillars of seismic safety for improving the effectiveness of earthquake management in India



Milestones for Implementing the Guidelines

These Guidelines envisage two phases for ensuring seismic safety. During Phase I, which is scheduled to commence with immediate effect and conclude by 31 December 2008, the various stakeholders will prepare their DM plans and carry out specific activities aimed at seismic risk reduction. These activities are the most challenging ones, as the stakeholders not only clearly articulate the earthquake safety issues during this phase, but also put in place institutions and processes for moving towards systematic seismic risk reduction. The activities to be carried out during Phase I include the following:

> Preparing DM plans; revising town planning bye-laws and adopting model bye-laws; disseminating earthquake-resistant building codes, the National Building Code 2005 and other safety codes.

> Training trainers in professional and technical institutions; training professionals like engineers, architects, and masons in earthquake-resistant construction.

> Launching demonstration projects and public awareness campaigns to dis- seminate earthquake-resistant techniques, seismic safety and seismic risk reduction.

> Enforcing and monitoring compliance of earthquake-resistant building codes, town planning bye-laws and other safety regulations; establishing an appropriate mechanism for compliance review of all construction designs submitted to ULBs; undertaking mandatory technical audit of structural designs of major projects by the respective competent authorities.

> > Developing an inventory of the existing built environment;

assessing its seismic risk and vulnerability by carrying out a structural safety audit of all critical lifeline structures.

Developing and undertaking seismic strengthening and retrofitting standards for existing critical lifeline structures, initially as pilot projects and for other critical lifeline structures in a phased manner.

Increasing the awareness of earthquake risk and vulnerability and seismic risk reduction measures to various stakeholders through sensitisation workshops, seminars and public awareness campaigns.

Preparing DM plans by schools, hospitals, super malls, entertainment multiplexes, etc. and carrying out mock drills for creating greater public awareness.

Strengthening the Emergency Operations Centre (EOC) network.

Streamlining the mobilisation of communities, civil society partners, the corporate sector and other stakeholders.

Preparing national, state and district DM plans, with specific reference to the management of earthquakes.

Preparing community and village level DM plans, with specific reference to management of earthquakes.

Carrying out the vulnerability mapping of earthquake-prone areas and creating inventory of resources for effective response.

Carrying out earthquake safety education in educational institutions and conducting mock drills.

Strengthening earthquake safety R&D in professional technical institutions.

Preparing documentation on lessons from previous earthquakes and ensuring their wide dissemination.

Developing an appropriate mechanism for licensing and certification of professionals in earthquake-resistant construction techniques by collaborating with professional bodies.

Developing appropriate risk transfer instruments by collaborating with insurance companies and financial institutions.

Setting up National Disaster Response Force (NDRF) battalions, training and equipping them.

Setting up State Disaster Response Force (SDRF) battalions in high seismic risk states, training and equipping them.

Strengthening the medical preparedness for effective earthquake response.