DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

DISASTER MANAGEMENT (J42OB)

[R20]

B.TECH ECE
(IV YEAR – II SEM)
(2023-24)

J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY
(UGC AUTONOMOUS)
Accredited by NBA & NAAC,
Approved by AICTE & Permanently affiliated to JNTUH
Bhaskar Nagar, Yenkapally(V), Moinabad(M), Ranaga Reddy(D),Hyderabad – 500 075,
Telanagana, India.

AY 2020-21 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech IV Year – II Sem			
Course Code: J42OB	DISASTER MANAGEMENT (Open Elective-IV)	L	T	P	D
Credits:3		3	0	0	0

Pre-requisite: Environmental Science

Course Objectives:
This course will enable students to:

1. Provide basic conceptual understanding the difference between the hazard and a disaster.
2. Knowledge about the various disasters and their impacts.
3. Provide basic understanding about the hazard and vulnerability profile of India.
4. Have conceptual understanding about the disaster management phases.
5. Approaches of Disaster Risk Reduction (DRR) and the relationship between vulnerability, Disasters, disaster prevention and risk reduction.

Module 1:
Unit-1: Understanding Disaster:
Concept of Disaster - Different approaches- Concept of Risk - Levels of Disasters - Disaster Phenomena and Events (Global, national and regional)
Unit-2: Hazards and Vulnerabilities:
Natural and man-made hazards; response time, frequency and forewarning levels of different hazards - Characteristics and damage potential or natural hazards; hazard assessment - Dimensions of vulnerability factors; vulnerability assessment - Vulnerability and disaster risk - Vulnerabilities to flood and earthquake hazards

Module 2:
Unit-1: Disaster Management Mechanism:
Concepts of risk management and crisis managements - Disaster Management Cycle - Response and Recovery - Development, Prevention, Mitigation and Preparedness - Planning for Relief

Module 3:
Unit-1: Capacity Building:
Capacity Building: Concept - Structural and Non-structural Measures Capacity Assessment; Strengthening Capacity for Reducing Risk - Counter-Disaster Resources and their utility in

Disaster Management - Legislative Support at the state and national levels

Module 4:

Unit-1: Coping with Disaster: Coping Strategies; alternative adjustment processes - Changing Concepts of disaster management - Industrial Safety Plan; Safety norms and survival kits - Mass media and disaster management.

Module 5:

Unit-1: Planning for disaster management:

Strategies for disaster management planning - Steps for formulating a disaster risk reduction plan - Disaster management Act and Policy in India - Organizational structure for disaster management in India - Preparation of state and district disaster management plans

Text Books:

1. Manual on Disaster Management, National Disaster Management, Agency Govt of India.
2. Disaster Management by MrinaliniPandey Wiley 2014. 3. Disaster Science and Management by T. Bhattacharya, McGraw Hill Education (India) Pvt Ltd Wiley 2015

Reference Books:

1. Earth and Atmospheric Disasters Management, N. Pandharinath, CK Rajan, BS Publications 2009.
2. National Disaster Management Plan, Ministry of Home affairs, Government of India (http://www.ndma.gov.in/images/policyplan/dmplan/draftndmp.pdf)

E-Resources:

1. https://nptel.ac.in/courses/105/104/105104183/
2. https://nptel.ac.in/courses/124/107/124107010/

Course Outcomes:

On completion of the course, the students will be able to:

1. **Acquire** knowledge on various types of disasters and hazards
2. **Distinguish** between the hazard and a disaster can be analyzed
3. **Acquire** knowledge on the various approaches of Disaster Risk Reduction (DRR)
4. **Ability** to understand the relationship between vulnerability. disasters, disaster prevention and risk reduction
5. **Develop** ability to respond to different disasters

Disaster Management

unit -1

→ **concept of Disaster:-**

Disaster is sudden catastroplic event that causes widespread & immeasurable damage, loss, destruction of life, property, livelihood, economy & Environment.

Types of Disasters

① Natural disasters

② Man-Made disasters.

① **Natural Disasters**

(a) Major natural disaster → floods, cyclone, droughts, eq etc,

(b) Minor Natural disaster → cold waves, thunderstorms, heat waves, landslides, storms etc;

② **Man-Made Disaster**

(a) Major man made disaster → forest fires, epidemic deforestation, wars.

(b) Minor man made disaster → Food poisoning, Riots, Industrial gas disasters.

→ **Different approaches**

landscape approach:- Fast evolving concept to have both conservation & sustainable use of biological diversity consideration.

④ Ecosystem approach

Involves eff management of land, water & living resources. Because humans & their activities have effect on species & ecosystem diversity causing destruction.

This approach is especially imp to professionals & practitioners involved in fields of forestry, fisheries, farming, protected areas etc.

Perception approach → ~~7th~~ page leftside check.

The perception approach to natural hazards/ disaster management & mitigation is an interdisciplinary linkage involving experts in social influence, risk communication, media coverage etc.

→ Concept of risk :-

According to Einstein risk is defined as the probability of an event multiplied by consequences of the event occur.

Acc to UNInt strategy for Disaster Reduction (UNISDR), ~~disaster risk is defined as~~

Risk is the possibility of extent of damage to infastructure, living beings & environmental impact of hazard.

→ Levels of Disasters →

The devastation and damage to the property, humans & environment is often used for defining disaster. Some disaster plans have categorized three levels of disaster as mentioned below.

Level 1 Disasters

Disaster that occur as localized incident where local agencies within municipalities can respond to it. Eg:- fire accident.

1st agencies to respond in event of disaster include police service, fire service & health service, depending upon requirement.

Level 2 Disaster

Disaster caused on extensive scale leading to mass casualities are level II disasters.

Eg:- Release of hazardous chemicals, Recent Kerala floods.

State level dm agencies have to respond by mobilizing resources to contain disaster.

Level 3 disasters

Disaster caused on large scale leading mass-casuality emergency. Magnitude of disaster is more. No (short) medical aid & personnel at local level. State level central level agencies respond.

Eg:- Eg, dam collapse, nuclear attack.

Efforts taken for meeting the challenges of global climate change

Some efforts for meeting the challenges of global climate changes include the following

(a) promoting measures to limit emission of CFC's

check page 14th.

Reasons for climate change

The term climate change refers to change in avg weather such as temperature, wind pattern & precipitation of particular region.

The scientist at Intergovernmental panel on climate change (IPCC) an international committee set up by UN have reported that avg global surface temperature has risen by 0.3 to 0.6°C in last 100 ~~tou~~ years. The 1990's was recorded as hottest decade in world. ~~since~~

Reasons :

(a) GHG – The gases in atmosphere that absorb the solar radiation are referred as green house gases (GHG). These include CO_2, water vapour (H_2O), Nitrous oxide (N_2O), methane (CH_4), chloro fluoro carbons (CFC's)

(b) Global warming :- The term GW refers to the increase in the average surface temp. of our planet due to GHGs.

Man made causes of GW include ~~burning~~ deforestration, population explosion, Env pollution.

(c) over population :- The continuous increase in population are dissappearing forests, increasing polluted water and air.

(d) Deforestration :- Deforestation is carried out to convert forests & woodlands to agricultural land to feed to feed the growing population, trees destroyed for wood.

Factors causing Global Atmospheric changes & climatechanges

① Global warming

↑c in avg surface temp

Man made causes

deforestation,

population explosion

Env pollution.

② GHG

CO_2

N_2O (Nitrous oxide)

Methane (CH_4)

CFC's.

- when solar radiation strike the earth, visible light, ultraviolet light, infrared rays, gases trap the sun's heat & help to sustain life on earth

↑in GHG ↑in Industrialization

So gases trap more solar energy

deflect back in outerspace causing global warmer

③ over population

↑population ↓ forests.

polluting water, air. ↑ GHG emission.

④ Deforestation To make use of agriculture deforestation done, to make wood furniture we are cutting trees

Effects of deforestation

- Disturbance of carbon cycle

Trees absorb CO_2 from atmosphere to produce carbohydrates, fats, proteins in them.

The carbon released when trees are burnt (or) rot then CO_2 is released.

↑CO_2 again gives rise to GH effect.

- Disturbance of water cycle

underground water drawn up by root system of trees & released into atmosphere - transpiration

The felling of trees/elimination causes drier climate.

- use of fossil fuels

Burning fossil fuels ( ) by transport sector, industrial & domestic appliances in our modern lives put carbon into atmosphere

Efforts taken for meeting challenges of global climate change

- ↓ release of high temperature/steam moisture into atm
- ↑ growth of O_2 producing plants.
- use compact fluorescent lamps (→ low pressure mercury ion.) rather than using standard bulbs. conserving electrical energy.
- ↑ population should be regulated.
- shift from conventional to non conventional energy resources - wind, solar energy.
- use public transportation.

~~Tsunami~~

~~A series of large ocean sea waves caused by any disturbance that displace large water volume in water body.~~

Natural & Man made hazards

Natural

1. Terrestrial hazards

Arise from tectonic movement of means sudden violent movement of earth surfaces (even oceanic plates. These are described as

(i) Endiogenic hazards

↑ high temp present beneath earth surface produce major internal forces to cause movement of plates for disaster of great intensity.

Eg:- Eq, volcanic eruptions, landslides, natural radioactivity.

(ii) Exogenic hazards

Hazards arise from atmospheric phenomenon

Eg:- storms, flash floods, cloudbursts etc.,

Exogenic hazards further classified as

~~as climatic hazards~~

(a) Hydrologic hazards - cyclones, ice, snow, flood tsunami etc.,

(b) Meteorological hazards - Heatwaves, coldwaves, storms.

(c) Infrequent Events - lightenings, hail storms.

2. Extra planetary hazards

caused by collision of celestial bodies & resulting debris of earth surface

Manmade

Include environmental pollution, terrorism, detruction of property,

(a) physical hazards.

caused due to human induced activities. deforestation, desertification, pollution.

(b) Technological hazards.

Hazard has interaction with whole society. like explosions.

Release of toxic substances into atmosphere

Nuclear disaster (chernobyl disaster)

ukraine - Russia war,

Technological hazards further classified into.

(i) Industrial hazards.

caused by industrial operation.

(ii) structural collapse hazards

collapse of construction projects, roads.

Buildings due to poor engineering.

(iii) Nuclear Hazards

occur as a result of release of massive amounts of radiation into environment.

Causes great damage & destruction of human civilization.

(iv) computer hazards

Hazards caused by electronic appliances include, strain injury, Eyestrain, computer vision syndrome.

(v) Transportation hazards

Includes accidents on roads, railways, airways (or) waterways.

(6) Biological Hazards (Biohazards)

Originates from biological sources like

bacteria virus Medical wastes	Insects Birds Animal humans.	Eg:- AIDS Malaria severe epidemic

Biologic hazards further into 2 types

(i) pathogens

organisms that are agents of diseases such as anthrax, small pox, influenza, plague, etc.

(ii) Toxins.

poisonous substances synthesized by plants & Animals.

(d) Social hazards

Hazards that originate from social systems such as population explosion, famine, warfare, terror attack, hijacking - social hazards.

Also reffered as inter-nals hazards as caused by human activities.

Response time frequency & forwarning levels of different hazards

→ provisions of immediate relief measure to disaster affected people

- To enable protection, survival of victims
- To enable victims to self sufficient & provide basic needs.

① A clear picture about nature & magnitude of disaster must be reported by news / media to enable international communities to respends with their contributions.

② 1st Relief operations undertaken at high impacted areas due to disaster.

Communication satellites

Remote sensing tools can be used.

Heavy machinery needed for debris removal.

③ Rescue, Relief, Rehabilitation operations.

④ Delivery of relief materials.

Administrative machinery for Disaster Management

National level organization

Activities related to disaster are coordinated by nodal ministry at national level. which forms part of National crisis Management committee.

Air accidents — Ministry of Civil aviation

Drought, floods, Famine — Ministry of agriculture

Indian meteorological Dept & central water commission information regarding warning of Natural disaster to central Relief commissioner. then PM, president

Alert people — Ministry of Health & family welfare.

State level orgn

Relief measures managed by relief commissioner of state.

State crisis Management group with chief secretary/ relief commissioner as chairman.

when disaster strikes Relief commissioner set up disaster operation centre (control room) to collect & transmit latest information on forecasting warning of disaster.

District & local level orgn

Distric magistrate / District commissioner looks after Administration body of all plans.

District — Blocks / Taluks. for administration.

So village officers, Tahsildhars, health centers play imp role in managing disaster.

→ Efforts taken by NDMA in provision of immediate relief measures to disaster affected people.

- Free food distribution for needy
- Rations for cooking
- Mass cooking for feeding large no. of people.

} food & nutrition.

- providing safe drinking water.
- " Quick & effective medical facilities
- provide mental health services to lower stress & strain of affected people
- providing clothes, blankets.
- providing shelter
- setting up relief ~~cat~~ camps with facilities.
- Monitoring hygiene & sanitation to people in camps.

Technologies for monitoring warning in event of disaster.

(i) Forecasting & Modelling technology in early warning system for disaster:

Several nations equipped with warning system like software & hardware techniques to control floods like

flood proofing
flood warning system

historical flood data

(ii) RS & GIS Applications.

Has imp role in early warning system.

Helps in detection of fires.

warning of probability of fire outbreak.

Impact of fire on land.

(iii) Sattelite communication technology

FB, twitter, insta, YT can be used to connect with friends, family for relief assistance.

Social media part of every emergency response effort.

(iv) crowdsourcing

- Method for recruiting & organizing labor using an open call participation.
- Makes an announcement to general public seeking solutions to a problem.
- Gives info about particular situation.

(v) crisis mapping

uses crowdsourcing, satellites, open street map to provide early warning systems.

Crises related data collected & analyzed so that relief workers provide service

characteristics & Damage potential of natural hazards

Economic consequences of disaster.

Loss of property.

① production losses.
Destruction of tangible assets, buildings, equipment, infrastructure, natural resources.

② Reduction in export of products.

③ Damage of roads, bridges

④ Destruction of factories, homes, businesses.

⑤ loss of earnings & output

⑥ Basic amenities loss

⑦ Increase in transportation costs.

~~Types of Economic loss~~

Vulnerability assessment - Vulnerability & disaster Risk.

Psychological and social dimensions of disasters:

Psychological dimensions

→ fear, anxiety, anger, ~~stress~~ sadness, illness among victims.

→ Mental & behavioural impact on children lasts longer.

→ Insomnia may occur in elders, children.

These all under intangible assets.

→ Injury, loss of economy, livelihood

These under tangible assets.

social dimensions.

Relief operations (shelter, food, health, Medical facilities, clothing). after disaster helps the people get out of the particular disaster.

Vulnerabilities to flood and EQ hazards.

Floods & types of floods.

Flood :- Flood refers to over flowing of river banks due to their inadequate capacity of water retention following heavy local precipitation, cyclones etc.,

Types of floods.

1. Natural floods.

Floods caused naturally by overflowing of water bodies (rivers, lakes, oceans)

(a) Riverine / stream floods

caused by overflowing of rivers when they receive too much water in short time.

(b) Estuarine floods.

Floods in estuaries are caused by sea tidal surge.

(c) coastal floods

cyclones, hurricanes, Tsunami cause floods.

2. Catastrophic floods.

Events like landslides, levees, dams, reservoirs.

causes of floods.

(1) Heavy rainfall.

(2) Heavy snow melting

(3) other Natural events

→ Measures to mitigate floods.

- constructing dams which helps to control floods.
- Embankments → krishna, Godavari, deltas.
- sand bags along banks of river as leavees.
- wetlands should be protected as natural flood control system.
- Afforestation prevents floods as trees absorb water.
- construction of bridges, roads. lead to runoff of rain water.
- public should be given warning in advance.

→ EQ → sudden voilent movement of the earth's surface & even the tectonic plates of the ocean which may cause great damage to livelihood, environment, economy.

Major action points.

- Houses should be securely attached to foundations
- water heaters & gas appliances should be fixed to walls to avoid any accident an eq.

- Tall furnitures, showcase bolted to walls.
- Heavy items pictures & mirrors fixed away from beds.
- Cabinets fixed with strong bolts.
- TV's, computers secured properly.
- structural defects should be repaired praptly.
-

Unit - II

DM Mechanism

→ concepts of Risk management & crisis management.

Disaster risk management related to chemical safety

① Assessing health risk & impacts of chemical disaster.

② prevention of risk - usage of less toxic & flammable chemicals, reduction in quantities of chemicals.

③ Management of waste.

④ security measures to control accessability to hazardous materials.

Emergency, Preparedness, Response & Mitigation.

① preparing a trained staff to manage the chemical emergy.

② Awareness of chemicals.

③ Install emergency communication system.

④ Development of healthcare facilities.

Different stages of DM

* Pre disaster stage
  1. preparedness stage (phase of readiness)
  2. Mitigation phase (prevention phase).
* Emergency stage.
* post disaster stage (Rehabilitation stage)

* pre-disaster stage:-

① Preparedness phase

This phase involves planning to respond immediatly when disaster occur.

- setting up awareness programs.
- Alerting government.
- Installing warning systems
  Emergency communication system.
- Food reserves water, medicines.

② Mitigation Phase

~~Involves disaster victim to~~

Eg Building stronger houses, good construction techniques.

Development of green belt

planting more trees along coastline to reduce impact of Tsunami on the land.

→ Guidelines for mitigation of disasters.

- Early warning systems
  Major role in mitigating effects of disasters.
  Detection of signs.
  Informing people
  setting up volunteers.
- land-use zoning.
  - Hazard zone areas must be identified & marked.
  - That area must be prevented from using
  - Those areas must not serve residential purposes / Industrial purposes.
  - can be used for agricultural activities.

- Building codes

Building codes to improve quality of new construction in resist disaster. Building codes estb in consultation with builders, architects & public.

- Incentives

Funds given to firms, households in hazard prone areas to strengthen existing buildings / include modification during construction phase.

→ Measures to mitigate cyclones.

cyclones → violent tropical storms (or) winds in which the air moves very fast in circular direction.

Measures

① Afforestation of land should be done,

② Trees prevent entry of cyclones in land. Act as Barrier to cyclones

③ Buildings constructed should be resistant to wind & water.

④ cyclone shelters should be constructed.

⑤ cyclone storms lead to flooding, so measures should be taken to prevent floods.

⑥ construction of embankments minimize effect of floods

⑦ public settlements should be avoided in coastal areas in range of 5km from sea.

⑧ Experiment should be conducted ~~being done~~ to prevent cyclones using wind power.

Unit - 4 COPING STRATEGIES

Alternate adjustment process - changing concept of Disaster management:

Measures of Adjustment to natural hazard:-

3) Implementation of non-structural measures:-

- Detection of signs
- Increase the public awareness
- Setting volunteers
- Informing people in the far off rural areas

1) Reducing loss by affecting the cause of disaster:-

Increasing afforestation, embankments, GHG → climate Chang → ↑ O_2 plants

2) Modifying physical process of Hazards damage:-

Dams / Reserviours - Built across the rivers

- Impact of floods
- Increase forest area → Barrier to strong winds, Floods
- Following buildings code to improve Quality of Construction

4) Reducing the impact of Hazards by adjusting to losses:

a) Insurance measures:- protecting the property and providing funds

b) Plan for losses:- Create reserve funds → Disaster event

⇒ measures of Adjustment :-

Adjustment to natural Hazards refers to human activities intended to reduce (or) minimize any repetative impacts of an extreme event.

⇒ Environmental Hazards linked to ecology with respect to drought :-

Ecology :- Study of different types organisms and their interaction with environment.

Drought :- Is considered as one of the worst natural disaster that can threaten the lifes and livelihood A wide range of Hydrometerlogical process (Transfer of water & energy b/w land and atmosphere) contribute to drought. This include :-

1) Decrease in average prescipitation

2) Deficiency in runoff of water over a period of time

3) A prolonged hard Dry spell.

4) Reduced Reservior stocks and Ground water storage.

5) Increase in atmosphere temperature.

⇒ The environmental effects caused to Decrease in Precipitation and Increased Sun light during drought are :-

1) Decrease in water holding capacity of soil, This result from Decreased Precipitation, increase in Sunlight, High atmosphere temperature, all of which cause increase in the rate of evaporation of moisture from soil.

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loss of protective cover on the soil due to plant mortality. Increased soil Aridity causes high rate of soil erosion. Serious wind erosion caused due to standy vegetation results in loss of nutrients from the top soil.

ii) Mortality of vegetation. The lack of prescipitation effects the vegetation patterns particularly along the ecotones (Boundary Between the ecological communities area, ecology) It has been observed that the soil erosion is increased. The land scape do not return to normally unless the temperature reduces and wet conditions prevage

iii) Wild Fires: This will commonly occuring disasters event especially during the drought conditions. The vegetation die-off further intensities the Frequency of the Fire out breaks. The past records also says that the major fire out breaks correspond with the periods of serious drought.

iv) Degraded wildlife habitat: The Decline in the availability of water, Food, habitat protection causes of loss of biodiversity (Different living organisms living in an area) and extension of species. This is Because of reduced reproduction and survival rate amoung the organisms, some wildlife may leave the drought striken area's and migrate to areas not effected by drought. The dangerous and vulnerable species are at an increased-rate.

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→ The Droughts can Thus. cause degradation of existing animal habitats, isolation of population, Increased potential for Forced migration to new places in search of new resources and increase in tendancy for human wild life conflicts.

→ Such a divastating drough situation can be avoided by adopting suitable control measures such as rain water harvesting. Desalination of sea water, Interlinking of river etc

⇒ Human Ecology & Its Application on Geographical Research:-

- Human ecology involves in fundamental interaction of ecology with human social system.
- The human depends on eco system. The ongoing environmental degradation, increased Frequency of extreme weather, climate change and natural disaster ~~co~~ putting human community has risk especially human elderly & children etc
- Therefore sustainable eco-system management practices enable effective disaster prevention & Thus safety of living communities.
- Some of the areas of research discipline includes:-

a) Geographical ecology of individuals ~~&~~ species community and eco-system level.

b) Impact of global evironmental changes on plants, bio-diversity and eco-system process.

c) Interaction between plants & atmosphere

d) Air pollution & ~~urbanal~~ urbal climate.

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e) water Quality of landscape ecosystem

f) Special analysis, species distribution by RS.

g) Globalization of worlds cities

h) Dynamic of avalanche and hazard assessment

= Relief camps setup for immediate relief measures to disaster affected people :-

* Role of UNDP (United nations Development programme) :-

→ In any case of emergency relief camps must be setup in openspaces to provide shelter to disaster victim for their rehabilitation.

→ The relief camps must have the base a aminity like lighting arrangement, drinking water, sanitation and health care health care facilities to avoid risk pose health & life

→ The disaster victims taking shelter in the relief camps must be provided with security arrangments by local police

→ The management of relief camps should be under taken by trained person.

→ proper attention should be given to sanitation services to prevent on out brake of a pidemics, typhoid, ~~cholo~~ cholera, diarrhea, Apitities etc

→ The UNDP is a part of united nations, Global network in 166 countries to work on various Global

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and national development challenges such as poverty reduction, work to worlds, decreasing loss of life, livelihoods, disaster mitigation and recovery, protection from HIV and AIDS and on the whole, it provides relief support and assistance to the victims of the catastrophy.

→ The emergency response division (ERD) of UNDP provides affective support and development to manage crisis relief.

→ The UN coordinator on representation has the following responsibility :-

(i) Ensuring to respond adicatively in case of any emergency

(ii) Ensuring long term risk reduction and preparedness

(iii) providing technical assessment for livelihood and prosperity

(iv) sustainable human development.

⇒ Occupational Health Hazards :-

The term occupational Health hazard refers to the probable risk to health and safety of individuals working outside their houses. Such hazards cause illhealth and result in mortality

Types of occupational Hazards :

1) Chemical Hazards :- commonly occur in chemical industries metal industrial, construction industries, as well as in the manufacture of consumer good, non-Industrial activities such as hospitals, office work and cosmetic services.

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The chemical used cause seriour health effect cause damage to central nervous system, liver, metal poisoning skin allergy, cancer, reproductive disorder.

2) Physical hazards :- The physical hazards to which the worker may be exposed to their work place are extremes of Temperature, noise, radiation that is ionizing and ultraviolet

3) Mechanical Hazards :- The mechanical hazards in the industries include the following :- uncovered machinery, dangerous tools, unsafe sturtures machines in poor working conditions, heavy physical work load, all of which may cause muscle injuries, cuts, broken, bones, sprains, troma & accidents

4) Biological Hazards :- The biologic hazards add the place of work include infective and parasitic phatogms like, virus, Bacteria, paracites, Fungi.

The occupational diseses include the Blood Bone disescas like HIV, AIDS, Hepatites -P, Fungus infections and many more

5) ~~Physical~~ physological Hazards :- This are caused due to irregular working hours, working in shift or overloaded work.

All of this can lead to following health effects :-

i) Sleep disturbance

ii) Dipression

iii) cardio-vascular disorder

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particularly health disease and hyper tension. other other health effect include aggurissive behaviour angzity depression drug obuse, alcoholizm.

In order to avoid all types of occupational hazards it would be better to use administrative control that focus on appropriate prexentive measures and hazards assissment conducted by comprehensive management system for the safety of workers.

⇒ Industrial Safety Inspectors:

The industrial Safety inspectors are concerned with the mamtamance of good health amoung industrial workers monitoring the environment of the work place, investigation sources of pollution and other sustamability concerns they record the safety of health conditions of work place equipment and practices to help prevent harm to work, property & civil society.

→ Types of industrial Safety Inspectors:-

1) environmental protection Technician

2) Health physics technicians

3) Industrial hygiene technicians

4) mine examines

1) environment protection Technician: The EPT deal with Climate change issue, land use regulation, water conservation and management. Investigation of sources of pollution in environment conducting test on pollutants levels,

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Interpretation & analysis of test result, monitoring environmental pollutants by setting up equipment like smoke stacks, manufacturing plants on mechanical equipment.

2) Health physics Technician :- The Health physics Technician is to ensure safety of work place in the industries that use radio active material or people exposed to radio active material like nuclear power - scientific research, hospitals etc

- The nuclear activity is monitored by using equipment like Spectrometers, Gamma Counters
- additional of Technician include data collection, analysis of data preparing radio activity relative equipment maintaining safety records.

3) Industrial Hyginic Technician :- The Industrial Hyginic Technician are responsible for inspections of work place environment equipment ensure minimize health hazards in the work place for the maintanance of good health among industrial workers. The advorse working conditions such as excessive noise, Chemical & Hazards material are examined by industrial hygine Technician

4) Mine examines : The mine examines carry out inspections of work place environment u/g mines especially for methane (CH_4) & other Gases

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⇒ Main causes of nuclear Hazards:-

→ nuclear Hazard :- Nuclear Hazards occur as a result of release of massive amount of radiation and radioactive material into environment. They have the greatest damage potential over a wide geographical area often leading mass distructions of human civilization.

→ nuclear Hazards and accidents usually occur in nuclear reactors that are used to generate electrical power. Some of causes are :-

1) release of massive amount of radiation into environment

2) Improper transportation of nuclear waste as the potential risk of pollution & environmental contamination

3) Improper storage of radio active Fuel at nuclear power plants. Therefore, radio active nuclear waste must be stored in Heavily shielded containers in areas remote from biological habitate

4) mismanagement of nuclear reactors

5) poor instrumentation

6) ~~error~~ error in operating procedure

7) spills and leaks from nuclear industry.

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⟹ Mass Media and disaster management :-

- role of mass media and communication in disaster management :

- The media is the major source of information to the people about the event

→ The role of media is :-

1) To inform the people about the occurance of disaster

2) To advice people rescue actions to be taken

3) To improve communication links among the disaster effected people

4) To encorage people to participate in rescue activities

5) To publizice the necessity for assistance of grands

→ The digitization of news media has anabled the real time analysis for DM purpose

→ The electronic media can reach to every comer of world. The media can stimulate the international community for donations and influence the central govt to allocate sufficient funds for disaster responce programs

→ The social media too has became an important tool for DM electronic communications has important role in DM for coordination, control, assessment & monitoring the disaster. Satellite and mobile phone help to keep track of the victims of disaster.

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→ The wireless technology is most useful at such time especially during the disaster warning & disaster recovery phases. Due to power failure the phone are limited usage. Therefore cell phones with large capacity and battery power with extented time limits are required other means of communications include SMS, Internet Radios, Fax, High frequency transmissions TV etc all these means of communication provide useful platform for Disaster mitigation

- Dispite the Development of latest technologies all over the world disaster cannot be completely prevented (or) mitigated. All efforts must be focussed to make our society ready to deal with any type of disaster

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Unit - 5

Planning for Disaster Management

→ Strategies for disaster management planning :-

(a) Monitoring & Mapping of Hazard :-

- we monitor the regions which are vulnerable to floods & Tsunami, earth Quakes
- They are monitored by -
  - Earth Quake - Fault plane & lines, RS, GIS
  - Tsunami - pressure recorders in water
  - This are monitored by DART (Deep ocean Assessment & Report of Tsunami)

(b) Risk and vulnerablity Assessment :

- Risk of life, property
- Lack of awareness to public
- Risk factor increase when improper construction of buildings.
- Insufficient preparedness for disaster
- Least alternation for environment management
- When, no predictions & forcasting.

(c) Prediction & forcasting :-

(d) ~~Dep~~ preparation of Building guidlines :-

- The building codes are meant to improve the Quality of constructions to resist the catastropy and thus protect the life and property.
- Building codes are established in consultant with builders, Architects etc.
- A civil engineers may involved in the following ~~roles~~ roles In disaster management planning like :- Sturtural engineer, geotechnical engineer, environmental engineer, surveyors, Building contractors, ~~&c~~ Irrigation engineers. All this varied roles of engineer use the Knowledge of Science, logic, experience to ensure that the Design of structure follow the engineering ethics prevent and control the adverse effect of disaster.

(e) Retrofitting :-

- Retrofitting of building refers to making modifications to the existing structure to prevent Harm from flooding and other Hazardous events like strong winds & earthquakes.

ii) Some of the measures include Building constructed on areas prone to earth quakes should be equiped with seismic retrofitting to prevent ther colapse

iii) Seismic strengthening of building including use of beams, columns, shear walls, footing for increasing the stiffness

iv) The different types hardware material used in the areas below the flood should be made of stainless or galvanised steel.

v) Construction of embankments parallel to the river flow act as Barrier to floods and protect the land.

vi). The walls & openings of lower levels of buildings located in cut prone areas should be seat against water penetration.

⇒ Steps for formulating a disaster risk reduction risk :-

1) Disaster prediction and mitigation :-

mitigation refers to the efforts put for to reduce losses resulting from natural disasters. It involves the measures to minimize the effect of probable disaster.

2) Disaster preparedness :- This phase include the awareness about emergency exercises or training in various methods of safely vacating the disaster striken areas and First Aid measures. Such awareness

programms must also strengthen the technical and managerial capacity of the government, organizations and communities to minimize the loss of life and property.

3) Disaster Response :- The Disaster responce to all efforts that are put forth to minimize the problems created by disaster. This include :- Providing assistance to the effected population with Transportation, Food, Shelter, Temporary repair to Damaged infrastructure

- The Disaster effected people must be taken care by providing them with basic nessacities. The efforts taken are :-

1) Free distribution of Food to needy

2) providing dry rations for cooking

3) Organizing mass cooking to Feed large no. of people

The Food should be of appropreate Quality & Quantity and Safe for Human consumption.

- The relief material meant for disaster effected people should be supplied at the earliest.

4) Disaster rehabilitation & recovery :-

-) Rehabilitation of people is the resettlement of relocated Communities from their indigenous Habitat in the event of major development activity or Hazard.

-) According WHO (world Health organization) Rehabilitation of people with disabilities is the process aim at enabling them to reach and maintain their physological

and social Functional level.

- Rehabilitation of people is necessary for following reasons:

1) To help people live a safe and secure life again

2) To restore the economic ~~vitality~~ vitality of community

3) To Help strengthen the ~~resians~~ resilance of displaced people.

⇒ Post Disaster Activities that are undertaken after major earthquake

The post disaster Activites should be undertaken after a major earthquake to protect life and property as well as control secoundary earth quake Hazards such earth quake induced fire out breaks, leakage of Hazardes materials etc.

→ The post disaster activities after an earth quake include :-

1) Quick Assessment of Damage caused by an earthquake

2) Search and rescue operations of disaster traped victims.

3) Emergency medical Attention to disaster victims to save lives.

4) provide emergency basic needs like:- shelter, water clothing, food.

5) proper supply of emergency relief materials to the victims.

6) establishing communication links and information management with the help of radio, cell Telephones, satellites.

7) relocation of the vulnerable population groups to safer location.

8) Reconstruction of Damaged Infrastructure.

9) Clearing of Debris to allow easy access to emergency vechicles and supply relief material.

10) providing appropriate Financial Assistance.

⇒ Disaster Management Act & policy in india :-

→ Policies used to mitigate risk from natural & manmade Hazards

1) NDMA - National Disaster Management Act - 2005

It was enacted on January 9th 2006, contains 79 sections, 11 Chapters.

objective of NDMA is - Effective management of disaster and matter related to it.

⇒ DM act of 2005 Defines Disaster management a continuous cycle and integrated process of planning, organizing, coordinating, implementing the disaster related measures

National DMA - Chairperson is prime Minister

State DMA - Chief minister

District DMA - collector

→ Central Govt is empowered to constitute NIDM (National Institute of Disaster Management) with main aim to Develope Training, engage in research activities and arrange, organize the lectures, Seminars to encorage the causes of disaster management.

→ NDRF (National Disaster ~~Resforce~~ Responce force) a Specialist will train the members.

→ Central Govt is empowered with NDRF to provide Specalist response in case of disaster situations.

→ Any person not following any disaster provisions, will be liable for punishment of impreserment, Fine (or) Both

* Various organizations involved in research & Mitigation of disaster :-

① International council for scientific union (ICSU)

Now refferred as International Council for Science.

- non-Government organization
- Objective → To address Challanges Caused by natural disaster.

Aim :-

1) Promote international Science for the welfare of man-kind & Society

2) encorage interaction for Scientist from various diciplines

② Scientific Committee on the problems of environment (SCOPE)

- consists of Scientist & experts.
- mainly focus on issues related to Global environmental problems.

③ International Geosphere - Biosphere Programme (IGBP)

- non-govt organization
- Related to Global Climate & Environmental Changes

Aim:

1) To Study the physical, Chemical, Biological interactions involved in the dynamics of earth processes.

2) To understand the role of humans in ~~bring~~ bringing out the changes

④ World Federation of Engineering organization (WFEO)

- Non-Govt Organisation
- Formed in 1968
- Supported by UNESCO (United National Education, Scientific Cultural organization)
- By applying engineering techniques for welfare of mankind.

⑤ National Academy of Sciences:-

- This is involved in researches for advancement of Science & Technology for mankind.
- National research Council (NRC) of National academy

of science has a scientist, experts to advice in matters related to science, Technology, medicine.

⑥ International Association of Seismology & physics of earth's Interior (IASPEI):

- non-Govt Organization.
- Formed in 1919
- objectives:

1) To promote the study of Geophysical processes of earth causing earthQuakes, Tsunamis etc, To understand the propagation of seismic waves and to predict the disaster in advance to minimize the consequences for man-kind

2) To encourage interaction of scientist from different countries for advancement of research in seismology.

⑦ World Health Organization (WHO):

- Technical Assisstance to health Development throughout the World.
- It take efforts to reduce the effects of communicable diseases, emerging diseases.
- It promotes maternal & child health care.

⑧ UNESCO → united national educational, scientific cutural organization.

- Encourges the research on natural disaster & Hazards.

- Encourages Education, Public awareness in Dealing with disaster
- Coordinating early warning system at disaster

⑨ UNICEF :-

1) provide assisstance for wellbeing of children & women as well as ~~nution~~ nutrition in disaster striken areas
2) provide logistic support in health related activities
3) provide shelter, rehabilated water system, family care for orphans, immunisation programme

⑩ UNEP (United nations environment programme)

1) Collabrate with other agencis in careing for environment
2) provisions of early warning of environmental Hazard
3) encourage people to improve their quality of life with out over consuming of natural resources beyound the capacity of environment.

⇒ Various institutional & national Centres involved in disaster reduction.

1) Centre DM authority : By Govt of India

- To prevent & mitigate disaster

2) National Centre for DM (NCDM) :-

- Set up by Indian institute of public Administration to provide training govt officials for mitigating disaster

3) Center for DM :-

- For training
- To Develop disaster preparaness.

4) National information centre of earthquake Engineering IIT Kanpur :-

- Aim to collect information on earth Quake Engineering
- Sponsored by railway Board, Ministry of Atomic energy, ministry of Agriculture

5) DM institute Bhopal :-

- 1987
- Aim to prevent & mitigate disaster
- Reduce consequences of disaster for welfare of people.

6) Environment protection training & Research institute (EPTRI) :-

- Established by Govt of AP.
- Collabaration with Swedish International Development Agency.

Objective : To Safeguard life, property from disaster by providing training & consultancy services for risk assessment

safety.

⇒ Role of NGO's in DM plan:

NGO- non-Governmental organization.

→ A non-Governmental organization is a voluntary, non-profit agency (or) Group registered under various indian laws. Since, NGO's are humanitarian in nature their are always ready to serve people.

- They have aboard of expert how offer professional and specilised assisstance were awere necessary.

- The NGO's have a significant role in disaster management with special focus on disaster preparedness.

→ The emergency stage is the stage at which the crisis occurs this phase results in great damage to life, property environment and Health of living beings.

→ The NGO's put forth all efforts to minimize the problems created by a disaster. This include providing assistance to the effected people with transport, food, shelter and temporary repair to damaged infrastructure.

⇒ State & District DM plan:

Administrative machinery for DM:-

The rescue relief and rehabilitation measures in the event of Hazards and disaster is considered to be the responsibility of the govt and national, state, district and sub-district levels.

State level organization: The relief measures in the event of natural disaster is managed by the relief commisnor of the state. In the absence of relief commisnor the cheif secretory is responsible for relief operation

- every state has a state crisis management Group (SCMG) with relief commissnor as its chairmen.
- It has seniour officers form of the Department of revenue, power, irregation, water supply etc who are responsible for the relief and rehabilitation measures in the case of disaster.
- When a disaster strikes the relief commissioner can setup an emergency operation centre (control room) to collect and transmit the latest information on forcasting and warning of disaster
- District & local level organizations:
- each state is divided into no. of district with district collector / district magistrate or deputy commissionor as the head of the admistrative organization for implementation of all govt plans and activities, coordinating and supervising the power over all Department at district level.
- every district in state is Further divided into Blocks and Taluks for administration.

- The sub-division officer (SDO) / Tasildar / village officers / volenteers / doctors have an important role in managening the disasters.

Unit-1

Concept of disaster

Disaster is a sudden, catastrophic event that occurs wide spread and causes inmeasurable damage of loss of life, property, livelyhood, economic and environment.

Types of disaster

1) Natural disaster
→ Minor disaster
thunderstorms
heatwaves
floods
drought
→ Major disaster
cyclones
earthquake
Tsunamis
forest fires
Volcano eruption

2) Manmade disaster
→ Minor disaste
Riots (rally)
Industrial pollution.
→ Major disaster
Industrial
chemical
gas leakages
pandemic
epidemic
deforestration

→ Disaster approaches.
different

1) Landscape approach – This is the fast evolving concept where both Conservation and suitable use of biological diversity are taken into consideration.

2) Ecosystem approach – This involes effective management of land, water, and living resources because humans and there activities have effect on species and ecosystem ~~because of this~~ diversity this approach is especially important to practicner involved in forestres, fisheres, farming, protected area etc.

3) Perception approach – (Recovery) – It is the of natural disaster (or) hazards, disaster management and mintoantion.

is an interdisciplanier linkage involving expert in social influances.

Concept of Risk

The probability of an event multipled by the Consequence of the event.

Risk is the possibility of extend of damage to infrastructure living being and environment

Levels of disaster

~~Level 1~~ ~~The~~ devastation.

Level - 1 → Local accidents.
→ Police service, fire service

Level - 2 → floods, cyclones, droughts
(State govt)

Level - 3 → Earthquakes, volconic eruption, Tsunami.
→ (Union → state + Central govt)

their lives and damage of properties was estimated b/w Rs 5000 cr & 6000 cr.

Case-4 - Uttarakhand flash flood - 2013

year - 2013

Affected area - It affected 12 out of 13 districts of the state. Four districts were worst affected namely, Rudraprayag, Uttarkashi, Pithorgarh, and Chamoli.

No. of death - 5,700 +

Cause - heavy rainfall, massive landslides

→ Uttarakhand flash flood is among the most disastrous floods in ~~Ind~~ the history of India. Uttarakhand recived heavy rainfall massive landslids in June 2013.

The flash flood and landslide continued from 14-17 June. Around 1 lac pilgrims were trapped in the Kedarnath shrine

→ factors causing Global atmospheric changes
or climatic changes

1) Global warming — ↑ avg surface temperature
deforestation
population explosion

2) GHG's (Green house Gases) — GHG's
CO_2, Nitrous oxide (N_2O), CH_4 (Methane), CFC's.
↑ temperature, causes heavy industrialisation

3) Over population — ↑ Population ↓ forests
↑ GHG's emissions
water pollution
air "

4) Deforestation → Agricultural purpose
higher rise buildings
Trees not for wood furniture
Effects of deforestation — disturbance of Carbon cycle
Trees absorb CO_2
↓
Rot again CO_2 released into atmosphere
↑ CO_2 ↑ GHG
→ Disturbance in water cycle
Evapotranspiration — Results in drought

5) Use of fossil fuels
Coal burning
Transportation, GHG's

→ Efforts taken for meeting challenges of Global climate

1) ↓ temperature / moisture / steam from Industries.

a) ↑ O_2 producing plants
3) use compact flourescent lamps, & electric stand and bulbs.
4) Regulate ↑ in population
4) use public transport
c) shift from conventional to non-conventional resources WEISE

→ Natural & man made hazards

→ Natural hazard
1) Terrestrial hazard – Beneath the earth

(*) Endogenic hazard
↑ in temperature beneath earth
internal force
Earthquake, volconic erruptions, landslides

(ii) Exogenic hazard
hazards in atomsphere → cyclones, storms.
a) hydrologic hazard – cyclones, ice, snowfall, floods
b) Metrological hazard – heatwaves, cold waves storms
c) Infrequent hazard – lightenings, hail storms.

2) Extra planetary hazard
collision of celestial bodies
Eg – asteroids, comets
Debris → earth surface.

→ Manmade hazard
Terrorism, Nuclear attacks.

a) Physical hazard
↓ less impact.
human induced activities
Eg. – Deforestation pollution.

Afforestation
Miyawaki technique
Japan etc
→ seeding nearby

b) Technological hazards.
hazard impacts whole society
Release of toxic substances.
Eg – Radiation, Nuclear disaster (wars, Russia – ukraine)

Unit – 1

Concept of disaster – sudden catastrophic event that causes ~~sudden~~ spe widespread & immeasurable damage of life, property, livelihood, economy & environment.

Type of disaster

Natural	Manmade
a) Major = flood, cyclones, earthquake, droughts etc	a) Major – forest fires, epidemic, deforestation
b) Minor = coldwave, thunderstorms, heatwave, landslids, storms etc	b) Minor – food poision, Riots, Industrial disaster

→ Different approaches –
~~1) Landscape~~ –
1) Ecosystem – ~~based on~~ application of It is strategy for the integrated management of land, water and living resources that promotes conservation and sustainable used in an equitable way. focused on levels of biological organization which encompass the essential processes, function

and Interactions among organisms and their environment.

2) Landscape – flexible concept without a clearly defined physical space. It includes natural features of the landscape, Infrastructure, stakeholders and external forces that affects the physical area. Applying this helps to overcome barriers by sector and contributes to effect risk management. Communities at the centers

3) Perception – Reality, mental process of identifying, sorting and arranging data into meaningful pattern, gathering sensory information and assigning meaning to it
→ Selection, Organization, Interpolation

Continous.

b) i) Industrial hazards.

Pollution causes due to industries

ii) Structural collapse hazard.

iii) Nuclear hazards
Massive radiation, Nuclear weapons human civilization.

iv) Transportation hazard
Air, Railway accidents.

4) Biological hazards –
originate from bacteria, virus, medical waste.

i) Pathogens – Small pox, Pelgue, anthrax, plague

a) Toxines – Poisonous substance
→ Plants or Animal.

5) Social hazard

terrorist attacks, flight hijacking, famines, also called as Inter natural hazard.

→ Response time frequency & forewarning levels of different hazards.

→ Provisions of immediate relief measures for disaster affected people.

1) enable protection/survival of victim.
2) Victims → self sufficients basic needs
3) Nature of disaster/Magnitude → media/News
4) Setting relief operations
5) Usage of remote sensing and GIS tools
6) heavy machinery - debris
7) Rescue & Rehabilitation centers
8) Relief materials first aid goods

~~Setting up re~~

→ characteristics and damage potential of natural hazards

Economic consequences of disaster

1) Production losses
2) Tangible assets → Buildings, equipments Infrastructure.
3) Exports Reduction
4) Damage of roads/Bridges.
5) factories, Business → destruction

6) loss of assets
7) Increase in cost, transpation cost &

→ Inflation – ↑ Cost

→ Vulnerability assessment – Vulnerability and disaster risk.

Psychological and social dimensions of disaster

Psychological dimension

1) fear, anxiety, stress, illness – victims.
2) Mental and behavior impact – children
3) Insomnea – (lack of sleep) – elders, & children

Destruction Intangible assets.

Social dimensions – Relief shelter, food, clothing.

Vulnerabilities to flood & earthquake hazards

→ flood – It refered to overflowing of river bank due to inadequate capacity of water detension following heavy local precipition, cyclons etc

Types – 1) Natural floods – overflowing of rivers, lakes etc.

1) Riverine/stream floods – flood caused when too much of water within less time
2) Estuarine flood – sea tidal surges
3) coastal floods – hurricanes, tsunamis

→ 2) Catastrophic floods – landslides,

Collaspsing of dams, reservoirs.

3) Other causes — 1) heavy rainfall
2) heavy snow melting

→ Measures to mitigate floods. (control),

1) Construction of dam will help to control flood
2) setting up of embackment ex - krishna and godavari delta
3) Sand bags alongs banks of river should be setup
4) Wetland ~~land~~ should be protected as natural flood control system. (Salt lakes).
5) afforestation prevents floods
6) Construction of bridge, roads which leads to runoff of rain water.
7) Public should be given warning in advance.

→ Earthquake - sudden violent moment of the earth surface and even tectonic plates of the ocean which cause great damage to livelyhood environment and economy

→ Major action points

1) Strong foundation
2) water heaters, appliances fixed to walls
3) Tall furnitures, showcase fix to walls
4) Mirrors/pictures fixed away from bed
5) Cabinets fixed - strong bolts
6) TV's, computers secured property.
7) structural defects repaired, repairs → cracks

Unit-II

Disaster Mechanism

Concept of Risk management & crisis management

Disaster risk management related to chemical safety.

1. Assessing health risk & impacts
2. usage of chemical must be reduced.
3. reducing the(↓) quantities of chemical
4. Management of waste.
5. security Measures to control hazardous materials.

Emergency, preparedness, Response, mitigation.

1. Trained staff
2. Awareness of chemicals
3. Install emergency communication
4. Development of healthcare facilities.

→ Different stages of DM:-

1. pre disaster stage
2. preparedness phase (phase of readiness)
   planning to respons immediately
   setup awareness programs
   Alerting the government

- Emergency communication systems.
- Alerting people living on coastal area.

(ii) mitigation phase (prevention phase)
- Earthquake resistant buildings
→ Adopt good construction techniques
→ Development of greenbelt
plant more no. of trees
coastal
less impact of Tsunamis

② Emergency phase
Firstaid box
Relief operations
Basic needs

③ post disaster phase
Rehabilation

Guidlines for mitigation of disasters
→ setting up volunteers
land-use zoning
- Disaster proned areas identify & mark
- Areas must be prevented from using
- Residential building not allowed.
- Should not set up industries.

Building codes

→ Improve quality of construction.

→ Building codes established in consultation with builders, architects etc,

Incentives:-

funds must be given to farmers any house holds repair works/ modification in construction.

Cyclone:- Violent tropical storms or winds in which the air moves very fast in circular direction is said to be a cyclones.

Measures to mitigation cyclons.

- Afforestation

1, Trees act as barriers to prevent major damages

- Buildings constructed resisted to wind, rainfall

→ cyclone shelters set up

→ cyclone storms - floods

Measures taken to prevent floods.

Unit-3

Capacity building

According to united national international strategy for disaster reduce (UNISDR) Capacity development/ building is define the Process through which individuals, organization and societies strengthen and maintain their capablility to set and achieve their development objectives over time

→ structural measures to control floods/ cyclones

1) River engineering — a) Construction of reservoirs/dams along course of river.

b) low lying depressions to collect flood water.

c) Construct the embankment.

d) Desilting of river → free flowing of water

e) Deepening the river channels (deep construction)

2) Afforestation → Trees / plants
↓
Coastal areas → Trees absorb water for ↓ impact.

3) Planned urban development on flood plains –

a) Raising the plinth area of the building above the flood level.

b) Using flood resistant materials.

c) Opening at lower level of buildings coated without penetration of water.

→ Non-structural mitigation measure

a) Early warning systems

- Bells detecting the signs of catastrophic
- Analysis of symptoms
- Informing people.

b) Awareness and education

Development of training, awareness, education
↓
disaster mitigation strategies.

c) Community participation

partnership
empowerment
Capacity building.

→ Structural mitigation measures to prevent landslides

1) Drains and pipelines → clear surface drainage water near slopes → landslides

2) Promote afforestation → plants dewater slope

3) Soil erosion prevented near hilly areas
4) Avoid digging channels on hilly slopes
5) Embankments constructed
6) slopes → landslides → vegetation of plants

→ Importance of reconstruction of damaged buildings and problems associated to ensure victims build back better

The reconstruction of damaged building in the events on a earthquake or any hazard is relevant and necessary for.

1) To help the disaster victim to live a safe and ~~more~~ secure life
2) To bring up children effected by the disaster to give them a ray of hope for the future
3) To help the elderly and handicap victims of disaster to start their life a fresh.
4) To give employment to the people by reconstruction of small medium size company to rebuild their lifes
5) To restore the economic vitality (needs) of the community.
7) To prove the essential child care service and to help children get back to the normal lifes

→ To concept of build back better refers to restoration of communities and assets in a manner so that they are less vulnerable to disaster and strengthen there resistence. The emergency effected people generally suffer

from serious mental health problem the health care works should be better equiped to manned the mental health problem
The recovery action should ensure that Community returns normalcy along with long term goals of reducing the risk and vulerability

Case study on landslide
→ A hill slope failure analysis – A case study of Malingoan village, Maharashtra, India.
→ Happen on 30 july 2014.
Has buried almost 140 people under a loose soil mass in malingaon village of pune districh.
→ The results showed that the hill slope was unstable with factor of safety less than one and which is prone to failure.
→ It caused by a burst of heavy ramfall, killed 151 pepple and damaging 45 houses.
→ Located at 756m ground elevation and about 95km away from Pune city.
→ Method to predicts the natural disaster.

1) Fractal Method → yale university professor
↓ hurriances, floods, cyclones, earthquakes, volcanic eruption, wildfires
↓ Benoit Mandel brot
↓ Mathematical formuala

2) Dilatency theory
→ Predict the earthquakes by observing rock sample.
→ Transmission of seismic waves of high speed.
→ changes in magnetic properties eq

and electrical resistance.
→ Raise in ground surface
→ change in pressure.

d) Scientific method of disaster prediction.
Advanced metrological and satellite → tornadoes, cyclones, hurricanes, avalanches, landslides, and flow → by snow fall, heavy rainfall.

4) Animal behaviours
Behaviour of animals can be predicted.

→ Methods of monitoring and control of environmental hazards.
Remote sensing instrument
- Colour Infrared film (CIF)
- ultrasound identification systems
Diff satellites for monitoring environmental hazards
↓
INSAT-3A → Geostationary satellite → Realtime pictures and information.
KALPANA-1.
- Thermal sensor - for active fires.
- Infrared sensors - floods.
- Microwave sensors - earthquake, volconic eruption

→ Monitoring floods
↓
Tropical rainfall monitoring mission satellite

→ fire mapping
↓
MODIS. Rapid response system

→ Earthquake mapping → Interferametric ground motion — synthetic aperture radar (INSAR)

→ Methods of monitoring and control of environmental hazards

- cyclone mapping

Indian remote sensing (IRS)

↓

flood maps, cyclones, tsunami etc.

→ Technological warning system available for disaster

- Cyclones – Indian meteorological department.
- Tsunami – Indian national centre for Oceanic Information services.
- floods – Centre water commission.
- landslide – Geological survey of India
- Avalanches – snow & avalanche study established.
- Heat and cold waves – Indian meterological department.

→ Various Institutions and national centres involved in Natural disaster reduction.

1) Central disaster management authority
2) National centre for DM (disaster management)
3) Centre for DM
4) National Information centre for earthquake engg – IIT kanpur.
5) Disaster Management Institute at Bhopal.
6) Disaster management Institute at ahmedabad.
7) Environment protection training & Research institute (EPTRI)
8) Gujarat state DM authority.
9) National Institute of disaster management.

→ Legislative support at state & National level

→ legal provisions for DM.

– The water act 1974.

acolding to the section 16(1) of the act, 'Subject to the provision of the act, the main function of central broad shall be to promote cleariness of stream and wells in different areas of the state.

– Section 24(1)(b) states that no person shall knowningly cause of permit to enter any stream or any other matter which may land, either ~~differ~~ directly or in combination with simple matter, to impede the proper flow of water of the stream in the manner leading to ~~pollutio~~ substaintion pollution.

– The forest conservation act 1980

S-2 of the act laysdown restrictions on reservation of forests or use of forest land for non-forest purposes.

The clause-4 of (s-2) imposes restrictions on clearing of trees in the forests which have grown naturally in that land.

3) The wet lands conservation & management rules 2010

S-4 (1) of the W.L.C & M.R 2010 impose restriction of activities like reccomendation of wet lands

→ The wet lands are one of the most productive habitat on the plant & they provide ecological services like flood mitigation and erosion control

4) Biological diversity act 2002:

According to S-2f of the act commercial utilizes means endures of biological resources for commercial utilization such as drugs, industrial enzymes, food stores, fragrance, cosmetics, colours, extracts & genes used for improving crops & livestock of through genetic intervention.

→ Droughts are defined as a condition that arises from two with precipitation for extended period of time for normal farming pratices hence drought resistance varies/D. tolerent V/ of crops of ↑ yielding. Qualities should be developed to tide over the food in securing to a large extend.