

DM PYQs

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- Measures
 - o Structural
 - o Non-structural
 - o Risk management & capacity development
 - o Awareness generation

Discuss about the vulnerability of India to earthquake related hazards. Give examples including the salient features of major disasters caused by earthquakes in different parts of India during the last three decades. (10, 2021)

Intro	
Body	
Conclusion	

Describe the various causes and the effects of the landslides. Mention the important components of the National Landslide Risk Management Strategy. (15, 2021)

Intro	
Body	
Conclusion	

10. Discuss the recent measures initiated in disaster management by the GoI departing from the earlier reactive approach. (15, 2020)

Intro	Disaster Mgmt = organisation and management of resources and responsibilities for dealing w/ all humanitarian aspects of emergencies in order to lessen the impact of disasters
Body	<p><u>Earlier approach = reactive</u></p> <ul style="list-style-type: none"> - Based on 4Rs - Rescue, Relief, Rehabilitation & Restoration - Rescue & relief <ul style="list-style-type: none"> • Search & rescue • Rapid damage & needs assessment • Provision of relief and first aid • Temporary shelters • Humanitarian assistance - Rehabilitation <ul style="list-style-type: none"> • Restore basic services & lifeline • Resume normal patterns of life - Restoration <ul style="list-style-type: none"> • Restoration of all services, local infra, replacement of damaged physical infra <p><u>New approach = responsive/ holistic</u></p> <ul style="list-style-type: none"> - Based on 3Ps - Prevention, Preparedness & Proofing - Work towards risk reduction through decrease in hazard & mitigating vulnerability <ul style="list-style-type: none"> • (risk = probability of hazard x degree of vulnerability) - 3 phases <ul style="list-style-type: none"> • Pre-disaster risk management phase • During disaster • Post-disaster

- Main elements:

- Policy framework
- Risk assessment
- Risk awareness
- Implementation of the plan
- Early warning system
- Application of knowledge gained

Measures - Structural

	Prevention	Preparedness	Proofing
Flood	- Channel, drainage improvement - Embankments	- Forecasting, warning - Lake MIS (Sikkim)	- Diversion of flow - Parallel channel bye-passing habitation areas
Droughts	- Watershed development approach - Integrate ground-based info & space based info	- Drought Monitoring Cells at state level - Training & Capacity Building programmes	- Crop diversification - Protective irrigation -- micro-irrigation - Afforestation - Drought Mgmt Plans (under NDMA)
Cyclone	- Stemming global warming -- NAPCC - Renewable shift	- National Cyclone Risk Mgmt Project -- MHA + WB - Early warning dissemination system	- Bio-shields: mangroves, wetlands - Shelter belts of trees in coastal areas - Adequate shelters, community centres
Earthquake			
Landslide			

Measures - non-structural

- Timely evacuation, forecasting, warning, insurance products

Conclusion

From
UNDRR

UN Office
for
Disaster
Risk
Reduction

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. Non-structural measures are measures not involving physical construction which use knowledge, practice or agreement to reduce disaster risks and impacts, in particular through policies and laws, public awareness raising, training and education.

Annotation: Common structural measures for disaster risk reduction include dams, flood levies, ocean wave barriers, earthquake-resistant construction and evacuation shelters. Common non-structural measures include building codes, land-use planning laws and their enforcement, research and assessment, information resources and public awareness programmes. Note that in civil and structural engineering, the term “structural” is used in a more restricted sense to mean just the load-bearing structure, and other parts such as wall cladding and interior fittings are termed “non-structural”.

9. Disaster preparedness is the first step in any disaster management process. Explain how hazard zonation mapping will help in disaster mitigation in the case of landslides. (15, 2019)

Intro	- UNISDR : Disaster Preparedness = knowledge, capabilities, actions of govts, organisations, community groups & individuals to effectively anticipate , respond to and recover from impacts of likely, imminent or current hazard events.
	Map of landslide prone areas: Very high -- Himalayas, Western Ghats Moderate to low -- trans-Himalayan (Ladakh, Himachal), Aravali, mining areas
Body	<p><u>Disaster preparedness as first step of DM</u></p> <p>- Integral part of new paradigm of 3P - prevention, preparedness, proofing</p> <p><u>Components of disaster preparedness</u></p> <ul style="list-style-type: none"> - Risk assessment & early warning systems - Life safeguarding equipment -- eg cyclone shelters - Resources and emergency kits, emergency rosters and evacuation plans, emergency info & communication systems - Training to ensure adequate emergency response capacity, maintenance of preparedness levels, public education and preparedness campaigns <p><u>Landslide -</u></p> <p>- Sudden mass movement of soil; occur in hill areas, due to instability of land mass due to loose soil, excessive water/ moisture</p> <p><u>Hazard zonation mapping</u></p> <p>- Division of land in homogeneous areas and their ranking according to the degrees of potential hazard caused by a disaster</p> <p><u>Role of hazard zonation mapping</u></p> <ul style="list-style-type: none"> - Better planning and suitable precautionary measures - Vulnerability assessment -> pre-emptive traffic diversion during bad weather (Eg heavy rains) - Ban construction of new roads, hotels etc in high risk areas - NDRF, SDRF personnel to stand by around high risk zones - Limiting agri to valleys, areas w/ moderate slopes - Preventive measures like large scale afforestation programmes, bunds to reduce water flow <p><u>How to do hazard zonation?</u></p> <ul style="list-style-type: none"> - High risk areas -- <ul style="list-style-type: none"> • EQ prone areas • Areas of intense human activities -- construction of roads, dams, etc • High rainfall regions w/ steep slopes
Conclusion	ISRO has prepared such maps for pilgrim routes in UK, HP & Meghalaya, can undertake expansion

8. Vulnerability is an essential element for defining disaster impacts and its threat to people. How and in what ways can vulnerability to disasters be characterized? Discuss different types of vulnerability with reference to disasters. (10,2019)

Intro	- Vulnerability = conditions which increase the susceptibility of a community to the impact of hazards
Body	<p><u>Vulnerability as an essential element</u></p> <ul style="list-style-type: none"> - Disaster risk = probability of hazard x degree of vulnerability - Vulnerability determined by physical, social, economic, envi factors or processes

	<p><u>Types of vulnerability</u></p> <ul style="list-style-type: none"> - Economic <ul style="list-style-type: none"> • Varied sources of income • Ease of access + control over means of production • Adequacy of economic fall back mechanisms • Availability of natural resources - Physical - geographical proximity - Social - poor, pregnant, disabled, children, elderly - Envi - flora, fauna, ecosystems, biodiversity - Attitudinal - victims of conflicts, hopelessness, pessimism
Conclusion	

- Hazard = dangerous condition or event that threatens/ has potential for causing injury to life, damage to property, environment

Types

- Natural

- Geophysical - EQ, landslides, tsunamis, volcanic
- Hydrological - avalanche, floods
- Climatological - extreme temp, drought, wildfires
- Meteorological - cyclones & storms/ wave surges
- Biological - disease epidemics and insect/ animal plagues

- Anthropogenic

- Pollution, deforestation, overuse of pesticides, herbicides, chemical spillage

7. Describe various measures taken in India for Disaster Risk Reduction (DRR) before and after signing 'Sendai Framework for DRR (2015-2030)'. How is this framework different from 'Hyogo Framework for Action, 2005? (,2018)

Intro	- UNISDR: DRR = use of knowledge, capabilities and actions of govt, organisations, community groups and individuals to effectively anticipate, respond to and recover from the impacts of likely, imminent or current hazard events or conditions.
Body	<p><u>Sendai features</u></p> <ul style="list-style-type: none"> - 4 priorities <ul style="list-style-type: none"> • Understanding disaster risk • Strengthening disaster risk governance to manage disaster risk • Investing in DRR for resilience • Enhancing disaster preparedness for effective response + B3 - Build Back Better in recovery, rehabilitation, reconstruction - 7 targets <ul style="list-style-type: none"> • Reduce disaster mortality by 2030 • Reduce no. Of affected people by 2030 • Reduce economic loss by 2030 • Reduce infrastructure damage by 2030 • Frame national/ local DRR Strategies by 2030 • Int'l cooperation • EWS and DR information by 2030 <p><u>DRR before Sendai</u></p> <ul style="list-style-type: none"> - 3 Rs - Rescue, Relief, Restorative <p><u>DRR after Sendai</u></p> <ul style="list-style-type: none"> - 3Ps - prevention, preparedness and proofing <p><u>Hyogo (2005-15) - Building Resilience of Nations and Communities to Disasters</u></p> <ul style="list-style-type: none"> - Making DRR a priority - Improving risk info & early warning

	<ul style="list-style-type: none"> - Building a culture of safety & resilience - Reduce risks in key sector - Strengthening preparedness for response
Conclusion	

6. On December 2004, tsunami brought havoc on 14 countries including India. 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. (,2017)

Intro	Tsunami = Japanese word for harbour wave; tsunami = series of large waves of extremely long wavelength and period usually generated by an undersea disturbance or activity near the coast or in the ocean
Body	<p><u>Factors for tsunami</u></p> <ul style="list-style-type: none"> - Large, impulsive displacement of the sea bed level - Earthquake -- vertical movement of sea floor -> tsunami - Landslides under water surface - Volcanic activity - Meteorite impacts <p><u>Effects on life and economy</u></p> <ul style="list-style-type: none"> - Large scale loss of livelihoods - Destruction of property - Salinity of agri lands -> decreased productivity - If waterlogging -> standing crop destroyed + diseases - Drinking water problem if infiltrates into the ground water - Industrial machinery faces faster rusting in presence of saline water - Services collapse due to roads, telecommunication infra breakdown - Rapid incoming waves -> high death toll on and around the beaches/ coastal areas - Destruction of boats etc -- fishermen no longer have equipments - Those at sea lose lives <p><u>NDMA guidelines</u></p> <ul style="list-style-type: none"> - Tsunami Risk Assessment and Vulnerability Analysis - Tsunami Preparedness - 17 station RTSMN Real Time Seismic Monitoring Network - planned to be estd by IMD & BPRs Bottom Pressure Recorders - NIOT National Institute of Ocean Technology - National Data Buoy Programme - Structural mitigation measures -- cyclone shelters, submerged sand barriers, dykes, sand dunes w/ sea weeds, mangrove plantations, coastal forests - Location specific sea walls & coral reefs - Break waters - Bio-shield - Regulation and enforcement of techno-legal regime - Indian Naval Hydrographic Dept plays a crucial role in disasters affecting coastal areas
Conclusion	

5. 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. (,2016)

Intro	- Urban flooding = inundation of property in built environment, particularly densely populated urban areas, due to intense rainfall on impermeable surfaces, which overwhelms the capacity of drainage systems
Body	<p><u>Increasing frequency</u></p> <ul style="list-style-type: none"> - Chennai, Mumbai, Hyderabad... (Map)

Reasons

- Meteorological factors

Heavy rainfall	Cyclonic rainfall	Small-scale storms	Cloudburst	Glacial lake outburst
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- Hydrological

- Synchronisation of runoffs from various parts of the watershed
- High tide -> impedes drainage
- Impervious cover
- High soil moisture levels
- Low natural surface infiltration levels
- Absence of over bank flow, channel network

- Anthropological

- Land use change
- Encroachment of flood plain -> obstruction of flows
- Inefficient flood mgmt infrastructure
- Extreme weather events due to human induced climate change
- Improper SWM -> drainage blockage

Risk reduction mechanisms (NDMA guidelines)

- Early Warning System & Communication

- National Hydro-Meteorological Network
- Local Network Cell @IMD HQ -- for real-time rainfall data collection
- Doppler weather Radars

- Design & Mgmt of Urban Drainage System

- Inventory of existing storm water drainage system -- ward based, watershed based
- Rainwater harvesting
- Penal action on encroachments

- Urban Flood Disaster Risk Mgmt

- Annual pre-monsoon desilting of all major drains
- De-link from riverine floods; deal as a separate disaster
- Rain Gardens
- Protect, restore, revive all urban water bodies

- Capacity development - flood hazard assessments

- Massive public awareness programmes incl Solid Waste disposal, encroachment, insurance, etc

- Techno-legal regime -- stormwater drainage concerns to be part of EIA norms

- Preparation of DM plans

Conclu
sionNDMA guidelines for urban floods

- Early warning system and Communication

- National Hydro-meteorological Network
- Doppler Weather Radars

- Decision Support System

- Design & Mgmt of Urban Drainage

- Catchment as a basis of design

- Contour data

- Design flow

- Removal of solid waste

- Drain inlet connectivity

- Vulnerability analysis & risk assessment

- Urban flooding cells

- Emergency operation centres, Incident Response System, flood shelters, search and rescue operations, emergency logistics

	<ul style="list-style-type: none"> - Sanitation - Capacity development, awareness generation and documentation
<p>4. With reference to National Disaster Management Authority (NDMA) guidelines, discuss the measures to be adopted to mitigate the impact of the recent incidents of cloudbursts in many places of Uttarakhand. (.,2016)</p>	
Intro	<ul style="list-style-type: none"> - Cloudburst = sudden and extreme rainfall events over a limited area in a short span of time - IMD = 100mm rainfall in a span of an hour, in a region approx 20-30sq km
Body	<p><u>Causes</u></p> <ul style="list-style-type: none"> - Saturated cloud unable to produce rain becomes too heavy to hold weight and falls down all at once - Generally in hilly areas, also possible in plains though <p><u>Impact</u></p> <ul style="list-style-type: none"> - Flash floods & landslides - Sudden nature of disaster -- difficult to predict <p><u>NDMA guidelines</u></p> <ul style="list-style-type: none"> - No specific guidelines - Guidelines for flood and landslides applicable <p><u>Mitigation</u></p> <ul style="list-style-type: none"> - Habitation on hard rock and firm ground of slopes - Appropriate measures for checking infiltration of water must be taken - Training for vigilance - Ban indiscriminate, unscientific construction - Safe disposal of rainwater - Drain pipes may be provided on debris slope - Bioengg tech can be successfully implemented by using specific and local vegetation - Dense network of rain gauges
Conclusion	<p><u>NDMA guidelines for floods</u></p> <ul style="list-style-type: none"> - Structural measures <ul style="list-style-type: none"> • Reservoirs, dams, other water storages • Embankments/ flood levees/ flood walls • Drainage improvement • Channel improvement/ desilting/ dredging of rivers • Diversion of flood water • Catchment area treatment/ afforestation - Non-structural measures <ul style="list-style-type: none"> • Flood plain zoning • Flood mgmt plans • Integrated water resources mgmt • Flood forecasting and warning
<p>3. The frequency of earthquakes appears to have increased in the Indian subcontinent. However, India's preparedness for mitigating their impact has significant gaps. Discuss various aspects. (.,2015)</p>	
Intro	
Body	<p><u>Increasing frequency</u></p> <ul style="list-style-type: none"> - ___

	<p>- (may write reasons for increase)</p> <p><u>NDMA guidelines</u></p> <ul style="list-style-type: none"> - Earthquake Resistant Construction of New Structures -- National Building Code of India - Selective Seismic strengthening and retrofitting of existing priority structures - Regulation and enforcement - Awareness & preparedness - Capacity development - Emergency response -- incident command system <p><u>Gap in structural mitigation</u></p> <ul style="list-style-type: none"> - Absence of EQ resistant features in constructions in urban & rural areas - Absence of systems of licensing of engg and masons <p><u>Gap in non-structural mitigation</u></p> <ul style="list-style-type: none"> - Inadequate enforcement - Lack of formal training - Lack of adequate preparedness - Poor response capacity of various stakeholder groups
Conclusion	

2. Drought has been recognised as a disaster in view of its party expense, temporal duration, slow onset and lasting effect on various vulnerable sections. With a focus on the September 2010 guidelines from the National disaster management authority, discuss the mechanism for preparedness to deal with the El Nino and La Nina fallouts in India. (, 2014)

Intro	ENSO definition
Body	<p><u>El Nino fallout</u></p> <ul style="list-style-type: none"> - Less than average rainfall - Drought conditions <p><u>NDMA guidelines</u></p> <ul style="list-style-type: none"> - Separate Drought Monitoring Cells DMCs - Watershed development approach - Automatic weather stations - A cloud seeding policy - Assessment of damage must be done in terms of agri-production, Credit creation - Afforestation w/ Casurina, Eucalyptus - Capacity building programme - Creation of fodder banks <p><u>Drought mitigation</u></p> <ul style="list-style-type: none"> - DPAP + DDP = National Watershed Development Programme for Rain-fed areas - NWDPRA and the WDPSC Watershed Development Programme for Shifting Cultivation - National Aquifer Mapping Programme - Better monsoon forecast - Adoption of soil conservation measures - Water harvesting practices - Plantation of drought resistant vegetation - Irrigation - Institutional fw - Ministry of Agriculture is the nodal ministry for mgmt of drought crisis in India - Ministry of Jal Shakti is involved in drought mgmt - CWWG -- Crop Weather Watch Group - Cloud Seeding

	<p><u>La Nina fallout</u></p> <ul style="list-style-type: none"> - More than average rainfall - Flood conditions in several parts <p><u>NDMA guidelines</u></p> <ul style="list-style-type: none"> - (written above)
Conclusio n	
	<p><u>Drought types</u></p> <ul style="list-style-type: none"> - Meteorological drought: prolonged pd of inadequate rainfall marked w/ maldistribution over time and space; rainfall <90% - Agricultural drought: low soil moisture that is necessary to support the crops - Hydrological drought: availability of water in different storages and reservoirs like aquifers, lakes, reservoirs, etc falls below what the pptn can replenish - Ecological drought: when the productivity of a natural ecosystem fails due to shortage of water
<p>1. How important are vulnerability and risk assessment for pre-disaster management. As an administrator ,what are key areas that you would focus in a disaster management. (,2013)</p>	
Intro	
Body	
Conclusion	