Disaster Risk Reduction and Management

Course Code: 22CEO02

Unit - I

“It is not the nature that kills us ……

It is what we do the nature that kills

Syllabus

Unit # 1

- Fundamental concepts in disaster management
- Hazard and disaster concepts
- Vulnerability and risk
- Hazard and disaster types – natural, water-related, pandemic
- Human-induced hazards/disasters

• ...contd

Syllabus

Unit # 1

- Causes and Impacts of disasters
- Impacts on natural ecosystems: physical, psychological, and social impacts
- Disaster and financial resilience
- GIS and remote sensing
- Disaster vulnerability profile of India – specific to geographical regions and states (as per regional significance)

Books

Text Books

1.Nidhi, G.D. (2014), “Disaster Management Preparedness”, CBS Publications Pvt. Ltd.

2. Singh, R. (2017), “Disaster Management Guidelines for Earthquakes, Landslides, Avalanches, and Tsunami”, Horizon Press publications.

3. Taimpo (2016), “Disaster management and preparedness”. CRC Press Publications

Suggested Reading

1. Gupta, A.K., Nair, S.S., Shiraz, A. and Dey, S. (2013), “Flood Disaster Risk Management-CBS Publications Pvt Ltd

2. Singh, R. (2016), “Disaster management Guidelines for Natural Disasters” Oxford University Press Pvt. Ltd.

Course Outcomes

Upon the completion of the course, the student will be able to

- Identify and understand the concepts of hazards, causes, and impacts of disasters

- Develop a critical capacity to evaluate the principles and practices of disaster risk reduction and management

- Develop a deep awareness of disaster resilience, risk mitigation, and recovery policies as they arise from natural hazards around the globe

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Course Outcomes

- Apply knowledge about existing global frameworks and existing agreements and the role of the community in successful Disaster Risk Reduction

- Evaluate the Disaster Management including data search, analysis, and presentation as a case study

Definitions

Disaster is an event which is

- generally unpredictable
- happens instantly or without giving enough time to react
- affects a large number of people
- disrupts normal life leading to a large scale devastation in terms of loss of life and property

Definitions

- ✓ **Hazard:** Hazards are natural or man-made phenomena that are features of the planet and cannot be prevented.
  In their dormant state, hazards just pose a threat to life and property.

- ✓ **Vulnerability:** The extent to which a community, structures, services or geographic areas that are likely to be damaged or disrupted by the impact of a particular hazard, on account of their nature, construction and proximity to hazardous terrains or disaster prone areas

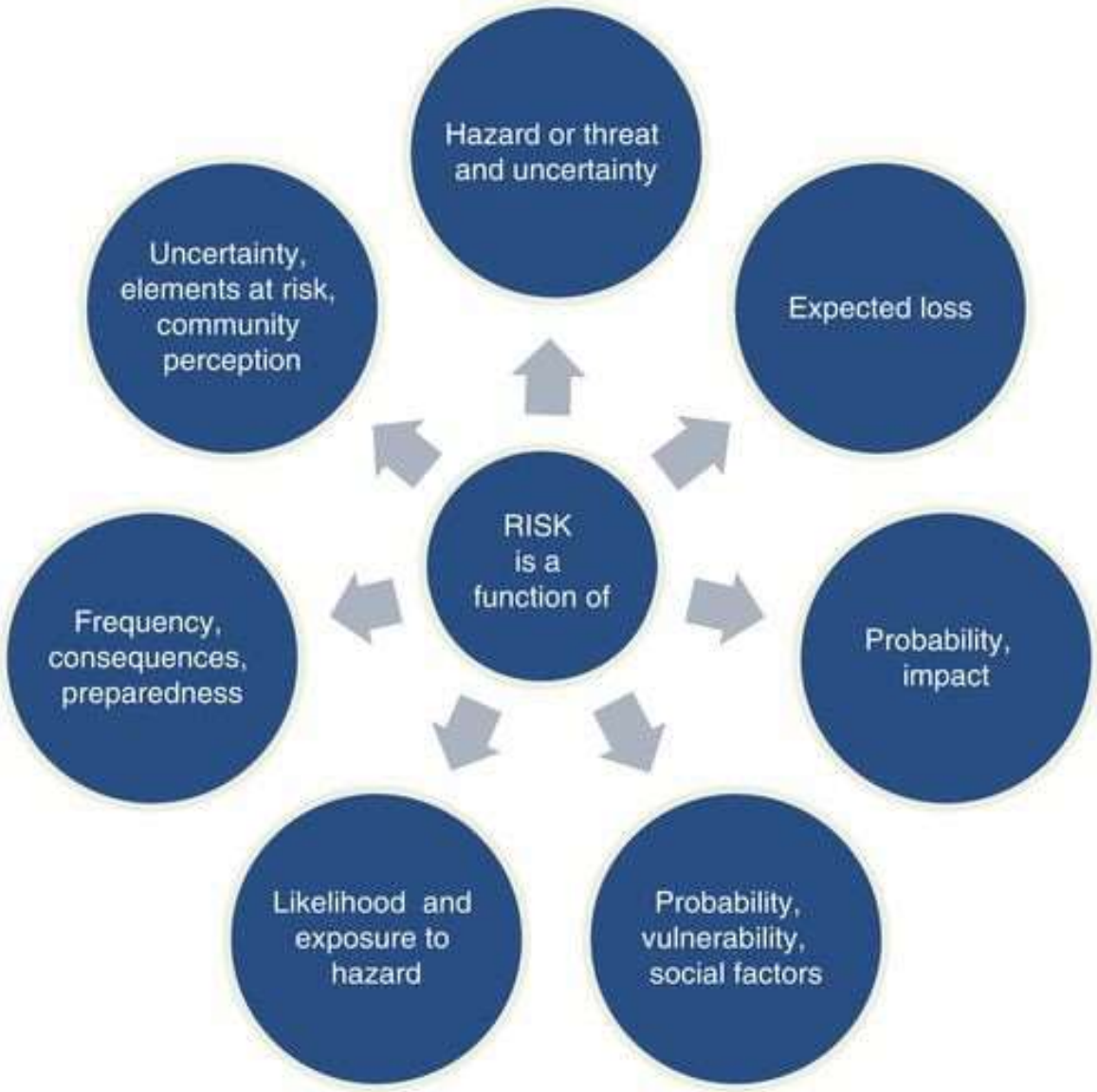
Types of Vulnerability

- ✓ Physical Vulnerability: It is based on the physical condition of people and elements at risk, such as buildings, infrastructure etc; and their proximity, location and nature of the hazard

- ✓ Socio-economic Vulnerability: It is based on the socio-economic conditions. The socio- economic condition of the people also determines the intensity of the impact

Risk

- ✓ Risk can be taken as a chance that harms or damages may occur
- ✓ Risk is a function of the probability of particular hazardous event
- ✓ The level of risk depends upon Nature of the hazard vs Vulnerability of the elements which are affected vs Economic value of those elements
- ✓ A community/locality is said to be at ‘risk’ when it is exposed to hazards and is likely to be adversely affected by its impact


RISK
is a
function of
Hazard or threat
and uncertainty
Expected loss
Probability,
impact
Probability,
vulnerability,
social factors
Likelihood and
exposure to
hazard
Frequency,
consequences,
preparedness
Uncertainty,
elements at risk,
community
perception

Capacity

- ✓ Capacity can be defined as “resources, means and strengths which exist in households and communities and which enable them to cope with, withstand, prepare for, prevent, mitigate or quickly recover from a disaster”
- ✓ **Physical Capacity**: Family members have skills, which enable them to find employment if they migrate, either temporarily or permanently
- ✓ **Socio-economic Capacity**: In most of the disasters, people suffer their greatest losses in the physical and material realm

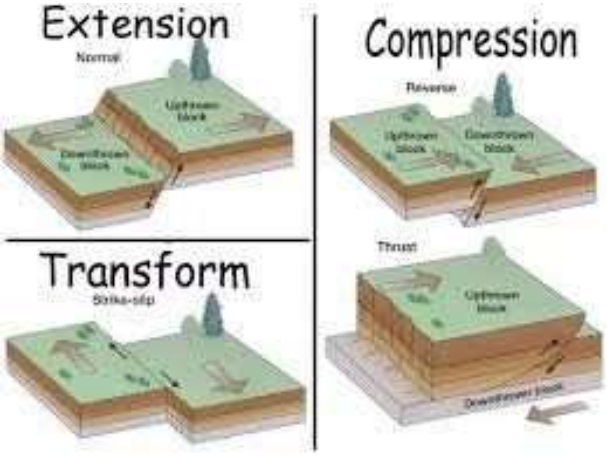
Natural Disasters

Examples of Some Natural Disasters

- Earthquakes
- Floods
- Cyclones
- Tsunami
- Heatwave / Cold wave
- Drought
- Desertification
- Landslides
- Forest fire
- Volcanic eruptions
- Cloud bursts

Earthquakes

- Earthquakes can result in ground shaking, soil liquefaction, landslides, fissures, avalanches, fires, and tsunamis.
- The extent of destruction and harm caused by an earthquake depends on magnitude, intensity, and duration.
- Earthquakes cause a huge loss of life and property worldwide every year.
- Proper strategies and disaster management awareness need to be in place.
- This will protect from the losses and help to cope with these hazards.



Landslides

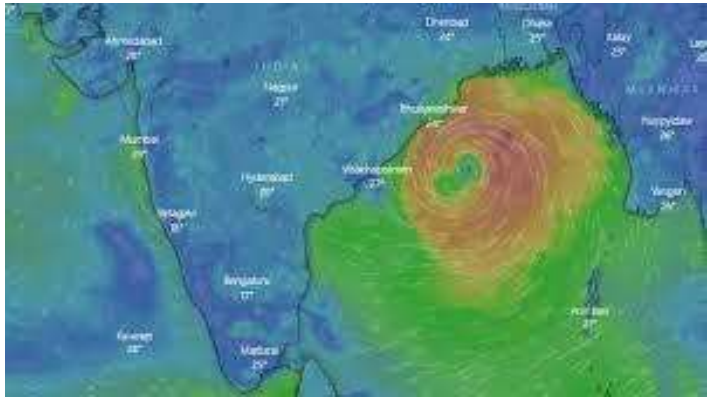
- A landslide is the movement of a mass of rock, debris, or earth down a slope.
- Landslides are a type of "mass wasting," which denotes any down-slope movement of soil and rock under the direct influence of gravity.

Floods

- Flood: An overflow of water onto normally dry land.
- Ponding of water takes place at or near the point where the rain falls.
- The inundation of a normally dry area is caused by rising water in an existing waterway - such as a river, stream, drainage, etc.

Cyclones

- Cyclones are caused by atmospheric disturbances around a
- low-pressure area distinguished by swift and often destructive air circulation.
- Cyclones are usually accompanied by violent storms and bad weather.



Tsunami

- A tsunami is a series of enormous ocean waves caused by earthquakes, underwater landslides, volcanic eruptions, or asteroids.
- A tsunami can kill or injure people and damage or destroy buildings and infrastructure as waves come in and go out.
- Tsunamis can travel at 20-30 miles per hour with waves ranging from 10-100 feet high.

Heatwave / Cold wave

A heatwave is a period of abnormally hot weather generally lasting more than two days. Heat waves can occur with or without high humidity. They have the potential to cover a large area, exposing a high number of people to hazardous heat.

Drought

Drought is a prolonged dry period in the natural climate cycle that can occur anywhere in the world. It is a slow-onset phenomenon caused by a lack of rainfall. Compounding factors, such as poverty and inappropriate land use, increase vulnerability to drought.

Desertification

Desertification is the process by which vegetation in drylands i.e. arid and semi-arid lands, such as grasslands or shrublands, decreases and eventually disappears.

Forest Fires

- Forest fires may be caused by humans, lightning and extreme drought
- They are a global concern as many countries face significant life and property losses
- Carbon dioxide released into the air due to forest fires causes lung and skin infections in humans

Volcanic Eruptions

- Volcanoes spew hot, dangerous gases, ash, lava, and rock that are powerfully destructive.
  People die from volcanic blasts.
  Volcanic eruptions can result in additional threats to health, such as floods, mudslides, power outages, drinking water contamination, and wildfires.

Environmental Degradation

- Environmental degradation is any change or disturbance perceived to be destructive or undesirable.
- Degradation is caused by depletion of resources such as air, water, and soil, the destruction of ecosystems, and the extinction of wildlife.

Examples of environmental degradation:

- Deforestation
- Soil erosion
- Falling levels of groundwater
- Depletion of the ozone layer and causing extreme air pollution.
- Water Pollution
- Throwing waste in the river
- Use of chemical fertilizers and pesticides
- Burning of coal and mineral oil

Natural Disasters

EWL

Tornado	Flood	Storm	Natural wildfire
			
Earthquake	Drought	Tsunami	Landslide
			
Typhoon	Volcano	Ice storm	Sinkhole
			

Man-made Disasters

Oil Spills

- Oil spills occur when petroleum oil is released into the ocean following accidents, such as vessel crashes or damage and problems with oil platforms and drilling.

- They can have devastating effects on the environment, affecting marine and coastal ecologies, and are not easy to remove.

Chemical Accidents

- The Bhopal Gas tragedy was the most devastating chemical accident in history, where over 2500 people died due to accidental release of the toxic gas Methyl Iso Cyanate (MIC).

Fire accidents

- Fire accidents can result in catastrophic personal injury and devastating damage. Every year, billions of rupees in property damage occur as a result of fire.

- Victims of fire accidents can suffer serious harm, including burn injury to their entire body.

Road/Rail Accidents

- Disaster in the Railway context was traditionally a serious train accident, caused by human/equipment failure, which may affect the normal movement of train services with loss of human life or property or both. This is now extended to include natural and other man-made disasters.
- Globally road crashes kill over 1.6 million people every year. Road traffic injuries are the leading cause of death for young people between the ages of 15 and 29.

Impacts of Disasters

- Disasters can have life-altering impacts on the individuals fortunate enough to survive them
- The effect of disasters can be felt at the community, city, district, state or even country level
- The negative impacts of a disaster are inevitable
- How well the impacts of a disaster is absorbed is dependent on the intensity of the disaster as well as the level of preparedness and resilience of the vulnerable community

Physical Impacts of Disasters

- The physical impacts of disasters can be at various levels such as individual level, community level, or even at a country level
- Individual physical impacts include the loss of limbs, injuries, physical illness, weakness, burns, death etc
- Damage to individual property both immovable like buildings, land, vehicles, etc is also considered as an individual physical impact
- At the community level the impacts include epidemic, sanitation damage, damage to public utilities like dams, transport terminals, ports, etc

Disaster Risks in India

Disaster risks in India are further compounded by increasing vulnerabilities.

These include:

- the ever-growing population
- the vast disparities in income
- rapid urbanization
- increasing industrialization
- development within high-risk zones

Importance of DMM

For a country like India, it is important to have adequate DMM processes in place

- India is vulnerable in varying degrees to a large number of natural as well as man-made disasters
- Further, the vulnerability to Nuclear, Biological, and Chemical disasters and terrorism has also increased manifold

Physical Impacts of Disasters

- Assets like buildings and equipment as well as human capital will be damaged by the disasters affecting the production capacity
- The losses suffered by the industries, and factories can also have economic consequences
- The most common physical impact in India is due to water during floods which is hazardous because of the pressure it exerts on structures
- Water can fill the lungs of organisms and prevent respiration
- The physical damage or destruction can also be caused by other losses like chemical or radiological contamination or loss of land itself due to erosion or subsidence

Physical Impacts of Disaster

- Polluted waters can also be dangerous because of their toxicity
- The waterborne diseases spreading after a disaster can also lead to health Issues at the community level
- Losses of structures, animals, and crops are also important measures of physical impacts
- Other important physical impacts include damage or contamination to cropland, grasslands, and forests

Social Impacts of Disasters

- The social impacts of disasters are " the consequences of a disaster to human populations of any public or private actions that alter how people live, work, play, relate to one another, organize to meet their needs, and generally cope as members of society "
- They can also include cultural impacts involving changes to the norms, values, and beliefs that guide and rationalize their cognition of themselves and their society impacts of disasters usually develop over some time and are difficult to assess when they occur
- The long-term functioning of the households and businesses in a community affected by the disaster can be monitored only by understanding their social impact
- The development of a contingency plan and pre-impact prediction mainly depends on this assessment

Social Impacts of Disasters

Social impacts of disasters include

- Mass migration of displaced population
- Social disorder due to increased crime rate
- Unemployment
- Children orphaned due to the death of parents or separation from families
- Lower prestige of the government
- The image of the community suffers at the international level

Psycho-social Impacts of Disasters

- Psycho-social impacts include emotional signs such as anxiety, grief, and depression
- Cognitive signs such as confusion, impaired concentration, and attention deficits
- Behavioral effects such as sleep and appetite changes, ritualistic behavior, and substance abuse
- In most cases, the effects are mild and transitory, the result of normal people responding normally to an abnormal situation

Psycho-social Impacts of Disaster

- Few disaster victims require psychiatric diagnosis and most benefit from the “crisis counselling” itself rather than “mental health treatment”
- The support network of the victims i.e. parents, relatives, friends, and neighbors play an important role
- The emotional reactions need to be understood based on the manifestation of various stress reactions,
- the level of effort put by the people for their reconstruction, the pattern and amount of disability created due to these psychological stress etc

Psycho-social Impacts of Disasters

- People suffering from pre-medical conditions could be disproportionately affected by the disasters
- Stress could be a primary result of the disaster
- Cognitive needs and growth of the children could be affected negatively
- More likely to engage in dangerous activities
- They may suffer from Post-traumatic Stress Disorder (PTSD), depression, sleeplessness, fatigue, etc

Effects of Disasters: Risk and Resilience Factors

- Every year, millions of people are affected by disasters.
- In disasters, one may face the danger of death or physical injury or lose home, possessions, and even community
- These losses may impart a risk for emotional and physical health problems
- Stress reactions after a disaster may seem to be routine
- Disasters can cause a full range of mental and physical reactions
- Several factors make it more likely that someone will have more severe or longer-lasting stress reactions after disasters

Risk Factors : Severity of Exposure

- The amount of exposure to the disaster is highly related to the risk of future mental problems.
- At the highest risk are those who go through the disaster themselves. Next are those in close contact with victims.
- At lower risk of lasting impact are, those who only had indirect exposure, such as news of the severe damage.
- Injury and life threat are the factors that lead most often to mental health problems.
- The findings show that at least half of these survivors suffer from distress or mental health problems that need clinical care.

Risk Factors : Age

- Adults who are in the age range of 40-60 are likely to be more distressed after disasters.
- The thinking is that if one is in that particular age range, they may have more demands from job and family.
- Research on 'how children react to natural disasters' is limited.
- In general, children show more severe distress after disasters than do adults.
- Higher stress in the parents is related to worse recovery in children.

Risk Factor 3: Gender and Family

- Almost always, women or girls suffer more negative effects than men or boys.
- Disaster recovery is more stressful when children are present in the home. Women with spouses also experience more distress during recovery.
- Having a family member in the home who is extremely distressed is related to more stress for everyone.
- Marital stress has been found to increase after disasters.
- Also, conflicts between family members or lack of support in the home make it harder to recover from disasters.

Risk Factor 4: Other Factors Specific to the Survivor

Several factors related to a survivor's background and resources are important for recovery from disaster. Recovery is worse if one

- Were not functioning well before the disaster.
- Have had no experience dealing with disasters.
- Must deal with other stressors after the disaster.
- Have poor self-esteem.
- Think one is uncared for by others.
- Lack of the capacity to manage stress.

Other Factors Resulting in Worse Outcomes

- Bereavement (death of someone close)
- Injury to self or another family member
- Life threat
- Panic, horror, or similar feelings during the disaster
- Being separated from family (especially among youth)
- Great loss of property
- Displacement (being forced to leave home)

Risk Factor 5: Case of Developing Countries

- Disasters in developing countries have more severe mental health impacts than disasters in developed countries.
- This is true even with less serious disasters.
- For example, natural disasters are generally thought to be less serious than human-caused.
- Natural disasters have more severe effects than human-caused disasters in developed countries.

Risk Factor 6: Low or Negative Social Support

- The support of others can be both a risk and a resilience factor. Social support can weaken after disasters.
- This may be due to stress and the need for members of the support network to get on with their own lives.
- Sometimes the responses from others relied on for support are negative.
- For example, someone may play down one's problems, needs, or pain, or expect to recover more quickly than is realistic. This is strongly linked to long-term distress in trauma survivors.

Low or Negative Social Support

- After a mass trauma, social conflicts, even those that have been resolved, may again be seen.
- Racial, religious, ethnic, social, and tribal divisions may recur as people try to gain access to much-needed resources.
- In families, conflicts may arise if family members suffer in various forms during the disasters.
- Family members may also serve as distressing reminders to each other of the disaster.
- Millions of people have been directly affected by disasters, and most of them do recover. Human nature is resilient, and most people can come back from a disaster.
- Though not very common, it is also observed that people sometimes report positive changes after the disaster.

Resilience Factors

- Human resilience dictates that a large number of survivors will naturally recover from disasters over time.
- They will move on without having severe, long-lasting mental health issues.
- Certain factors increase resilience after disasters.

Social Support

- Social support is one of the keys to recovery after any trauma, including disaster.
- Social support increases well-being and limits distress after mass trauma.
- Being connected to others makes it easier to obtain the knowledge needed for disaster recovery.

Resilience Factor 1: Social Support

- Practical help to solve problems
- A sense of being understood and accepted
- Sharing of trauma experiences
- Some comfort that what you went through and how you responded is not "abnormal"
- Shared tips about coping

Resilience Factor 2: Coping with Confidence

- Research has found that coping self-efficacy - "believing that you can do it" - is related to better mental health outcomes for disaster survivors.
- When one thinks that he can cope no matter what happens, he tends to do better after a disaster.
- It is believing that one can cope with the results of a disaster that has been found to help survivors recover.

Resilience Factor 3: Hope

Better outcomes after disasters or mass trauma are likely if anyone has one or more of the following:

- Optimism (hope for the future)
- Expecting the positive future
- Confidence
- Belief that things will likely work out as well as can reasonably be expected
- Belief that outside sources, such as the government, are acting
- Belief in God
- Positive superstitious beliefs, such as "I'm always lucky."
- Practical resources, including housing, job, money

Water-related Pandemics

- Contaminated water and poor sanitation are linked to the transmission of diseases such as **cholera, diarrhoea, dysentery, hepatitis A, typhoid, and polio**.

- Water-borne diseases are caused by pathogenic microbes that spread via contaminated water.

- Transmission of these pathogens occurs while using infected water for drinking, food preparation, and washing clothes, among others.

- Many developing countries do not have proper water treatment plants, especially in the rural areas

- In some places, the availability of water is so scarce that people have neither the time nor the money to afford water purifiers or other water treatment mechanisms

Water-related Pandemics

- Majority of water-borne diseases worldwide mainly affect children due to poor hygiene and weak immunity
- Most of these diseases are life-threatening
- The knowledge of the different types of water-borne diseases has come to the forefront with the advent of globalization over the past few decades
- Several pathogenic microorganisms which were previously unknown, have become the focus of major research in this field

Disasters and Financial Resilience

- Financial resilience -- how people access, build, and preserve their financial assets and limit their liabilities.
- A household is financially resilient when it can rebound from the shock caused by a hazard, and re-establish a means of earning a living
- Finding ways to support financial resilience both before and after disasters is a crucial way to reduce the negative impact of disasters
- When a hazard strikes a community, not all households are equally affected, and this is also true for their financial resilience

Disasters and Financial Resilience

- Financial resilience and vulnerability are two sides of the same coin and concern how a household accesses, builds, and preserves its financial assets and limits its financial liabilities.

- To be considered “financial”, assets must be marketable or have some intrinsic financial value.

- Financial assets are those that can be: i) sold or redeemed for cash, ii) pledged to purchase other assets iii) pledged to produce predictable revenue streams.

- A household’s financial resilience is the difference between its assets and liabilities

- A financially resilient household endures the shock and regains previous levels of net worth within a reasonable time after being affected by the disaster

Disaster Vulnerability Profile of India

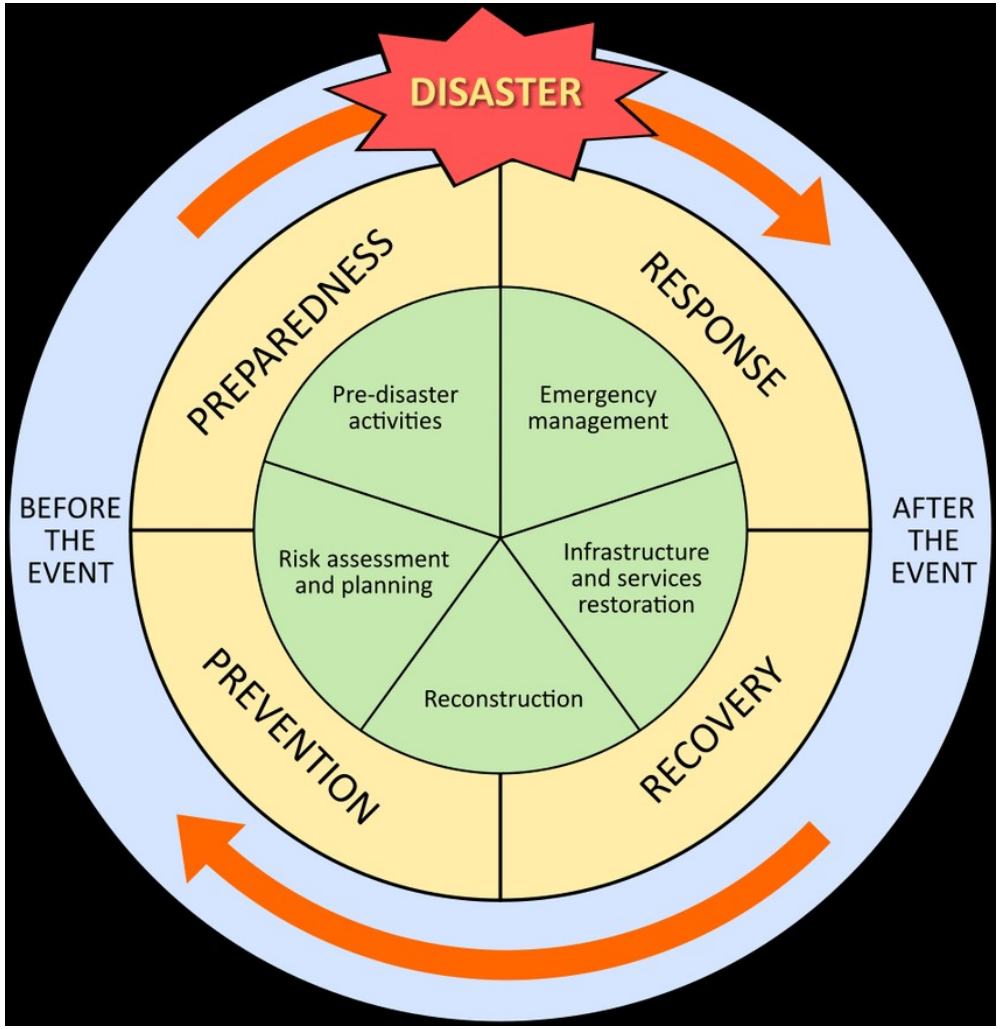
- India is vulnerable to a large number of disasters. Around 59% of the landmass is prone to earthquakes of moderate to very high intensity.
- About 12% (over 40 million hectares) of its land is prone to floods and river erosion.
- Close to 5,700 km, out of the 7,516 km long coastline is prone to cyclones and tsunamis.
- 68% of its cultivable area is vulnerable to droughts; and, the hilly areas are at risk from landslides and avalanches.
- India is also vulnerable to chemical, biological, radiological, and nuclear (CBRN) emergencies and other man-made disasters.
- Disasters may also be related to changing demographics and socio-economic conditions, unplanned urbanization, development within high-risk zones, environmental degradation, climate change, geological hazards, epidemics, and pandemics.
- All these contribute to a situation where disasters seriously threaten India's economy, its population, and sustainable development.

Background of Disaster Management

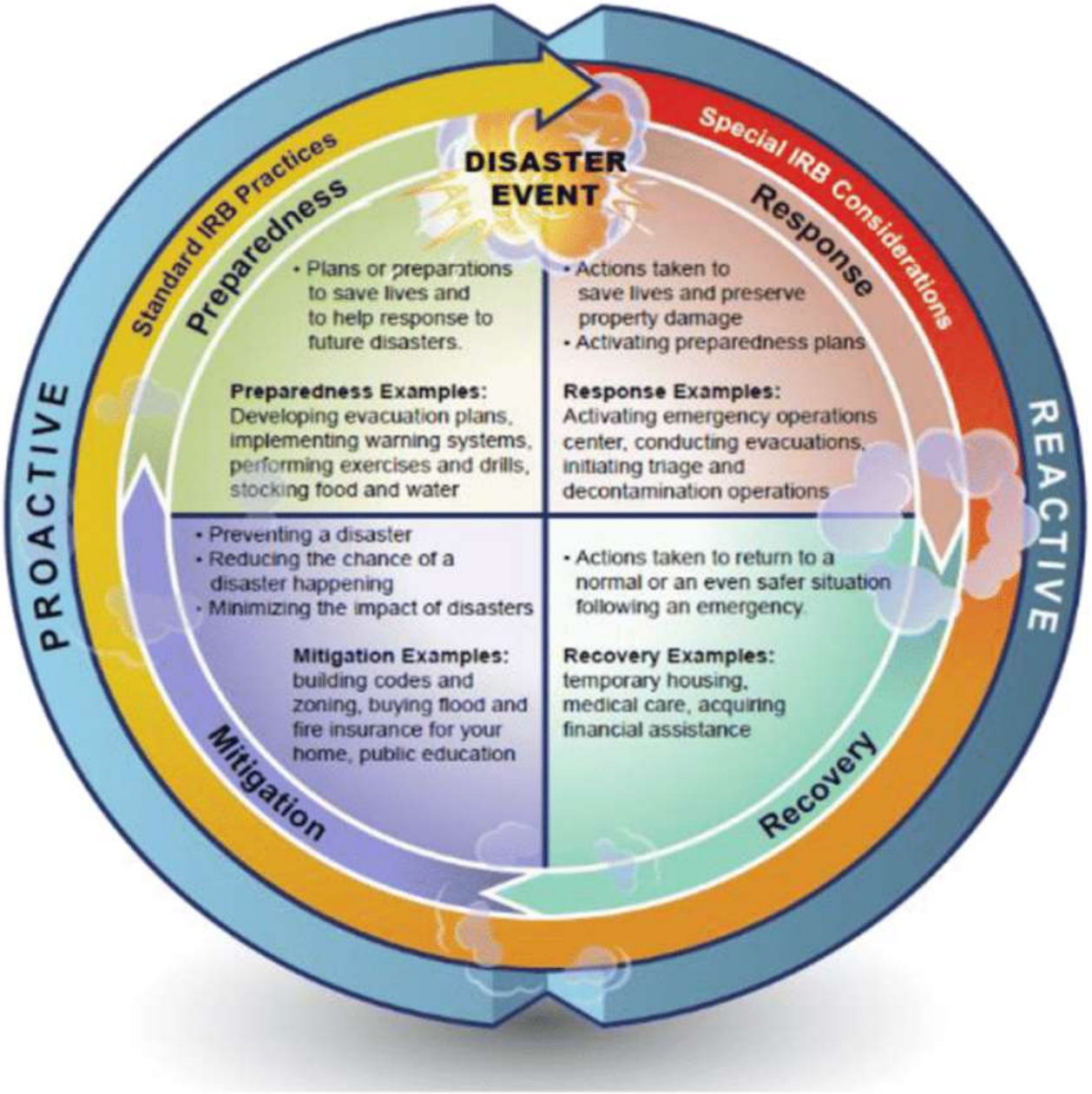
Disaster Management involves a continuous and integrated process of planning, organizing, coordinating, and implementing measures that are necessary or expedient for:

- Prevention of danger or threat of any disaster
- Mitigation or reduction of risk of any disaster or its severity or consequences
- Capacity building including research and knowledge management
- 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
- A typical DM continuum (cycle) comprises six elements; the pre-disaster phase includes prevention, mitigation and preparedness, while the post-disaster phase includes response, rehabilitation, reconstruction and recovery

Disaster Management Continuum (Cycle)




Mitigation Phase
Public Education and Awareness
Hazard and Vulnerability Assessment
Improved Infrastructure
Preparedness Phase
National Emergency Telecommunication and Response Plans
Training and Exercises
Early Warning
Standard Operating Procedures
PHASES OF DISASTER MANAGEMENT
Recovery Phase
Restoring Telecommunications Infrastructure
Improving Lives
Recovery and rehabilitation of other services
Response Phase
Communication and Coordination
Saving Lives


DISASTER EVENT
PROACTIVE
REACTIVE
Standard IRB Practices
Special IRB Considerations
Preparedness
Response
Mitigation
Recovery
• Plans or preparations to save lives and to help response to future disasters.
Preparedness Examples: Developing evacuation plans, implementing warning systems, performing exercises and drills, stocking food and water
• Actions taken to save lives and preserve property damage
• Activating preparedness plans
Response Examples: Activating emergency operations center, conducting evacuations, initiating triage and decontamination operations
• Preventing a disaster
• Reducing the chance of a disaster happening
• Minimizing the impact of disasters
Mitigation Examples: building codes and zoning, buying flood and fire insurance for your home, public education
• Actions taken to return to a normal or an even safer situation following an emergency
Recovery Examples: temporary housing, medical care, acquiring financial assistance

Vulnerability Profile of India

GS SCORE Datastory

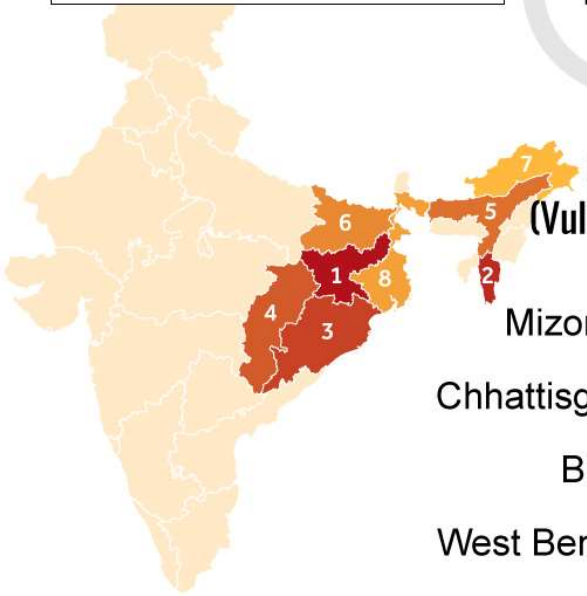
According to the World Bank, Direct losses from natural disasters have been estimated to amount up to

2% of India's GDP

It is ranked 7th in the Global Climate Risk Index 2021

Vulnerability to various hazards

- **Earthquake** — 59% of geographical area
- **Floods** — 12% of geographical area
- **Drought** — 68% of agricultural land
- **Cyclones** — 10% of Indian coastline
- **Landslides & Avalanches** — 12% of geographical area
- **30%** of the world's landslides occur in the Himalayas
- **Forest Fires** — 35.47% of total forest area

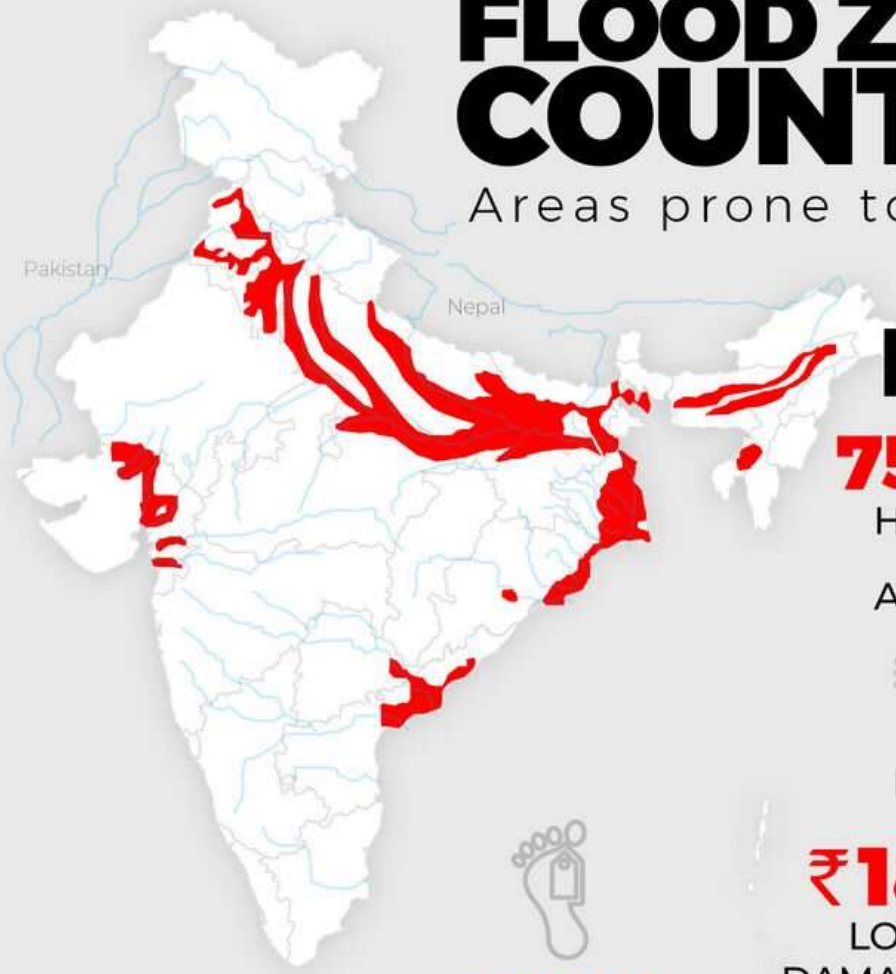


8 'highly vulnerable states' (Vulnerability Index (VI) 2020):

1. Jharkhand
2. Mizoram
3. Orissa
4. Chhattisgarh
5. Assam
6. Bihar
7. Arunachal Pradesh
8. West Bengal

FLOOD ZONE COUNTRY

Areas prone to floods



ON AVERAGE EVERY YEAR

75 lakh
HECTARES LAND AFFECTED

1600
LIVES LOST

₹1805 cr
LOSS DUE TO DAMAGE TO CROPS, HOUSES AND PUBLIC UTILITIES


INDIA'S SEISMIC ZONES
The Geological Survey of India published the country's seismic zoning map in 1935. The colour-coded map shows four distinct seismic zones.
Break-up of the seismic zones:
Zone 2: Least active seismic zone
Zone 3: Moderate seismic zone
Zone 4: High seismic zone
Zone 5: Highest seismic zone

Disaster Management Act 2005

The Disaster Management Act, 2005 was enacted in 2005 after 2004 tsunami when the country lost thousands of lives.

- The Act aims to manage disasters, including preparation of mitigation strategies, capacity-building and others

Agencies established under DMA 2005

- **National Disaster Management Authority** or NDMA is the nodal central body for disaster management coordination, with the Prime Minister as its Chairperson.
- It is responsible for framing the policies, plans and guidelines for disaster management to ensure an effective & strong response during any disaster
- **National Executive Committee** or NEC assists NDMA & prepares National Disaster Management Plan for the whole country
- On the state and district level, **SDMA & NDMA** are responsible for drawing the disaster plan for states & districts respectively
- NDRF or **National Disaster Response Force** directly responds to threatening disasters and calamities. The NDRF has been playing a major role in rescuing people from disasters for years.

Punishments under DMA 2005

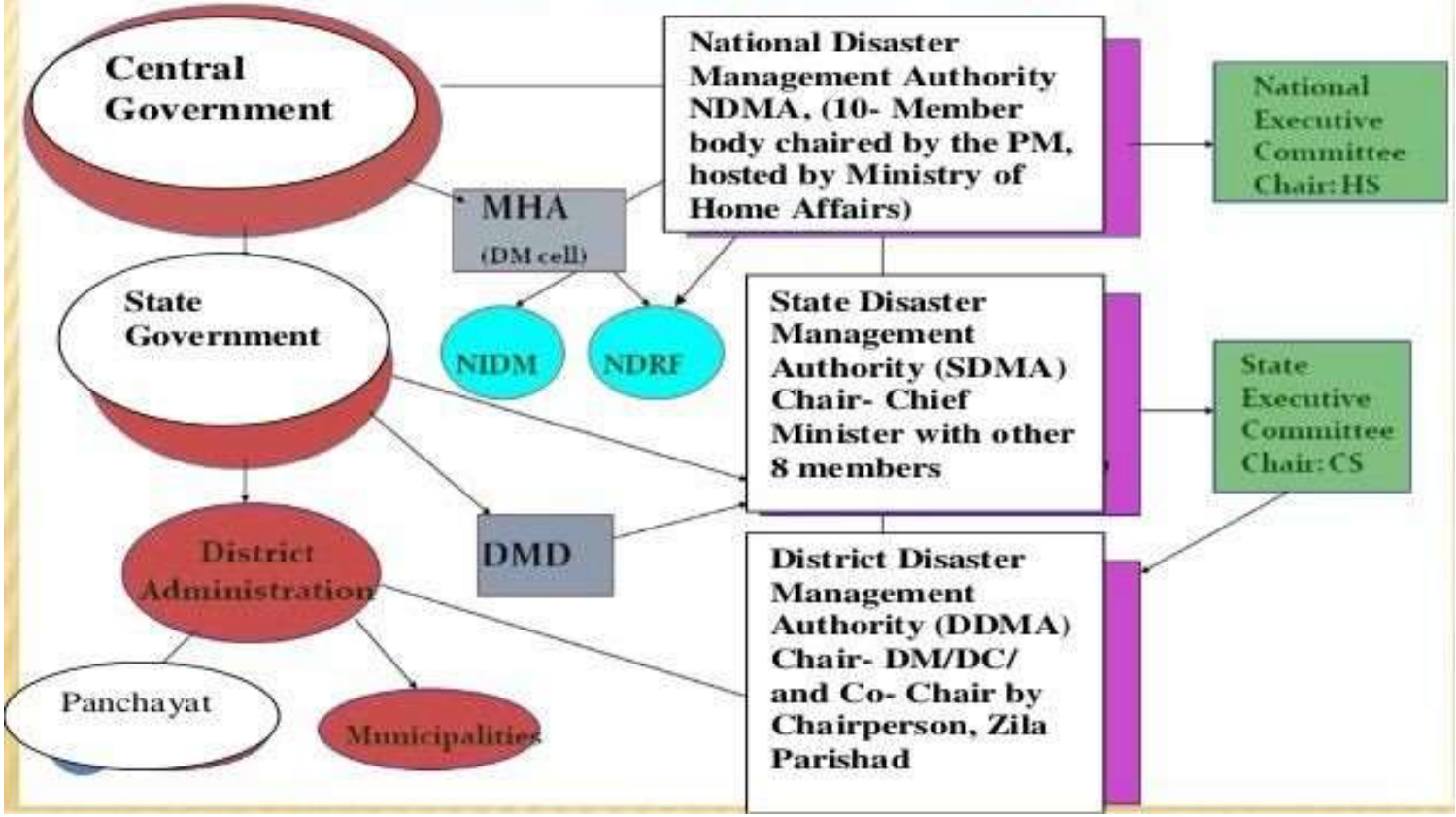
- The DM Act immensely empowers the NDMA and the central government
- Regardless of any law in effect, the Central Govt can issue instructions to any authority anywhere in India to assist and contribute to disaster management. Failure to follow such directions leads to a violation of the act.
- Anyone refusing or failing to follow orders is liable for punishment with imprisonment up to one year, or fine, or both.
- The Act guarantees imprisonment for almost two years and a fine on any person making false claims to gain relief benefits.
- It also enforces imprisonment of one year or a fine on anyone circulating false alarms about the severity of a disaster.

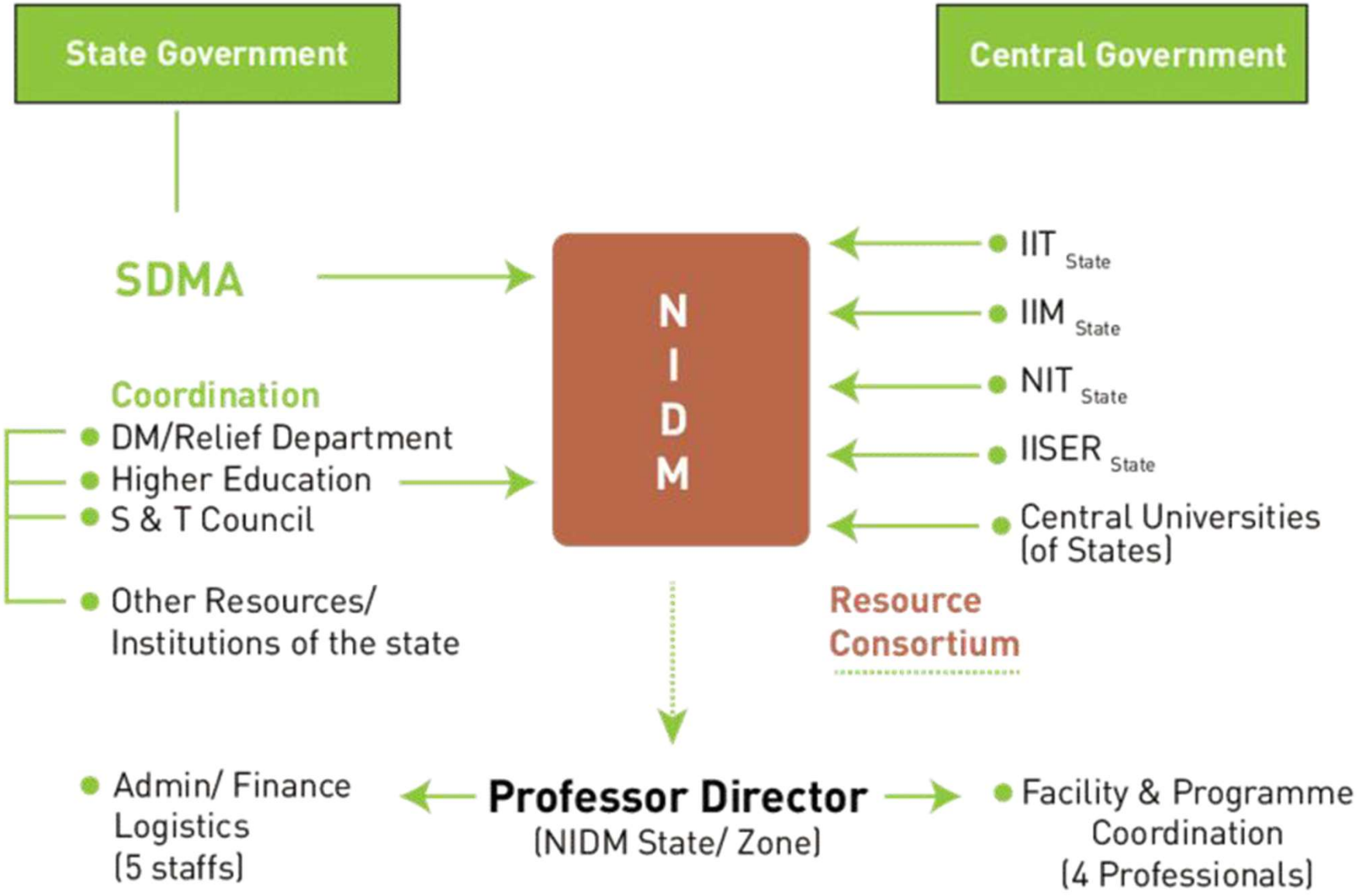
Prime Minister's 10-Point Agenda on Risk Reduction

- All development sectors must imbibe the principles of disaster risk management
- Risk coverage must include all, starting from poor households to SMEs to multi-national corporations to nation states
- Women's leadership and greater involvement should be central to disaster risk management
- Invest in risk mapping globally to improve global understanding of nature and disaster risks
- Leverage technology to enhance the efficiency of disaster risk management efforts
- Develop a network of universities to work on disaster-related issues
- Utilise the opportunities provided by social media and mobile technologies for disaster risk reduction
- Build on local capacity and initiative to enhance disaster risk reduction
- Make use of every opportunity to learn from disasters and, to achieve that, there must be studies on the lessons after every disaster
- Bring about greater cohesion in the international response to disaster

Legal-Institutional Framework

Disaster Management Act 2005



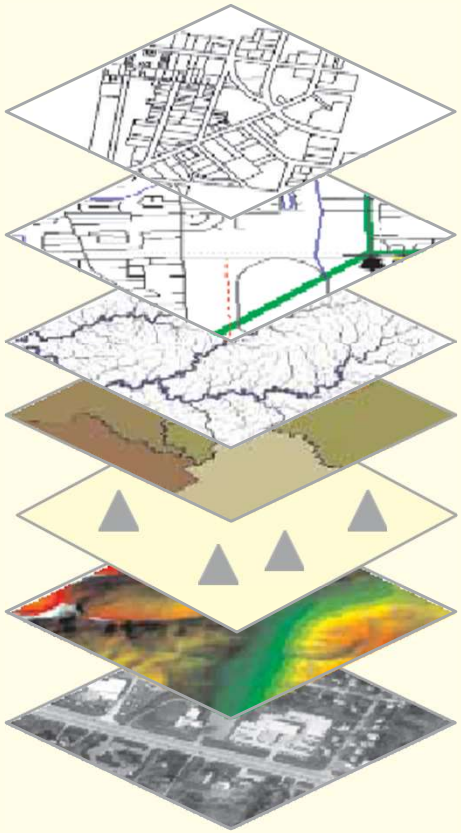

State Government
Central Government
SDMA
Coordination
DM/Relief Department
Higher Education
S & T Council
Other Resources/
Institutions of the state
N
I
D
M
IIT State
IIM State
NIT State
IISER State
Central Universities
(of States)
Resource
Consortium
Admin/ Finance
Logistics
(5 staffs)
Professor Director
(NIDM State/ Zone)
Facility & Programme
Coordination
(4 Professionals)

Role of GIS in Disaster Management

GIS Applications

- Land use / Ownership
- Road Network
- Hydrography
- Borders
- Geodetic Points
- Power supply networks
- Water supply networks
- Gas networks
- Critical zones

Basic cartographic data
Osnovni kartografski podaci



Land use / ownership
Korištenje zemljišta / vlasništvo

Road network
Ceste

Hydrograpy
Hidrografija

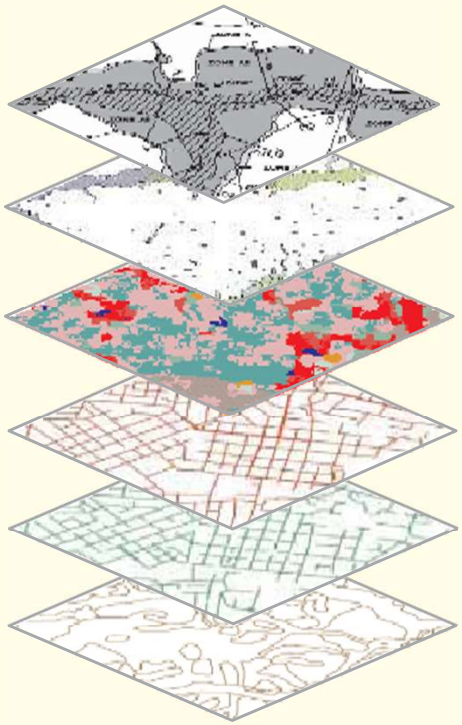
Borders
Granice

Geodetic points
Geodetske točke

DTM
DMR

Orthophoto
Ortofotosnimke

Thematic data
Tematski podaci



Critical zones (floods)
Kritične zone (poplave)

Population
Stanovništvo

Critical zones (Earthquake)
Kritične zone (potresi)

Power supply network
Električna mreža

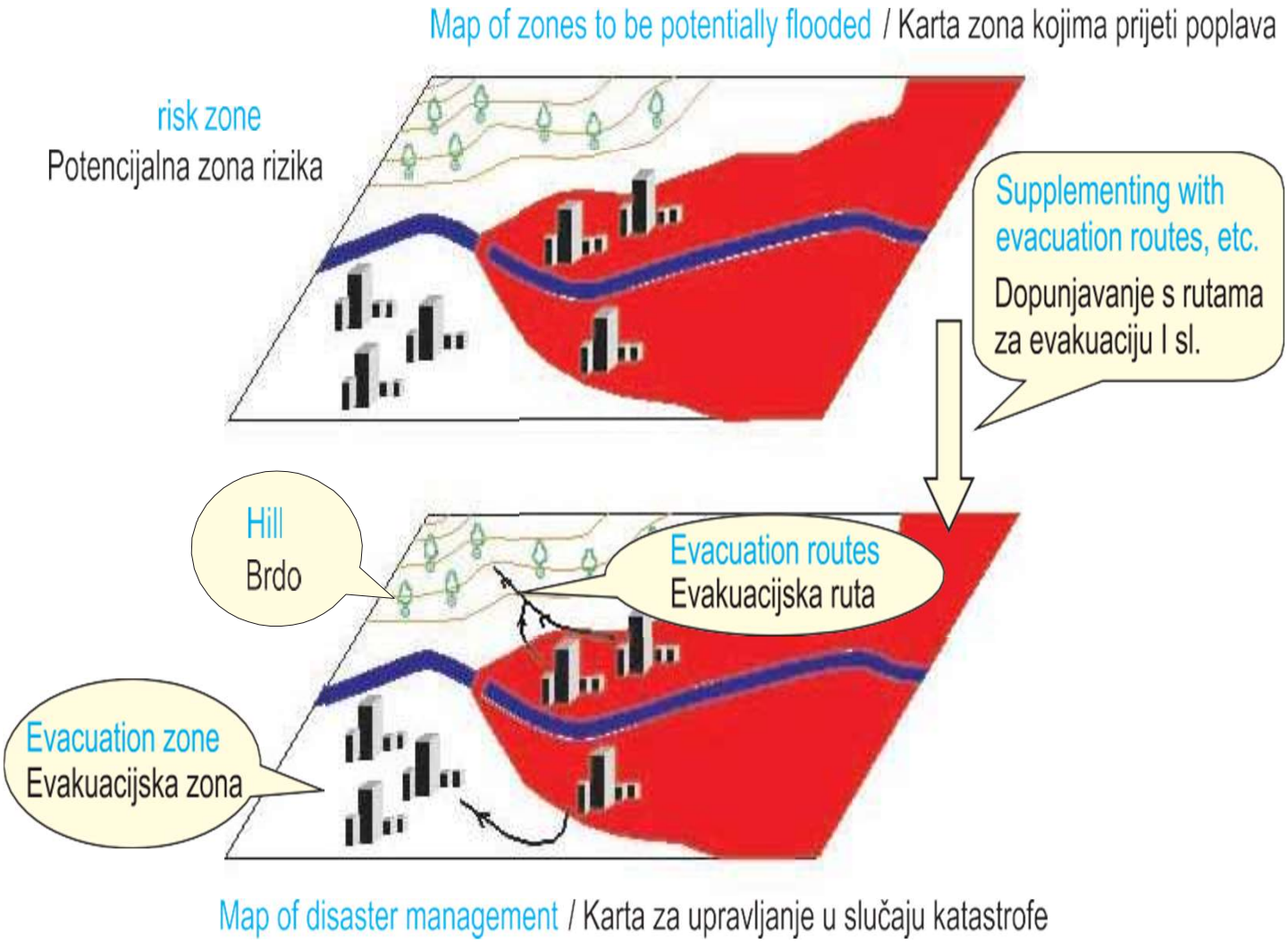
Water supply network
Vodovodna mreža

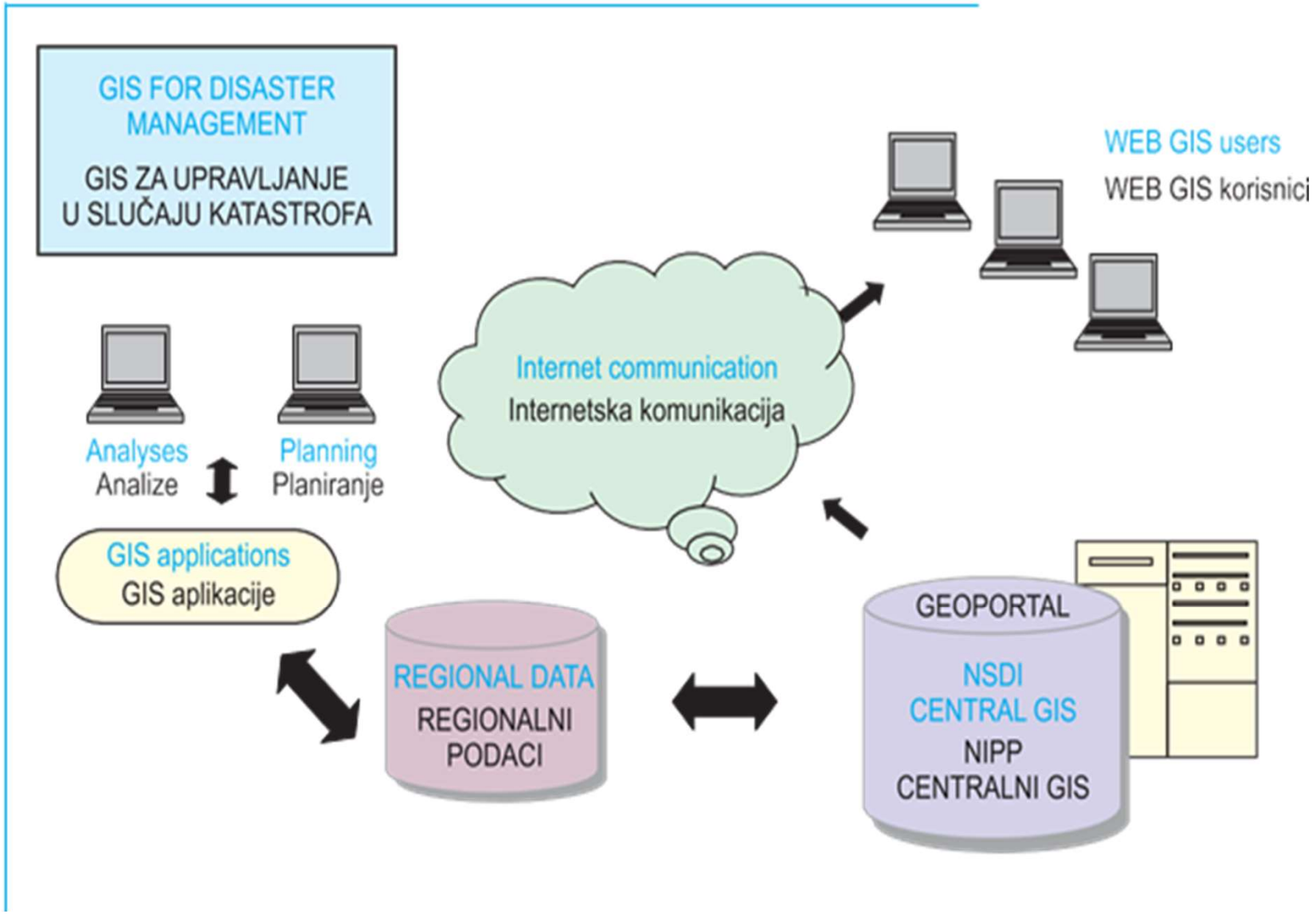
Gas network
Plinovod

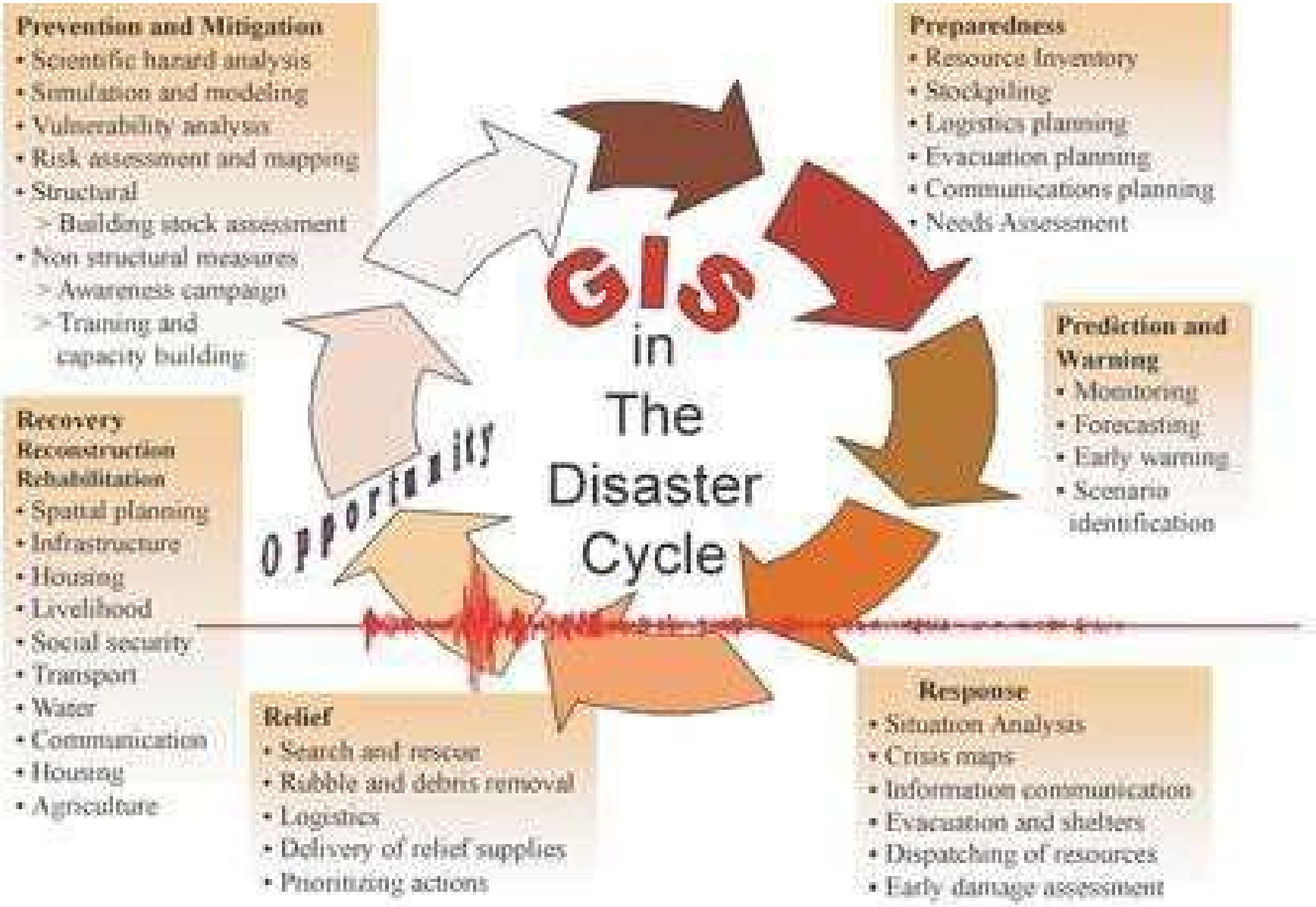

Role of GIS in Disaster Management

Use of Aerial Imagery for Early Detection of Fire

Orthophoto maps for planning and flood prevention


Map of zones to be potentially flooded / Karta zona kojima prijeti poplava
risk zone
Potencijalna zona rizika
Supplementing with evacuation routes, etc.
Dopunjavanje s rutama za evakuaciju I sl.
Hill
Brdo
Evacuation routes
Evakuacijska ruta
Evacuation zone
Evakuacijska zona
Map of disaster management / Karta za upravljanje u slučaju katastrofe


GIS FOR DISASTER MANAGEMENT
GIS ZA UPRAVLJANJE U SLUČAJU KATASTROFA
WEB GIS users
WEB GIS korisnici
Internet communication
Internetska komunikacija
Analyses
Analize
Planning
Planiranje
GIS applications
GIS aplikacije
REGIONAL DATA
REGIONALNI PODACI
GEOPORTAL
NSDI CENTRAL GIS
NIPP CENTRALNI GIS


Prevention and Mitigation
• Scientific hazard analysis
• Simulation and modeling
• Vulnerability analysis
• Risk assessment and mapping
• Structural
> Building stock assessment
• Non structural measures
> Awareness campaign
> Training and capacity building
Preparedness
• Resource Inventory
• Stockpiling
• Logistics planning
• Evacuation planning
• Communications planning
• Needs Assessment
GIS in The Disaster Cycle
Prediction and Warning
• Monitoring
• Forecasting
• Early warning
• Scenario identification
Recovery
Reconstruction
Rehabilitation
• Spatial planning
• Infrastructure
• Housing
• Livelihood
• Social security
• Transport
• Water
• Communication
• Housing
• Agriculture
Relief
• Search and rescue
• Rubble and debris removal
• Logistics
• Delivery of relief supplies
• Prioritizing actions
Response
• Situation Analysis
• Crisis maps
• Information communication
• Evacuation and shelters
• Dispatching of resources
• Early damage assessment

Thank you