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Paper 3 – Volume - 4

DISASTER MANAGEMENT AND INTERNAL SECURITY

SIERRA INNOVATIONS

IAS

G.S. PAPER – 3 VOLUME – 4

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1 CHAPTER Basics of Disaster

Crisis

- An unstable or crucial time or state of affairs in which a decisive change is impending; especially, one with the distinct possibility of a highly undesirable outcome.
- May be defined as "an emergency situation arising out of natural or human activity which poses a threat to human life and property or leads to large scale disruption of normal life".

 # Crisis can be classified as follows:

(i) **By acts of nature-**
- **Climatic events:** cyclones and storms (associated sea erosion), floods and drought
- **Geological events:** earthquakes, tsunamis, landslides and avalanches

(ii) **By environmental degradation** and disturbance of the ecological balance

(iii) **By accidents** which can be further classified into: industrial and nuclear mishaps and fire related accidents;

(iv) **By biological activities:** public health crises, epidemics etc;

(v) **By hostile elements:** war, terrorism, extremism, insurgency etc;

(vi) **By disruption/failure of major infrastructure** facilities including communication systems, large-scale strikes etc; and

(vii) **By large crowds getting out of control**.

Hazard

- A dangerous condition or event that threatens or has the potential for causing injury to life or damage to property or the environment
- A potential source of harm.
- Substances, events, or circumstances can constitute hazards when their nature would allow them, even just theoretically, to cause damage to health, life, property, or any other interest of value.

Disaster

The **United Nations Office for Disaster Risk Reduction (UNISDR)** defines disaster as:

- "A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources."
- The **UNISDR** definition provides three important components of a disaster:
  - **Firstly**, there should be **serious disruption or abnormality in life of people**;
  - **Secondly**, the **community cannot deal with the consequences on its own** and;
  - **Lastly**, the consequences of the **event must be faced by a 'community'**, i.e., a group of people.

The **Disaster Management Act of India** defines disaster as, "A catastrophe, mishap, calamity or grave occurrence in any area arising from natural or man-made causes or by accident or negligence, which results in substantial loss of life or human suffering or damage to and destruction of property or damage to, or degradation of environment and is of such a nature or magnitude as to be beyond the coping capacity of the community of the affected area.

Thus, a disaster is the result of the combination of hazard, vulnerability and insufficient capacity to reduce the potential chances of risk.

 # Difference between Disaster and Hazard:

	Disaster	**Hazard**
Definition	Disaster is an event that occurs suddenly/ unexpectedly in most cases and disrupts the normal course of life in affected areas. It results in loss or damage to life, property or environment. This loss is beyond the coping capacity of the local affected population/society. And therefore requires external help.	Hazard is a threat that has potential for causing injury/ loss of life or damage to property/environment.
Occurrence	in overpopulated areas	places with less population
Severity	Critical consequences and more catastrophic	Severity of a hazard is low compared to a disaster- less critical consequences.
Avoidance	Can be prevented	May be inevitable
Similarities	Both occur unexpectedly with little or no warning, produce negative effects, and require immediate response.	

Classification of Disasters

- **As per origin** - Natural and man-made disasters
- **As per impacts** - Minor or Major
- **Natural disasters -**
    - sudden ecological disruptions or threats
    - exceed the adjustment capacity of the affected community and require external assistance.
    - Natural disasters can be broadly classified into categories including -
        - **geophysical** - earthquakes and volcanic eruptions;
        - **hydrological** - floods;
        - **meteorological** - hurricanes;
        - **climatological** - heat and cold waves and droughts; and
        - **biological** - epidemics.

- **Man-made disasters -** can include hazardous material spills, fires, groundwater contamination, transportation accidents, structure failures, mining accidents, explosions and acts of terrorism.
- Hazards are also distinguished on the basis of timing:
    - **Slow Onset Disasters:**
        - develop over a long period of time.
        - can be predicted by early warning systems.
        - Examples - Climate change, global warming, droughts, desertification, Soil degradation, etc.
    - **Rapid Onset Disasters:**
        - appear suddenly without early warnings.
        - Examples - fires, flash floods, cloudburst, volcanic eruptions, earthquakes, etc.

Vulnerability

- Means the inability (of a system or a unit) to withstand the effects of a hostile environment.
- It signifies the extent of exposure of the people to suffer damage due to hazards.
    - According to **UNISDR** Vulnerability is "a set of prevailing or consequential conditions arising from various physical, social, economic and environmental factors, which increase the susceptibility of a community to the impact of hazards".

Vulnerability = (Exposure) + (Resistance) + (Resilience)

Where, Exposure: at risk property and population;
Resistance: Measures taken to prevent, avoid or reduce loss;
Resilience: Ability to recover prior state or achieve desired post-disaster state.

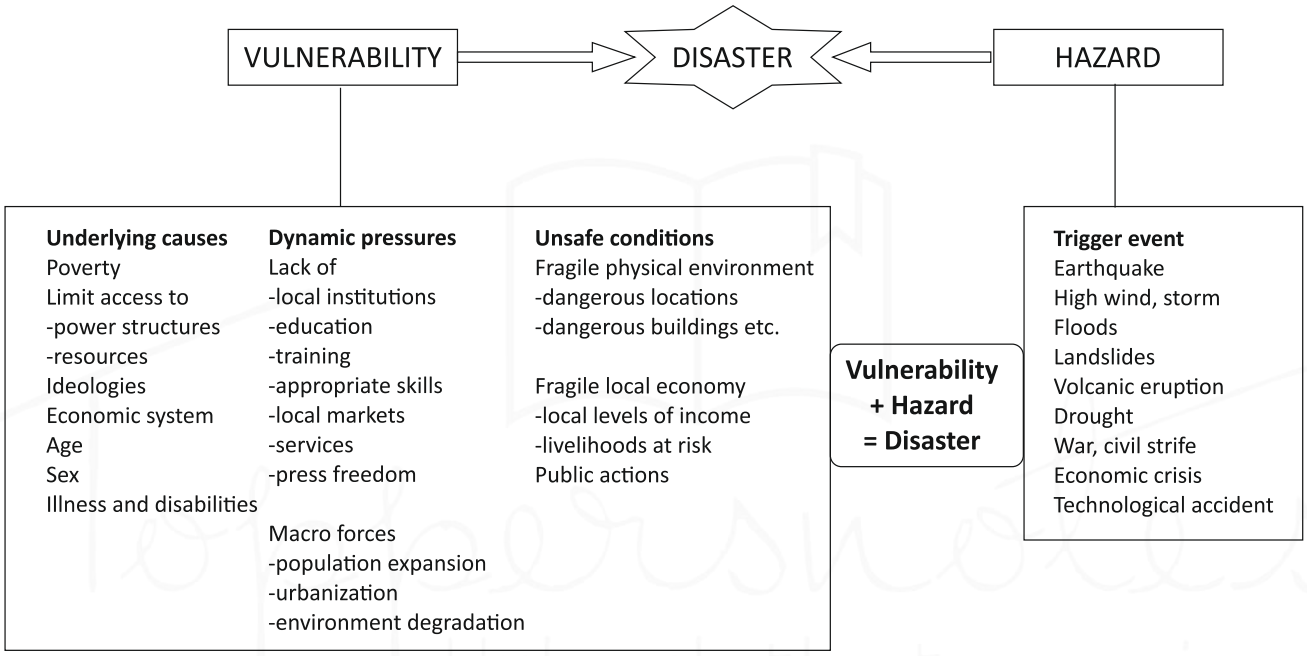
- **Factors Responsible for Increased Vulnerability**
    - **Natural Factors:** Geo-Climatic Conditions, Topographic features
    - **Human-Induced Factors:** Population growth, urbanization, industrialization, non scientific development practices

Types of Vulnerability:

	Physical Vulnerability	Social Vulnerability	Economic Vulnerability	Environmental Vulnerability
Meaning	Potential impact on the Physical Environment	Potential impact on society especially vulnerable sections	Potential impact on economic assets and processes	Potential impact on biosphere
Direct Losses	● Infrastructural damage	● Fatalities and injuries ● Loss of Employment ● Homelessness ● Women, children, elderly and specially abled persons at higher risk	● Interrupted economic activities ● Loss of productive human capital ● Economic burden of response and relief	● Sedimentation and Pollution ● Destruction of ecological zones

Indirect Losses	● deterioration of damaged infrastructure in the absence of repair and maintenance	● Disease Spread ● Permanent disability ● Low social cohesion	● Increased inflation, unemployment and poverty ● Lower investments ● Reduced Service sector activities ● Burdened Insurance sector	● Loss of Biodiversity

A Disaster occurs when hazards and vulnerability meet

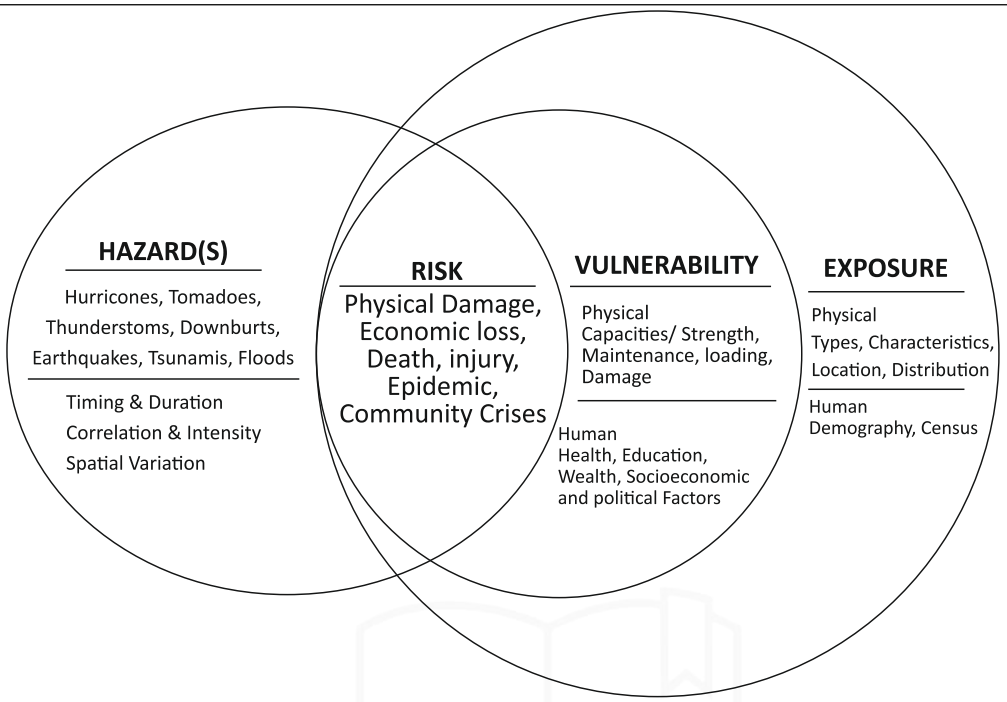


Risk

Risk is a “measure of the expected losses due to a hazard event occurring in a given area over a specific time period. Risk is a function of the probability of a particular hazardous event and the losses each would cause.”

The terms "hazard" and "risk" are often used interchangeably. However, in terms of risk assessment, these are two very distinct terms.

- **A hazard is an agent that can cause harm** or damage to humans, property, or the environment.
- **Risk is the probability** that exposure to a hazard will lead to a negative consequence, or more simply, a hazard poses no risk if there is no exposure to that hazard.



Risk = Hazard * Vulnerability * Capacity to Cope

- The **risk** of a disaster **increases** when **as the frequency or severity of hazards increases, people's vulnerability increases, and people's capacity to cope decreases**.
- Here **Capacity to cope** means ability of people, organizations and systems, to use available skills and resources, to manage adverse conditions, risk or disasters.

Global Climate Risk Index, 2021

- Released annually by **Germanwatch**
- Analyses the **extent of impacts** of weather-related loss events (storms, floods, heat waves etc.).
- **Quantitative Analysis** in terms of fatalities and impact of extreme weather events
- Aims at contextualising ongoing climate policy debates, especially the International climate negotiations
- **Four Indicators:** Death toll, deaths per 100000 inhabitants, absolute losses in PPP and losses per GDP unit

Highlights of the Report:

- **Most Affected Countries in 2019:** Mozambique, Zimbabwe and the Bahamas
- **Most affected countries between 2000 and 2019:** Puerto Rico, Myanmar and Haiti
- **Loss between 2000 and 2019:** 11000 extreme weather events occurred across globe; 475000 people lost their lives and economic loss: around US$2.56 trillion (in purchasing power parties)
- **Storms and cyclones** were one of the major causes of damages in 2019. Of the ten most affected countries, six were hit by tropical cyclones
- **Climate change and extreme weather events cause the most distress** to the countries which are still developing and have a lower coping capacity. Eight out of the ten most affected belong to the low to lower-middle-income category

India's Status on the Report:

- India **ranked 7th** with a **CRI score of 16.67**.
- In 2019, the **extended period of monsoon** resulted into floods leading to death: 1800 people across 14 states; migration: 1.8 million people; economic loss: US$10 billion
- **Eight tropical cyclones** hit the country in 2019; **worst:** *"Cyclone Fani"* which affected 28 million people, economic losses of US$8.1 billion

Global Risk Report, 2021

- Released by World Economic Forum (WEF)
- **Aim:** To highlight the risks and consequences of widening inequalities and increasing societal fragmentation, due to the COVID-19 pandemic, in 2021 and over the next decade.

Key Highlights of the Report:

- **Impact of Covid-19:** huge immediate human and economic cost; increasing global poverty and inequality; reduced social cohesion and global cooperation
- **Climate concerns:** The report has described these threats as an existential threat to humanity.

Top Risks by likelihood	Top Risks by impact
1. Extreme weather	1. Infectious disease
2. Climate action failure	2. Climate action failure
3. Human environmental diagram	3. Weapons of mass destruction
4. Infectious disease	4. Biodiversity loss
5. Biodiversity loss	5. Natural resource crises
6. Digital power concentration	6. Human environmental damage
7. Digital inequality	7. Livelihood crises
8. Interstate relations fracture	8. Extreme weather
9. Cybersecurity failure	9. Debt Crises
10. Livelihood crises	10. IT infrastructure breakdown

- **Widening digital gaps:** Accelerated Digitalization has resulted in widening the digital gap between individuals and across countries and aggravating existing inequalities, polarization, and regulatory uncertainties.
- **Intensifying pressures on businesses:** Businesses under increasing pressures from inward-looking national agendas, greater market concentration, and popular scrutiny and volatility.

Recommendations:

- **Formulating analytical frameworks** that take a holistic and systems-based view of risk impacts.
- **Investing in high-profile risk champions** to encourage national leadership and international cooperation.
- **Improving risk communications** and combating misinformation.
- **Exploring new forms of public-private partnership** on risk preparedness.

2 CHAPTER Disaster Management

Disaster Management

is defined as an integrated process of planning, organizing, coordinating, and implementing measures that are necessary for-

1. Preventing occurrence of any disaster
2. Reducing the risk of any disaster or its consequences
3. Readiness to face any disaster
4. Promptness while dealing with a disaster
5. Assessing the severity of any disaster
6. Rescue and relief measures adopted
7. Rehabilitation and Reconstruction of affected population and infrastructure

Need for Disaster Management

- As per the Institute for Economics and Peace between 1900 and 2019 the **number of disasters increased** from 39 incidents in 1960 to 396 in 2019.
- **Cost of addressing damage** caused by natural disasters **has risen** from US$50 billion per year in the 1980s to US$ 200 billion per year in the last decade.
- As per **World Meteorological Organization (WMO)** weather, climate or water hazards have occurred every day on average over the past 50 years – **killing 115 people and causing US$ 202 million in losses daily**.
- **Poor bear the brunt:** According to the **World Bank's** *Disaster risk management report*, more than 95% of all deaths caused by hazards and losses due to natural hazards are 20 times greater (as a percentage of GDP) in developing countries than in industrialized countries.

Disaster Management Life-Cycle

The comprehensive approach to disaster management comprises prevention, preparedness, mitigation, response and recovery to ensure a balance between the reduction of risk and the enhancement of community resilience, while ensuring effective response and recovery capabilities.

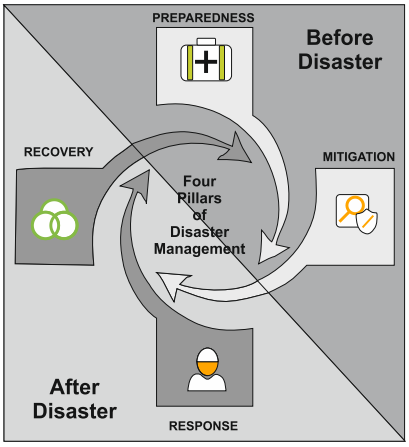


Figure : Disaster Management Cycle

	Prevention	Preparedness	Mitigation	Response	Recovery
Objective	• Ensure that human action or natural phenomena do not result in disaster or emergency • Reduce -avert- avoid the risk by getting rid of the hazard or vulnerability	• Ensure the organized mobilization of personnel, funds, equipments, and supplies within a safe environment for effective relief • Build capacities before a disaster situation prevails to reduce impacts	• Ensure long term measures for reducing or eliminating risk of a disaster.	• Set of activities implemented after the impact of a disaster in order to assess the needs, reduce the suffering, limit the spread and the consequences of the disaster, open the way to rehabilitation.	• Restore and improve, where appropriate, facilities, livelihoods and living conditions of disaster affected communities to pre-disaster levels.
Activities	• Hazard Identification • Vulnerability Assessment • Capacity building of community and implementing agencies • Early Warning (EW) that reach and are accessible to all • Public awareness • Frame inclusive disaster risk management act and policy	• Prepare database related to basic common services • Ensure effective Contingency Planning including inter alia, availability of food reserve, emergency reserve fund, seed reserve, health facilities, warning systems, logistical infrastructure, relief manual, and shelves of projects.	• Undertaking actions based on past experiences and knowledge • Mobilization of the community along with other actors like NGOs, civil society, government organizations, etc • Preparation of development plans, extensive public awareness strengthening institutional mechanisms and international cooperation.	• Rapid Needs Assessment • Resource Mobilization • Ensure responsive evacuation, search and rescue of victims including vulnerable groups • Emergency assistance including identification of needs for affected population when providing food, health care, shelter, water and sanitation , education and non-food items • Ensure safe spaces for vulnerable groups	• **Relief:** Damage and loss assessment; Integration of needs of vulnerable sections into recovery; Restore health and other social services • **Reconstruction** of destroyed and damaged housing; restoration of infrastructure, water, sanitation and communication • **Rehabilitation:** Livelihoods recovery by ensuring access to income generating programmes and employment schemes; Facilitate the recovery of property and other important documents.

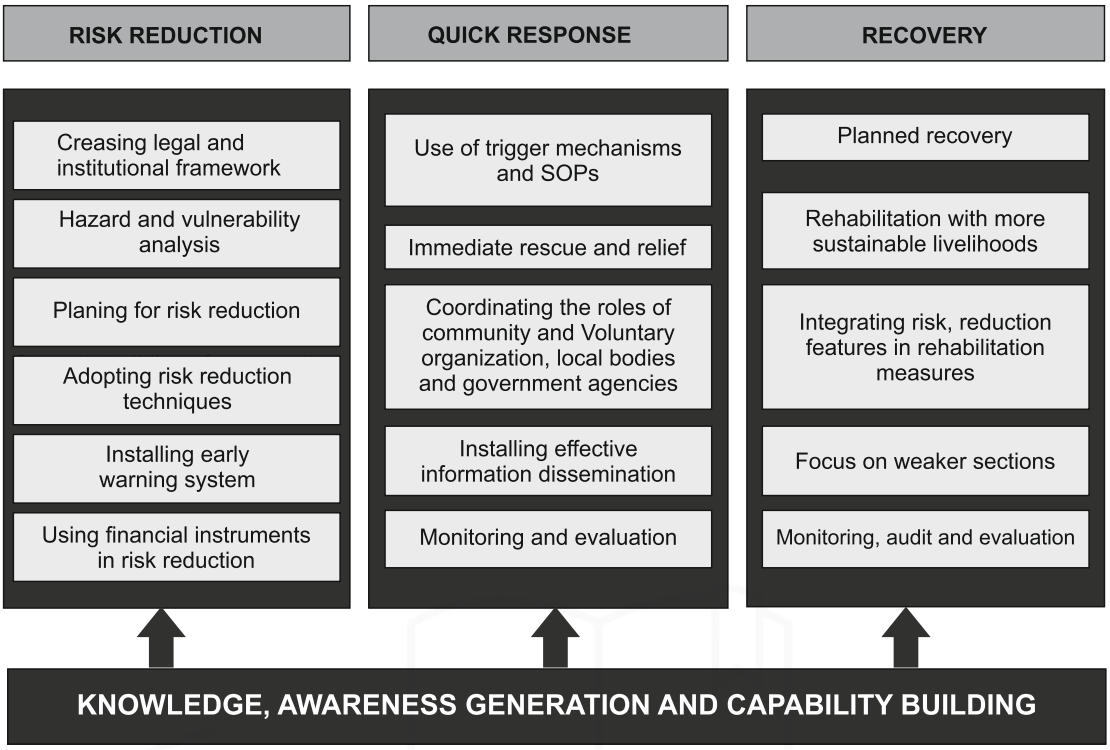


Figure : Elements of Crisis Management

Role of different actors in Disaster Management

Community

- An approach to **building the capacity of communities** to assess their vulnerability to hazards and develop strategies and resources necessary to prevent and/or mitigate the impact of identified hazards as well as respond, rehabilitate, and reconstruct following its onset.
- a **bottom-up approach**
- Empowers the community to be **proactive in disaster management** and develop strategies
- The **Great Hanshin Awaji Earthquake of 1995** hit the city of Kobe and other parts of Hyogo prefecture in **Japan** causing serious loss of life and property. **85 percent of the people were rescued** by the community efforts.
- **Elements of community involvement**: partnership, participation, empowerment and ownership by the local people
- **Community can**
    - Raise **public awareness** about disasters.
    - **Coordinate** disaster management and development activities.
    - Community **capacity building** at the social, economic and environmental levels.
    - **Educating people on how to mitigate the consequences of disasters** during relief, recovery and reduction preventive strategies periods.
    - **Providing psychological support** e.g. counseling for disaster survivors.
    - Tracking people down for **family reunions** after disasters.
    - Utilizing **interpersonal communication** for disseminating warning signals.
    - Familiar with the **local logistics, resource and coordination plans**.
    - Promoting the **needs of marginalized citizens** who are displaced or who have returned but are living in substandard conditions.

World Disaster Report 2004

- Had **'Building Community Resilience'** as its central theme.

Recommendations:

- **Systematic assessment is badly needed** to enable people to cope with, recover from and adapt to risks and adversities at household and community level
- **Strengthening social capital** should be the primary objective in relief, recovery or risk reduction; rather than a byproduct.
- **People-centred approaches** to development
- New **institutional strategies and cross-sectoral coalitions** to boost the resilience of local livelihoods in the face of multi-dimensional risks.
- **Good governance is essential** for communities to thrive.

Steps involved in CBDRM

1. **Community Preparedness-** involvement of the **community with their traditional coping mechanisms** to reduce their vulnerabilities with available resources which lead to **multi-pronged development interventions** and to a **self-reliant disaster-proof community**. Following steps can be undertaken-
   - **Community-Based Disaster Preparedness Plans (CBDP)** can be prepared where the community decides activities to prevent socio-economic losses during a disaster.
   - **Deliberation of responsibilities** amongst the members of the community on receiving a warning.
   - **Proper training** would be provided.
   - A **well acquainted community for preventive and preparedness measures** will substantially reduce the damage caused by disasters.
2. **Community Empowerment**- **Community capacity building** where goals and strategies, resources are decided and monitored by the community itself. Community empowerment demands their participation in risk assessment, mitigation planning, capacity building, participation in implementation, and development of a system for monitoring the disaster risk.
3. **Time and resource budgeting- Resource Inventory needs** to be prepared to analyze the local resources available within the community. **A well-framed timeline** needs to adhere to achieving the desired results.
4. **Convergence-** Convergence of **Government schemes and programs** implemented at the national and state level **empower communities**. **Standard forums of convergence** need to be formally created and must have **common points** like **community mobilization** and **awareness generation** and must devise **locally and culturally appropriate participation** methodologies.
5. **Gender-sensitive CBDRM-** Societies where the **socioeconomic status of women is low,** natural disasters **kill more women than men** and also at a younger age than men. The reason for this lies in the fact that women, in general, have **unequal access to opportunities and unequal exposure to risks**, making them more vulnerable to natural disasters. Several steps can be undertaken in this regard-
   - **Gender-inclusive elements** need to be included such as **gender-inclusive risk assessment and vulnerability and/or capacity analysis** and targets for women's involvement in developing risk and hazard maps.
   - **Ensure 40% of women's participation in local disaster risk management committees**
   - Support **skill-building on coping strategies** that would facilitate women and girls in disaster settings.
   - A **gender-sensitive early warning system** using communication channels that are easily understood, used, and accessible to both men and women.
   - Regular **preparedness drills** involving both women and men are to be conducted.

- Ensuring that **women and girls have relevant documents** like identity cards and bank accounts **to access disaster response support**.
- **Support women's organizations to organize microinsurance policies** to allow community women to protect their tools and sources of livelihood.

6. **Inclusive approach-** The **special needs of physically and mentally challenged and socially disadvantaged groups** need focused attention particularly in the aftermath of a disaster situation.

Media

Pre-disaster

- Can i**nfluence the government to prioritize Disaster Risk Issues**.
- It can **help disaster mitigation experts** create early warning systems. Emergency alerts using TV, radio, cable services across the country can be very effective.
- To **educate the community** in recognising symptoms and reporting them early if found.
- **Ensuring cooperation** of the community in risk reduction by forewarning the people about the consequences of their dangerous actions and operations.

During disaster

- **Broadcast real-time information** both for affected areas and interested people;
- **Receive real-time data** from affected areas;
- **Mobilize and coordinate** immediate relief efforts; **assist the authorities**, voluntary organizations and volunteers **in reaching the affected** with assistance and relief.
    - During the **Hudhud cyclone** that struck Visakhapatnam, PWD officials created a **WhatsApp group** that **acted as the main tool of communication** for sharing information.
- **Cautioning the affected** or to be affected people about the Dos and Don'ts, of scotching rumours and preventing panic and confusion.
    - For example, many individuals and organizations used **Twitter** in 2015 to convey critical information (helpline phone numbers, train timetables, relief counts, weather forecasts, and so on) regarding the **Chennai floods**.
- **Identifying the needy spots** and focusing attention on them, giving details on impassable roads and downed utility lines.
- Communicating the information in advance to take the necessary steps to **minimize the losses of lives and property**.
- It **provides the outside world with a glimpse** of what that affected community is dealing with.

Post-disaster

Collection of material resources and the enlisting of man-power by appealing to the people to come forward to render help.

- **Optimize recovery activities**.
- Ensure **effective and targeted** delivery of aids, identification, fundraising, etc.
- Helping the affected in **establishing contacts** with their closed ones
- Keeping a **watch and report on some anti-social elements** who try to take advantage of such situations

Negative Effects of Media

- The media **may exaggerate some elements of the disaster** and create unnecessary panic.
- **Biased coverage** for the purposes of sensationalism by choosing to capture only small incidents of devastation **leads to misreporting**.
- Can create tremendous "**congestion**" in the affected area.
- Live coverage of critical operations can **disrupt the counter-terrorism strategy** of the forces, as was observed in Mumbai 26/11 attacks.

Private Sector

- **Intersectoral collaboration** is part of the **Sendai framework for Disaster Risk Reduction 2015–2030**
- Framework advocates that the **government's responsibility to assume the leadership, regulation and coordination role** while the **public and private sectors** and civil society should collaborate and **create opportunities for collaboration, and integrate disaster risks into businesses' management practices**
- Businesses may help in **creating value in innovative social investments** in the community.
- Public-private partnership **increases the effectiveness and efficiency** of disaster management.
- **Provide immunity to governments** against the financial shocks due to disasters
- **Ensure Good Governance** by improved observance and transparency, better results with emphasis on planning and accountability during crisis.

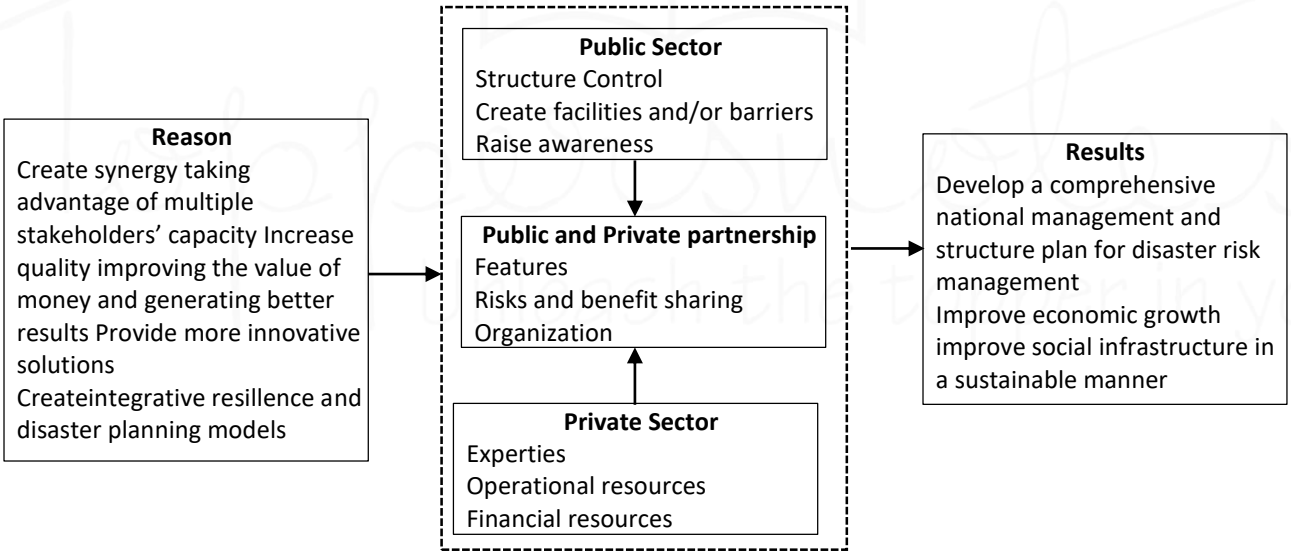


Figure : Public-Private Partnership in Disaster Management

Challenges in PPP in Disaster Management

Challenges	Solutions
Lack of mutla understanding	To specify the necessities as soon as participation channels are prede-fined so that expectations are met when and where needed.
Lack of transparency and responsibility	To agree on communication strategies to avoid conficting messages that may compromise the partnership validity.
Commitment level	To develop engagement rules that define needs in advance and that can be fulfilled by the alliance, together with protocols and guidelines to reach agreement on service level and clarify expectations of different levels and stages.
Role and Responsibilities	To determine areaas to improve skills and allow each party to focus on areasa where they can best contribute.
Relations management	To develop partnership in non-emergency period. Building relationship and getting to know each other requires significant investment from both sides.

Role of Technology in Disaster Management

Disaster management requires innovative thinking and fundamental changes like adoption of new technologies, methods, procedures, etc. for better prediction of such hazards. For example, “SATARK” (System for Assessing, Tracking, and Alerting Disaster Risk Information based on Dynamic Risk Knowledge), TNSMART, Early Warning Dissemination System, etc.

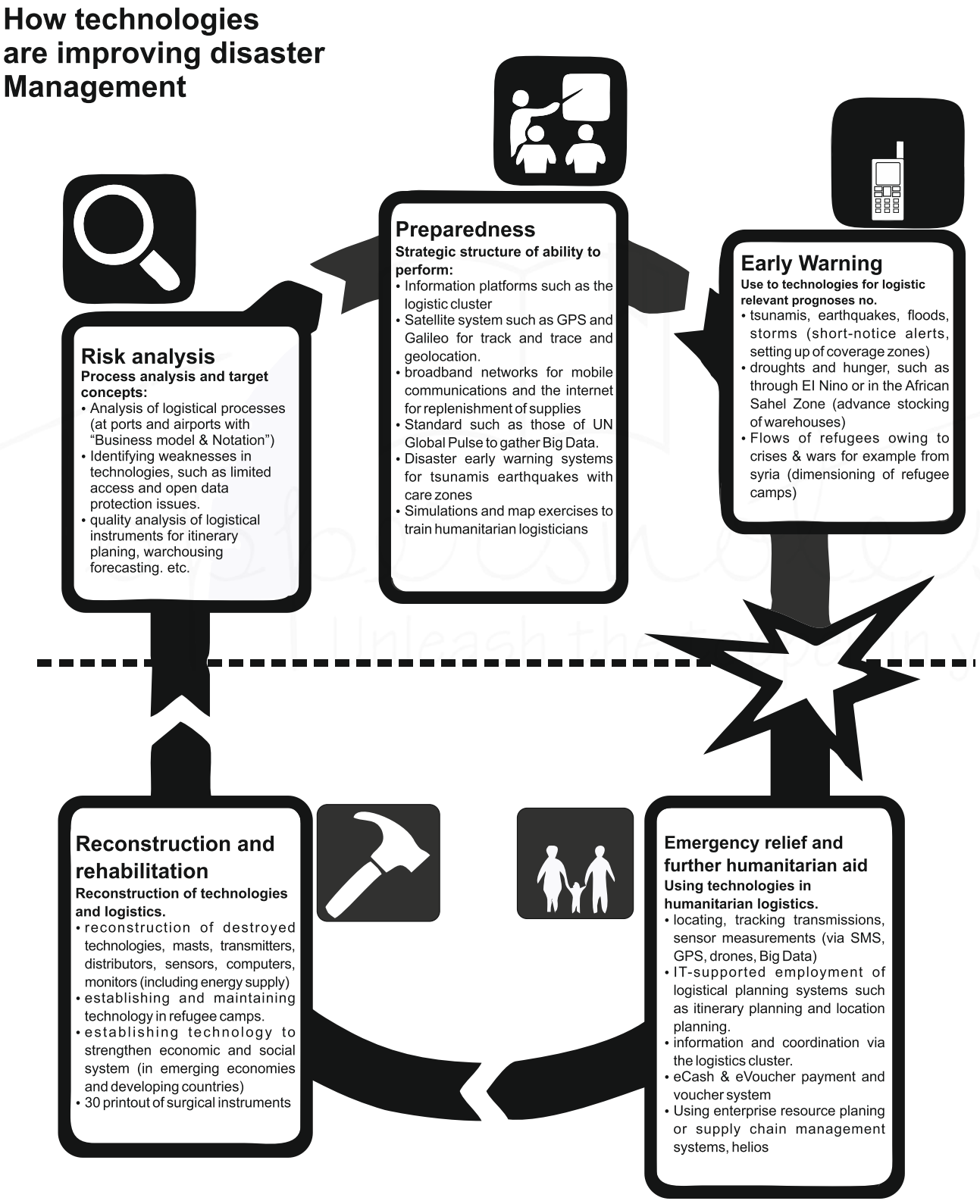


Figure : World Risk Report 2016 Report

Important Technologies in the field of Disaster Management and their usage

Aerial Robotics

- Helps organizations **effective mapping**, analyze damage in real-time, and ensure faster, cheaper and efficient delivery of services even to inaccessible places
- With infrared cameras and advanced listening systems **help in rescue missions**
- Provide **access to** locations that would otherwise be **inaccessible**.
- For example, **Drones** were used to find missing individuals and monitor the terrain during the **Uttarakhand floods of 2013**, providing authorities with vital updated information.
- potential to change **humanitarian relief**.

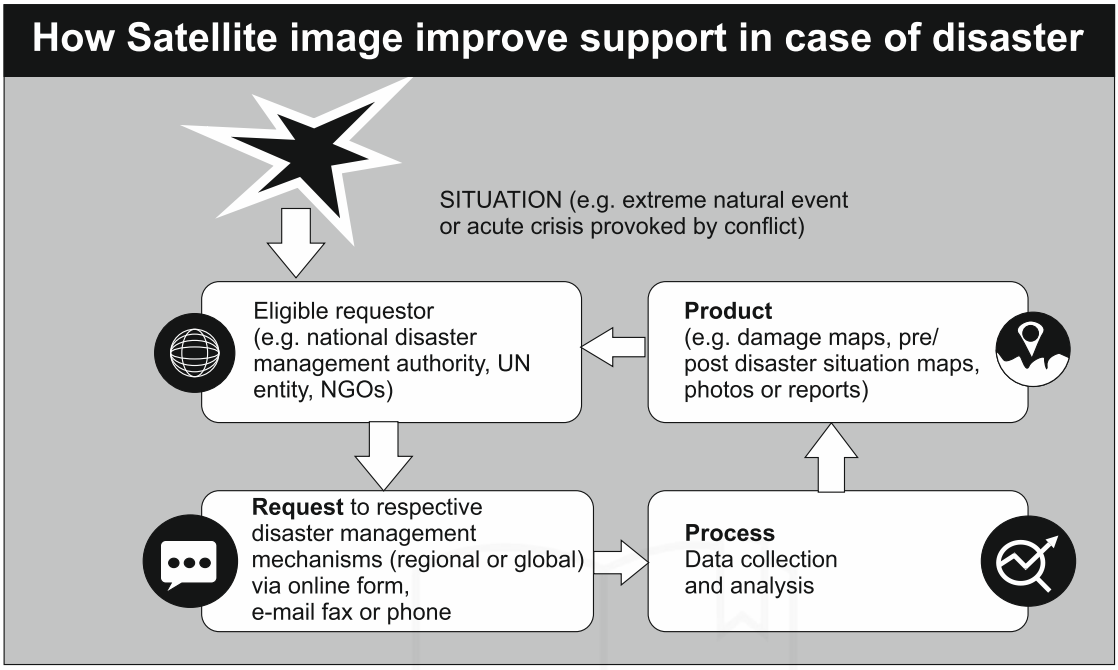
Modern Cameras

- High-definition cameras can **help in real time monitoring** of natural disasters
- Can provide a moving **alternate to satellite imagery**
- **UAVs** mounted with cameras **can be directed flexibly** with a high spatial and temporal resolution.
- Rapid-deployment cameras can **quickly track changing weather systems**.
- High resolution camera helps in **mapping the terrain** crucial for efficient disaster relief efforts
- Cameras placed at a strategic point **enable professionals to find potential danger points** before they become a serious problem during the rescue efforts.
- Infrared and night vision enabled cameras **help on locating victims**
- Deploying cameras **enables responders to find the easiest and safest path to victims**
- Gives **clearer and more focused views** which makes the rescue teams well verse with location before they move in.
- **Data and images can be collected from areas that are otherwise inaccessible**, allowing for greater information flow throughout the relief center crucial for rescue efforts.
- **Monitor relief efforts** and allow timely action whenever required.
- **Help in Efficient Planning**

Modern Communication

- **Geographic Information System (GIS):** Help planners with **quality assessments** and direct development activities, selection of mitigation measures and implementation of disaster preparedness and response plans.
- **Remote sensing:** Aid in the identification of hazardous locations, the **real-time monitoring** of the planet's changes, and the early detection of numerous imminent disasters.
- **Satellite communication:** Provides an **effective communication** channel in all weather and situations thus, ensures efficient management and mitigation

Satellites for Disaster Management Applications



A. International Efforts

- **International Charter "Space and Major Disasters"** is a venture between 17 space agencies to provide free satellite data to those affected by disasters
- **UN-SPIDER** facilitates the use of space-based technologies for disaster management and emergency response.
- **UNITAR/UNOSAT (Geneva)** provide United Nations funds, satellite analysis, training and capacity building
- **Sentinel Asia** is a regional collaboration for satellite based emergency response in Asia Pacific.
- Currently, the **U.S**. is putting up its third-generation advanced fleet of **Tracking & Data Relay Satellites (TDRS).**
- **Russia** has its **Satellite Data Relay Network.**
- **Europe** is building its own **European Data Relay System.**
- **China** is into its **second generation Tianlian II** series.
- **Canada** has Satellite **RADARSAT-2** and **RADARSAT Constellation Mission** in place for efficient disaster management

B. South Asia Satellite (SAS or GSAT-9)

- A **geosynchronous communications and meteorology satellite** launched by India in 2017
- **Application:** reliable weather forecasting, efficient natural resource mapping, capacity building by providing e-governance, telemedicine, e-education and e-banking services, better connectivity and communication, disaster information transfer between member countries.

C. Indian Efforts: Gagan Enabled Mariner's Instrument for Navigation and Information (GEMINI) device

- **Launched by:** Union Minister of Earth Sciences
- **Salient Features:**
  - A portable receiver linked to ISRO satellites
  - Can send signals up to 300 nautical miles