



# UP - PCS

## Provincial Civil Services

Prelims & Mains

Uttar Pradesh Public Service Commission, Prayagraj

### General Studies

### Paper 3 – Volume 4

## Disaster Management & Internal Security



# G.S. PAPER – 3 VOLUME – 4

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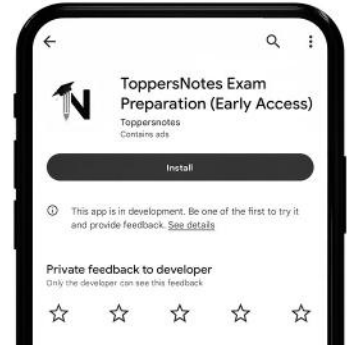
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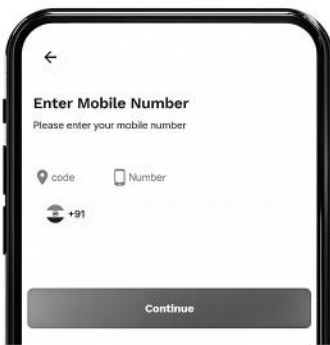
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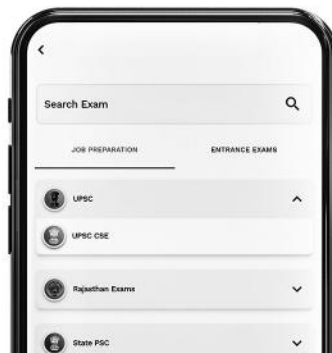
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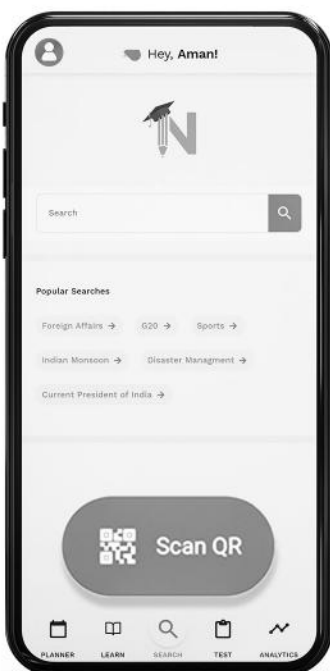
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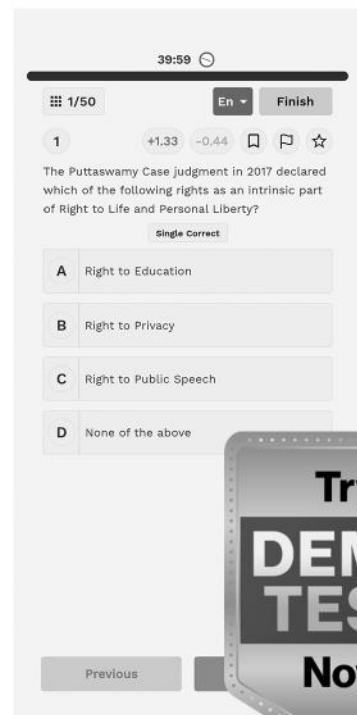
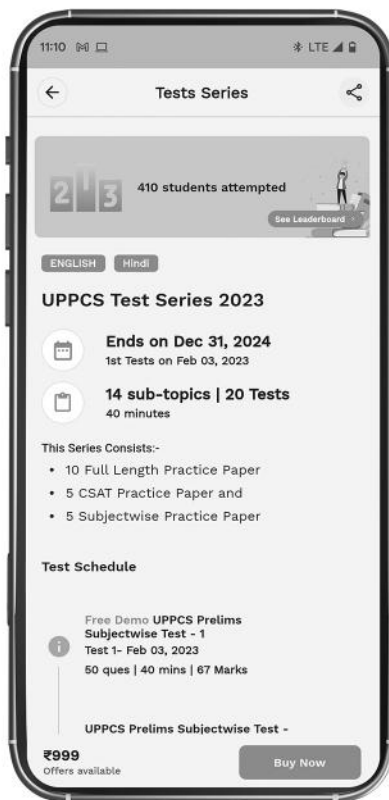
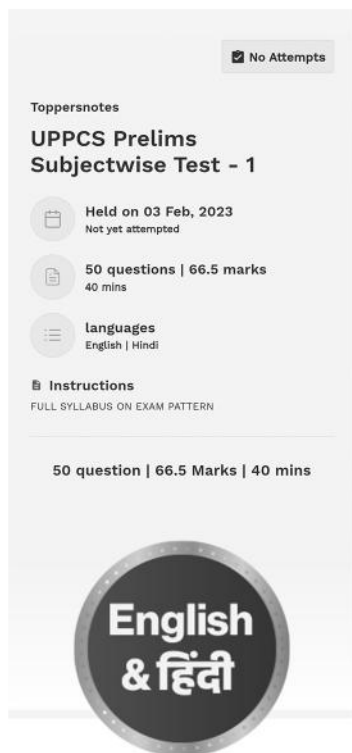
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# 1

## 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.

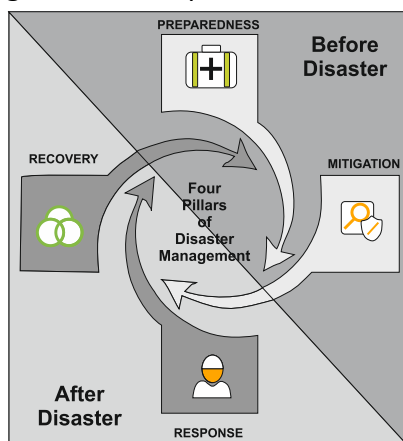


Figure : Disaster Management Cycle



	Prevention	Preparedness	Mitigation	Response	Recovery
<b>Objective</b>	<ul style="list-style-type: none"> <li>• Ensure that human action or natural phenomena do not result in disaster or emergency</li> <li>• Reduce -avert- avoid the risk by getting rid of the hazard or vulnerability</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure the organized mobilization of personnel, funds, equipments, and supplies within a safe environment for effective relief</li> <li>• Build capacities before a disaster situation prevails to reduce impacts</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure long term measures for reducing or eliminating risk of a disaster.</li> </ul>	<ul style="list-style-type: none"> <li>• 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.</li> </ul>	<ul style="list-style-type: none"> <li>• Restore and improve, where appropriate, facilities, livelihoods and living conditions of disaster affected communities to pre-disaster levels.</li> </ul>
<b>Activities</b>	<ul style="list-style-type: none"> <li>• Hazard Identification</li> <li>• Vulnerability Assessment</li> <li>• Capacity building of community and implementing agencies</li> <li>• Early Warning (EW) that reach and are accessible to all</li> <li>• Public awareness</li> <li>• Frame inclusive disaster risk management act and policy</li> </ul>	<ul style="list-style-type: none"> <li>• Prepare database related to basic common services</li> <li>• 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.</li> </ul>	<ul style="list-style-type: none"> <li>• Undertaking actions based on past experiences and knowledge</li> <li>• Mobilization of the community along with other actors like NGOs, civil society, government organizations, etc</li> <li>• Preparation of development plans, extensive public awareness strengthening institutional mechanisms and international cooperation.</li> </ul>	<ul style="list-style-type: none"> <li>• Rapid Needs Assessment</li> <li>• Resource Mobilization</li> <li>• Ensure responsive evacuation, search and rescue of victims including vulnerable groups</li> <li>• Emergency assistance including identification of needs for affected population when providing food, health care, shelter, water and sanitation , education and non-food items</li> <li>• Ensure safe spaces for vulnerable groups</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Relief:</b> Damage and loss assessment; Integration of needs of vulnerable sections into recovery; Restore health and other social services</li> <li>• <b>Reconstruction</b> of destroyed and damaged housing; restoration of infrastructure, water, sanitation and communication</li> <li>• <b>Rehabilitation:</b> Livelihoods recovery by ensuring access to income generating programmes and employment schemes; Facilitate the recovery of property and other important documents.</li> </ul>

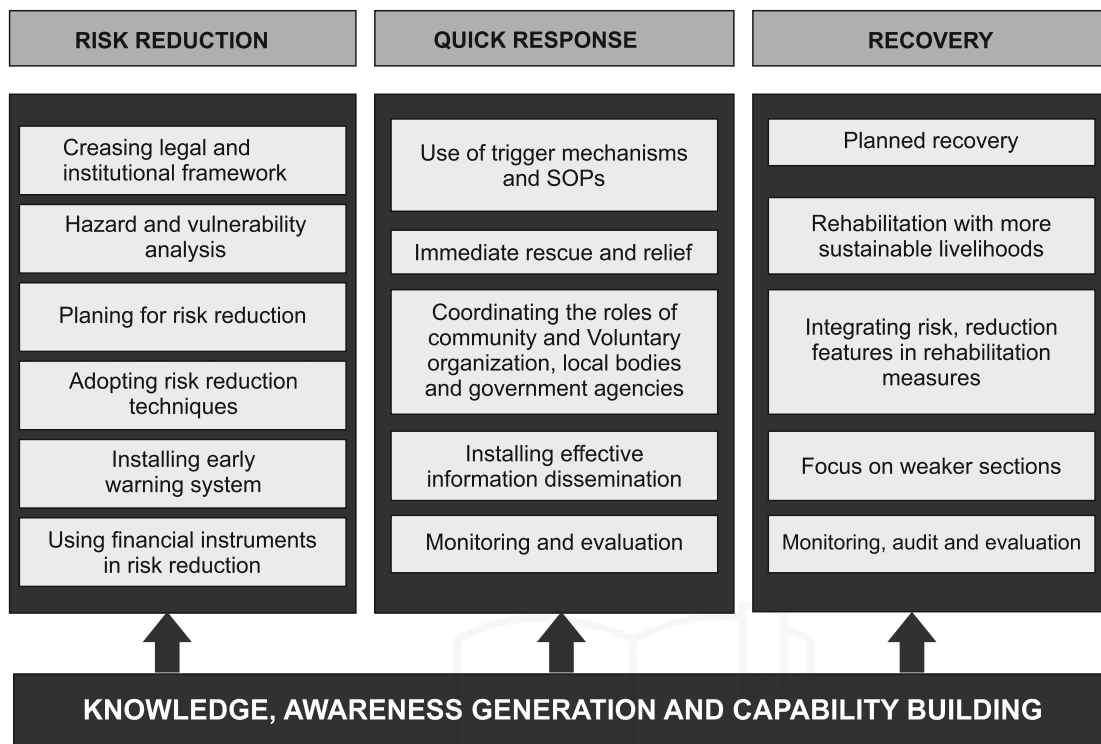


Figure : Elements of Crisis Management

## 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

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### # Pre-disaster

- Can **influence 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.



## # Challenges in PPP in Disaster Management

Challenges	Solutions
Lack of mutual understanding	To specify the necessities as soon as participation channels are pre-defined so that expectations are met when and where needed.
Lack of transparency and responsibility	To agree on communication strategies to avoid conflicting 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 areas to improve skills and allow each party to focus on areas 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.



## How technologies are improving disaster Management

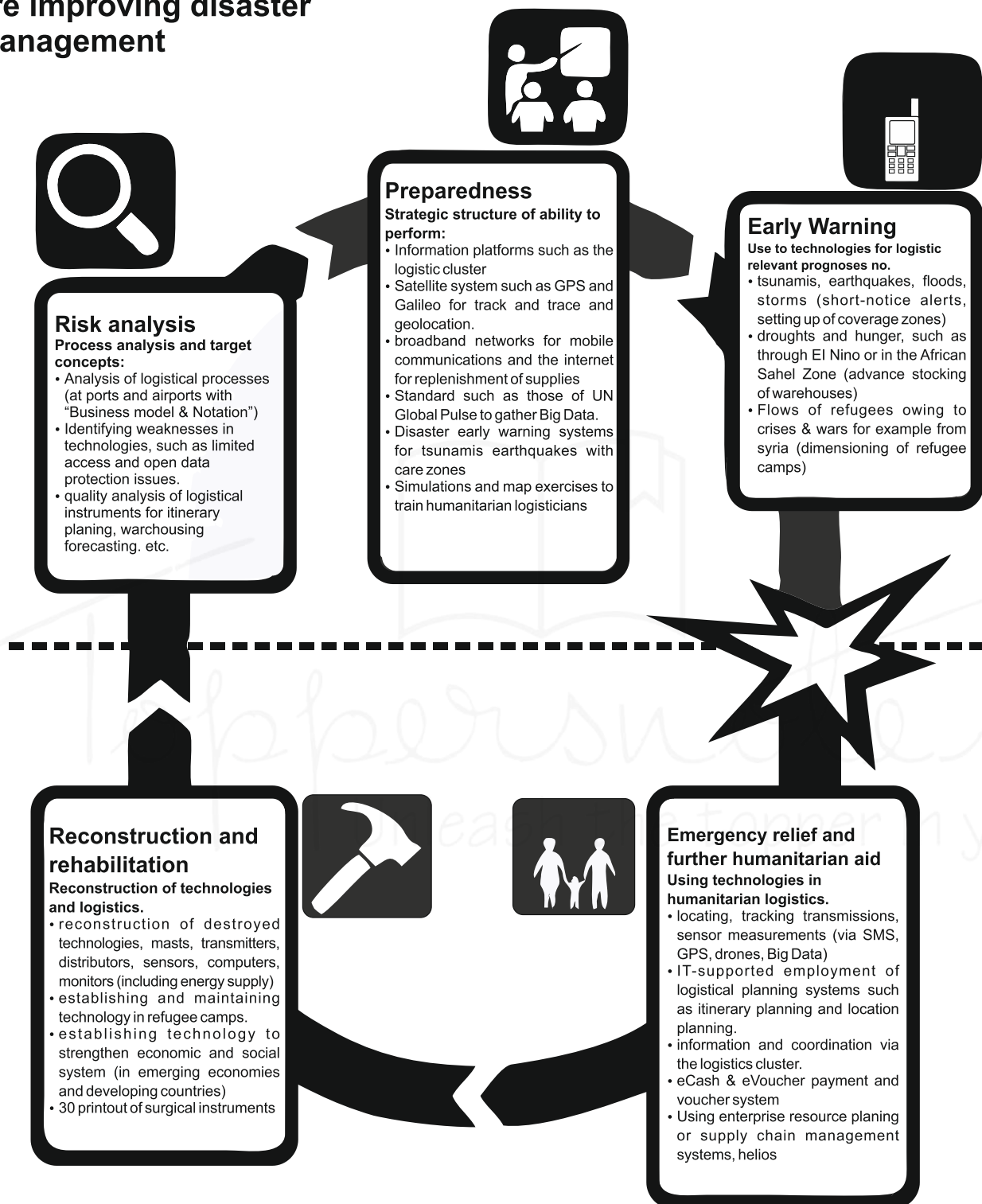


Figure : World Risk Report 2016 Report



## 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**

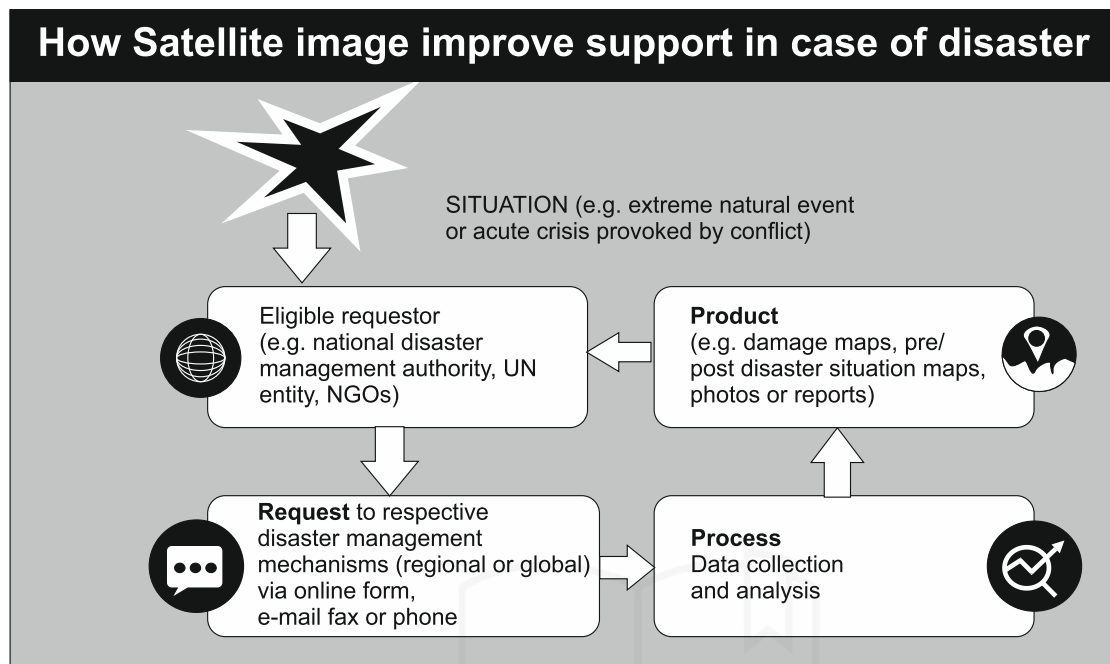


### # Modern Communication

- **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



- Map Potential Fishing Zones
- Ocean States Forecast gives reliable information about the state of the ocean
- Uses data from GAGAN (GPS Aided Geo Augmented Navigation) satellite
- Provides only one way communication channel
- **Objective:**
  - Effectively disseminate emergency information and communication to fishermen beyond the range of telephonic service providers

## # Other Indian Satellites

Satellite	About
EOS-01	<ul style="list-style-type: none"> <li>● An earth observation satellite</li> <li>● Intended for applications in agriculture, forestry and disaster management support.</li> </ul>
RISAT-2BR1	<ul style="list-style-type: none"> <li>● A radar imaging earth observation satellite</li> <li>● Provide services in the field of Agriculture, Forestry and Disaster Management.</li> </ul>
RISAT-2B	<ul style="list-style-type: none"> <li>● A radar imaging earth observation satellite</li> </ul>
INSAT-3DR	<ul style="list-style-type: none"> <li>● An advanced meteorological satellite configured with an imaging System and an Atmospheric Sounder.</li> <li>● Middle Infrared band images provide night time pictures of low clouds and fog</li> <li>● Imaging in two Thermal Infrared bands provides estimation of Sea Surface Temperature (SST) with better accuracy</li> <li>● Higher Spatial Resolution in the Visible and Thermal Infrared bands</li> <li>● Carries a Data Relay and Search and Rescue Transponder</li> </ul>
INSAT-3D	<ul style="list-style-type: none"> <li>● An advanced weather satellite configured with an improved Imaging System and Atmospheric Sounder.</li> <li>● Designed for enhanced meteorological observations, monitoring of land and ocean surfaces, generating vertical profile of the atmosphere in terms of temperature and humidity for weather forecasting and disaster warning.</li> </ul>







## Big Data and Disaster Management

- Satellite pictures, drone footage, simulations, crowdsourcing, social media, and global positioning systems are all examples of data sources.
- According to research by the **United Nations' Asia-Pacific Social Agency**, **technological advancements, Natural disasters in the Asia-Pacific region** have killed two million people since 1970, accounting for **59 percent of global deaths**. Climate Change and Global Warming has further increased the frequency and intensity of floods, cyclones and droughts in the region.
- According to the research, **big data can assist to better predict disasters** in the Asia-Pacific area and decrease their impact.



# The Six Vs of big data

Big data is a collection of data from various sources, often characterized by what's become known as the 3Vs: Volume, variety and velocity.  
 Over time, other Vs have been added to descriptions of big data:

VOLUME	VARIETY	VELOCITY	VERACITY	VALUE	VARIABILITY
The amount of data from myriad sources. 	The types of data: structured, semi-structured, unstructured 	The speed at which big data is generated 	The degree to which big data can be trusted 	The business value of the data collected 	The ways in which the big data can be used and formatted. 

## # Predictive Policies

- **Social media monitoring** can support disaster management with **real-time information on the victim** location, effects and strength of the hazard.
- A sensor network powered by **Big Data** can **assist mitigate disaster** in the following ways:
  - **Flood and cyclone predictions** are now based on computer simulations, and machine learning can aid in predicting flood location and intensity.
  - **Sensor webs and the Internet of Things** can help **earthquake early-warning systems** work more efficiently.

## # Efficient Resource Allocation

- With **access to mobile network insights** under the GSMA's Big Data for Social Good Initiative, humanitarian agencies can more efficiently monitor the flow of people in the impacted areas aiding evacuation, response and recovery efforts (e.g. **Arogya Setu App during COVID-19 pandemic in India**).
- Satellites and drones use remote sensing to provide immediate evaluations of damage and people affected, allowing **disaster assistance** to be prioritised.
  - Drought-affected millions of small and marginal farmers can benefit from public data such as India's digital ID system (**Aadhar**).

## # Economic Mitigation Plans

- **Disasters** in Asia and the Pacific further **increased the economic disparity**
- Help **identify** people in danger and post-disaster **identify beneficiaries** of **targeted relief packages**
- Typhoons in north and east Asia have resulted in significant reductions in fatalities and economic losses because of big data applications.