IDM Subject Code : CHM 2042
Management of Flood Disasters

Introduction

- A flood is an overflow of water (flow rate exceeds the capacity of the river channel), breaks levees from water bodies, such as a river, lake, or ocean
- Accumulation of rainwater on saturated ground also causes flooding
- Inflow of the tide also caused flooding in coastal areas

- Floods often cause damage to homes, businesses, agricultural land and livestock if they are in the natural flood plains of rivers

Causes of Floods

- Heavy Precipitation (Rainfall)
- Inadequate capacity (within banks)
- Bank erosion and silting
- Land slides
- Tidal and back water effects
- Poor drainage
- Snow melt and glacial out bursts
- Indiscriminate encroachment
- Increasing economic and developmental activities in flood plains
- Lack of regulations
- Inadequate drainage system
- Inadequate maintenance
- Lack of disaster preparedness

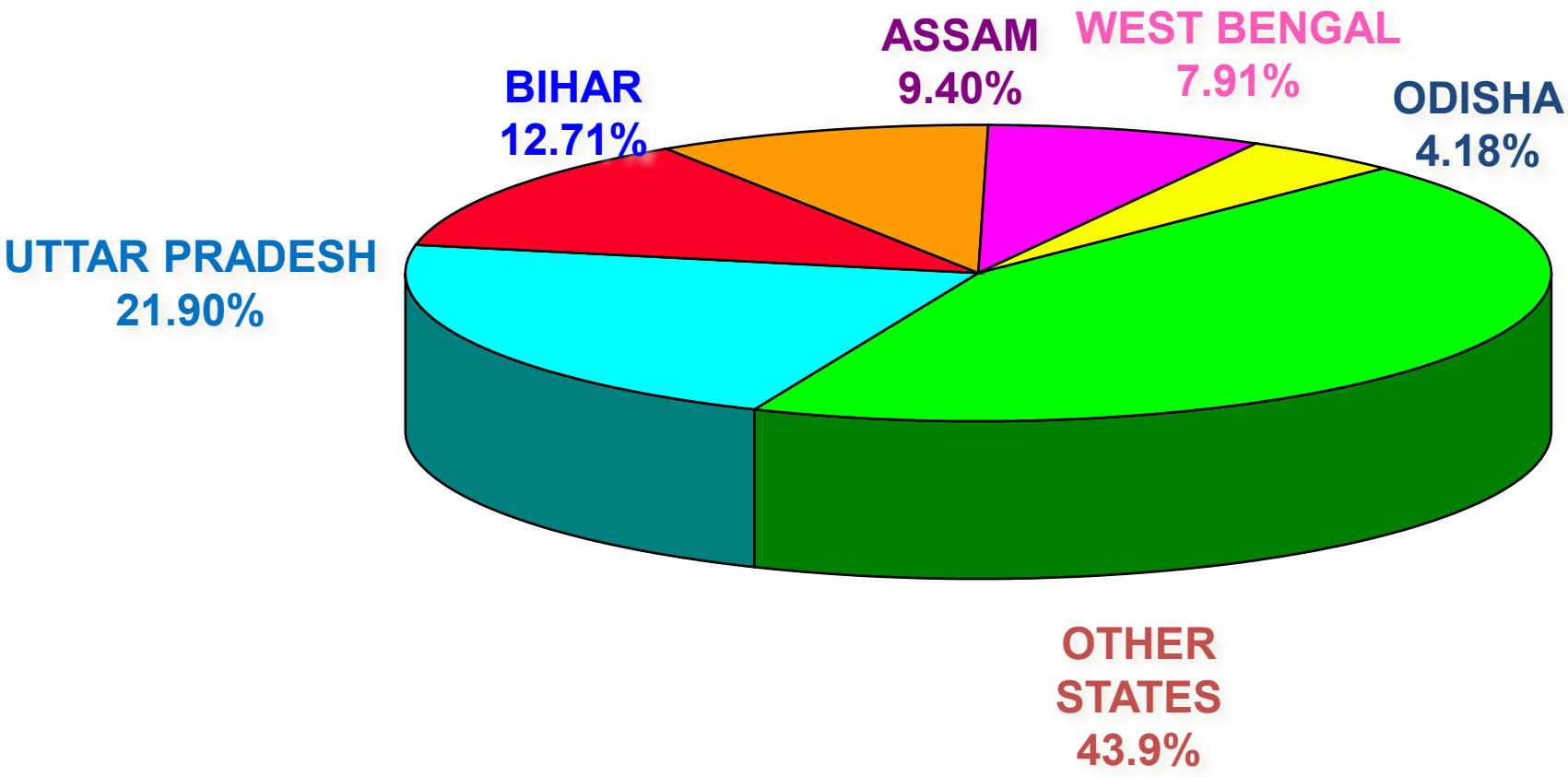
Flood Risks and Hazards

- Heavy rainfall exacerbates problems with:
  - Runoff
  - Absorption
  - Flood-control measures
- Ravine flooding can inundate downstream areas
- In rocky and heavily paved areas, lack of absorption can cause flash flooding
- Most communities have some risk of flooding
- Damage increases with development in:
  - Coastal areas
  - Floodplains

Flood Prone Areas

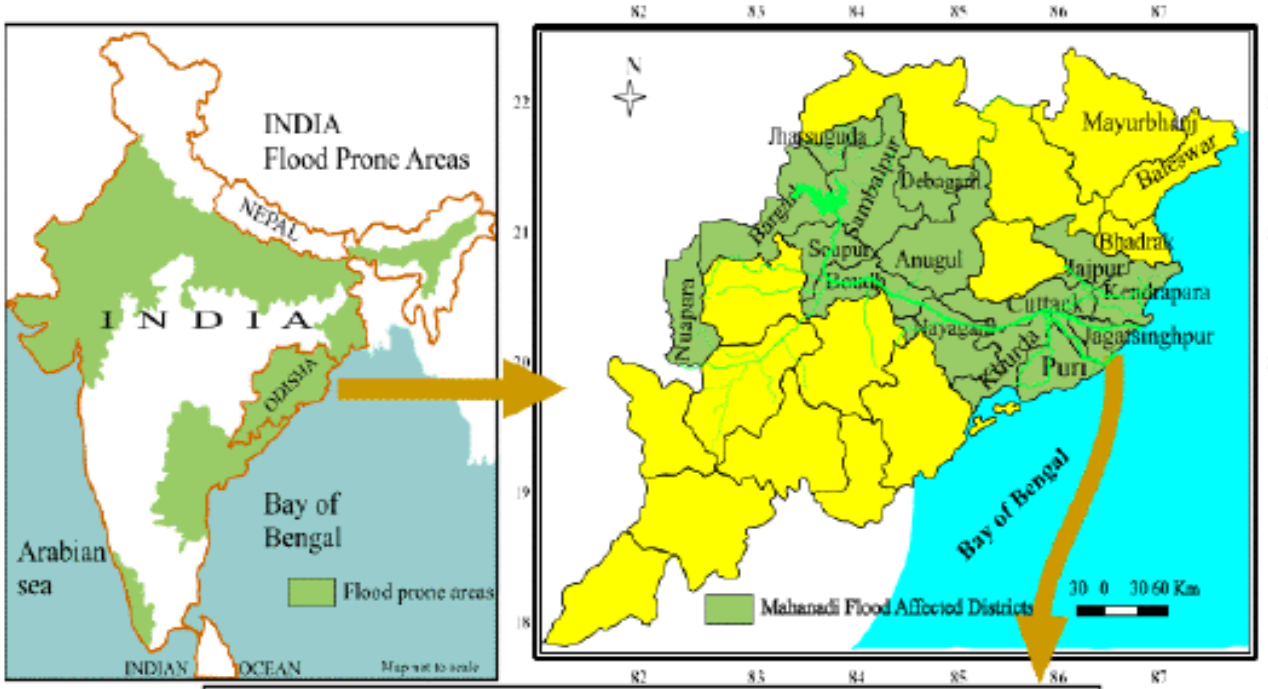
- Total flood prone area in India - 40 million hectares
- It is about 12% of total geographical area of India

Most Flood Prone States of India



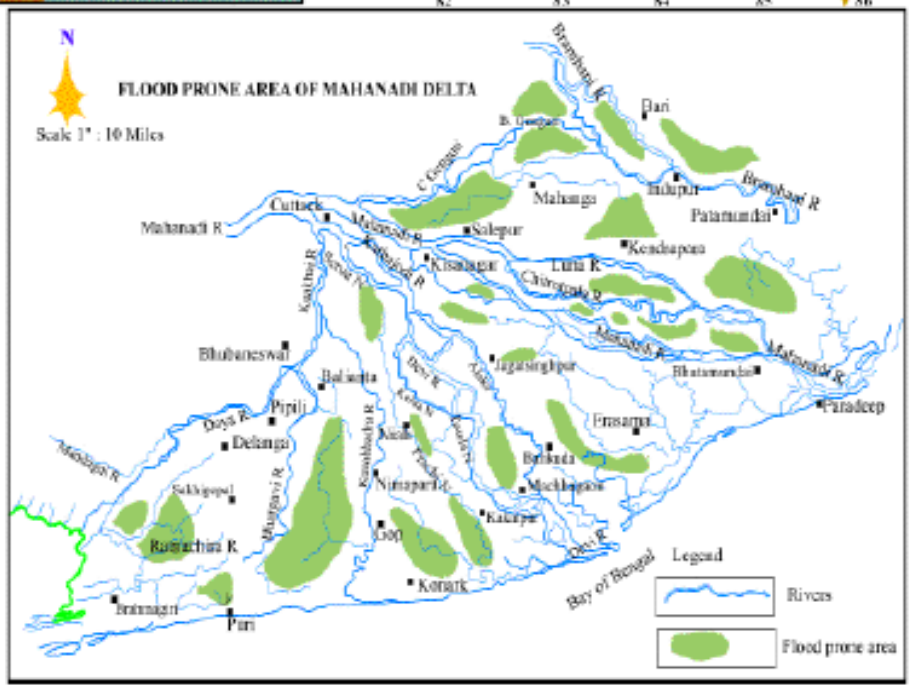
Flood Prone Areas

Flood Prone areas of India



Flood Prone Areas of Odisha

Flood Prone areas of Mahanadi River Delta in Odisha



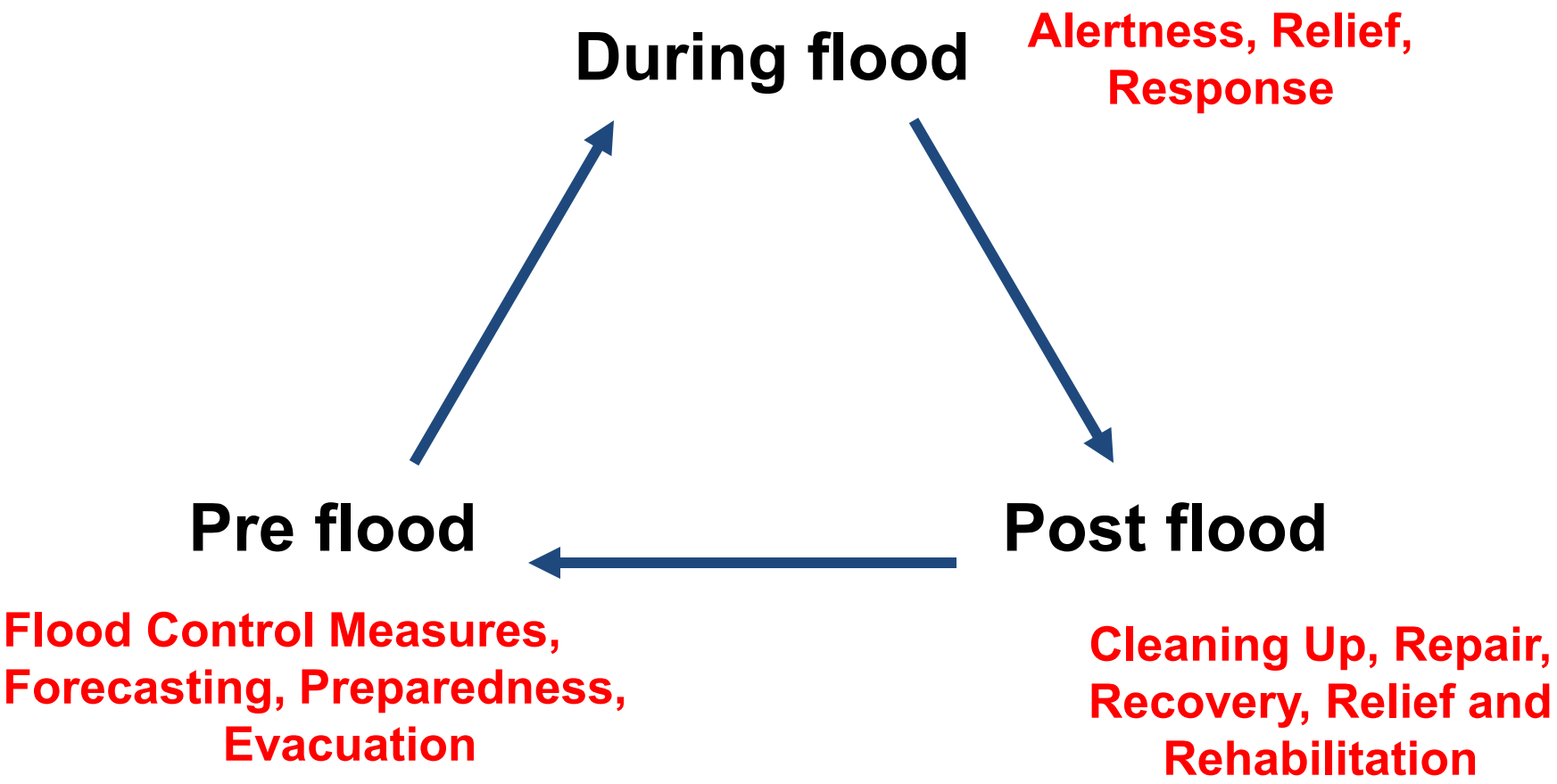
Flood safety planning

- Observation of previous and present flood heights and inundated areas
- Statistical, hydrologic, and hydraulic model analyses
- Mapping inundated areas and flood heights for future flood scenarios
- Long-term land use planning and regulation
- Engineering design and construction of structures to control or withstand flooding
- Intermediate-term monitoring, forecasting, and emergency-response planning
- Short-term monitoring, warning, and response operations

Flood Management

Approach

- Floods can not be absolutely controlled
- Floods can only be managed to reduce flood losses



Flood Preparedness

- Know flood risk in area
- Prepare flood evacuation plan
- Obtain flood insurance if living in floodplain
- Keep important documents in water-proof box
- Check portable radio for current information and emergency messages
- Elevate furnace, water heater, and electric panel
- Move furniture and other items to higher level

Flood Evacuation

- Do not walk, swim, or drive through flood waters
- Stay off bridges over fast-moving water
- Keep away from waterways
- Pay attention to barricades
- Avoid storm drains and irrigation ditches
- Keep family together
- Stay out of flooded areas
- Reserve telephone for emergencies
- Avoid driving, except in emergencies
- Wait for authorities to issue message that it is safe to return
- Be aware that snakes and other animals may be in your house

Flood Forecasting

STEPS

- Data collection
- Data transmission
- Data analysis & forecast formulation
- Dissemination of forecast

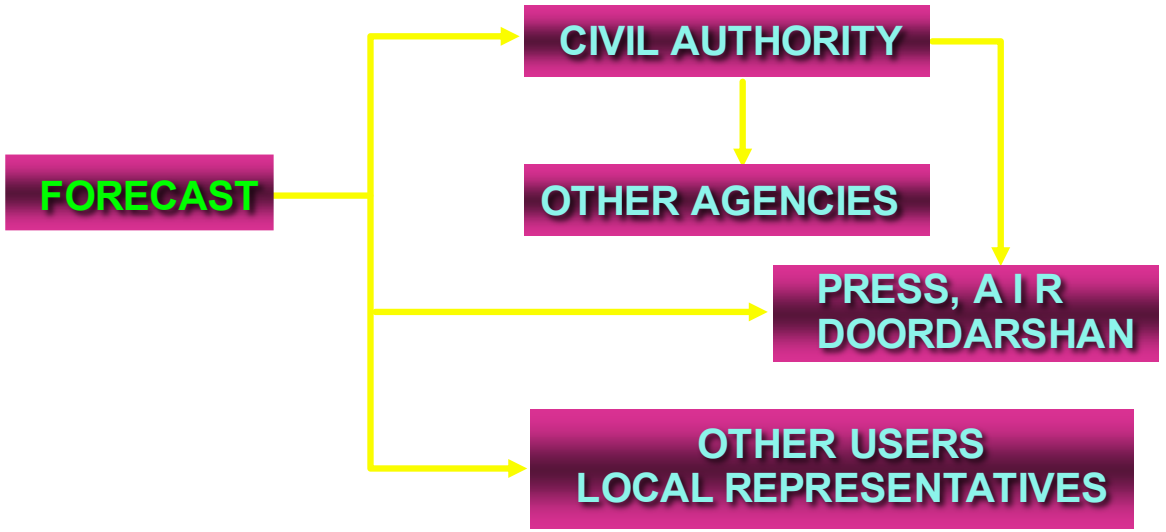
DATA TRANSMISSION

- Wireless
- Telephone
- Fax
- Satellite
- Telegraph
- Telex

DATA COLLECTION

- Hydrological
  - River water level
  - River discharge
- Hydrometeorolgical
  - Rainfall
  - Other Precipitation such as snow, hail etc.

DISSEMINATION



Flood Management

STRUCTURAL MEASURES

- Dams & reservoirs
- Embankment
- Channel improvement
- River diversion
- Inter basin transfer
- Anti erosion works

NON STRUCTURAL MEASURES

- Flood forecasting & warning
- Flood plain zoning
- Flood fighting
- Flood proofing
- Flood insurance
- Relief & rehabilitation

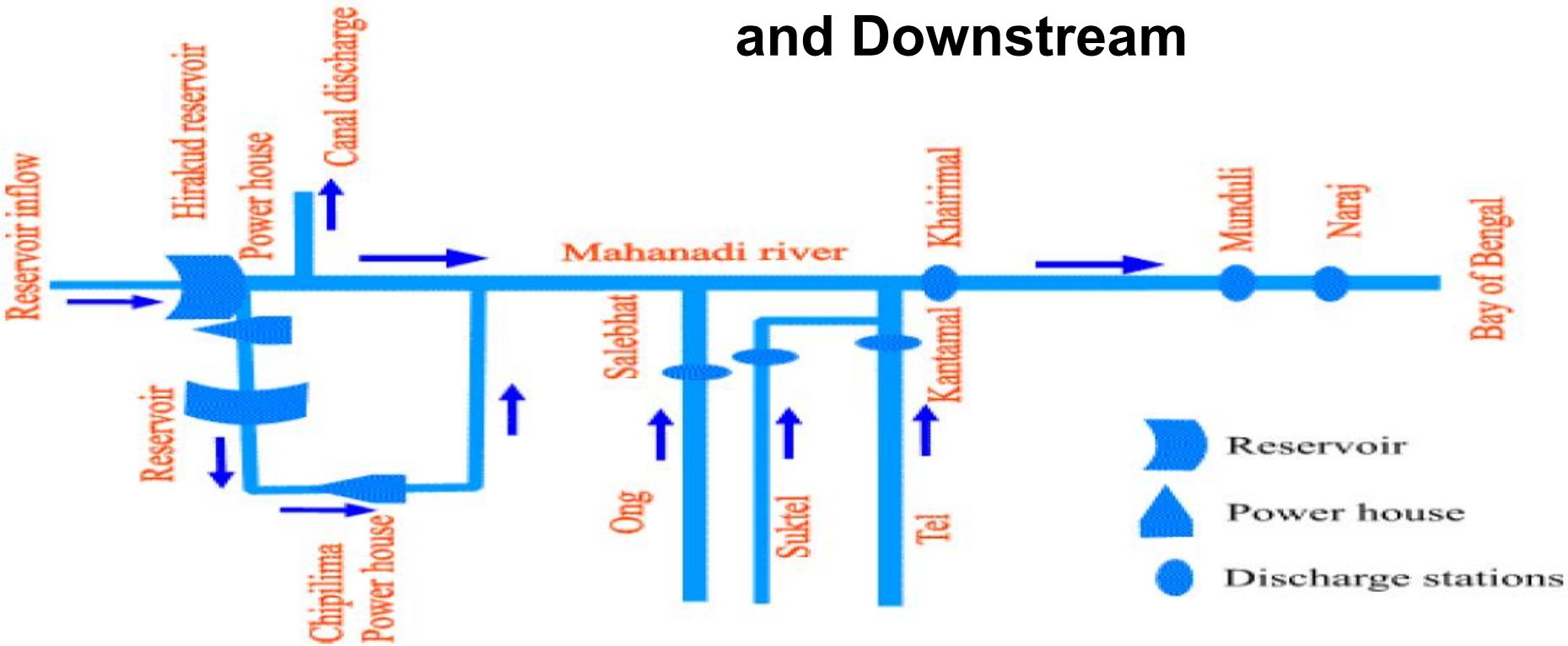
Flood Fighting Response

- Flood water management using water -level control structures such as dams and reservoirs
- Emergency repair and reinforcement of levees and embankments
- Emergency diversion of flood water via cut-through channels
- Temporary flood proofing using sandbags, cavity blocks etc.

Mahanadi Flood Management

- Hirakud dam regulates the flow of the Mahanadi River
- Prevents flood in the downstream
- Water from the dam is used for irrigation
- Generates hydroelectricity through several hydroelectric plants

Schematic Diagram of Hirakud Dam and Downstream



Post Flood Recovery and Cleaning

- It is important to thoroughly wash and disinfect every part of your home that has been inundated by floodwaters
- Wash all surfaces that have been inundated to reduce the danger of flood related infections
- Boil all drinking water or drink bottled water only until supplies have been declared safe by health authorities.
- Use disinfectant when cleaning
- Mattresses soaked with flood water are difficult to salvage and should be discarded
- Do not use any electricity until you have had the power supply reconnected and have appliances checked by a qualified licensed electrician
- Disinfect refrigerators, freezers and dishwashers after they have been checked by an electrician

Deadliest floods

Death toll	Event	Location	Year
2,500,000–3,700,000	1931 China floods	China	1931
900,000–2,000,000	1887 Yellow River flood	China	1887
500,000–700,000	1938 Yellow River flood	China	1938
230,000	2004 Indian Ocean tsunami	Indonesia	2004
145,000	1935 Yangtze river flood	China	1935
100,000	Hanoi and Red River Delta flood	North Vietnam	1971
100,000	1911 Yangtze river flood	China	1911

Disaster mitigation

- An artificially created reservoir behind a dam across a river
- Channelization of river.
- Artificially raised embankments that reduce spilling
- Channel and drainage improvement works, which artificially reduce the flood water level

Eg. improving structural qualities of schools, houses and such other buildings so that medical causalities can be minimized.

Similarly ensuring the safety of health facilities and public health services including water supply and sewerage system to reduce the cost of rehabilitation and reconstruction.



Disaster management structure

E.g.: Indian Meteorological department (IMD) plays a key role in forewarning the disaster of cyclone-storms by detection tracing. It has 5 centres in Kolkata, Bhubaneswar, Vishakhapatnam, Chennai & Mumbai. In addition there are 31 special observation posts setup along the east coast of India.

The International Agencies which provides humanitarian assistance to the disaster strike areas are United Nation agencies.

- Office for the co-ordination of Humanitarian Affair (OCHA)
- World Health Organization (WHO)
- UNICEF
- World Food Programme (WFP)
- Food & Agricultural Organisation (FAD)

E.g.: Non Governmental Organizations

- Co-Operative for assistance and Relief Every where (CARE)
- International committee of Red cross

Disaster Management Structure

NDMA Apex Body with Prime Minister as Chairperson.
National Executive Committee - Secretaries of 14 Ministries and Chief of Integrated Defence Staff.

- Armed Forces
- Central Para Military Forces
- State Police Forces and Fire Services
- Civil Defence and Home Guards
- State Disaster Response Force (SDRF)
- National Cadet Corps (NCC)
- National Service Scheme (NSS)
- Nehru Yuva Kendra Sangathan (NYKS)

Integrated Disaster Management

Thank You