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ANALYSIS**

TOPIC

Floods and a 'Preventive Measure'

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FLOODS AND A 'PREVENTIVE MEASURE'

Context:

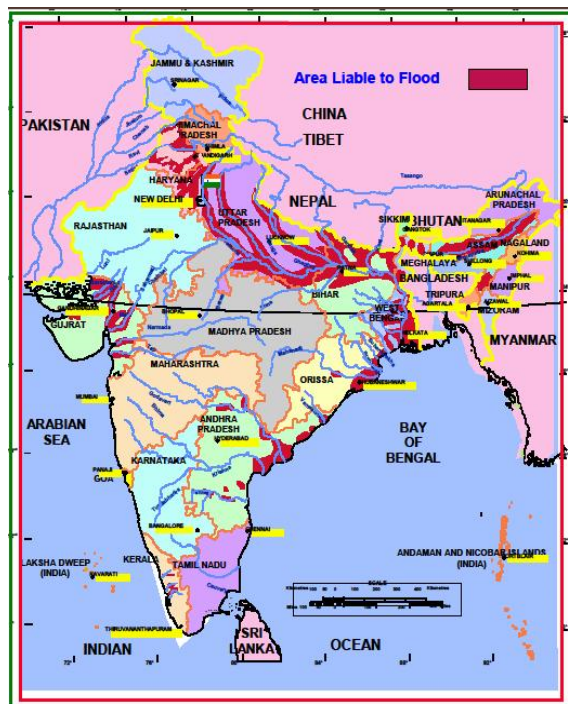
- After the landfall of Cyclone Michuung, there is a need to take preventive measures to avoid urban flooding in India.

Floods:

- Increased incidence of high-intensity rainfall in short duration is mainly responsible for floods. It is further compounded by unplanned growth, encroachment of natural water bodies, poor drainage system, etc.
- **Urban flooding** is significantly different from **rural flooding** as urbanisation leads to developed catchments, which increases the flood peaks from 1.8 to 8 times and flood volumes by up to 6 times.
- **According to the World Meteorological Organization (WMO)**, flood-related catastrophes have increased by 134% since 2000, compared with the two previous decades.
- The **Intergovernmental Panel on Climate Change (IPCC), in 2021**, underscores rising global temperatures are dramatically affecting the water cycle, making floods and droughts more extreme and frequent.
 - ♦ **The IPCC highlighted** the high probability that monsoon rainfalls will increase in the medium and long term, especially in **South and Southeast Asia**, causing severe floods.

Floods in India:

- Floods are a recurrent phenomenon, causing huge loss of lives and damage to livelihood systems, property, infrastructure and public utilities.



- Flood related damages show an **increasing trend** because of increase in population, rapid urbanisation, growing developmental and economic activities in flood plains coupled with global warming.
- Out of the total geographical area of 329 million hectares (mha), more than **40 mha is flood prone**.
- An average every year, 75 lakh hectares of land is affected, 1600 lives are lost and the damage caused to crops, houses and public utilities.

Causes of Urban Floods:

- **Weather Systems:** A special feature in India is that we have heavy rainfall during monsoons.
 - ♦ **Cyclones, cyclonic circulations and cloud bursts** cause flash floods and lead to huge losses.

- ◆ **Storm surges** can also affect coastal cities/towns.
- **Precipitation:** 80% of the precipitation takes place in the monsoon months from June to September, and the rivers bring heavy sediment load from catchments, coupled with inadequate carrying capacity of rivers, are responsible for causing floods, drainage congestion and erosion of river-banks.
- **Water release for dam:** Sudden release or failure to release water from dams can also have a severe impact.
- **Urban Heat Island:** The urban heat island effect has increased rainfall over urban areas.
- **Climate Change & Sea Level Rise:** Global climate change is resulting in changed weather patterns and increased episodes of high-intensity rainfall events occurring in shorter periods.
 - ◆ Cities/towns located on the coast, on river banks, upstream/ downstream of dams, inland cities and in hilly areas can all be affected.

Urban Challenges & Floods in India:

- **Encroachment & Habitations:** Encroachment is a major problem in many cities and towns.
 - ◆ Natural streams and watercourses have formed over thousands of years due to the forces of flowing water in the respective watersheds.
- **Loss of Drains:** Ideally, the natural drains should have been widened (similar to road widening for increased traffic) to accommodate the higher flows of stormwater.
- **Improper disposal systems:** Improper disposal of solid waste, including domestic, commercial and industrial waste and dumping of construction debris into the drains also contribute significantly to reducing their capacities.
- **Health Risk:** Flood potentially **increases chances of outbreak of infectious diseases.**
 - ◆ Affected areas become more prone to disease outbreak especially after the flood water dries up. Surge in diseases happens as flood water gets mixed up with sewage water and several other contaminants.
 - ◆ **Insufficient policy attention:** Even though urban flooding has been experienced over decades in India, sufficient attention was not given to planning specific efforts to deal with it.

Solutions:

- **Nature based Solutions: Restoration** includes a variety of ecological, physical, spatial and management interventions aimed at restoring the natural state and functioning of the ecosystem. It includes:
 - ◆ Wetland Restoration;
 - ◆ River / lake Restoration;
 - ◆ Reviving Ecological Area;
 - ◆ Riparian Vegetation Restoration;
 - ◆ Mangrove Restoration;
 - ◆ Restoring Natural Drainage Terrain
- **Bioremediation of water bodies:** It is a process followed to improve the quality of water wherein microbes are introduced in the water body to break down the pollutants.
- **Bioswales** are landscape vegetation designed to convey stormwater while removing debris and pollution.
- **Recharge well** is a technique to use rainwater for replenishing the ground water.
- **Bioretention system** is a landscaped depression that not only captures surface runoff but also treats the water.
- **Rain water harvesting techniques** include a wide array of interventions that stores surface runoff water and/or recharges groundwater.
- **Permeable Ground Surfaces:** Increasing permeable surfaces in the city, especially of footpaths and other green areas can help reduce the surface runoff and replenish groundwater to an extent.

Planning Interventions:

- **Urban River Management Plan:** The National Mission for Clean Ganga (NMCG) and the National Institute of Urban Affairs have developed a framework for developing Urban River Management Plan (URMP) to help river cities systematically and holistically plan for interventions required to revive and maintain the rivers within their limits in a sustainable manner.
- **River Basin Management plan:** It provides a road map for conserving, managing and developing river water, river basin and related resources to achieve maximum socio, economic and environmental benefits.
- **Flood Resilience Strategy or flood mitigation plans** define the short, medium and long-term measures to be adopted for strengthening flood resilience. The roles and responsibilities of various agencies and stakeholders are also defined in this strategy.
- **Plan for interlinking rivers and canals:** It includes large scale infrastructure related intervention to support efficient management of water resources. The intent is to address floods, water shortages, groundwater recharge and irrigation.
- **Community based Flood Management Plan:** It engages local communities in all the phases of a **flood - prevention, mitigation, preparedness, response and recovery**.
 - ♦ It sensitises vulnerable communities and empowers them to take appropriate actions for addressing flood risks.

Government efforts to curtail floods in India:

- Management of urban flooding falls under **purview of the State Governments and the Urban Local Bodies/ Urban Development Authorities** who are responsible for maintaining the drainage and sewerage system.
- **Urban Flood Mitigation Project:** India's maiden urban flood mitigation project worth Rs 561 crore under the National Disaster Mitigation Fund (NDMF).
 - ♦ The Prime Minister of India approved the **country's first urban flood mitigation project** under the NDMF.
- **Master Plan for Artificial Recharge to Groundwater - 2020:** It has been prepared by the **Central Ground Water Board (CGWB)** in collaboration with States/UTs envisaging construction of about 1.42 crore rain water harvesting and artificial recharge structures in the country to harness 185 Billion Cubic Meter (BCM) of water.
- **Jal Shakti Abhiyan (JSA):** Its emphasis is being given for rainwater harvesting/groundwater recharge in water stressed blocks **across India** with the **primary aim** to effectively harvest the monsoon rainfall through creation of artificial recharge structures, watershed management, recharge and reuse structures, intensive afforestation and awareness generation etc.
 - ♦ JSA for the year 2023 has been launched with the theme '**Source Sustainability for Drinking Water**'.
- **The Amrit Sarovar Mission:** It has been launched with an aim of developing and rejuvenating 75 water bodies in each district of the country as a part of celebration of Azadi ka Amrit Mahotsav for rainwater harvesting/recharge.
 - ♦ **Atal Bhujal Yojana:** The focus is on demand side management of ground water and accordingly water saving interventions such as use of micro irrigation (drip/sprinkler system), shifting of cropping pattern from high water intensive crops to low water intensive crops, mulching etc. are being encouraged and incentivised.
- **The Atal Mission for Rejuvenation and Urban Transformation (AMRUT) 2.0 Scheme:** The provisions have been made for harvesting the rainwater through storm water drains into the water body (which is not receiving sewage/effluent) & creation/ strengthening of storm water drains around the water body.