Mains Practice Question

Q. Discuss the causes of urban flooding in India. How can sustainable urban planning contribute to flood resilience? **(150 words)**

07 Aug, 2024   GS Paper 3 Disaster Management

Approach

- Introduce the answer by defining urban flooding
- Give me Causes of Urban Flooding in India
- Highlight Sustainable Urban Planning for Flood Resilience
- Conclude suitably.

Introduction

Urban flooding occurs when intense and prolonged rainfall overwhelms the drainage systems of urban areas, leading to **water accumulation on streets, roads, and buildings.** It can also result from other factors such as poor drainage infrastructure and encroachment on natural water bodies.

- The confluence of rapid urbanization, climate change, and inadequate urban planning has exacerbated this crisis.

Body

Causes of Urban Flooding in India:

- **Rapid Urbanization and Poor Planning**: India's cities are **expanding at an unprecedented rate,** often without adequate infrastructure planning.
  - This leads to the concretization of natural drainage systems and encroachment on floodplains.
  - For instance, the **2022 Bengaluru floods** were exacerbated by construction in low-lying areas and lake beds, disrupting natural water flow.
- **Inadequate Drainage Systems**: Many Indian cities have outdated and undersized drainage systems that cannot cope with intense rainfall.
  - **Mumbai's century-old drainage system**, for example, is frequently overwhelmed during monsoons, leading to widespread flooding as seen 2023.
- **Climate change and Extreme Weather Events:** Climate change is increasing the frequency and intensity of extreme rainfall events.
  - The **2023 Delhi floods,** caused by the **Yamuna River** overflowing due to record-breaking rainfall, exemplify this trend.
- **Solid waste Mismanagement:** Improper disposal of solid waste often clogs drainage systems, exacerbating flooding.
  - This was a significant factor in the **2023 floods in Himachal Pradesh,** where plastic waste blocked natural and artificial drainage channels.
- **Loss of Water Bodies and Green Spaces:** Urbanization has led to the destruction of natural water bodies and green spaces that act as natural flood buffers.

- The shrinking of Chennai's Pallikaranai marshland from 50 sq km to just 3.17 sq km has contributed to the city's recurring flood problems.
  - **Deforestation in Catchment Areas**: Deforestation in the upper catchment areas of rivers increases runoff and siltation, leading to more frequent and severe urban flooding downstream.
    - This has been observed in the case of **Assam's recurring floods affecting cities like Guwahati.**

Sustainable Urban Planning for Flood Resilience:

- **Integrated Watershed Management**: Implementing comprehensive watershed management plans that consider entire river basins can help mitigate flooding.
  - The "**Room for the River" project in the Netherlands,** which creates space for rivers to overflow safely, could be adapted for Indian cities.
- **Green Infrastructure and Nature-based Solutions**: Incorporating green infrastructure like **rain gardens, bioswales, and permeable pavements** can help absorb and filter stormwater.
- **Sponge City Concept:** Adopting the **"sponge city" approach,** which aims to absorb, clean, and use rainfall in an ecologically friendly way.
  - Mumbai's efforts to implement sponge city principles in its new development plan are noteworthy.
- **Sustainable Urban Drainage Systems**: Implementing SUDS can help manage surface water by slowing down and reducing runoff.
  - Enforcing **strict zoning laws to prevent construction in floodplains and low-lying areas.**
- **Restoration of Water Bodies and Wetlands:** Reviving and protecting urban water bodies and wetlands can significantly enhance flood resilience.
  - The **restoration of Bengaluru's Jakkur Lake** has improved the area's flood resilience while providing other ecological benefits.
- **Community Engagement and Early Warning Systems:** Involving communities in flood management and implementing robust early warning systems.
  - **Ahmedabad's heat action plan**, which includes community outreach, could be adapted for flood resilience.

Conclusion

Addressing urban flooding in India requires a shift to sustainable, nature-based urban planning, aligned with **SDGs 6, 11 and 13.** By implementing adaptive infrastructure and fostering community resilience, Indian cities can become models of **flood resilience and sustainable development.**