

GS I

SYLLABUS: URBANISATION PROBLEMS AND THEIR REMEDIES.

URBAN LOCAL BODIES ISSUES

THE HINDU, PG.NO: 6.

News: "India's urban infrastructure financing, needs and reality."

"Urban population will increase from 400 million in the last decade to 800 million over the next three decades". India will require about ₹70 lakh crore by 2036 to meet its urban infrastructure needs— recent World Bank report estimates.

Urban Local Bodies functioning issues:

- **Non functional 74th CAA:**
 - Urban planning is often controlled by private entities.
 - **Non transfer of subjects:** less than three of the 18 functions outlined in the 12th Schedule have been universally transferred to urban govts.
 - **Limited municipal finance:** since 2002 to 2024, municipal finance has stayed at just 1% of GDP.
 - **Reduction in revenue generation capacity:** the share of municipalities' own revenue sources has declined from 50% to 40% — *study on ULBs 2010-20*.
 - **Inefficient Tax collection:** ULBs in Bengaluru and Jaipur collect only 5%-20% of their potential tax revenue.
- **About 23% of total municipal revenue (capital budget) remains unspent — 15th Finance Commission report.**
- **Decline in PPP investments in urban infrastructure:** PPP saw ₹8,000 crore in 2012 but plummeted to just ₹400 crore by 2018.
- **Non-utilisation of central scheme funds:** *Smart Cities Mission* achieved 70% utilisation, *AMRUT* achieved 80%.
- **India lacks precise data on its urban population:** there was *no 2021 Census*.
- **Ineffective planning:** Eg. *Absence of project-specific revenue generation*, this projects further diminish commercial attractiveness.

Reforms to mobilise Rs.70 lakh crore:

- **Provide greater financial and administrative autonomy:** Eg. raising private capital via debt borrowing and municipal bonds.
- **Need for development financing framework to meet Rs.70 lakh crore** infrastructure investment requirement over next 20 years.
 - About 15% of this total investment could potentially come through **PPPs**.
- **Leverage Digital Public Infrastructure (DPI)** for improved operations particularly in public transport.
- **Ensuring urban projects' financial, social, and environmental sustainability** is crucial, given India's **climate change vulnerability**.
- **Capture land value in transport projects** Eg. metro rail projects, potential of raising half of the ₹70 lakh crore investment by 2036

The path forward will require collaboration across government levels, private sector participation, and a relentless focus on innovation and governance efficiency.

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GS III

SYLLABUS: ENVIRONMENTAL POLLUTION AND DEGRADATION.

NATIONAL CLEAN AIR PROGRAM

THE HINDU, PG.NO: 22.

News: "After a health emergency, toxic air foretells an economic one."

The lungs of teenagers now look like the lungs of lifelong smokers. Pollution isn't just in our cities, it's inside us— **Thoracic Surgeons opinion**.

National Clean Air Programme:

- Launched by **MoEFCC** in 2019.
- **Implementation:** by CPCB under **Air (Prevention and control of Pollution) Act 1981**.
- **131 Non Attainment Cities: cities that exceed the NAAQS for 5 consecutive years.** They are identified by CPCB.
- Aims to **reduce PM10 and PM2.5 concentrations** to 40% by 2025-26.
- **PRANA** (Portal for Regulation of Air-pollution in Non Attainment Cities) to monitor the implementation of NCAP.

Major issues with Air pollution:

- **Nearly 2 million died in India in 2021** alone due to pollution-related diseases— **WHO report 2022**.
- **Among the most affected are:**
 - **Pregnant women:** Eg. PM 2.5 detected in foetus.
 - **Children:** permanently impair lung development, asthma.
 - **Elderly:** already with comorbidity.
- **Burden of non-communicable diseases** linked to pollution continues to rise.
- Poor air quality leads to **increased hospitalisations and higher healthcare costs**.
- **The poorest are most exposed** yet least equipped to mitigate these effects.
- Rural families still **extensively rely on wood and animal dung as affordable cooking fuel**.

Issues with implementation of NCAP:

- **Lack of accountability mechanism:** no specified mechanism to hold implementing agencies accountable.
- **Poor implementation at ULBs levels:** NCAP remained as a symbol of intent without effective action.
- **Lacking statutory backing:** means compliance is voluntary, and there are no legal repercussions for non-compliance.
- **NCAP lacks a comprehensive, multi-sectoral approach:** Eg. poor, living near pollution with limited resources, to protect themselves (**N95 Masks, Air purifiers etc**).
- **NCAP reliance on debatable technologies:** Eg. There **isn't enough evidence that smog towers work— IIT experts**.
- **One-size fit for all approach:** NCAP needs localised strategies focused on specific emission sources.
- **NCAP's targets are unrealistic** unless there is a shift of focus towards clean energy and reducing India's reliance on fossil fuels.

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TECHNOLOGY

PRE-CONTEXT

6GHZ

THE HINDU, PG.NO: 9.

News: "Why India's 6Ghz spectrum dilemma is affecting PS5 Pro console launch in India?"

• Data transfer speeds (user perspective):

- **5G:**
 - 100mbps to 1 Gbps.
- **6G:**
 - upto 1 -2 Gbps, (while on paper 1 Tbps).

• Latency:

- **5G:**
 - 1 millisecond.
- **6G:**
 - In microsecond.

• Frequency Spectrum:

- **5G:**
 - Operate in sub 6GHz, millimeter-wave frequencies (24GHz-100Ghz).
- **6G:**
 - 100GHz to 10THz.

• Network Capacity and connectivity:

- **5G:**
 - 1 million devices per square kilometer, facilitating the growth of the *Internet of Things (IoT)*.
- **6G:**
 - up to 10 million devices per square kilometer, widespread *deployment of sensors, wearables, and smart devices*.

• Application:

- **5G:**
 - *High-speed internet access* for smartphones and devices.
 - *Ultra-Reliable Low-Latency* Communication: autonomous vehicles and remote surgeries.
 - *Massive Machine-Type Communications*: IoT devices and smart city infrastructure.
- **6G:**
 - *Extended Reality (XR)*: Seamless integration of virtual, augmented, and mixed reality experiences.
 - *Holographic Telepresence*: Real-time hologram communication for immersive meetings and events.
 - *Integrated AI*: Embedding AI into the network for intelligent resource management and new services.
 - Advanced Robotics and Automation

• Network Architecture:

- **5G:**
 - *Network slicing and edge computing* to optimize network performance
- **6G:**
 - *Cell-Free Massive MIMO*: provide uniform service quality.
 - *Integrated Terrestrial and Non-Terrestrial Networks*: **Seamless connectivity across land, air, and space** through satellites, drones, and high-altitude platforms.

• Energy efficiency:

- **5G:**
 - Improved energy efficiency over 4G.
- **6G:**
 - *AI-Optimized Networks*: reduce energy consumption.

- *Reducing the carbon footprint* of network infrastructure.

• Security and Privacy:

- **5G:**
 - Enhanced authentication and encryption.
- **6G:**
 - *Quantum Security Technologies*.
 - *Advanced AI-Driven Security measures* using machine learning techniques.
 - *Technologies like blockchain* for secure data transactions.

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BIODIVERSITY

PRE-CONTEXT

POPPY FLOWER

THE HINDU, PG.NO: 4.

News: "Naga village in Manipur seeks action against 'encroacher' poppy planters"

• Poppy flower:

- Also known as *Khus Khus*.
- Source of the narcotic drug mixture *opium*.
- Contains powerful medicinal alkaloids such as *morphine* etc.
- Production is regulated under *Narcotic Drugs Psychotropic Substances Act, 1985*.
- *Opium is legally cultivated only in 3 States* of India, viz. *Madhya Pradesh, Rajasthan and Uttar Pradesh*, for medicinal and scientific purposes.

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Thank you!