Mains Practice Question

Q. India faces increasingly frequent and severe heat waves. Suggest effective mitigation strategies for heatwave management in Indian cities. **(250 words)**

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Approach

- Introduce by defining heatwaves
- Highlight the factors responsible for intensified heatwaves in India
- Give mitigation strategies for heatwaves in Indian cities
- Conclude positively.

Introduction

Heatwaves are prolonged periods of excessively hot weather, with temperatures significantly higher than the normal maximum for a particular region and time of year. As per IMD, the number of heatwave days in India has increased from 413 over 1981-1990 to **600 over 2011-2020.**

Body

Factors Responsible for Intensified Heatwaves in India:

- **Urban Heat Island Effect:** Rapid urbanization and the expansion of cities have led to an increase in built-up areas, which absorb and retain more heat than natural landscapes. This creates urban heat islands, exacerbating the intensity of heatwaves in cities.
    - For example, **Delhi and Mumbai** have experienced higher temperatures compared to their surrounding rural areas due to this effect.
- **Deforestation and Loss of Green Cover**: Deforestation and the reduction of green spaces in urban areas have diminished the natural cooling effects provided by vegetation.
    - The loss of green cover in cities like **Bengaluru** has contributed to an increase in heat wave intensity.
- **Climate Change and Global Warming:** Rising global temperatures due to climate change have increased the frequency, duration, and intensity of heatwaves in India.
- **Lack of Preparedness and Adaptation Measures**: Many Indian cities lack adequate preparedness and adaptation measures to cope with heatwaves.
    - Limited access to **cooling infrastructure, inadequate early warning systems, and insufficient public awareness** about heatwave risks contribute to the severity of their impacts. The lack of comprehensive heat action plans in many cities has left populations vulnerable.
- **Anthropogenic Activities**: Human activities, such as **industrial processes, transportation, and energy consumption**, generate waste heat and greenhouse gas emissions, further contributing to the urban heat island effect and global warming.
    - The severe heat wave in **Delhi** in 2024, with temperatures reaching over **49°C in some areas.**

Mitigation Strategies for Heatwaves in Indian Cities:

- **Heat-resistant Infrastructure:** Promote the use of **reflective materials for pavements and rooftops** to reduce heat absorption.
- **Urban Greening Initiatives:** Developing **urban forests, parks, and rooftop gardens** to create natural cooling sinks.
    - Encourage **vertical gardens on building facades** to provide insulation and reduce ambient air temperature.
- **Heat Action Plans:** Develop and implement comprehensive heat action plans at the city level.
    - These plans should involve **heat forecasting, real-time alerts, and outreach programs** to educate citizens about heat-related illnesses and preventive measures.
- **Vulnerable Population Outreach:** Identify and target outreach programs towards vulnerable populations like the elderly, children, and those living in informal settlements who are more susceptible to **heatstroke**.
- **Smart Grid Management:** Implement **smart grid technologies to optimize power distributio**n and reduce peak demand during heatwaves. This can help prevent power outages that exacerbate heat stress.

Conclusion

By adopting a holistic approach that combines urban planning, early warning systems, technological interventions, and community engagement, cities can build resilience and mitigate the devastating effects of heatwaves moving towards achieving **Sustainable Development Goal (SDG) 11: Sustainable Cities and Communities.**