1. The Evergreen Revolution is often cited as a sustainable alternative to the Green Revolution. Critically assess its relevance in the context of contemporary agricultural challenges such as soil degradation, water stress, and climate variability.

Introduction
The *Evergreen Revolution*, a term coined by **Dr. M.S. Swaminathan**, refers to a second-generation agricultural reform focused on **ecologically sustainable and economically viable farming practices**. Unlike the *Green Revolution*, which prioritized yield maximization often at the cost of long-term environmental health, the Evergreen Revolution aims to integrate **productivity with sustainability and inclusiveness**.

Key Features of the Evergreen Revolution
- **Eco-Friendly Technologies**: Emphasis on biofertilizers, organic farming, and reduced chemical usage.
- **Sustainable Resource Use**: Promotes precision farming, micro-irrigation, agroforestry, and zero tillage.
- **Crop Diversification**: Encourages mixed cropping, horticulture, and allied activities.
- **Farmer Empowerment**: Focuses on training, ICT-based knowledge dissemination, and institutional support.

1. Addressing Soil Degradation
Challenge:
- Overuse of chemical fertilizers and monocropping during the Green Revolution led to nutrient depletion and declining soil health.
  Evergreen Revolution Response:
- Promotes **organic inputs** (e.g., Sikkim's 100% organic model).
- Encourages **agroforestry**, which enhances organic matter (seen in Karnataka's models).
- Implements **zero tillage** to reduce erosion and retain soil structure, as adopted in Punjab.

Limitations:
- Lower initial yields, lack of awareness, and labor-intensive practices hinder adoption at scale.

2. Tackling Water Stress
Challenge:
- Unsustainable irrigation practices and overextraction of groundwater have created acute water stress, especially in Punjab and Haryana.
  Evergreen Revolution Response:
- Promotes **micro-irrigation** through PMKSY; Gujarat and Maharashtra show improved water-use efficiency.
- **Water harvesting structures** (e.g., Telangana's Mission Kakatiya) have enhanced irrigation resilience.
- Encourages **drought-resistant crop varieties**, reducing irrigation needs.

Limitations:
- High upfront costs, need for maintenance, and lack of technical knowledge among small farmers pose barriers.

3. Coping with Climate Variability
Challenge:
- Erratic weather patterns, unseasonal rains, and extreme events are threatening farm incomes and productivity.

Evergreen Revolution Response:
- Development of **climate-resilient crop varieties** like Sub-1 rice in flood-prone regions.
- Promotes **precision agriculture** using remote sensing and ICT to optimize resource use (Maharashtra, Karnataka pilots).
  Limitations:
- Requires robust agri-tech infrastructure, skilled manpower, and long-term R&D investment.

Conclusion
The Evergreen Revolution presents a **holistic and long-term vision** for Indian agriculture by addressing the ecological flaws of the Green Revolution. While its **relevance is undeniable** in the context of soil, water, and climate challenges, effective implementation demands **strong policy support**, financial incentives, and **capacity building**. Balancing productivity with sustainability is key to securing India's agricultural future.

2. Examine the impact of high population growth on the pace and pattern of urbanization in India. What specific challenges does rapid urban expansion pose for urban infrastructure and planning?

Introduction
India is undergoing a demographic and spatial transformation. According to the **UN World Urbanization Prospects (2022)**, India's urban population is expected to reach **52.8% by 2050**, adding over **400 million new urban residents**. High population growth has accelerated both the **pace** and **unregulated pattern** of urbanization, posing significant challenges for infrastructure, services, and governance.

Impact of Population Growth on Urbanization: Pace and Pattern
1. **Accelerated Urban Expansion:**
   o Rapid population growth leads to mass **rural-to-urban migration**, especially among the working-age population, accelerating urban sprawl.
   o Tier-2 and Tier-3 cities are experiencing unprecedented growth without adequate planning.
2. **Proliferation of Informal Settlements:**
o Urban land and housing supply fail to meet population demand, leading to **slum growth**.
o For instance, **Mumbai** houses over **9 million people in slums**, often lacking basic services.
   3. **Employment Strain and Informalization:**
o Migration-driven urbanization increases demand for jobs, pushing many into the **informal economy** with limited social security.
   4. **Skewed Urban Development:**
   o Metropolitan cities attract disproportionate investment and infrastructure, while **peri-urban and satellite towns** lag behind in basic services.

Challenges to Urban Infrastructure and Planning

1. **Housing Shortages and Slum Growth:**
   o Lack of affordable housing pushes populations into **unauthorized colonies**, worsening quality of life.
2. **Strained Public Transport:**
   o Cities like Delhi face **overburdened metro systems and traffic congestion**, indicating insufficient mobility infrastructure.
3. **Water and Sanitation Stress:**
   o Rapid growth outpaces water supply. **Chennai's 2019 water crisis** exemplifies poor urban water governance.
4. **Solid Waste Management:**
   o India generates over **62 million tonnes** of municipal solid waste annually; much remains unsegregated and mismanaged.
5. **Health and Education Services:**
   o Inadequate public hospitals and schools result in poor urban human development indicators.
6. **Environmental Degradation:**
   o Urban expansion leads to **deforestation**, loss of lakes (e.g., Bengaluru), and poor air quality (e.g., Delhi).

Way Forward

- **Integrated Master Plans** (e.g., Hyderabad Master Plan 2031) to guide spatial growth.
- Strengthening schemes like **Smart Cities Mission**, **AMRUT**, **PMAY-Urban** for infrastructure resilience.
- Promoting **Transit-Oriented Development (TOD)** and **green infrastructure**.
- Leveraging technology for **e-governance** and **smart utilities**.

Conclusion

High population growth is both a driver and consequence of India's urbanization. While it creates opportunities, the **unregulated pattern** of urban expansion has strained infrastructure and planning. A **proactive, inclusive, and sustainable urban governance model** is essential to ensure that India's cities become engines of equitable growth in the 21st century.