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INTRODUCTION

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SOCIAL JUSTICE & GOVERNANCE

NITI Aayog launches the “Fiscal Health Index 2025” in New Delhi

Context: The Fiscal Health Index (FHI) 2025, launched by NITI Aayog, marks a significant milestone in assessing the **fiscal health of Indian states**. This is part of NITI Aayog’s effort to promote fiscal prudence, transparency, and sustainable economic growth at the sub-national level.

Relevance : GS 2(Governance)

Features of the FHI:

Purpose:

- The FHI aims to offer a **data-driven, comprehensive assessment** of the fiscal health of 18 major Indian states.
- It will serve as an **annual report** focusing on the fiscal status of states and help inform **state-level policy interventions**.
- The report also aims to improve fiscal governance, **economic resilience**, and **national stability**.

Key Sub-Indices: The FHI is based on five major sub-indices that determine the fiscal health of states:

- **Quality of Expenditure:** Examines how efficiently states are utilizing public funds.
- **Revenue Mobilisation:** Measures the state’s capacity to raise revenue through taxes and other means.
- **Fiscal Prudence:** Assesses the state’s ability to manage its financial resources responsibly.
- **Debt Index:** Measures the state’s overall debt position.
- **Debt Sustainability:** Evaluates the sustainability of the state’s debt over the long term.

Top Performers:

- **Odisha** leads the ranking with a score of **67.8**, excelling in revenue mobilization and expenditure management.
- **Chhattisgarh** and **Goa** follow with scores of **55.2** and **53.6**, respectively.

Observations:

- States like **Jharkhand** have shown improvement in fiscal prudence and debt sustainability.

- On the other hand, **Karnataka** has experienced a decline due to weaknesses in expenditure quality and debt management.

Policy Implications:

- The FHI will act as a **tool for fiscal consolidation** by promoting transparency and improved resource management.
- The report helps policymakers make **informed decisions** to **strengthen fiscal resilience**.
- It encourages states to align their fiscal strategies with **national objectives** and adopt **best practices** to contribute to India's goal of becoming a **"Viksit Bharat"** by 2047.

Annual Publication:

- The FHI will be published annually, providing valuable **data-driven insights** into the fiscal health of Indian states.
- It is designed to assist **policymakers** by identifying **areas requiring intervention** and **strategic planning** to improve fiscal governance

Draft Legal Metrology (Indian Standard Time) Rules, 2025

Overview

- **Objective:** The Government of India has published the **Draft Legal Metrology (Indian Standard Time) Rules, 2025**, aiming to achieve **"One Nation, One Time"** by ensuring uniform and precise time synchronization across India.

Relevance : GS 2(Governance)

- **Lead Departments:** The initiative is led by the **Department of Consumer Affairs**, in collaboration with **National Physical Laboratory (NPL)** and **Indian Space Research Organisation (ISRO)**.
- **Project Goal:** To disseminate **Indian Standard Time (IST)** with **millisecond to microsecond accuracy**, impacting various sectors like telecommunications, banking, navigation, power grid synchronization, and scientific research.

Features of the Draft Rules

- **Precision Time Dissemination:** Establishes infrastructure to broadcast **Indian Standard Time (IST)** nationwide with high precision, leveraging advanced technologies from NPL and ISRO.
- **Critical Sectors Impacted:**
 - **Navigation** (e.g., satellite-based services)
 - **Telecommunications** (ensuring synchronization of networks)
 - **Power Grid Synchronization** (essential for grid management)
 - **Banking and Financial Services** (important for transaction timing)
 - **Digital Governance** (supporting data integrity and security)
 - **Cutting-Edge Research** (e.g., deep space navigation, gravitational wave detection)

- **Current Challenges:** Many **Telecom Service Providers (TSPs)** and **Internet Service Providers (ISPs)** still rely on foreign time sources (like GPS), which are not synchronized to IST. This creates vulnerabilities in critical national infrastructure.
- **Legal Metrology Act, 2009:** The rules will be incorporated under this Act to ensure legal enforcement of IST across sectors.
- **Mandatory Adoption of IST:** The rules propose making **IST** the official time reference across all sectors in India.
 - IST is based on **UTC +5:30 hours** and maintained by **CSIR-NPL**.
- **Synchronization Guidelines:**
 - Government offices, public institutions, and critical infrastructure must synchronize their activities with IST using reliable protocols like **Network Time Protocol (NTP)** and **Precision Time Protocol (PTP)**.
 - Exceptions are allowed only for **scientific, astronomical, and navigational** purposes with prior government approval.
- **Cybersecurity and Resilience:**
 - Establishes **cybersecurity frameworks** to protect the time dissemination infrastructure from cyber-attacks.
 - Includes **alternative time references** and mechanisms to ensure continuity during disruptions.
- **Compliance and Penalties:**
 - Compliance will be **audited periodically**.
 - Penalties will be imposed for violations to enforce nationwide adherence.

Benefits of the Rules

- **Strategic Benefits:**
 - **National Security:** Synchronizing all systems to IST is critical for national security, ensuring that time-sensitive applications function seamlessly across the country.
 - **Scientific Advancements:** Precision in timekeeping supports high-end scientific endeavors, such as **deep space exploration** and **gravitational wave detection**.
- **Economic Efficiency:**
 - **Accurate Financial Transactions:** Improved synchronization in financial services ensures accurate time-stamping for transactions, reducing errors and fraud.
 - **Industrial Benefits:** Manufacturing processes and industrial operations will be optimized through synchronized processes, enhancing **productivity** and **efficiency**.
 - **Global Competitiveness:** Enables Indian industries to align with global standards, improving their competitiveness in international markets.
- **Enhanced Public Services:**
 - Facilitates the **scheduling of public transportation**, ensuring reliable and synchronized operations.
 - Improves coordination in emergency response systems.

- **Technological Advancements:** Supports the integration of **5G technologies, Artificial Intelligence (AI), and Internet of Things (IoT)** by ensuring precise timekeeping across devices and systems.

Implementation and Compliance

- **Synchronization Procedures:** The rules define **procedures for synchronization**, accuracy standards, and the process for implementation across different sectors.
- **Auditing and Monitoring:** To ensure uniformity, periodic audits and inspections will be conducted.
- **Penalties:** Strict penalties for those who fail to comply with the synchronization standards, ensuring the rules are followed.

Long-term Implications

- **Unified National Time Standard:** The rules pave the way for a unified, synchronized time standard across India, which is crucial for the integration of national infrastructure, communication networks, and emerging technologies.
- **Government Efficiency:** Improves the **efficiency** of government operations by ensuring consistent time-keeping across departments and public services, enhancing coordination and decision-making.
- **Social and Economic Impact:** By standardizing time, the rules aim to improve **day-to-day operations** for businesses, consumers, and government institutions, promoting smoother societal and economic functioning.

National Girl Child Day 2025

Context and Significance

- Date of Celebration: **January 24** annually.
- **Objective:** To promote awareness about the rights, education, and welfare of girl children, addressing gender disparities and societal challenges.
- **Initiated by:** Ministry of Women and Child Development in **2008**.
- **Key Focus:**
 - Gender equality.
 - Awareness about issues like female foeticide and declining sex ratios.
 - Advocacy for education and empowerment of girls.

Relevance : GS 2(Governance,Social Issues)

Important Themes and Objectives

a. Awareness of Rights:

- Highlighting the **fundamental rights of girl children**, as enshrined in the Constitution of India.
- Emphasizing their **right to education, health, and equal opportunities**.

b. Advocacy Against Gender Bias:

- Promoting societal change to **eliminate discriminatory practices** like female foeticide and child marriage.
- Focus on improving the **child sex ratio** and addressing issues of neglect and abuse.

c. Empowerment and Welfare:

- **Encouraging education for girls** and fostering their participation in societal and economic activities.
- Promoting an **inclusive environment** for the holistic growth of girl children.

Major Government Initiatives

a. Legal Framework:

- **Prohibition of Child Marriage Act (2006):**
 - Targets the elimination of child marriages through penalties and awareness.
- **POCSO Act (2012):**
 - Protects children from sexual offenses, with updated rules in 2020 for better implementation.
- **Juvenile Justice Act (2015):**
 - Ensures care and protection for children in need, addressing their rights comprehensively.

b. Dedicated Programs and Schemes:

- **Mission Vatsalya:**
 - Aimed at child protection, offering services like the **Child Helpline (1098)** and the **Track Child Portal**.
 - The **Track Child Portal (2012)** links missing children reports with those residing in Child Care Institutions (CCIs).
- **PM CARES for Children Scheme:**
 - Supports children orphaned by COVID-19 through education, health, and financial assistance.
- **Collaborations with NIMHANS & E-SAMPARK:**
 - Provides mental health and medical care for children, emphasizing emotional well-being.

Challenges Addressed

- **Declining Sex Ratio:** Rising concerns about societal preferences for male children, leading to skewed ratios.
- **Gender Disparities in Education:** Limited access to education for girls in rural and underprivileged areas.
- **Gender-Based Violence:** Addressing violence, abuse, and neglect faced by girl children.

Broader Implications

- **Social Advancement:** Empowering girl children leads to improved societal metrics such as literacy rates, maternal health, and economic productivity.
- **Economic Growth:** Educating and empowering girls contributes to workforce diversification and national development.
- **Global Commitments:** Aligns with SDG 5 (Gender Equality) and SDG 4 (Quality Education).

Way Forward

- **Strengthening Implementation:** Ensure effective enforcement of child protection laws and policies.

- **Community Engagement:** Mobilize local communities to eliminate stereotypes and biases.
- **Focus on Education:** Expand educational initiatives tailored to girls, particularly in rural and backward areas.
- **Healthcare Accessibility:** Enhance health programs targeting adolescent girls and reduce maternal mortality rates.

From Data to Diagnosis

Introduction

- India's healthcare is undergoing **rapid digitalization** due to government initiatives and technological advancements.
- **Key objectives:** Enhance accessibility, affordability, and efficiency of healthcare, especially for rural areas.
- **Tools:** Telemedicine, EHRs, AI-based diagnostics.

Relevance : GS 2(Health , Schemes)

India's Potential in Digital Health (WEF Article)

- **Global Leader Role:** WEF emphasizes India's potential to lead digital health globally.
- Key Pillars:
 - **Interoperability:** Standardizing data exchange between healthcare stakeholders.
 - **Public-Private Partnerships:** Driving innovation and scalability.
 - **Affordability & Accessibility:** Bridging healthcare gaps using digital tools.
 - **Scalability:** Positioning India's models as global templates for healthcare equity.

Digital Healthcare Infrastructure

- **Ayushman Bharat Digital Mission (ABDM)**
 - Components: **Health ID, HPR, HFR, UHI.**
 - Impact: **73 crore health accounts** created; focus on urban-rural healthcare parity.
 - **AI Research Collaboration:** IIT Kanpur & NHA for advanced AI solutions.
- **Telemedicine (e-Sanjeevani)**
 - Modules: OPD for patients, AB-HWC for specialists.
 - COVID-19 accelerated adoption; significant boost to rural healthcare.
- **U-WIN Portal**
 - **Focus:** Digital vaccination services for women and children.
 - **Adoption:** **7.43 crore** beneficiaries registered by **November 2024.**
- **Aarogya Setu App**
 - Transformed into a **comprehensive National Health App** under ABDM.
 - **Services:** Scheduling appointments, e-prescriptions, lab reports, vaccination certificates.

- **e-Hospital & e-BloodBank**
 - A Digital India initiative for streamlining hospital workflows and blood bank management.
- **Tele Mental Health Programme (Tele-MANAS)**
 - Scope: Launched in 2022; operational in 36 States/UTs, handling over 17.6 lakh calls.

Policies Shaping Digital Healthcare

- **National Health Policy 2017:** Advocates EHRs, telemedicine, and digital health integration.
- **National Health Mission (NHM):** Focus on rural infrastructure and marginalized healthcare access.
- **Health Data Management Policy:** Emphasizes data privacy, patient consent, and secure exchange.
- **National Digital Health Mission (NDHM):** Aims for universal health coverage via digital health tools like UHID and PHR.
- **PM Ayushman Bharat Health Infrastructure Mission (PM-ABHIM):** Strengthening healthcare infrastructure with digital integration.

Future Scope

- **Focus Areas:**
 - AI diagnostics.
 - Blockchain-based health record systems.
 - Robust cybersecurity frameworks.
- **Global Impact:** India is set to establish a scalable, inclusive, and efficient digital health ecosystem, serving as a model for developing nations.

INTERNATIONAL RELATIONS

India's delegation to WEF 2025 highlights AI, Sustainability and Global Partnerships

Event Overview: WEF 2025 in Davos

- 55th Annual Meeting of WEF
- **Dates:** January 20-24, 2025
- **Location:** Davos-Klosters, Switzerland
- **Theme:** "Collaboration for the Intelligent Age"

India's participation will focus on **AI, sustainability, global partnerships, and economic transformation**, reflecting its role in shaping the global agenda for the "**Intelligent Age.**"

Relevance: GS 2 (International Relations) | GS 3 (Economy)

Focus Areas for India

India's delegation will contribute to WEF's **five key workstreams:**

1. **Reimagining Growth** – Exploring innovation-driven economic growth models.
2. **Investing in People** – Emphasizing human capital development and upskilling.
3. **Rebuilding Trust** – Addressing trust deficits in governance and global cooperation.
4. **Industries in the Intelligent Age** – Leveraging emerging technologies like AI, IoT, and blockchain.
5. **Safeguarding the Planet** – Promoting sustainable practices and climate resilience.

India's Delegation: One Nation, One Voice

six Indian states will participate:

- Andhra Pradesh
- Maharashtra
- Telangana
- Tamil Nadu
- Uttar Pradesh
- Kerala

The states will highlight their **industrial advancements and investment opportunities** to attract global investments.

Key Topics India Will Address

India will engage in panel discussions, roundtables, and G2B/G2G engagements covering critical global issues:

6. Sustainability and Trust
7. Food Security
8. Economic Partnerships Driving Investments
9. Infrastructure as an Enabler
10. Supply Chain Diversification
11. AI for Process Transformation
12. Chemicals Investment Opportunity

AI & FDI Session: Key Highlight for India

India will participate in the session “**AI and FDI: Challenges and Opportunities for Sustainable Investment,**” co-organized by:

- Invest India
- WAIPA (World Association of Investment Promotion Agencies)
- WIDA (World Investment for Development Alliance)

This session will explore how artificial intelligence can enhance foreign direct investment (FDI) and sustainable investments.

India's FDI Success Story

- India has surpassed **\$1 trillion in FDI inflows since April 2000.**
- FDI in the first half of the current fiscal year reached **\$42.1 billion**, reflecting a **26% growth.**
- India's strategic **policy reforms** and **business-friendly ecosystem** make it a top destination for **global investments.**

Why WEF 2025 Matters for India

13. **Global Economic Leadership** – India's participation reinforces its role in shaping the **global economic agenda.**
14. **Technological Innovation** – Demonstrating leadership in **AI** and **frontier technologies** for **digital transformation.**
15. **Sustainability Focus** – Showcasing efforts to achieve **Net Zero goals** and **climate resilience.**
16. **Investment Destination** – Promoting India as a prime investment hub through FDI success stories.

Significance for India's Global Role

India's participation at **WEF 2025** highlights its growing influence in **global policy discussions** on **sustainable development, emerging technologies, and economic cooperation.** This aligns with India's **G20 Presidency vision** and underscores its role as a key player in the **Fourth Industrial Revolution.**

INDIAN ECONOMY

Future Ready: India's Digital Economy to Contribute One-Fifth of National Income by 2029-30

The recent report "State of India's Digital Economy 2024" highlights that India is the **third-largest** digitalized economy globally and ranks **12th among G20 nations** in terms of **individual digitalization**.

By **2029-30**, the digital economy is projected to contribute nearly **one-fifth** of India's national income, surpassing the share of agriculture and manufacturing.

Relevance : GS 3(Digital Economy)

Size and Growth of India's Digital Economy

- The digital economy contributed **11.74% of GDP** (INR 31.64 lakh crore or USD 402 billion) in **2022-23**.
- It employed **14.67 million workers**, accounting for **2.55%** of the workforce.
- The sector is **five times more productive** than the rest of the economy.
- The digitally enabling industries (**ICT services, electronic components, and communication equipment**) contributed **7.83% of Gross Value Added (GVA)**.
- Digital platforms and intermediaries added **2% of GVA**, while digitalization of traditional sectors (BFSI, retail, education) contributed another **2% of GVA**.
- By 2029-30, the digital economy's share is projected to grow to **20% of GVA**, overtaking agriculture and manufacturing.

Sectoral Impact of Digitalization

- **Banking & Financial Services (BFSI):**
 - Over **95%** of payment transactions are digital.
 - Revenue-generating activities like **loans** and **investments** remain **largely offline**.
- **Retail:**
 - Increasing adoption of **omni-channel models** with **e-commerce firms** opening physical stores.
 - **AI-powered inventory** management and chatbot-driven customer service are improving efficiency.
- **Education:**
 - Shift towards **hybrid learning models** (offline and online integration).
- **Hospitality & Logistics:**
 - Use of **AI, metaverse, and digital management tools** in large firms.

- Smaller enterprises lag behind in digital adoption.

Growth Drivers

- **Artificial Intelligence (AI) and Cloud Services:** AI-driven solutions are streamlining operations across industries.
- **Global Capability Centers (GCCs):** India hosts **55% of the world's GCCs**, strengthening its digital workforce.
- **Digital Intermediaries & Platforms:** Rapid growth expected, with digital platforms anticipated to expand at **30% CAGR**.
- **Government Initiatives:** Programs like **Digital India, PM Gati Shakti, and ONDC** are enabling seamless integration of technology in various sectors.

Employment Trends and Gender Inclusion

- The digital economy accounts for **2.55% of India's workforce**.
- **58.07% of jobs** in the digital economy are in digital-enabling industries.
- **Increased opportunities for women:** Digital platforms have facilitated female workforce participation in sectors where mobility was a challenge.

Challenges & Road Ahead

Challenges

- **Digital Divide:** Unequal access to digital resources in rural vs. urban areas.
- **Cybersecurity Risks:** Rising digital transactions increase vulnerability to cyber threats.
- **Skill Gap:** Workforce needs upskilling in AI, cloud computing, and cybersecurity.
- **Regulatory Challenges:** Ensuring a balanced regulatory framework for digital platforms and AI governance.

Future Prospects

- By **2030**, India's digital economy will outpace traditional sectors, contributing **one-fifth of the national income**.
- **Digital transformation** in BFSI, retail, education, and logistics will drive economic resilience.
- **Focus on AI, cloud services, and GCC expansion** will be crucial for sustained growth.

Exponential Growth in Digital Transactions

Context: India's exponential growth in digital transactions reflects the nation's transformative journey toward a **cashless economy**. Spearheaded by platforms like **UPI, IMPS, and NETC FASTag**, this digital revolution is an embodiment of financial inclusion and efficiency.

Relevance : GS 3(Economy)

Unified Payments Interface (UPI)

- UPI integrates multiple bank accounts into a single app, enabling seamless fund transfers, merchant payments, and more.
- **Growth Statistics:**
 - **Transactions in December 2024:** 16.73 billion (value: **₹23.25 lakh crore**).

- **Yearly Increase (2024):** 172 billion transactions (+46% from 2023).
- **Significance:**
 - Facilitates secure, instant payments.
 - Empowers small businesses and rural merchants, fostering financial inclusivity.
 - Reduced dependency on cash transactions, aligning with government goals like *Digital India*.

Immediate Payment Service (IMPS)

- IMPS, operational since 2010, offers 24x7 real-time fund transfers. Accessible via mobile, ATM, internet, and SMS, it caters to both businesses and individuals.
- **Growth Statistics:**
 - **December 2024:** 441 million transactions (value: ₹6.01 lakh crore).
 - **November 2024:** 407.92 million transactions (value: ₹5.58 lakh crore).
- **Significance:**
 - Critical for instant payments across sectors.
 - Supports micro and macroeconomic financial activities.

NETC FASTag

- A cashless toll collection mechanism linked to bank accounts, saving time and fuel at national highways.
- **Growth Statistics:**
 - **Transactions in December 2024:** 381.98 million (value: ₹6,642 crore).
 - **November 2024:** 358.84 million transactions (value: ₹6,070 crore).
- **Significance:**
 - Improves highway infrastructure efficiency.
 - Encourages digital adoption in traditionally cash-heavy sectors

Drivers of Growth

- **Policy Push:**
 - Initiatives like *Digital India* and demonetization have catalyzed digital adoption.
 - Introduction of **robust financial infrastructures by NPCI**.
- **Technological Advancements:**
 - Mobile penetration and improved internet connectivity.
 - Simplified user interfaces of digital payment apps.
- **Behavioral Shifts:**
 - Increased trust in secure, digital transactions.
 - Growth in rural digital literacy and banking access.

Challenges to Address

- **Cybersecurity Concerns:** Growing digital adoption increases vulnerability to fraud and cybercrimes.
- **Digital Divide:** Access disparities in rural and underdeveloped areas.
- **Infrastructure Gaps:** Need for reliable internet and digital literacy in remote regions.

Future Outlook

- **Enhanced Digital Ecosystem:** Expansion of digital payment platforms and innovations in fintech.
- **Increased Adoption:** Government initiatives to incentivize digital transactions and address the digital divide.
- **Global Leadership:** India's success can serve as a model for other nations aiming to transition toward a cashless economy.



AGRICULTURE

Union Minister for Commerce and Industry Shri Piyush Goyal launches National Turmeric Board

Context: The **National Turmeric Board (NTB)** has been launched by the Union Minister for Commerce & Industry, Shri Piyush Goyal, with its headquarters in **Nizamabad, Telangana**. The board aims to boost **turmeric production**, ensure **farmer welfare**, enhance **exports**, and **develop new varieties** for global markets.

Relevance : GS 3(Agriculture , Economy)

Establishment of National Turmeric Board (NTB):

- **Headquarters:** Nizamabad, Telangana – a major turmeric-growing region.

Objectives of the Board:

- Welfare of turmeric farmers across **20 states**.
- Focus on **research and development (R&D)** for high-yield and high-quality turmeric varieties.
- **Value addition** for turmeric products to boost exports.
- **Creation of awareness** about the health and medicinal properties of turmeric.
- Ensuring **quality and safety standards** for turmeric production and export.

India's Dominance in Turmeric Production:

- India produces **70%** of the world's turmeric.
- In **2023-24**, **3.05 lakh hectares** were under turmeric cultivation, yielding **10.74 lakh tonnes**.
- India exported **1.62 lakh tonnes** of turmeric products valued at **226.5 million USD**.

Participants and Representation:

- Ministry of AYUSH, Department of Pharmaceuticals, Agriculture & Farmers Welfare, and Department of Commerce are part of the Board.
- **Maharashtra, Telangana, and Meghalaya** will have rotating state representatives on the Board.
- **Lakadong Turmeric** from Meghalaya, known for its **high curcumin content**, will be a priority.

Significance of the National Turmeric Board:

Farmer Welfare and Livelihoods : Turmeric cultivation is a **major source of livelihood** for farmers in **Telangana, Andhra Pradesh, Tamil Nadu, and Maharashtra**.

- The Board will focus on:
 - Fair pricing mechanisms.

- **Improved logistics** for marketing and distribution.
- **Insurance schemes** to reduce risks for turmeric farmers.

Boosting Exports and Trade :

- Turmeric holds immense potential in the **global health and wellness industry** due to its medicinal properties.
- The Board will:
 - Focus on **value-added products like curcumin extracts, cosmetics, and nutraceuticals.**
 - Explore **new markets**, especially in **Europe and North America**, where turmeric is increasingly used for its **anti-inflammatory and antioxidant** properties.

Promoting Research and Innovation :

- The Board will invest in **R&D** to:
 - Develop new high-yielding and disease-resistant varieties.
 - **Enhance curcumin content** (a key compound in turmeric with medicinal properties).
 - Promote **organic farming** practices to meet global demand for **chemical-free turmeric.**

Enhancing Logistics and Supply Chains:

- Turmeric farmers face **challenges** related to:
 - Inadequate **storage** facilities.
 - High **transportation** costs.

The Board aims to:

- Develop **cold storage** infrastructure.
- Improve **supply chain mechanisms** to reduce wastage and improve shelf life.

Major Turmeric-Producing States in India:

State	Special Varieties	Key Districts
Telangana	Nizamabad Turmeric	Nizamabad, Warangal
Andhra Pradesh	Kadapa Turmeric	Kadapa, Guntur
Tamil Nadu	Erode Turmeric	Erode, Salem
Maharashtra	Sangli Turmeric	Sangli
Meghalaya	Lakadong Turmeric	Jaintia Hills

Challenges Faced by the Turmeric Sector:

Challenges	Proposed Solutions by NTB
Price volatility	Establish price stabilization mechanisms.
Poor quality standards	Promote quality certification and standardization.

Lack of export-oriented products	Focus on value-added turmeric products .
Low productivity	R&D on high-yield varieties and best practices.
Poor farmer awareness	Conduct training and awareness programs.

Global Demand for Turmeric:

- The global **turmeric market** is expected to grow significantly, driven by demand for **natural health supplements, cosmetics, and food additives**.
- India, with its **62% share in global turmeric trade**, stands to benefit from targeted interventions in production and export.

Government Schemes Supporting the Turmeric Sector:

Scheme	Details
Paramparagat Krishi Vikas Yojana	Promotes organic farming and supports turmeric farmers adopting organic practices.
Mission for Integrated Development of Horticulture (MIDH)	Provides financial assistance for the cultivation and marketing of spices like turmeric.
National Agricultural Market (eNAM)	Digital marketing platform to connect turmeric farmers to buyers directly.
Spice Development Agency	Aims at regional development of spices, including turmeric.

Way Forward:

Improving Farmer Income:

- The Board should prioritize **minimum support prices (MSP)** and **direct benefit transfer (DBT)** to turmeric farmers.

Creating Export-Ready Products:

- Focus on **value-added products** such as **turmeric capsules, essential oils, and curcumin extracts** to cater to the global health industry.

Addressing Farmer Challenges:

- The Board should implement **farmer training programs** to improve **agricultural practices** and increase **awareness about export markets**.

Strengthening Quality Standards:

- Introduce **GI tags** for unique varieties like **Lakadong Turmeric** to improve branding and recognition.

SCIENCE & TECHNOLOGY

Cabinet approves the establishment of “Third Launch Pad”

Context : Approval and Objectives:

- The Union Cabinet has approved the establishment of the **Third Launch Pad (TLP)** at the **Satish Dhawan Space Centre (SDSC), Sriharikota, Andhra Pradesh.**
- **Objective:**
 - To accommodate **Next Generation Launch Vehicles (NGLV).**
 - Act as a **standby** for the Second Launch Pad (SLP).
 - Support **Indian human spaceflight missions** and enhanced space exploration capacity.

Relevance : GS 3(Space)

Features and Implementation:

- The TLP will be designed with **universal adaptability** to support multiple vehicle configurations:
 - NGLV.
 - **LVM3 vehicles** with semi-cryogenic stages.
 - Scaled-up configurations of NGLV.
- Realization within **48 months** (4 years).
- Emphasis on **industry participation** and leveraging ISRO's prior experience.

Expenditure:

- Total estimated cost: **₹3984.86 crore**, covering the launch pad and associated facilities.

Impact on Space Ecosystem:

- Boosts India's space ecosystem by enabling:
 - Increased launch frequency.
 - Support for human spaceflight and space exploration.
 - Development of heavy-lift capabilities.

Background:**Existing Launch Infrastructure:**

- Current reliance on:
 - **First Launch Pad (FLP):** Operational for 30 years, primarily supports **PSLV** and **SSLV** missions.
 - **Second Launch Pad (SLP):** Operational for 20 years, designed for **GSLV** and **LVM3**. It also supports PSLV missions and commercial launches.

Need for a Third Launch Pad:

- Increasing demands of the **Amrit Kaal vision**:
 - Bharatiya Antariksh Station (BAS) by 2035.
 - Indian crewed lunar landing by 2040.
- Requirement for new-generation, heavier launch vehicles with advanced propulsion systems.

TLP Justification:

- Current launch pads are insufficient to cater to:
 - Upcoming **heavier-class launch vehicles**.
 - Increased **launch frequencies** for national and commercial missions.
- TLP is critical to support space transportation needs for the next **25-30 years**.

Analytical Perspective:**Strategic Importance:**

- Enhances **national space capabilities** to compete globally.
- Critical for missions like **Gaganyaan, Chandrayaan, and interplanetary exploration**.
- Reduces dependency on aging infrastructure, ensuring redundancy.

Economic and Industrial Implications:

- Promotes **private sector participation** in the space sector, aligning with **Atmanirbhar Bharat**.
- Strengthens India's position as a **commercial space hub**, boosting exports and collaborations.

Technological Advancements:

- Supports development of semi-cryogenic engines and heavier payload capabilities.
- Enables **human-rated launches** and next-gen propulsion systems.

Way Forward:

- Timely execution of the TLP project to meet evolving space demands.
- Integration with future projects like **NGLV, Bharatiya Antariksh Station, and Indian lunar missions**.
- Strengthening **private-public partnerships** for innovative and cost-effective solutions.

The Third Launch Pad represents a significant step toward realizing India's ambitious space vision, reinforcing its leadership in the global space arena.

India's Deep Ocean Mission Gains Momentum: Human

Context and Significance

- **Launch Year:** 2025 for the first human submersible (**500 meters depth**).
- **Future Target:** A manned mission to explore depths of **6,000 meters in 2026**.
- Objective:
 - To establish India's dominance in **deep-sea exploration**.
 - To strengthen the blue economy by unlocking underwater resources.
- **Global Recognition:** India joins an elite group of six nations with advanced deep-sea technology capabilities.

Relevance: GS 3(Technology)

Highlights

a. Technological Milestones:

- Deep-Sea Manned Vehicle (**Submersible**):
 - The **2025** submersible will operate at a depth of **500 meters**.
 - A **subsequent model** will dive to a depth of **6,000 meters**, showcasing advanced engineering and research capabilities.
 - Entirely indigenous technology, reinforcing India's self-reliance.

b. Strategic Vision:

- Aligns with **India's space mission (Gaganyaan)**, symbolizing dual achievements in space and ocean exploration.
- Strengthens the **Atmanirbhar Bharat (Self-Reliant India)** initiative.

c. Focus on Sustainability and Economy:

- Unlock critical resources like:
 - **Rare metals and critical minerals:** Vital for industries like electronics, renewable energy, and defense.
 - **Marine biodiversity:** Promotes sustainable fisheries and ecosystem conservation.
- Contribution to economic growth through the **Blue Economy** framework.

Mission Objectives and Impacts

a. Objectives:

1. **Resource Exploration:**
 - Accessing untapped mineral wealth and rare earth elements on the ocean floor.
 - Discovery of deep-sea biodiversity for sustainable use.
2. **Scientific Research:**
 - Enhancing understanding of deep-sea ecosystems.

- Studying potential impacts of climate change on marine environments.

3. **Economic Growth:**

- Boosting India's GDP through sustainable resource utilization.

4. **Technological Advancement:**

- Development of cutting-edge indigenous technology.

b. Impacts:

• **Economic:**

- Reducing dependency on imported critical minerals.
- Establishing India as a leader in ocean-based economies.

• **Environmental:**

- Facilitating marine conservation through informed exploration.

• **Global Standing:**

- Strengthening India's geopolitical position in oceanic resource exploration.

Challenges Addressed

• **Technological Barriers:**

- Advanced materials and pressure-resistant systems are required for missions at extreme depths.

• **Pandemic-Induced Delays:**

- Despite setbacks during COVID-19, the mission's progress showcases India's resilience.

• **Environmental Concerns:**

- Commitment to responsible and sustainable exploration to avoid ecological damage.

Stakeholders and Contributions

- **Ministry of Earth Sciences (MoES):** Core agency for implementation.

• **Collaborators:**

- NITI Aayog: Strategic planning and policy alignment.
- Scientific Advisors: Ensuring cutting-edge innovation and global standards.

• **Leadership:**

- Dr. Jitendra Singh: Highlighting the mission's significance and alignment with national priorities.
- Other ministries such as Finance and Defense: Cross-sectoral collaboration.

Broader Implications

a. Global Recognition:

- Positions India as a **technological leader** in oceanic and space exploration.
- Aligns with international goals such as the **United Nations Decade of Ocean Science** for Sustainable Development (2021-2030).

b. Blue Economy Potential:

- Diversification of **economic activities** related to oceans:
 - Marine biotechnology.
 - Ocean-based renewable energy.
 - Sustainable fisheries.

c. Strategic Edge:

- Strengthens India's claim in the **Indian Ocean Region (IOR)**, enhancing geopolitical influence.
- Supports **national security** by fostering advanced underwater technology.

Way Forward

- **Technological Readiness:** Strengthen indigenous manufacturing for mission-critical components.
- **Environmental Stewardship:** Ensure exploration aligns with global conservation standards.
- **Global Partnerships:** Collaborate with other countries and institutions to leverage expertise.
- **Capacity Building:** Train scientists and engineers to handle advanced oceanic technology.

SpaDeX Mission: Revolutionising Space Exploration

Context : Achievement Milestone:

- **India's Fourth Nation Status:** With the successful execution of the SpaDeX mission, India joins the elite group of countries capable of space docking operations.
- **Launch Details:**
 - Mission initiated on **30th December 2024**.
 - Spacecraft launched via **PSLV-C60** from the **Satish Dhawan Space Centre**, Sriharikota.
- **Docking Success:** Completed on 16th January 2025.

Relevance : GS 3(Space)

Technological Significance:

- SpaDeX demonstrates rendezvous, docking, and undocking capabilities essential for:
 - Satellite Servicing.
 - Space Station Operations.
 - Interplanetary Exploration.

Mission Objectives:

- Develop and validate docking mechanisms.
- Establish control over docked satellites as a single entity.
- Demonstrate **life-extension** capabilities for satellites.
- Conduct **power transfer** between docked spacecraft.

Mission Features:

- Two satellites: **SDX01 (Chaser)** and **SDX02 (Target)**, each weighing ~220 kg.
- **Equipped with:**
 - Solar panels and lithium-ion batteries.
 - Advanced Attitude and Orbit Control System (AOCS).
- **Indigenous innovations include:**
 - Bharatiya Docking System.
 - GNSS-based Relative Orbit Determination.
 - Inter-Satellite Communication Link (ISL).

Applications and Future Goals:

- High-resolution **imaging** and **resource monitoring**.
- Preparation for ambitious missions like:
 - Bharatiya Antariksh Station (BAS).
 - Chandrayaan-4.
 - Gaganyaan.
- Collaboration with the Department of Biotechnology to explore **space biology** applications.

Global and Strategic Importance:

- Strengthens India's leadership in **autonomous space technology**.
- Supports India's strategic goals in **space exploration**, enhancing **global partnerships**.
- Lays groundwork for **lunar sample returns** and **manned space missions**.

Analytical Perspective:**Technological Leap:**

- Marks a pivotal step in India's transition from satellite launches to **advanced space operations**.
- Positions ISRO for competitive participation in global space programs.

Strategic Autonomy:

- Indigenous developments reduce dependence on foreign technologies, aligning with **Atmanirbhar Bharat**.

Broader Implications:

- Enhances India's capacity for **space diplomacy**.

- Opens avenues for commercial utilization of space technologies.

Way Forward:

- Ensure successful undocking and validate power transfer mechanisms.
- Leverage SpaDeX outcomes for **operationalizing the Bharatiya Antariksh Station**.
- Strengthen global collaboration in space exploration and technology sharing.

SpaDeX underscores India's emergence as a **leader in space innovation**, setting the stage for a new era of scientific and strategic advancements.

Technology developed to shape light for future technologies**Context:** Technological Breakthrough in **Nanophotonics**

Researchers at **IISc Bangalore** have developed a **cutting-edge platform** for controlling light at the nanoscale, with significant applications in **quantum communication, data encryption, and next-gen photonic devices**.

Relevance : GS 3 (Science & Technology)

Technology: 2D Semiconductor Colloidal Quantum Wells (CQWs)

- CQWs are highly suitable as **nanoscale photon sources** due to their:
 - Giant oscillator strengths
 - Large absorption cross-sections
 - These features make CQWs ideal for applications in **quantum metrology** and **quantum cryptography**.

Innovation: Integration with Dielectric Metasurfaces

- **Dielectric Metasurface Resonators (MSRs)** were integrated with CQWs to achieve:
 - Emission line narrowing
 - Long-range photon transport
 - Enhanced spectral purity
- **Platform used:**
 - Cadmium Selenide (CdSe)-based CQWs
 - Silicon nitride (SiN) slab-waveguide
 - **Square-lattice geometry of holes** for precise light emission tuning.

Important Results Achieved

- 12-fold increase in brightness
- **97% reduction in spectral width**, ensuring superior spectral purity.
- Photon transport over 1 mm, a critical step for on-chip quantum devices.

Applications of the Innovation

1. **Quantum Communication** – Highly secure information transfer.
2. **Quantum Cryptography** – Ensuring data encryption using single-photon sources.

3. Next-gen Photonic Devices – Efficient on-chip light sources for quantum information processing.

Tools and Setup Used

- Confocal Photoluminescence (PL) Microscope funded by DST-FIST program.
- Published in **Advanced Optical Materials**.

Future Plans

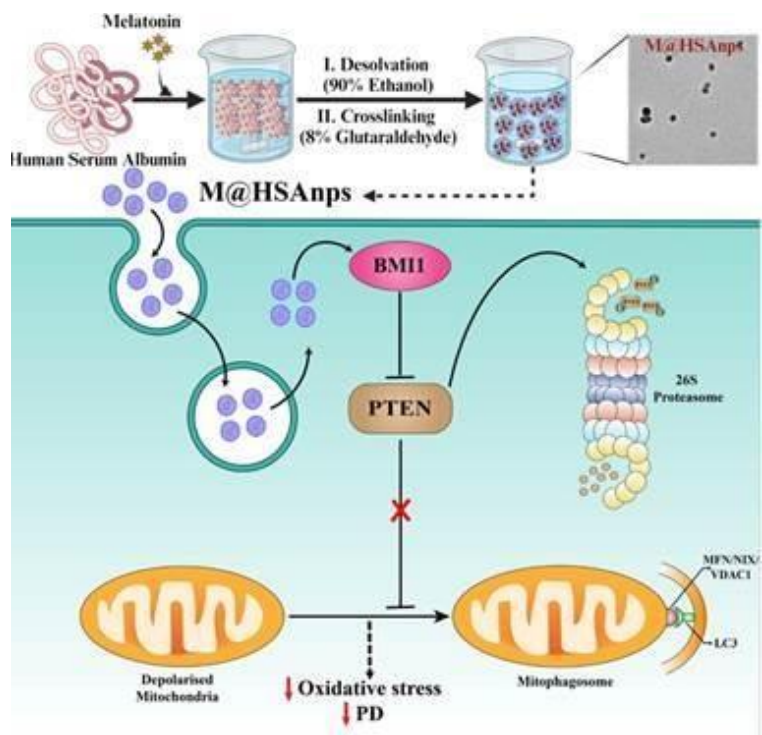
- **Integration of Single Quantum Emitters (SPEs) with MSRs**
 - Potential for creating highly efficient single-photon sources.
 - Could revolutionize on-chip quantum photonics for secure communications and advanced sensing technologies.

Significance for India

- Enhances India’s quantum technology ecosystem.
- Strengthens quantum cryptography capabilities.
- Opens new frontiers in **nanophotonics research**.

Nano-formulation of Darkness Hormone Could Be Therapeutic Solution for Parkinson's Disease

Context : Scientists at the Institute of Nano Science and Technology (INST), Mohali, have developed a nano-formulation of **melatonin**, a hormone produced in response to darkness. This nano-formulation has demonstrated improved **antioxidative** and **neuroprotective** properties and could be a potential therapeutic solution for Parkinson's disease (PD).



Highlights

Parkinson's Disease (PD)

- **PD is a neurodegenerative disorder** characterized by the death of **dopamine-secreting neurons** due to the aggregation of **synuclein protein** in the brain.
- **Current treatments** for PD only manage symptoms but do not cure the disease, highlighting the need for better therapeutic approaches.

Role of Melatonin

- **Melatonin** is a **neurohormone** secreted by the **pineal gland** that regulates the sleep-wake cycle.
- It has potential as an **antioxidant** and can induce **mitophagy** (removal of dysfunctional mitochondria), reducing oxidative stress in neurons.
- However, melatonin has **limitations** such as **low bioavailability**, **premature oxidation**, and **poor brain delivery**.

Research Overview

- **Institute Involved:** Institute of Nano Science and Technology (INST), Mohali.
- **Research Lead:** Dr. Surajit Karmakar and his team.
- **Objective:** To enhance the delivery and efficacy of melatonin using human serum albumin (HSA) nano-formulation.

Key Innovations

Nano-formulation of Melatonin:

- A biocompatible protein (HSA) nanocarrier was used to deliver melatonin to the brain.
- The nano-melatonin formulation resulted in **sustained release** and improved bioavailability.

Mechanism of Action:

- The nano-formulation enhanced antioxidative and neuroprotective properties.
- It promoted **mitophagy** to remove unhealthy mitochondria and improved **mitochondrial biogenesis**.
- **Reduction of pesticide-induced toxicity** was demonstrated in an in vitro PD model using rotenone.

Epigenetic Regulation via BMI1:

- The nano-melatonin formulation induced the expression of **BMI1**, a key epigenetic regulator in neurons.
- BMI1 plays a critical role in regulating gene expression and promoting mitophagy.

Key Findings

- The study revealed that **nano-melatonin** improved **antioxidative effects** and reduced **oxidative stress**.
- **TH-positive neurons in rat brains** were protected against rotenone-induced toxicity.
- The research demonstrated, for the first time, that **BMI1 overexpression** could be achieved through nano-formulation, inducing **mitophagy** and **protecting neurons** from degeneration.
- The findings were published in the journal **ACS Applied Materials & Interfaces**.

Importance of Mitophagy in PD

- **Mitophagy** is a cellular process that identifies and removes dysfunctional mitochondria to reduce oxidative stress.
- Dysregulated mitophagy contributes to **neurodegeneration** in Parkinson's disease.
- Enhanced mitophagy through **BMI1 regulation** can help in curbing oxidative stress, reducing neuronal damage in PD.

Advantages of Nano-Melatonin

- **Improved Bioavailability:** The nano-formulation ensures better absorption and delivery to the brain.
- **Sustained Release:** The drug is released gradually, ensuring long-lasting effects.
- **Enhanced Antioxidative Properties:** It significantly reduces oxidative stress in neurons.
- **Epigenetic Regulation:** The upregulation of **BMI1** helps protect neurons from degeneration.

Potential Applications

- **Parkinson's Disease:** As a therapeutic solution to reduce oxidative stress and protect neurons.
- **Other Diseases:** The approach could be applied to diseases where **dysregulated mitophagy** is a critical pathological factor.

Conclusion

The nano-formulation of melatonin presents a promising therapeutic strategy for Parkinson's disease by addressing oxidative stress and improving mitochondrial health through mitophagy regulation. The study provides a foundation for developing **safer and more effective neurotherapeutic drugs** for PD and other neurodegenerative diseases.

ISRO's 100th Launch Marks a Quantum Leap in India's Space journey

Background:

- **100th successful launch from Sriharikota:** ISRO's **GSLV-F15/NVS-02** mission marks a historic milestone.
- **Rapid infrastructure expansion:** A third launch pad in **Sriharikota** and a new launch site in **Tamil Nadu's Tuticorin**.
- **Private sector boom:** Growth from single-digit startups in **2021** to nearly **300 today**.
- **Economic impact:** India's space economy projected to reach **\$44 billion** by 2035.
- **Global leadership in satellite launches:** ISRO handles **90%** of foreign satellite launches.

Relevance : GS 3(Space)

ISRO's Evolution: From Slow Beginnings to a Rapid Growth Phase

- **Foundation (1969-1993):**
 - Established under Vikram Sarabhai's leadership.
 - Took over two decades for the first launch pad (1993).

- **Gradual Expansion (1993–2014):**
 - Second launch pad established in 2004, a decade after the first.
- **Transformational Growth (2014–2024):**
 - Accelerated infrastructure and investment.
 - Upcoming third launch pad in Sriharikota.
 - New spaceport in Tuticorin, Tamil Nadu.

Implication: Faster development in the last decade indicates strong government push, policy reforms, and increased international collaborations.

Private Sector Revolution in Space

- **2014–2020:**
 - ISRO solely led India's space advancements.
- **Post-2020:**
 - Government reforms unlocked the space sector for **private players**.
 - Number of space startups surged from single digits in **2021 to nearly 300 in 2025**.
 - **Rs 1,000 crore** investment in the sector in **2023 alone**.
 - International collaborations and private satellite launches increased significantly.

Significance: India is positioning itself as a major global hub for space entrepreneurship.

India's Space Economy: A Growing Powerhouse

- Current valuation: **\$8 billion**.
- Projected by 2035: **\$44 billion**.
- **Foreign satellite launches:** ISRO now accounts for **90%** of all global foreign satellite launches.
- **India's global positioning:** Rising as a key player in commercial space launches and satellite-based services.

Economic Implication: Increased foreign investments, technology transfers, and global collaborations in the coming years.

Strategic Infrastructure Expansion

- **Sriharikota Expansion:** Third launch pad under development.
- New Launch Site in **Tuticorin, Tamil Nadu:** Diversifying launch capabilities.
- **Advantage of Tuticorin:**
 - Closer to the equator → More efficient satellite launches.
 - Less congested air and sea routes compared to Sriharikota.

Strategic Benefit: Strengthens India's launch capacity, reduces dependency on a single site, and enhances global competitiveness.

Global Leadership in Space Missions

- **India's Strengths:**
 - Cost-effective, reliable launch services.
 - Track record of successful interplanetary missions (Mars, Moon).
 - Expanding space applications (earth observation, navigation, communication).
- **Future Prospects:**
 - Gaganyaan (Human Spaceflight).
 - Chandrayaan-4, Mars Orbiter-2, Venus Mission (Shukrayaan-1).
 - Strengthening collaborations with NASA, ESA, and emerging space nations.

Strategic Implication: Strengthens India's geopolitical standing and economic influence in space technology.

Conclusion:

- Marks a transition from **slow growth to rapid expansion**.
- **Private sector integration** and policy reforms fueling innovation.
- India emerging as a **dominant player** in global space commerce.
- Infrastructure growth paving the way for **deep-space missions and human spaceflight**.



ENVIRONMENT & ECOLOGY

7.93% Drop in GHG Emissions

Context : India's recent **4th Biennial Update Report (BUR-4)** to the **United Nations Framework Convention on Climate Change (UNFCCC)** highlighted a significant **7.93% reduction in greenhouse gas (GHG) emissions in 2020 compared to 2019**. This marks a **crucial step** in India's journey toward achieving a sustainable and climate-resilient future.

Relevance : GS 2 (Governance) , GS 3(Environment)

India's Climate Action under the UNFCCC

Background on UNFCCC and Paris Agreement:

- The UNFCCC, effective from **March 21, 1994**, aims to stabilize GHG concentrations and promote global cooperation on climate change.
- At the **21st session (COP21) in Paris in 2015**, **195 countries** adopted the Paris Agreement, with a key objective to limit the global temperature rise to **below 2°C** and pursue efforts to limit it to **1.5°C**.
- The Paris Agreement entered into force on November 4, 2016. It requires countries to submit **Nationally Determined Contributions (NDCs)**, outlining their climate targets.

India's Commitment:

- India pledged to achieve **net-zero emissions by 2070 at COP26 (2021)**.
- It submits **Biennial Update Reports (BURs)** to the UNFCCC **every two years** to update GHG inventories and detail mitigation actions.

Emission Reductions and Climate Commitments

Highlights from BUR-4:

- **Total Emissions in 2020:** India's total GHG emissions, excluding **Land Use, Land-Use Change, and Forestry (LULUCF)**, were **2,959 million tonnes of CO₂e (carbon dioxide equivalent)**.
- **Net Emissions Including LULUCF:** After accounting for LULUCF, net emissions stood at **2,437 million tonnes of CO₂e**.
- **Sectoral Contribution:** The energy sector was the largest contributor, accounting for **75.66%** of total emissions.
- **LULUCF Impact:** Other land uses sequestered approximately **522 million tonnes of CO₂**, equivalent to reducing 22% of total emissions.

These figures reflect India's commitment to combating climate change while addressing its national developmental needs.

India's Path to Sustainable and Low-Carbon Growth

Despite its minimal contribution to global warming, India faces significant climate challenges due to its large population and developmental needs.

Statistics:

- **Historical Share of Global Emissions:** India's cumulative share from 1850 to 2019 is just 4%, despite housing 17% of the global population.
- **Energy Consumption:** In 2019, India's annual primary energy consumption per capita was 28.7 gigajoules (GJ), far below global averages.

Commitment to Low-Carbon Development:

- India has developed a **Long-Term Low Greenhouse Gas Emission Development Strategies (LT-LEDS)** to ensure sustainable growth while addressing climate challenges.

Seven Key Strategic Transitions in LT-LEDS:

- Low-carbon development of electricity systems
- Integrated, efficient low-carbon transport systems
- Urban adaptation and energy-efficient buildings
- Economy-wide decoupling of growth from emissions
- CO2 removal and engineering solutions
- Enhancing forest and vegetation cover
- Economic and financial aspects of low-carbon development

Climate Action Initiatives for Carbon Neutrality

India has implemented several initiatives to address environmental challenges:

A. Forest Land Diversion & Mitigation Measures:

- **Forest Fragmentation Consideration:** Addressed during approvals for forest land diversion.
- **Compensatory Afforestation:** Mandatory afforestation for non-forestry land diversion.
- **Green Credit Program:** Launched in 2023 to promote afforestation on degraded forest lands.

B. Urban Climate Adaptation & Low-Carbon Development:

- **Urban Planning Policies:** Integrates climate adaptation in policies like Smart Cities Mission, AMRUT, and PMAY.
- **Energy-Efficient Urban Design:** Emphasized in the LT-LEDS strategy.

C. Air Pollution Control & Clean Air Initiatives:

- **National Clean Air Programme (NCAP):** City-specific action plans for improving air quality in 131 cities.
- **Air Quality Measures:** Includes cleaner fuels, ethanol blending, and BS VI norms.

D. Coastal Ecosystem Conservation & Resilience:

- **Mangrove and Coral Reef Conservation:** Financial assistance provided to coastal states.

- **MISHTI Program:** Launched for mangrove restoration covering 540 km² across 9 coastal states.

E. Regulatory Measures for Climate Resilience:

- Coastal Regulation Zone (CRZ) Notifications (2011 & 2019) and Wildlife Protection Act, 1972 are in place to protect critical ecosystems.

Key Innovative Solutions

Miyawaki Tree Planting Technique:

- Adopted during the **Mahakumbh 2025 in Prayagraj** to enhance green cover.
- Highlights the fusion of **traditional practices** with **modern environmental responsibility**.

Conclusion

India's efforts to achieve a **sustainable future** through innovative policies, regulatory frameworks, and community-based initiatives demonstrate its commitment to **reducing GHG emissions**. With strategic transitions outlined in the **LT-LEDS and practical measures** such as **afforestation campaigns**, India is paving the way for a climate-resilient future.

Around 56,000 sq. meters of Dense Forests created in Prayagraj in last two years using Miyawaki Technique

Project Overview

- Dense forests developed across Prayagraj to provide a clean and healthy atmosphere for Mahakumbh 2025.
- Utilized **Miyawaki technique** to create multiple **oxygen banks** over two years.
- Aims to improve air quality, promote environmental conservation, and manage industrial waste.

Relevance : GS 3(Environment, Environmental Governance)

Locations & Plantations

- **Naini Industrial Area:** Largest plantation with **1.2 lakh trees** from **63 species**.
- **Baswar Dump Yard:** **27,000 trees** from **27 species** planted after cleaning the city's largest garbage dump.
- Total area covered: **55,800 sq. meters** across **10 locations**.

Species Planted

- **Fruit-bearing trees:** Mango, Mahua, Amla, Lemon, Tamarind, etc.
- **Medicinal plants:** Tulsi, Brahmi, Drumstick (Sahjan).
- **Ornamental plants:** Hibiscus, Kadamba, Bougainvillea, Gulmohar.
- **Other trees:** Neem, Peepal, Teak, Arjuna, Bamboo, Sheesham, Mahogany, Kaner, Kachnar.

Environmental Benefits

- **Air Quality Improvement:** Reduced dust, dirt, and foul odours.
- **Temperature Regulation:** Dense forests lower temperature by **4 to 7°C** during summers.
- **Biodiversity Boost:** Creates habitats for birds and animals.
- **Soil Health:** Prevents soil erosion and improves soil fertility.

- **Pollution Control:** Absorbs carbon, reduces air and water pollution.

Expert Insights

- **Dr. N.B. Singh** (former Botany professor):
 - Dense forests reduce the temperature **difference** between **day and night**.
 - Help improve **biodiversity** and **soil fertility**.
 - Offer **habitats** for wildlife, thus improving the ecological balance.

Miyawaki Technique Highlights

- Developed by Japanese botanist **Akira Miyawaki** in the **1970s**.
- Involves dense planting of **native species** to mimic natural forests.
- **10x faster growth** compared to traditional methods.
- Ideal for **urban spaces and polluted lands**.
- **Benefits:**
 - Improves **soil quality** and **biodiversity**.
 - **Carbon absorption** and temperature control.
 - **Waste management** and pollution reduction.
 - **Ecological restoration** of barren and degraded lands.

Significance for Mahakumbh 2025

- Ensures **clean air** for millions of devotees expected to visit.
- Strengthens environmental **conservation efforts**.
- Showcase of sustainable urban planning in Prayagraj.

Relevance for Environmental Governance:

- Emphasizes urban **afforestation** as a tool for climate mitigation.
- Aligns with India's climate commitments under **SDG 13 (Climate Action)**.
- Demonstrates **waste management** through ecological restoration.

DISASTER MANAGEMENT

India as First Responder for Global South in Disaster Management

Context:

- India is acknowledged as a **first responder** for humanitarian crises in the **Global South**.
- Examples include **flood prevention, mitigation initiatives**, and the **‘Vaccine Maitri’** initiative, which provided free COVID-19 vaccines to over 100 countries.

Relevance : GS 2(International Relations) , GS 3(Disaster Management)

• Role of Armed Forces and IMD

- **The Indian Armed Forces and Rapid Action Forces** play a pivotal role in disaster rescue and relief operations.
- **Indian Meteorological Department (IMD)** contributes significantly to disaster prevention, reducing casualties.

• Focus on Disaster Relief Insurance

- Faster settlement of disaster relief claims is essential, with emphasis on **factual and accurate assessments** to prevent delays.
- Importance of **raising awareness** about relief insurance claims to ensure a seamless process.

• Holistic Approach to Disaster Management

- **Prime Minister's 10-point agenda** for disaster management includes integration, risk mapping, capacity building, and international cooperation.
- Recent **Disaster Management (Amendment) Bill, 2024** aims to create a national and state-level disaster database, strengthening response mechanisms.

• Budgetary Allocations

- Disaster relief budgets have tripled in the last decade.
- Relief funds are allocated through **State Disaster Relief Fund (SDRF)** and **National Disaster Relief Fund (NDRF)**.

• Education and Awareness

- Disaster management education from an early age is critical to **enhancing India's resilience**.

- **Capacity-building workshops** and **state-specific initiatives bolster grassroots disaster readiness.**
- **India's Role in the Global South**
 - India's initiatives, such as '**Vaccine Maitri**', underscore its **soft power** and **humanitarian leadership.**
 - Disaster management outreach strengthens **India's global partnerships**, especially in the *Context* of climate resilience.
- **Challenges in Disaster Insurance**
 - Simplifying and **digitizing claim processes** can enhance efficiency.
 - Encouraging ethical practices in claims management ensures fairness and prevents delays.
- **Institutional Preparedness**
 - The IMD's advancements highlight the **need for continuous investment** in early warning systems.
 - The amendment to the **Disaster Management Act** reflects a shift towards data-driven **disaster governance.**
- **Capacity Building and Community Engagement**
 - Introducing **disaster management in school curriculums** creates long-term resilience.
 - Collaboration between **government, NGOs, and private stakeholders** is vital for inclusive disaster response.
- **Budgetary Enhancements**
 - Increased **financial commitment** aligns with India's vulnerabilities to climate-related disasters.
 - Effective **fund utilization** remains crucial for impactful outcomes.

Way Forward

- **Strengthening Regional Collaboration**
 - Enhance regional cooperation through **SAARC and BIMSTEC** frameworks for disaster response.
- **Leveraging Technology**
 - Invest in **advanced geospatial tools** and **AI for real-time disaster mapping** and response.
- **Inclusive Planning**
 - **Empower women and marginalized communities** in disaster management frameworks as per PM's agenda.
- **Expanding Education**
 - Develop comprehensive **disaster management** modules at all education levels.
- **Global Advocacy**
 - Position India as a **global hub for disaster management training and expertise**