VIVECHNA
IAS & JUDICARY ACADEMY

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CURRENT AFFAIRS MAGAZINE

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ViVECHNA

May-2025

Current Affairs

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HISTORY & CULTURE

Kokborok Language

Context:

An indigenous literary body from Tripura has urged the state government to seek constitutional recognition of Kokborok language by including it in the Eighth Schedule of the Constitution.

About Kokborok Language:

What is Kokborok?

- Kokborok is the native language of the Borok (Tripuri) people, belonging to the Tibeto-Burmese linguistic family.
- It holds cultural and historical significance among Tripura's indigenous communities.
- State Found: Predominantly spoken in Tripura, it is also used in parts of Assam, Mizoram.

History of Language:

- Officially recognized as a state language of Tripura on January 19, 1979.
- Declared an official language of the Tripura Tribal Areas Autonomous District Council (TTAADC) on April 20, 1999.
- Historically used Bengali script, but recent movements advocate for the Roman script for better accessibility.

About the Eighth Schedule of the Constitution:

What is the Eighth Schedule?

- The Eighth Schedule of the Constitution of India lists the languages recognized by the Constitution for official purposes.
- Constitutional references: Article 344(1) and Article 351.
- Languages Included: Currently contains 22 languages, including Hindi, Bengali, Assamese, Urdu, Tamil, Telugu, and Bodo.

History:

- Originally, 14 languages were included at the time of adoption in 1950.

Later additions:

- Sindhi (1967)
- Konkani, Manipuri, Nepali (1992)
- Bodo, Dogri, Maithili, Santhali (2004).

Benefits of Inclusion:

- Constitutional recognition at the national level.
- Enhanced government support for language promotion and preservation.
- Eligibility for official use in exams like UPSC and public administration.
- Boosts cultural pride, literary development, and language education.

UNESCO's BIOCOM programme

Context:

UNESCO's BIOCOM programme in Madagascar is empowering local youth with vocational skills, offering sustainable livelihoods and reducing pressure on forest ecosystems such as the Montagne des Français Reserve.

About UNESCO's BIOCOM Programme:

- What it is: The Biodiversity Conservation and Sustainable Natural Resource Management for Integrated Community Development (BIOCOM) is a flagship UNESCO initiative promoting conservation-linked livelihood generation in Madagascar.
- Launched by: UNESCO, in collaboration with the Korea International Cooperation Agency (KOICA).
- Launched in: 2020, implemented across Madagascar's Montagne des Français, Marojejy, and Andohahela protected areas.
- Aim: To conserve biodiversity while enhancing socio-economic resilience among local communities vulnerable to climate change and unsustainable forest exploitation.

Key Features of BIOCOM Programme:

- Sustainable Livelihood Training: Offers training in masonry, metalwork, eco-tourism, cooking, and basketry to create alternatives to slash-and-burn agriculture and illegal logging.
- Community Participation: Sets up local forest governance and conflict management systems like "dina" contracts to reduce ecological damage.
- Ecological Protection: Supports carbon sequestration, watershed preservation, and forest connectivity to counter deforestation and biodiversity loss.
- Educational Empowerment: Establishes environmental education and sustainable development awareness, especially among women and school dropouts.
- Resilience Against Climate Change: Targets Forest regeneration and flood prevention in erosion-prone zones by integrating nature-based solutions.

Why Buddhism faded in the land of its birth?

Context:

Prime Minister of India was gifted the Tipitaka by the Thai government during his visit for the 6th BIMSTEC Summit, reigniting public curiosity on Buddhism's origins and its decline in India.

Origins of Buddhism in India:

- Founded by Siddhartha Gautama (563–483 BCE): Born in Lumbini (Nepal), attained enlightenment in Bodh Gaya, and preached the Four Noble Truths & Eightfold Path.
- Reaction to Vedic Ritualism: Rejected caste hierarchy and Brahminical rituals, emphasizing individual enlightenment.
- Early Patronage: Magadha rulers (Bimbisara, Ajatashatru) supported Buddhism as an alternative to Brahmanism.
- First Buddhist Council (483 BCE): Held at Rajgir to preserve Buddha's teachings after his death.
- Ashoka's Role (3rd Century BCE): Spread Buddhism across India and beyond through edicts and missionaries.

Evolution & Development of Buddhism

- Theravada vs. Mahayana: Theravada (original teachings) vs. Mahayana (universal salvation, Bodhisattva ideal).
- Monastic Universities: Nalanda, Vikramshila, Taxila became global centers of Buddhist learning.
- Vajrayana (Tantric Buddhism): Emerged in Bengal & Bihar, blending esoteric rituals with Mahayana philosophy.
- Spread Beyond India: Sri Lanka (Ashoka's son Mahendra), China (via Silk Road), Southeast Asia.
- Art & Architecture: Sanchi Stupa, Ajanta Caves, Gandhara Art reflect Buddhist influence.

Contributions of Buddhism to India:

- Social Equality: Challenged caste discrimination, offered egalitarian Sangha.
- Education & Literature: Pali & Prakrit texts enriched Indian languages; Jataka tales inspired moral storytelling.
- Non-Violence (Ahimsa): Influenced Ashoka's Dhamma and Gandhi's Satyagraha.
- Architectural Legacy: Stupas, Chaityas, Viharas set benchmarks for Indian architecture.
- Diplomatic Soft Power: Buddhist missions strengthened India's cultural ties with Asia.

Factors Behind the Decline of Buddhism in India:

1. Cultural Factors:

- Clash with Hindu Traditions:
- Buddhism's ascetic, monastic focuscontrasted with Hinduism's joyful (Ananda), deity-centric traditions (e.g., Bhakti movement).
- Hindus absorbed Buddha as Vishnu's 9th avatar, diluting Buddhism's uniqueness.

Lack of Emotional Connect:

- No personal Ishwara (God)in Buddhism, unlike Hinduism's Rama/Krishna devotion.

Art & Rituals:

- Hindu temples dynamically integrated music, dance, and festivals, while Buddhism remained meditative and austere.

2. Social Factors:

Monastic vs. Household Life:

- Buddhism encouraged monasticism, pulling able-bodied men away from family and economic duties.
- Hindu grihastha (householder) dharmawas more socially sustainable.

Caste System Resistance:

- While Buddhism rejected caste, Hindu reformers like Shankaraadapted, reducing Buddhism's appeal.

Decline in Lay Support:

- Wealthy monasteries relied on slaves/donations, losing touch with common people.

3. Political Factors:

- Loss of Royal Patronage:
- Guptas (4th–6th CE) and Rajput's favoured Hinduism (Vaishnavism/Shaivism).
- Pala Dynasty (8th–12th CE)was the last major Buddhist patron.

Islamic Invasions (12th CE):

- Turks destroyed Nalanda, Vikramshila, and other key centers.
- No mass resistance since Buddhism had weak grassroots roots.

Hindu Revivalism:

- Adi Shankara's Advaita Vedantacountered Buddhist logic, winning back intellectuals.

Conclusion:

Buddhism faded due to cultural incompatibility, social impracticality, and political neglect. Unlike in Southeast Asia, where it merged with local traditions, in India, it was reabsorbed or destroyed.

Devaraya I of Sangama Dynasty

Context:

Rare copper plates dated 1406 CE, documenting the coronation of Devaraya I of Sangama Dynasty (Vijayanagara Empire), were unveiled in Bengaluru by Falcon Coins Gallery and ASI.

About Devaraya I of Sangama Dynasty: (1406–1422 CE)

- Devaraya I was one of the most notable rulers of the Sangama Dynasty, known for expanding the Vijayanagara Empire and strengthening its administrative base.

Key Features of His Reign:

- Ascension and Civil War: Gained the throne after a power struggle post-Harihara II's death.
- Military Expansion: Led campaigns into Tamil Nadu, Konkan, and Tondaimandalam, securing borders against the Bahmani Sultanate.
- Irrigation and Infrastructure: Built canals and tanks to improve agriculture; supported public works.
- Cultural Encouragement: Patronized literature and trade, strengthening ties with Arab and Chinese merchants.
- Historic Copper Plate: The newly unveiled plate confirms his exact coronation date and a grant to Brahmins at Devarāyapura Agrahāra.

About the Sangama Dynasty:

- The Sangama Dynasty was the founding royal house of the Vijayanagara Empire, reigning from 1336 to 1485 CE.
- Founded by: Harihara I and Bukka Raya I
- Year of Origin: 1336 CE
- Capital: Vijayanagara (present-day Hampi)

Major Kings:

1. Harihara I (1336–1356 CE) – Founder, established fort at Barkuru.
2. Bukka Raya I (1356–1377 CE) – Expanded empire, known for religious patronage.
3. Harihara II (1377–1406 CE) – Extended territory into Tamil Nadu and coastal Andhra.
4. Devaraya I (1406–1422 CE) – Known for administrative strength and military success.
5. Devaraya II (1425–1446 CE) – Peak of Sangama rule, patron of arts and foreign trade.

Key Contributions:

- Strong Central Administration: Divided empire into Nadu and Sime
- Military Strength: Constant resistance against Bahmani Sultanate and Gajapati rulers.
- Cultural Flourishing: Promoted Kannada and Telugu literature, art, and temple construction.
- Religious Tolerance: Supported Hindu, Jain, and Islamic scholars and institutions.
- Trade and Economy: Boosted internal agriculture and foreign trade with Arabs and Chinese.

Chapter-
2

POLITY

Deputy Speaker of Lok Sabha

Context:

The 18th Lok Sabha, like the 17th, has not yet elected a Deputy Speaker, raising concerns about constitutional compliance and parliamentary conventions.

About Deputy Speaker of Lok Sabha:

- Constitutional Article: Governed by Article 93 of the Constitution: mandates the House to elect a Speaker and a Deputy Speaker "as soon as may be".

Selection:

- Elected by: Lok Sabha members from among themselves.
- Timing: After the Speaker's election, the date is fixed by the Speaker.
- Convention: Deputy Speaker is usually from the Opposition, though not legally mandated.

Powers and Functions:

- Presiding Role: Acts as Speaker when the latter is absent.
- Casting Vote: Exercises casting vote only in case of a tie when presiding.
- Committee Chairmanship: Automatically becomes chairperson of any parliamentary committee if appointed.
- Independence: Is not subordinate to the Speaker but directly responsible to the Lok Sabha.

Relevance of Deputy Speaker:

- Continuity of Proceedings: Ensures that House proceedings are never disrupted due to the Speaker's absence.
- Institutional Neutrality: Upholds impartiality and balances legislative debates (S.C. Kashyap: Speaker cannot preside continuously without relief).
- Symbol of Bipartisanship: Historical practice of appointing Deputy Speaker from Opposition fosters cross-party cooperation and trust.
- Crisis Management: Acts decisively during emergencies like sudden Speaker vacancies.

  E.g., M.A. Ayyangar acted after G.V. Mavalankar's death in 1956.

Impact of Vacuum in Deputy Speaker's Office:

- Weakens Institutional Continuity: In the Speaker's absence, no designated authority leads to procedural disruptions and undermines smooth functioning of the Lok Sabha.
- Concentration of Procedural Power: Power centralizes in the Speaker alone, reducing checks and diluting the balance envisioned in parliamentary democracy.
- Erosion of Democratic Conventions: Ignoring the tradition of appointing a Deputy Speaker (often from Opposition) reduces bipartisan cooperation and trust in parliamentary processes.
- Risk During Emergencies: In events like sudden resignation, death, or removal of the Speaker, absence of a Deputy Speaker could trigger a leadership crisis, stalling legislative business.

Legislative Reform Needed:

- Fix a Time Frame: Amend Article 93 to mandate Deputy Speaker's election within 60 days of first sitting.
- Trigger Mechanism: Allow the President, upon Cabinet advice, to initiate the election process if delayed.
- Strengthen Opposition Representation: Enforce conventions offering the post to an Opposition member to promote inclusivity and trust.
- Statutory Clarifications: Codify the roles and election timeline by amending the Rules of Procedure and Conduct of Business in Lok Sabha.

Conclusion:

The Office of the Deputy Speaker is not a ceremonial redundancy but a constitutional necessity for ensuring balance and resilience in Parliament. Prolonged vacancy weakens democratic processes and compromises institutional integrity. Timely election of the Deputy Speaker is essential for upholding constitutional democracy and restoring credibility in legislative functioning.

World Bank's Poverty and Equity Brief 2025

Context:

The World Bank's Spring 2025 Poverty and Equity Brief acknowledged India's success in lifting 171 million people out of extreme poverty between 2011-12 and 2022-23.

Summary of World Bank's Poverty and Equity Brief:

- Purpose: Published twice a year, these briefs track poverty, shared prosperity, and inequality trends in over 100 developing countries.

India's Highlights:

- Extreme poverty (living under $2.15/day) declined from 16.2% (2011-12) to 2.3% (2022-23).
- Lower-middle-income poverty (living under $3.65/day) fell from 61.8% to 28.1%, lifting 378 million people.
- Multidimensional poverty declined from 53.8% (2005-06) to 15.5% (2022-23).
- Inequality reduction: Gini index improved from 28.8 to 25.5.
- Employment Growth: Urban unemployment dropped to 6.6%, the lowest since 2017-18.

Factors Leading to Poverty Decline:

- Welfare Schemes: Programmes like PMAY, MGNREGA, Ujjwala Yojana expanded safety nets (e.g., 11 crore households received LPG under Ujjwala).
- Economic Reforms: GST, Ease of Doing Business reforms accelerated formal sector growth, boosting employment opportunities.
- Access to Essentials: Initiatives like Ayushman Bharat and Jan Dhan Yojana improved healthcare and financial inclusion.
- Rural Development: Increased road connectivity under PMGSY and rural electrification enhanced rural income and access to markets.
- Women Empowerment: Rise in rural female employment and SHG-based entrepreneurship expanded family incomes.

Analysis of Report:

Positives in Report:

- Broad-Based Gains: Both rural and urban poverty declined significantly, closing the rural-urban gap from 7.7% to 1.7%.
- Employment Upsurge: Female employment witnessed a notable rise; self-employment surged among rural women.
- Inclusive Development: States like Uttar Pradesh, Bihar, Maharashtra contributed heavily to national poverty reduction.
- Inequality Reduction: Improved Gini index indicates wealth distribution becoming more equitable.

Negatives in Report:

- Youth Unemployment: Despite overall employment gains, 13.3% youth unemployment remains concerning, reaching 29% among graduates.
- Informal Employment: Only 23% of non-farm jobs are formal; agriculture still remains largely informal.
- Gender Disparity: Despite improvements, women's labour force participation remains at 31%, highlighting persistent inequality.

- Poverty Pockets: Five populous states still account for 54% of India's extremely poor in 2022-23.

Way Ahead:

- Skill Development Focus: Massive upskilling and vocational training for youth to address educated unemployment.
- Strengthen Formal Sector: Labour reforms and MSME strengthening can shift employment towards formal, secure jobs.
- Targeted State Interventions: Special poverty eradication missions in high-burden states like Bihar and Uttar Pradesh.
- Promote Rural Non-Farm Economy: Diversifying income sources through rural industries, agri-tech, and services to ensure sustainable rural incomes.
- Address Gender Gap: Policies encouraging women's workforce participation through safer workplaces and flexible working models.
- Enhance Safety Nets: Strengthening schemes like PM-Kisan and Ayushman Bharat for last-mile delivery and impact.

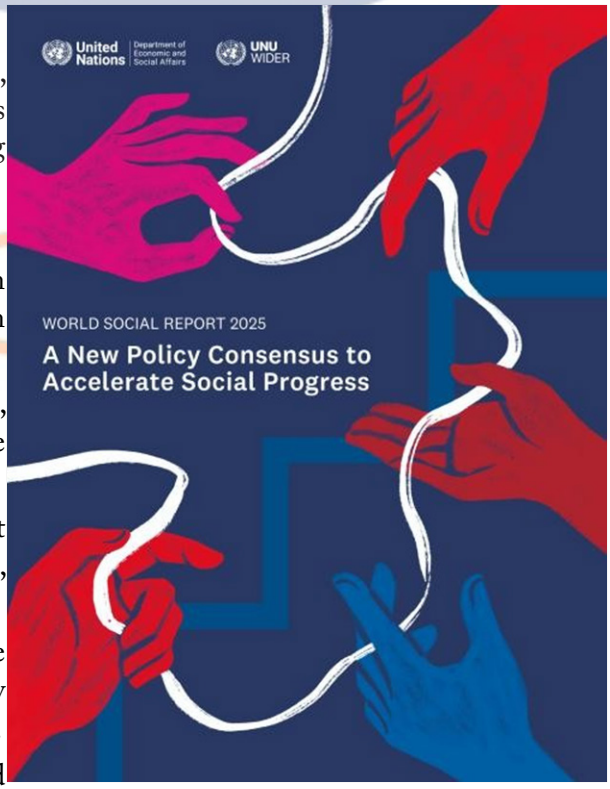
Conclusion:

India's achievement in lifting 171 million people out of extreme poverty over a decade is historic and globally significant. The World Bank's recognition reflects India's policy-driven approach to inclusive growth. Continued reforms, targeted interventions, and empowering the informal sectors will be key to sustaining this momentum toward a poverty-free India.

World Social Report 2025

Context:

The United Nations released the World Social Report 2025, highlighting the urgent need for a new global policy consensus focused on equity, economic security, and solidarity amid rising insecurity, inequality, and declining trust worldwide.



Key Summary of World Social Report 2025:

1. Rising Economic Insecurity: 60% of the global population experiences economic insecurity, with over 690 million people still in extreme poverty.
2. Persistent Inequality: Despite poverty reduction gains, income inequality widened in two-thirds of countries; the richest 1% hold more wealth than 95% of humanity.
3. Fragile Livelihoods: Informal and precarious employment remains dominant, especially in Africa and South Asia, leading to unstable incomes and vulnerability.
4. Declining Institutional Trust: More than 50% of people globally report low or no trust in governments, driven by economic distress, misinformation, and governance failures.
5. Climate and Conflict Impacts: One in five people faced climate shocks and one in seven endured conflicts in 2024, reversing development gains and fuelling insecurity.
6. Positive Trends: Over 1 billion people lifted out of extreme poverty since 1995; improvements noted in literacy, life expectancy, and access to basic services.
7. Policy Gaps Identified: Weak social protection, unfair taxation, and underinvestment in public goods continue to widen the gap between rich and poor nations.
8. Call for a New Social Contract: The report urges building inclusive, equitable, and resilient societies through fair taxation, universal social protection, and renewed multilateralism

Positives in the Report:

- Poverty Reduction: Over 1 billion people lifted out of extreme poverty since 1995.

- Education and Health Gains: Significant improvements in global literacy, life expectancy, and well-being.
- Social Inclusion Efforts: Some success in closing gaps related to ethnicity, residence, and socio-economic status.
- Recognition of Inequality: Clear acknowledgment of the interconnectedness of economic, social, and environmental factors.

Negatives in the Report:

- Persistent Inequality: Income inequality increased in two-thirds of countries despite economic growth.
- Insecure Livelihoods: 60% of workers globally fear job loss; informal and precarious employment dominate.
- Low Trust in Institutions: Institutional trust declined steadily since the late 1990s, especially among youth.
- Digital Misinformation: Echo chambers and digital polarization threaten social cohesion.
- Fragile Progress: Climate change and conflicts continue to reverse gains in poverty alleviation and equity.

Way Ahead:

- Rebuild Social Contracts: Invest heavily in education, health, decent work, and universal social protection.
- Promote Fair Taxation: Shift towards progressive taxation to reduce wealth concentration.
- Strengthen Institutions: Foster inclusive governance structures to rebuild trust and legitimacy.
- Support Climate Resilience: Ensure climate adaptation strategies protect the poor and marginalized.
- Enhance Multilateralism: Use upcoming summits like the Second World Summit for Social Development to drive global cooperation.

Conclusion:

The World Social Report 2025 signals that despite economic advances, rising insecurity and inequalities are destabilizing societies. A transformative shift towards inclusive, resilient, and people-centric development models is crucial. Renewed multilateral cooperation and bold policy action can break the current cycle of distrust and stagnation.

National Mission for Clean Ganga

Context:

The National Mission for Clean Ganga (NMCG) has approved an annual master plan to integrate river-sensitive urban planning under the River Cities Alliance (RCA).

About National Mission for Clean Ganga (NMCG):

- What it is: It is the implementation arm of the National Ganga Council for rejuvenating and managing the river, Ganga.
- Launched in: Registered on 12th August 2011 under the Societies Registration Act, 1860.
- Ministry Involved: Ministry of Jal Shakti (Department of Water Resources, River Development and Ganga Rejuvenation).

Objectives:

- Prevention and control of pollution in river Ganga.
- Ensure continuous adequate water flow for rejuvenation of Ganga.
- Implement river basin management strategies.

Key Features:

- Two-tier management structure: Governing Council and Executive Committee, both headed by the Director General.
- Executive Committee can approve projects up to 1,000 crore.

- State Program Management Groups (SPMGs) act as state-level implementing arms.
- Functions under a five-tier structure from national to district level.

About River Cities Alliance (RCA):

- What it is: A dedicated platform for river cities to exchange ideas, share best practices, and collaborate for sustainable urban river management.
- Launched in: 2021 by the Ministry of Jal Shakti and the Ministry of Housing and Urban Affairs.

Objective:

- Promote networking among river cities.
- Enhance capacity building for sustainable river management.
- Offer technical support and innovation-sharing platforms.

Key Features:

- Open to all river cities in India; started with 30 member cities like Varanasi, Dehradun, Chennai, and Pune.
- Secretariat housed at the National Institute for Urban Affairs (NIUA).

Egg Mayonnaise

Context:

The Tamil Nadu government banned the production and sale of mayonnaise made using raw eggs for one year under the Food Safety and Standards Act, 2006, citing serious health risks linked to foodborne pathogens like Salmonella and E. coli.

About Egg Mayonnaise:

What is Egg Mayonnaise?

- Egg mayonnaise is a semi-solid emulsion made from raw egg yolk, vegetable oil, and acid (like vinegar or lemon juice), with seasoning.
- Origin: Believed to have originated in France or Spain, it is now a global staple in fast food—used in sandwiches, burgers, wraps, and momos.

How it Differs from Traditional Mayonnaise?

- Traditional Mayonnaise: Uses raw or pasteurised egg yolk.
- Eggless Variants: Use emulsifiers like soy proteins or milk solids instead of eggs—more common in India due to dietary preferences and food safety concerns.

Health Impact of Raw Egg Mayonnaise:

- Pathogen Risk: Raw eggs may harbor Salmonella typhimurium, Salmonella enteritidis, E. coli, and Listeria monocytogenes.
- Public Health Concern: High humidity and poor refrigeration in India raise the risk of contamination.
- Vulnerable Groups: Children, the elderly, and immunocompromised individuals are at greater risk.
- Symptoms: Can include vomiting, diarrhea, fever, and intestinal infection.

About Section 30 of the FSSAI Act, 2006:

- Section 30 of the FSSAI Act, 2006 empowers the State Government to appoint a Commissioner of Food Safety to ensure effective implementation of food safety laws.

Key powers include:

- Prohibit manufacture, sale, or distribution of unsafe food for up to one year in public interest.
- Survey food processing units to check compliance with standards.
- Conduct training and awareness programs on food safety.
- Ensure uniform and accountable enforcement of food standards.

- Sanction prosecution for offences involving imprisonment.
- Delegate powers (excluding key appointments) to subordinates as needed.

Article 142: The Supreme Power or Judicial Overreach?

Context:

The Supreme Court's invocation of Article 142 in the Tamil Nadu Bill controversy has reignited debates about judicial overreach and constitutional balance between the judiciary, executive, and legislature.

About Article 142:

What is Article 142?

- Allows the Supreme Court to pass any decree or order "necessary for doing complete justice" in any case pending before it.
- Objective: Originally intended as a tool to bridge gaps in law where strict adherence to legal procedures would deny justice.

Constitutional Provision:

- Article 142(1): Enables passing enforceable decrees or orders to ensure complete justice.
- Article 142(2): Empowers the Court to secure attendance, document production, and punishment for contempt across India.

Tamil Nadu Bill Controversy and Judicial Outcome

- Background: In 2024, the Tamil Nadu Governor delayed assent on 11 bills, stalling legislative processes.
- Supreme Court Action: Using Article 142, the Court deemed the bills passed without awaiting Presidential assent.

Judgement Outcome:

- Bypassed executive bottlenecks.
- Raised concerns about the Court assuming quasi-legislative powers.
- Altered the balance among constitutional authorities by sidelining the Governor and indirectly the President.

Article 142 Can Lead to Judicial Overreach:

- Bypassing Executive Authority: Courts enforce decisions directly without waiting for legislative or executive responses (e.g., Tamil Nadu case).
- Erosion of Federalism: Judiciary overrides states and Union's constitutional roles, affecting Centre-State relations.
- Threat to Separation of Powers: Frequent use makes the judiciary a super-legislature and weakens democratic accountability.
- Undermining Constitutional Remedies: Legislative delays or executive errors could be resolved by other constitutional means instead of judicial enforcement.

Article 142 Does Not Always Lead to Overreach:

- Ensures Complete Justice: Used sparingly to uphold citizens' rights where no legal remedy exists (e.g., Union Carbide Bhopal gas case 1989).
- Safeguards Fundamental Rights: Helps prevent injustice when rigid application of law would cause harm.
- Temporary Relief: Measures under Article 142 are interim and tailored for specific cases without necessarily setting binding precedents.
- Acts as a Safety Valve: Provides flexibility in exceptional situations where other remedies are inadequate.

Way Ahead:

- Guidelines for Use: Establish a judicial protocol limiting use of Article 142 to rare and truly extraordinary cases.

- Strengthen Legislative Procedures: Ensure quicker executive and legislative action to prevent judicial interventions.
- Encourage Dialogue among Organs: Promote healthy consultation between Judiciary, Legislature, and Executive.
- Parliamentary Oversight: Pass legislation under Article 142(1) to define its boundaries, ensuring checks and balances.

Conclusion:

Article 142 remains a powerful judicial instrument meant for extraordinary situations. However, its overuse risks upsetting India's delicate constitutional equilibrium. To safeguard democracy, each constitutional organ must respect the boundaries set by the Constitution.

Primary Health Care in India

Context:

The National Health Accounts 2021–2022 reveal only a marginal increase in healthcare spending, highlighting gaps in India's primary healthcare system despite schemes like Ayushman Bharat.

Status of Primary Health Care in India:

- India's public health infrastructure includes 1.75 lakh Ayushman Arogya Mandirs (AAMs), handling 350 crore consultations (MoHFW, 2024).
- Per capita out-of-pocket expenditure (OOPHE) has declined, but private sector still dominates (68% of total health expenditure).
- National Quality Assurance Standards (NQAS) aim to improve service quality, yet trust in public healthcare remains low.

Need for Primary Healthcare in India

- Early Disease Detection and Prevention: Timely interventions through primary care help detect and manage diseases early, reducing burden on tertiary hospitals.

  E.g: Routine diabetes and hypertension screening under Ayushman Arogya Mandirs.
- Reducing Out-of-Pocket Expenditure (OOPE): Strong primary healthcare minimizes expensive hospitalization costs by providing early treatment.

  E.g: OOPE declined from 62.6% (2014-15) to 39.4% (2021-22) as per NHA report.
- Bridging Rural-Urban Healthcare Gap: Primary Health Centres (PHCs) act as the first point of contact in rural and tribal areas.

  E.g: 1.75 lakh Ayushman Arogya Mandirs established to deliver doorstep healthcare.
- Managing Non-Communicable Diseases (NCDs): Primary care is essential for long-term management of lifestyle diseases like cancer, diabetes, heart ailments.

  E.g: Health and Wellness Centres now include NCD screenings under NHM.
- Strengthening Health System Resilience: A robust primary care network can tackle pandemics, reduce hospital overload, and ensure community health preparedness.

  E.g: PHCs and CHCs served as frontline COVID-19 vaccination centres across India.

Challenges in Primary Healthcare:

Visibility:

- Lack of Trust: Trust deficit in public healthcare reduces its utilization; private hospitals are often preferred for perceived better quality (NHA 2021-22).
- Limited Awareness: Many citizens are unaware of schemes like Ayushman Bharat Arogya Mandir, reducing community engagement.

Accessibility:

- Geographical Gaps: Remote and tribal areas still face inadequate distribution of primary health centers (e.g., shortfall of 18% PHCs in hilly regions).
- Infrastructure Deficits: Lack of modern facilities, especially diagnostic equipment, hampers quality healthcare delivery in rural belts.

Affordability:

- Private Sector Dominance: Private healthcare accounts for a major share of services, making treatment costly despite public schemes.
- Hidden Costs: Expenses like transportation, diagnostics, and non-listed treatments still burden rural families.

Way Ahead for Primary Healthcare

Improving Visibility:

- Community-Based Awareness Drives: Use village health committees to spread information on free services at Ayushman Bharat Health Centres.
- Publish User Feedback Reports: Regular public disclosure of service quality ratings to build people's trust and confidence.

Enhancing Accessibility:

- Mobile Health Clinics: Deploy mobile units in remote and underserved regions to bridge access gaps, modeled on Kerala's e-Sanjeevani initiative.
- Strengthen Digital Health Platforms: Expand telemedicine services through e-health portals, ensuring last-mile consultation support.

Boosting Affordability:

- Wider Coverage under PMJAY: Extend free healthcare coverage to the near-poor and vulnerable middle-income groups.
- Strengthen Generic Medicine Availability: Expand Pradhan Mantri Bhartiya Janaushadhi Pariyojana outlets to bring down drug costs substantially.

Conclusion:

Strengthening India's primary healthcare needs an integrated approach focusing on trust building, infrastructure upgrading, and financial protection. With Ayushman Bharat and health system reforms, India is on a path toward universal health coverage, but sustained efforts are crucial to ensure equity and resilience in healthcare delivery.

IT adoption in Aquaculture

Context:

India's aquaculture sector is witnessing a transformation through digital and IT-driven innovations, as highlighted by investments like the $4.5 million infusion into aquaculture tech platforms.

About IT adoption in Aquaculture:

What is Aquaculture?

- Aquaculture refers to the controlled farming of aquatic organisms like fish, shrimp, and mollusks in freshwater or marine environments, aimed at boosting food production and exports.

How IT is Revolutionising Aquaculture?

- Digital Farm Management: Mobile apps and digital platforms are enabling real-time monitoring, disease management, and supply chain integration.
- Cost and Productivity Gains: Data-driven technologies help farmers reduce input costs and optimize yields through precise field management.
- Supply Chain Control: IT tools ensure transparency in price discovery, reduce market opacity, and build stronger farmer-market linkages.
- Disease Mitigation: Early disease detection through digital monitoring reduces losses in fish and shrimp farming.

- Access to Finance and Insurance: Schemes like PMMSY now integrate IT systems to streamline credit, insurance, and subsidy delivery.

Significance:

- Enhances Farmer Incomes: Improved yield and price transparency directly uplift small farmers' earnings.
- Promotes Food Security: Increased fish and shrimp availability makes nutrition affordable domestically.
- Drives Export Growth: Boosts India's competitiveness in global seafood markets through efficient, quality production.
- Encourages Private Investment: Attractive for FDI and reverse FDI models targeting global markets like the US.

India Justice Report 2025

Context:

The India Justice Report 2025 revealed that no State/UT has met its own reserved quotas for women in the police force.

About India Justice Report 2025:

Aspect	Details
What it is?	A national ranking assessing capacity of States/UTs to deliver justice across four pillars.
Released by	Tata Trusts in collaboration with partners like CHRI, DAKSH, Vidhi Centre, TISS-Prayas etc.
Aim	To promote data-driven reforms by evaluating states on justice delivery using official government data.

Criteria	Ranks states on Police, Judiciary, Prisons, Legal Aid, and Human Rights Commissions, based on 5 filters: Human Resources, Budgets, Infrastructure, Workload, Diversity.

Positives Highlighted in IJR 2025:

- Southern states dominate: Karnataka, Andhra Pradesh, Telangana, Kerala, and Tamil Nadu secured the top 5 ranks among large states.
  E.g. Karnataka ranked 1st overall (score: 6.78/10).
- Increased gender representation: Female share in judiciary and police steadily rising across most states.
  E.g. Bihar has the highest share of women in police among all states.
- Improved case clearance: High Courts maintained >100% disposal rate; subordinate courts also improved.
  E.g. Over 86% of prisons now have video-conferencing facilities for trials.
- Tech adoption in judiciary: Digital filing, e-Sewa Kendras, and legal aid tracking via NALSA's online system have improved access.
  E.g. More live-streaming and expansion of NJDG platform.
- Prison Management Excellence: Tamil Nadu retained top position in prison management with 100% budget utilisation and optimal staff-inmate ratio.

Negatives / Gaps Identified:

- Women Quota Unmet: No State/UT fulfilled reserved quotas for women in police; <1,000 senior women officers exist.
  E.g. Despite mandates, not even progressive states met gender quotas in senior policing.
- Infrastructure Gaps in Police: 17% of police stations have no CCTV; 30% lack women help desks.
  E.g. SC-mandated CCTVs under Paramvir Singh guidelines not fully implemented.
- Low Legal Aid Spending: National average is just 6 per capita annually – least among all justice pillars.
  E.g. Legal aid budgets declined in 19 states.
- Severe Judicial Backlog: 5 crore+ cases pending across court levels; 71% of cases in Bihar pending over 3 years.
  E.g. HC vacancies >30% in some states like Gujarat.
- Prison Overcrowding & Undertrial Crisis: 76% of prisoners are undertrials, up from 66% in the last decade.
  E.g. 176 prisons operate at over 200% capacity.

Suggested Reforms:

- Gender-Inclusive Recruitment: Enforce women reservation in senior police/judicial roles with transparent audits.
  E.g. Mandatory mid-level lateral entry for women officers.
- Upgrade Police Infrastructure: Universal CCTV coverage, digitised FIR systems, and women help desks at every station.
- Judicial Staffing and AIJS: Standardised recruitment calendar and All India Judicial Service for lower courts.
  E.g. Fast-track special courts to reduce pendency.
- Revamp Legal Aid Delivery: Strengthen community-based legal aid, taluka clinics, and PLV network.
  E.g. Revise per capita budget and involve civil society.
- Prison Decongestion: Strengthen parole, open prisons, and ensure medical staffing in line with inmate population.
  E.g. Implement Model Prison & Correctional Services Act 2023 with urgency.
- Performance-linked Justice Budgets: Reward states showing year-on-year improvement with increased funding.
  E.g. Tie grants to vacancy reduction, training coverage, and tech use.

Conclusion:

The India Justice Report 2025 reflects India's aspirations and challenges in making justice accessible, efficient, and inclusive. Despite digital tools and reforms, core capacity deficits remain unaddressed. A holistic, sustained, and accountable approach is essential to transform justice delivery across India.

Registration of Birth and Death

Context:

The Registrar General of India (RGI) issued a circular in March, warning hospitals for non-compliance in registering births and deaths within 21 days.

- The circular noted that 10% of such events go unregistered, despite the 2023 amendment to the Registration of Birth and Death Act mandating 100% digital registration.

About Registration of Birth and Death:

What is it?

- A statutory process under the Civil Registration System (CRS) that mandates the recording of every birth and death occurring in India.

Governing Authority:

- Registrar General of India (RGI) under the Ministry of Home Affairs (MHA) oversees the system.
- Chief Registrars are appointed by State governments, and Registrars operate at local levels (panchayats, municipalities).

Governing Law:

- Registration of Births and Deaths (RBD) Act, 1969, amended in 2023, makes digital registration mandatory.
- Section 23(2) of the Act penalises negligence by registrars with a fine (enhanced to 1,000 from 50 in the amendment).

Registration Procedure:

- Government hospitals act as official registrars.
- Private hospitals must report events to registrars.
- Registration must be done within 21 days of the event.
- Post October 1, 2023, all records are maintained digitally through the Civil Registration System (CRS) portal.

2023 Amendment Highlights:

- Birth certificates from CRS are now the sole valid document for proving date of birth for: School admissions, Government jobs, Marriage registration, and Electoral rolls and property registration.
- Data from CRS will automatically update the: National Population Register (NPR), Ration card database, and Other central schemes.

World Pandemic Treaty

Context:

After over three years of negotiations, WHO Member States finalised the draft World Pandemic Treaty to boost global pandemic preparedness.

About World Pandemic Treaty:

What it is?

- A legally binding international instrument aimed at strengthening global response to future pandemics.
- Developed by: Negotiated by the Intergovernmental Negotiating Body (INB), constituted under WHO in December 2021.
- Aim: To improve pandemic prevention, preparedness, and equitable response, using a One Health approach involving human, animal, and environmental health.

Key Features:

- Establishes pathogen access and benefit-sharing systems.
- Strengthens global supply chains and logistics for health emergencies.
- Promotes technology and knowledge transfer for vaccines, diagnostics, and therapeutics.
- Mobilises skilled global health workforce and supports geographically balanced R&D capacities.
- Respects national sovereignty — does not allow WHO to mandate lockdowns, travel bans, or vaccines.

About the World Health Organization (WHO):

- Established in: 1948, as a specialized agency of the United Nations focusing on international public health.
- Headquarters: Based in Geneva, Switzerland.

Core Objectives:

- Promote universal health coverage.
- Combat disease outbreaks, ensure health security, and advance public well-being.
- Support countries in policy development, emergency preparedness, and health system strengthening.

Governance Structure:

- World Health Assembly (WHA): Highest decision-making body; meets annually.
- Secretariat: Executes WHA's decisions under the Director-General.
- Regional Offices: Six regional offices coordinate implementation (e.g., South-East Asia, Africa).

Funding Mechanism:

- Assessed contributions: Mandatory membership dues.
- Voluntary contributions: Additional funding from countries, UN bodies, private sector, and philanthropies.

Hybrid Paddy Seeds

Context:

Punjab government has banned the sale of hybrid paddy seeds ahead of the 2025 Kharif season.

- The decision follows rice millers' refusal to accept hybrid rice due to low milling efficiency and broken grain output.

About Hybrid Paddy Seeds:

What is Hybrid Paddy?

- Hybrid paddy is a crossbred rice variety developed from two different parent lines to increase yield, water efficiency, and early maturity.
- These varieties are non-Basmati and cultivated for commercial high-yield farming.
- Common Hybrid Varieties in Punjab: Sava 127, Sava 134, Sava 7501, 27P22, VNR 203.

Key Features

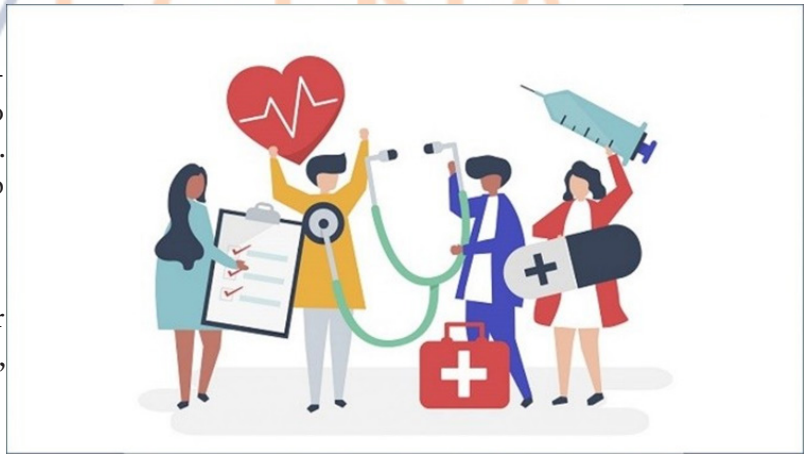
- Higher Yield: Produces 35–40 quintals per acre (5–6 quintals more than regular varieties).
- Shorter Duration: Matures in 125–130 days, conserving water.
- Less Stubble: Helpful in reducing stubble burning issues.

Reason for Ban by Punjab Govt

- Low Milling Efficiency (OTR): Millers report 60–63% Out Turn Ratio vs FCI's minimum of 67%.
- Broken Grains: High grain breakage results in losses to millers.
- Farmer Losses: Lower procurement prices due to quality mismatch.

Preventive Healthcare

Context:



India faces a "silent epidemic" of non-communicable diseases (NCDs), contributing to 66% of deaths and threatening economic growth. Experts advocate preventive healthcare to curb this crisis and secure a healthier future.

What is Preventive Healthcare?

- Focuses on disease prevention rather than treatment, through early detection, lifestyle changes, and vaccinations.

Key Characteristics:

- Proactive: Regular health check-ups (e.g., BP, diabetes screenings).
- Holistic: Combines nutrition, exercise, mental health, and pollution control.
- Tech-Driven: Uses AI, wearables, and apps for risk prediction.

Examples:

- Ayushman Bharat HWCs (Health & Wellness Centres) for rural screening.
- National Cancer Screening Programme for early detection.

Importance of Preventive Healthcare in India:

- Rising Burden of NCDs: Non-communicable diseases like heart disease, cancer, and diabetes cause over 5 million deaths annually in India.

  E.g. 22% of Indians face the risk of premature death from NCDs before the age of 70.

- Economic Consequences: The growing NCD crisis is projected to cost India $3.5–4 trillion by 2030, reducing national productivity.
- Threat to Youth and Workforce: Rising obesity and hypertension among young adults are weakening India's demographic dividend.

  E.g. Urban youth increasingly suffer from preventable conditions like Type-2 diabetes.
- Strong Lifestyle Link: Poor diet, lack of exercise, and tobacco use are linked to 80% of heart attacks and strokes.

  E.g. WHO studies show 4 out of 5 cardiovascular events can be avoided with lifestyle changes.
- Digital Health Potential: With over 750 million smartphone users, India can scale AI-powered health alerts and early interventions.

  E.g. Apollo's "ProHealth" app uses AI to predict health risks based on lifestyle and vitals.

Challenges to Preventive Healthcare in India:

- Lack of Preventive Awareness: Most Indians seek healthcare only when symptoms appear, delaying early detection.

  E.g. Only 30% of urban adults go for annual health check-ups.
- Urban–Rural Disparity: Primary healthcare infrastructure in rural areas is poor, with limited diagnostics and doctors.

  E.g. India has only 1 doctor per 1,457 citizens, worse in villages.
- Budgetary Constraints: Low public spending on health limits investment in preventive services and screenings.

  E.g. India allocates just 2.1% of its GDP to healthcare, far below OECD average of 8–10%.
- Cultural Perceptions: People avoid medical visits unless sick, neglecting preventive habits and early screenings.

  E.g. "No illness = no doctor" remains a common belief, especially in semi-urban regions.
- Low Corporate Involvement: Few companies promote preventive care or wellness initiatives for their employees.

  E.g. Less than 10% of Indian firms have structured annual health programs.

Way Forward: Enhancing Preventive Healthcare

- Policy-Led Interventions: Strengthen Ayushman Bharat's Health & Wellness Centres and regulate packaged food contents.
- Public Health Campaigns: Large-scale initiatives should promote regular check-ups, nutrition, and fitness habits.

  E.g. "Eat Right India" and "Fit India Movement" target behavioural lifestyle shifts.
- Corporate Health Mandates: Incentivize annual health screenings and wellness programs in private and public sectors.
- Integrate Technology for Early Detection: Use AI tools and health wearables for continuous monitoring and early diagnosis.
- Healthy Urban Design: Cities should promote physical activity through walkable layouts and open spaces.

  E.g. Bhopal's Smart City plan includes green parks and pedestrian zones for public fitness.

Conclusion:

Preventive healthcare is India's best weapon against NCDs and economic losses. Policy reforms, tech adoption, and public participation can transform health outcomes. A "health-first" mindset will secure both individual well-being and national prosperity.

Restatement of Values of Judicial Life – 1997

Context:

In a historic move, all Supreme Court judges, including the Chief Justice of India, have decided to publicly declare their assets, reaffirming the principles laid down in the 1997 Restatement of Values of Judicial Life, which underpins judicial ethics in India.

About Restatement of Values of Judicial Life:

What is it?

- A judicial code of ethics adopted by the Supreme Court of India in 1997 during a full court meeting.
- It provides a non-exhaustive, 16-point framework outlining the ethical conduct expected of judges.
- Acts as a moral compass and accountability guide for higher judiciary, especially in the absence of statutory laws governing judge conduct.

Key Features of the 1997 Restatement of Values of Judicial Life:

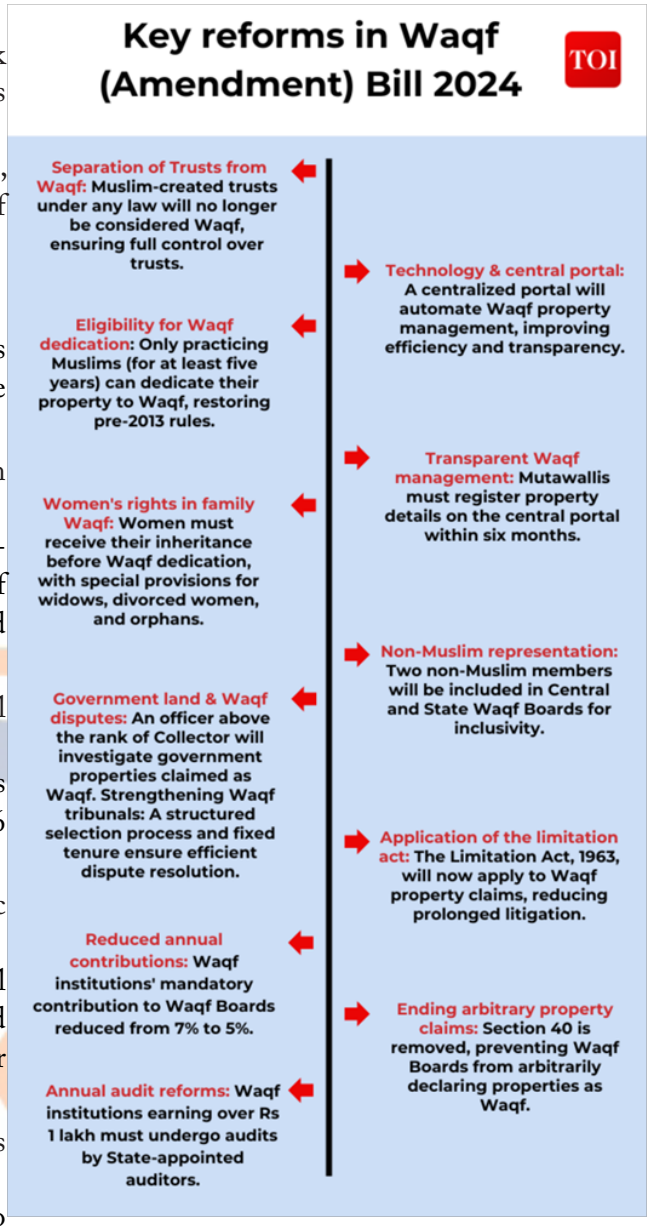
- Judges must avoid actions that "erode" people's faith in the higher judiciary, as "Justice must not merely be done but it must also be seen to be done".
- Must not contest elections/hold office in clubs, societies, and associations.
- Must avoid close association with "individual members of the Bar" and if any immediate or close family members are members of the Bar, they must not appear before the judge in court or be associated with any case or "cause" she is dealing with.
- Similarly, such family members cannot be permitted to use the judge's residence for professional work.
- Must practice "a degree of aloofness consistent with the dignity of his office", i.e. being impartial by maintaining distance from the case before her.
- Must not hear and decide cases where a family member or friend is involved.
- Must not publicly express views on political matters that may arise for judicial determination.
- Must "let his judgments speak for themselves" and must not give interviews to the media.
- Must not accept gifts or hospitality from anyone besides family and friends.
- Must not hear and decide matters involving a company in which the judge holds shares unless previously disclosed and no objection is raised.
- Must not "speculate in shares, stocks or the like".
- Must not engage in any trade or business "directly or indirectly". This does not include legal publishing or anything "in the nature of a hobby".
- Should not seek any financial benefit connected to her office "unless it is clearly available".
- Must be conscious that she is "under the public gaze" and avoid acts "unbecoming of the high office".

The Waqf (Amendment) Bill, 2025

Context:

The Waqf (Amendment) Bill, 2025 was tabled in the Lok Sabha amid opposition protests, introducing sweeping changes to the Waqf Act, 1995 based on JPC recommendations.

- It seeks to overhaul the governance, registration, dispute resolution, and transparency of Waqf properties across India.



Key Features of the Waqf (Amendment) Bill, 2025

1. Retention of 'Waqf by User': Protects religious properties established through customary usage before the enactment of the new law, unless disputed.

E.g., Mosques established through long-term communal use remain protected.

1. Inclusion of non-Muslims in Waqf Institutions: Non-Muslims can be members of Central and State Waqf Boards and tribunals to promote transparency and administrative expertise.

E.g., 2 out of 22 members in Central Waqf Council may be non-Muslims.

1. Digital Registration Portal: Mandates all waqf properties to be registered via a centralised online portal within 6 months, extendable by waqf tribunals.

E.g., Automates property updates and ensures public accessibility.

1. New Tribunal Composition: Each waqf tribunal will include a district judge, a Joint Secretary-level officer, and a Muslim law expert, replacing the older two-member body.

E.g. Ensures better legal, administrative, and religious balance.

1. Application of Limitation Act: Repeals Section 107 to apply the Limitation Act, 1963, enabling adverse possession claims after 12 years of unlawful occupancy.

E.g., Long-term encroachments can now claim ownership, risking waqf loss.

Major Issues Surrounding the Waqf Bill

1. Alleged Religious Targeting: Critics claim the bill targets Muslim-managed properties by applying rules exclusive to one religion.

E.g., PIL in Delhi HC challenges constitutional validity of Waqf Act.

1. Exclusion of New Converts: Only Muslims with five years of practice can dedicate property to waqf, excluding recent converts unfairly.

E.g., May contradict Article 25 (freedom of religion).

1. Encroachment Legitimisation: Applying the Limitation Act could enable illegal occupants to claim waqf lands legally.

E.g., Properties encroached for over 12 years may now be lost.

1. Reduction in Judicial Oversight: Replacing waqf tribunals with state officers as arbiters may compromise fairness and community rights.

E.g., Officers may favour state claims over waqf protection.

1. Removal of Section 40: While preventing misuse, this also restricts Waqf Boards from identifying undocumented waqf properties, risking loss of heritage assets.

Need for the Waqf Bill

1. Improving Transparency: Digitised records and audit reforms ensure accountability and reduction in property misuse.

   E.g., 515 waqf properties declared under misused Section 40.

1. Regulating Property Management: Addresses irregularities in property registration, survey, and ownership disputes.

   E.g., Survey pending in several states like Gujarat, Uttarakhand.

1. Preventing Misuse of Waqf Law: Ensures state-level checks on arbitrary waqf claims that create communal and legal tensions.

   E.g., Delhi's 123 properties transferred under UPA scrutinised.

1. Benefit for the Poor: More efficient waqf governance will enhance funding for education, healthcare, and housing for the underprivileged.

   E.g., Reduced board fees (from 7% to 5%) will aid welfare.

1. Clarifying Legal Disputes: Tribunals with legal and religious experts, plus judicial appeal rights to High Courts, restore checks and balances.

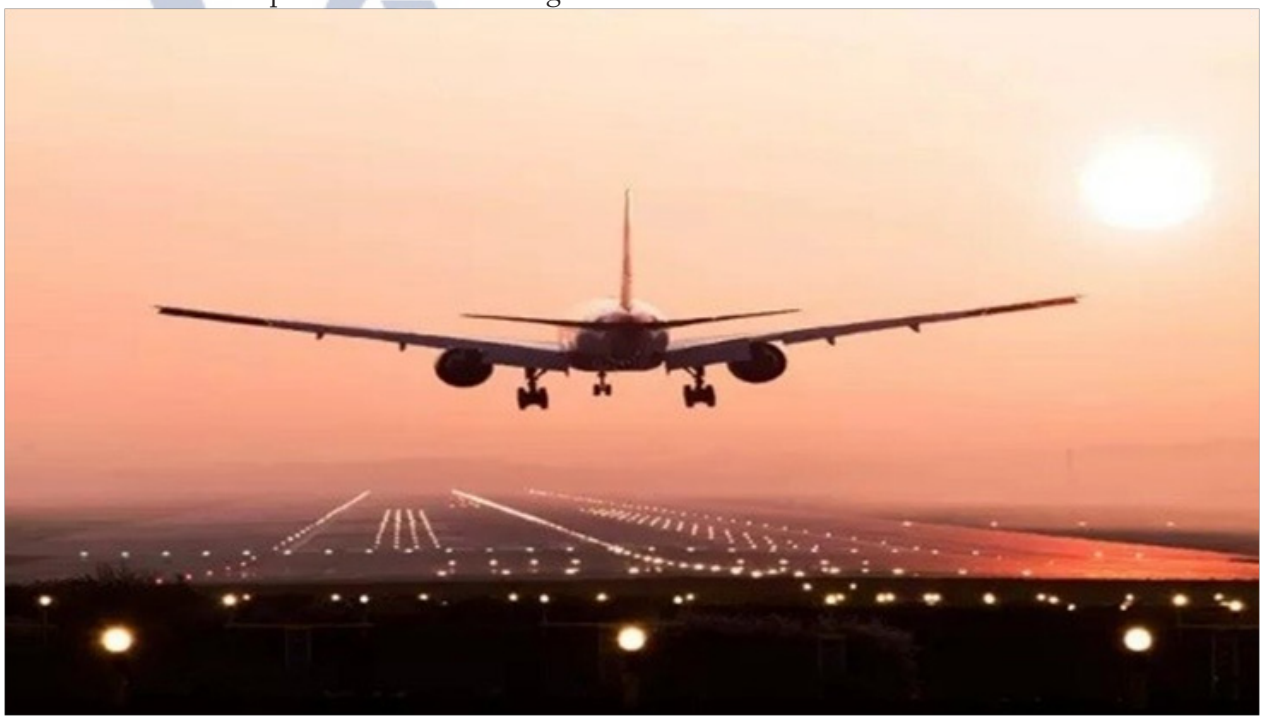
Conclusion:

The Waqf (Amendment) Bill, 2025 aims to streamline waqf property governance through digitisation, transparency, and legal clarity. While it promises reforms and safeguards, concerns remain about religious autonomy and property rights. Balanced implementation and stakeholder engagement are essential to ensure inclusive and just outcomes.

Cape Town Convention

Context:

The Rajya Sabha passed the Protection of Interests in Aircraft Objects Bill, 2025, giving legislative force to the Cape Town Convention to promote aircraft leasing in India.



About Cape Town Convention:

What is it?

- An international treaty adopted in 2001, the Cape Town Convention on International Interests in Mobile Equipment and its Aircraft Protocol establish uniform legal rules for asset-based financing and leasing of aircraft, helicopters, and engines.

Objective:

- Protect lessors and creditors by ensuring legal remedies in cases of default.

- Streamline international aviation leasing by reducing cross-border legal complexities.

Key Features:

- Standardized Legal Framework: Covers leasing, security interests, and conditional sales of aircraft equipment.
- Creditor Protection: Grants creditors rights to repossess and deregister aircraft swiftly if lessees' default.
- Global Registry System: Establishes a centralized international registry of ownership and interests.
- Enforceability Across Jurisdictions: Makes cross-border aircraft leasing legally safer and more predictable.

About Protection of Interests in Aircraft Objects Bill, 2025:

What is it?

- A bill passed by the Indian Parliament to implement the Cape Town Convention and Aircraft Protocol into domestic law and strengthen India's aircraft leasing framework.

Objective:

- Provide legal clarity to aircraft leasing transactions.
- Reduce aircraft leasing costs by aligning with international norms.
- Position India as a global hub for aviation leasing and financing.

Key Provisions of the Bill:

- Legal Enforceability: Grants full legal force to the Cape Town Convention and Protocol in India.
- Creditor Remedies in Defaults: Enables creditors/lessors to repossess aircraft within 2 months of default or as per agreed terms.
- DGCA as Domestic Registry: Makes DGCA responsible for maintaining a registry of aircraft interests and dues.
- Mandatory Reporting: Airlines and lessors must periodically update DGCA on dues and leasing activities to ensure transparency.
- Boost to Leasing Sector: The Bill may cut leasing costs by 8–10%, attracting global investors and making airfares more affordable.

Evolution of Monsoon Forecasting in India

Context:

The IMD has predicted an 'above normal' monsoon for 2025, at 105% of the Long Period Average (LPA).

- This highlights the progress made in monsoon forecasting models, especially dynamic and ensemble-based systems like MMCFS and MME.

About Evolution of Monsoon Forecasting in India:

What is Weather Forecasting?

- Weather forecasting is the scientific estimation of atmospheric conditions (e.g., rainfall, temperature, humidity) at a specific location and time using observational data and mathematical models.

Types of Forecasts:

- Nowcasting (0–6 hrs): Provides ultra-short-term weather updates using real-time data from radars and satellites.
- Short-range (1–3 days): Useful for agriculture and planning; relies on numerical weather prediction (NWP) models.
- Medium-range (4–10 days): Uses dynamic models to simulate atmospheric conditions; forecasts moderate-term patterns.
- Long-range (10 days–2 years): Focuses on seasonal trends like monsoon; involves ocean-atmosphere interactions.
- Ensemble Forecasting: Combines multiple models and parameters to offer more reliable and probabilistic forecasts.

About Evolution of Monsoon Forecasting in India:

Pre-Independence Era:

- 1875 – IMD Established: Founded after the 1876 famine to monitor weather and predict monsoons scientifically.
- Henry Blanford (1882–85): Linked Himalayan snow cover to monsoon strength; laid early forecasting foundation.
- Sir John Eliot (1889): Added Ocean and Australian conditions; began regional forecasts based on April-May indicators.
- Sir Gilbert Walker (1904): Introduced 28 global predictors and statistical correlations to forecast monsoon patterns.

Post-Independence Era

- 1947–1987 – Walker Model Continued: IMD retained statistical models with high errors due to outdated predictors.
- 1988 – Gowariker Model: Used 16 climatic variables in a power regression model for seasonal monsoon prediction.

- 2003 – Parameter Reduction: Introduced two simpler models and two-stage forecasts to enhance accuracy.
- 2007 – SEFS Launched: Developed a five-parameter (April) and six-parameter (June) model to prevent overfitting.

Recent Developments:

- 2012 – MMCFS Introduced: Dynamic coupled model combining ocean, land, and atmospheric variables for holistic prediction.
- 2021 – Multi-Model Ensemble (MME): Integrates forecasts from global climate models to improve monsoon accuracy.

Limitations of Current Forecasting:

- Model Biases: Systematic errors in simulations lead to regional inaccuracies and underperformance in extreme events.
- Weak Teleconnections: Climate signals like ENSO and IOD are not consistently linked to rainfall outcomes in India.
- Regional Discrepancies: Forecast precision drops at the micro-level, making district-wise prediction unreliable.
- Changing Predictors: Long-used predictors have lost statistical relevance, affecting model reliability.
- Extreme Event Forecasting: Current models still struggle with predicting droughts, floods, or sudden monsoon failures.

Way Ahead:

- Refine Dynamic Models: Improve calibration of MMCFS and MME to reduce structural errors in simulations.
- Integrate AI & ML Tools: Adopt machine learning to refine pattern recognition and climate correlations.
- High-Resolution Modelling: Build district-level models to support local disaster management and agriculture.
- Upgrade Observational Systems: Expand coverage of Doppler radars, buoys, and automatic weather stations (AWS).
- Global Collaboration: Share data and align with international agencies for broader and accurate forecasting.

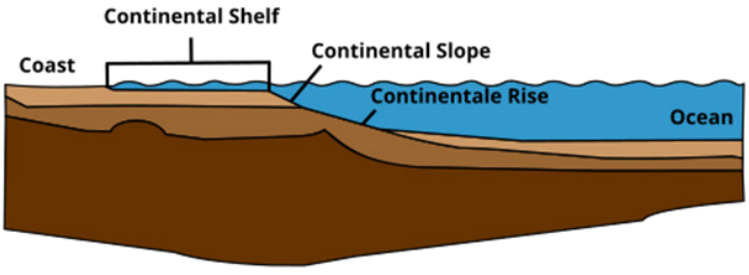
Conclusion:

The journey of monsoon forecasting in India reflects scientific perseverance and technological evolution. While the IMD has made commendable strides, future accuracy hinges on upgrading models, data assimilation, and global partnerships. Reliable monsoon predictions are not just about climate—they are vital for India's agriculture, water security, and economic stability.

Indian Continental Shelf Claim in Arabian Sea

Context:

India has expanded its continental shelf claim in the Arabian Sea by nearly 10,000 square km, modifying earlier submissions to the UN to sidestep maritime disputes with Pakistan.



About Indian Continental Shelf Claim in Arabian Sea:

What is Continental Shelf?

- The continental shelf is the extended submerged border of a continent, offering rights over seabed resources beyond the Exclusive Economic Zone (EEZ).
- Coastal nations can claim beyond 200 nautical miles, based on scientific proof of natural prolongation.

What India is Claiming?

- India has sought recognition for an additional 10,000 sq. km in the central Arabian Sea.
- It supplements India's original 2009 submission with partial claims to avoid the Sir Creek dispute with Pakistan.

- Organization Involved: Submission is made to the Commission on the Limits of the Continental Shelf (CLCS) under the UN Convention on the Law of the Sea (UNCLOS).

Significance:

- If accepted, India's extended continental shelf would add 1.2 million sq. km, almost matching India's landmass (3.274 million sq. km).
- Unlocks potential mining rights for minerals, oil, and polymetallic nodules.
- Strengthens India's maritime security, energy security, and blue economy ambitions.
- Avoids geopolitical complications with Pakistan while maintaining negotiation options for overlapping claims.

About Commission on the Limits of the Continental Shelf (CLCS):

- What it is? A specialized body under UNCLOS facilitating legal establishment of a country's outer continental shelf limits beyond 200 nautical miles.
- Headquarters: Based at the United Nations Headquarters, New York, USA.
- Established in: 1997, following UNCLOS guidelines.
- In 1964, the Convention on the Continental Shelf came into force.
- Aim: To assist coastal States in defining the outer boundaries of their continental shelf based on scientific and technical data.

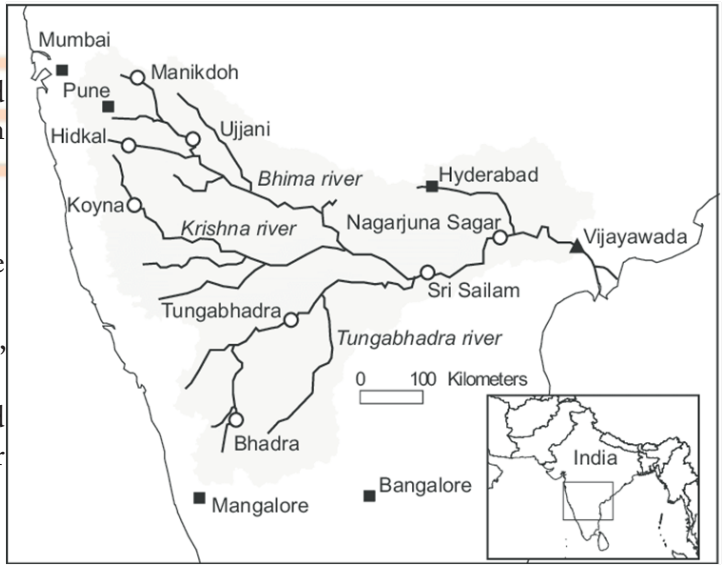
Functions:

- Examine Data: Review submissions by coastal states regarding seabed extension.
- Make Recommendations: Advise whether submitted areas qualify under
- Support Technical Preparation: Provide scientific consultation during claim development if requested.
- Non-Prejudicial to Boundary Disputes: CLCS recommendations do not settle maritime boundary conflicts between neighbouring states.

Krishna River

Context:

Due to extreme heat, the Krishna River has dried up earlier than usual, severely affecting irrigation in Karnataka's Bagalkot, Vijayapura, and Yadgir districts.



About Krishna River:

- Origin: Rises near Mahabaleshwar in the Western Ghats, Satara district, Maharashtra.
- States Flowing Through: Maharashtra, Karnataka, Telangana, Andhra Pradesh.
- Course and Length: Flows ~1,400 km eastward and drains into the Bay of Bengal near Vijayawada, Andhra Pradesh.

Tributaries:

- Right Bank: Venna, Koyna, Panchganga, Dudhganga, Ghataprabha, Malaprabha, Tungabhadra.
- Left Bank: Bhima, Musi, Munneru.

Unique Features of Krishna River:

- Second Largest East-Flowing River in Peninsular India (after Godavari).
- Seasonal Dependence: Largely rain-fed, resulting in highly variable water flow.
- Hydroelectric Projects: Major installations at Srisailam, Nagarjuna Sagar, and Tungabhadra.

Key Projects on Krishna River:

- Tungabhadra Project (Karnataka): Irrigation and hydroelectricity.
- Srisailam Dam (AP): Hydropower and irrigation.
- Nagarjuna Sagar Dam (AP/Telangana): Key part of Green Revolution infrastructure.

- Prakasam Barrage (AP): Canal irrigation across Krishna delta.
- Ghataprabha & Bhima Projects (Maharashtra): Regional irrigation support.

Gandhi Sagar Wildlife Sanctuary

Context:

Gandhi Sagar Wildlife Sanctuary (GSWS) in Madhya Pradesh will become the second home for African cheetahs after Kuno National Park (KNP).

- Two South African male cheetahs, Prabhas and Pavak, will be relocated from KNP to GSWS as part of India's ongoing cheetah reintroduction project.

About Gandhi Sagar Wildlife Sanctuary:

Location:

- Situated in northwestern Madhya Pradesh along the Madhya Pradesh–Rajasthan border.
- Falls within the Khathiar-Gir dry deciduous forests

Key Features:

- Declared a wildlife sanctuary in 1974 and expanded in 1983 to cover 62 sq km.
- The Chambal River bisects the sanctuary into two parts — western side in Nimach district and eastern side in Mandsaur district.
- Recognized as an Important Bird and Biodiversity Area (IBA) by BirdLife International.

Flora:

Forest types:

- Northern tropical dry deciduous forests.
- Dry mixed deciduous forests.
- Dry deciduous scrub.
- Principal tree species include Khair (Acacia catechu), Salai, Kardhai, Dhawda, Tendu, and Palash.

Fauna:

- Herbivores: Chinkara (Indian Gazelle), Nilgai, and Spotted Deer.
- Carnivores: Indian Leopard, Striped Hyena, and Jackal.
- Aquatic species: Mugger Crocodile, Otters, Fish species, and Turtles.
- Rivers: The Chambal River flows through the sanctuary, enhancing aquatic biodiversity and dividing the forest landscape.

Majuli Island and Sivasagar

Context:

Following Charaideo Maidams' UNESCO World Heritage status in 2024, Assam is now pushing for Majuli Island and Sivasagar to achieve UNESCO recognition.

About Majuli Island:

- Location: Majuli is located in the Brahmaputra River in Assam, about 40 km from Jorhat city.
- Formation: Formed by the dynamic shifting of Brahmaputra's river channels over centuries, Majuli emerged as the world's largest river island.

Key Features:

- Area: Once spread across 880 sq km, currently reduced due to severe erosion.
- Biodiversity: Known for lush landscapes, paddy fields, wetlands, and monsoon submergence enriching the soil.
- Culture: Home to vibrant Assamese traditions, Satras (Vaishnavite monasteries), and tribes like the Mising, Deori, and Assamese.
- Status: Declared a district in 2016, it is being proposed under the mixed category (cultural and natural) for UNESCO recognition.

About Sivasagar:

Location:

- Sivasagar is a historical city and district headquarters in Upper Assam, known for its Ahom-era monuments.

History:

- Formerly known as Rangpur, it was the capital of the Ahom Kingdom from 1699–1788.
- It witnessed key events like the Battle of Dhai Ali and later British annexation post-1826.

Key Features:

- Heritage: Hosts iconic Ahom monuments like Talatal Ghar, Rang Ghar, and Sivasagar Tank.
- Architecture: Medieval techniques like lime plastering were used in restoration, preserving authenticity.
- Culture: Rich in history tied to the Ahom dynasty's six-century-long reign over Assam.
- Economy: A major hub today for Assam's tea and oil industries.

Tuti Island

Context:

After two years of violent civil war, Sudan's Tuti Island has been reclaimed by the national army, but lies devastated and depopulated.


EGYPT
Status undetermined
Claimed by Sudan; under de facto administration of Egypt
LIBYA
SAUDI ARABIA
SAHARA
NUBIAN DESERT
LIBYAN DESERT
HADADA HILL
JEBEL ABYAD PLATEAU
AL-BISHĀRĪYĪN HILL
RED SEA HILLS
RED SEA
Nile
Atbara
CHAD
TEIGA PLATEAU
SUDAN
ERITREA
Blue Nile
GEZIRA
White Nile
MARRAH MOUNTAINS
DINDER NATIONAL PARK
NUBA MTS
MORO HILLS
Bahr al-Arab
ETHIOPIA
Final border not determined
RADOM NATIONAL PARK
Final status of Abyei region to be determined
CENTRAL AFRICAN REPUBLIC
SOUTH SUDAN
DEMOCRATIC REPUBLIC OF THE CONGO
UGANDA
KENYA
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Omdurman
أم درمان
BET AL-MAL
بيت المال
AL-SAFYIA
الصافية
NORTH L INDUSTRIA
منطقة صناعية بحرى
Abdelrahman Awad House
AL ARDA
العرضة
AL-MULAZMIN
الملازمين
Al-Ma'una St
Al-Inqaz St
AL-SABABI
الصبابي
Khartoum Nort Train Station
AL MAWRADA
الموردة
Blue Nile River
مطعم رابح
BANAT GHARB
بانت غرب
Al Morada St
KOBAR
كوبر
Tuti Island
جزيرة توتى
AL-AMLAK
الاملاك
AL MOHANDISEEN
المهندسين
Sudan National Museum
المتحف القومي السوداني
Temporarily closed
Nile St
HAY AL-MATAR
حي المطار
السنط
Khartoum

About Tuti Island:

- Location: Tuti Island lies at the confluence of the Blue Nile and White Nile rivers.
- Bordering Urban Centres: It is surrounded by the "Three Towns" – Khartoum, Omdurman, and Bahri (Khartoum North).
- Agricultural Significance: Known as "Khartoum's Garden", it supplied a major portion of the capital's fruits and vegetables, with manual farming practices still in use.

About Sudan:

- Location: Sudan is situated in Northeast Africa, south of Egypt, with a strategic position along the Red Sea coast.

Capital: Khartoum

- Neighbouring Countries: Egypt, Eritrea, Ethiopia, Red Sea, South Sudan, Central African Republic, Chad, and Libya.

Geological Features:

- River System: Dominated by the Nile River, formed by the Blue Nile and White Nile merging at Khartoum.
- Mountains: Includes Nuba Mountains, Marrah Mountains, and Red Sea Hills.

Tanzania

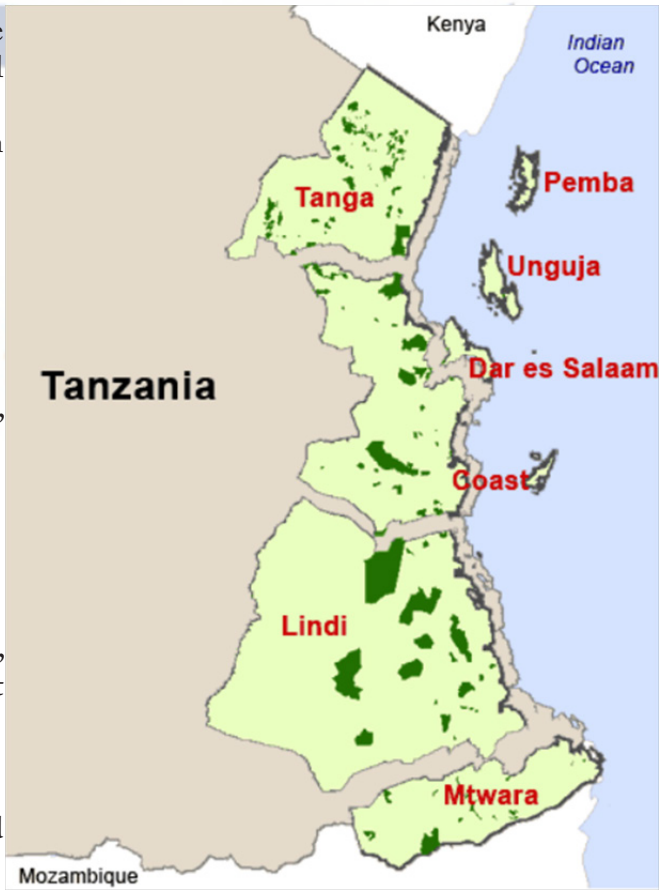
Context:

India launched its first Africa-India maritime exercise (AIKEYME-2025) in Tanzania to strengthen naval cooperation.

- The exercise involves 9 African nations focusing on anti-piracy and maritime security operations.

About Tanzania:

- Located in: East Africa, south of the Equator.
- Capital: Dodoma (official).



Neighbouring Nations:

- Borders: Kenya, Uganda, Mozambique, Malawi, Zambia, Rwanda, Burundi, DR Congo.
- Maritime Borders: Comoros, Seychelles.

Key Geological Features:

Mountains:

- Mount Kilimanjaro(Africa's highest peak, 5,895 m), Mount Meru & Ngorongoro Crater (world's largest volcanic caldera).

Rivers:

- Rufiji(largest river, drains into Indian Ocean) and Kagera (feeds Lake Victoria, Nile's source).

Lakes:

- Lake Tanganyika(world's 2nd deepest, 1,436 m) and Lake Victoria (Africa's largest lake, shared with Kenya/ Uganda).

UNESCO Sites:

- Serengeti National Park(wildlife migration).
- Kilimanjaro NP& Selous Game Reserve.

Ice Stupas – Artificial Glacier

Context:

Farmers in Gilgit-Baltistan region have successfully used ice stupas, inspired by Ladakhi engineer Sonam Wangchuk, to overcome water shortages.

About Ice Stupas – Artificial Glacier:

What are Ice Stupas?

- Ice stupas are artificial glaciers shaped like cones that store winter water in frozen form.
- Named after Buddhist stupas due to their iconic dome-like shape.

Science Behind the Formation of Ice Stupas:

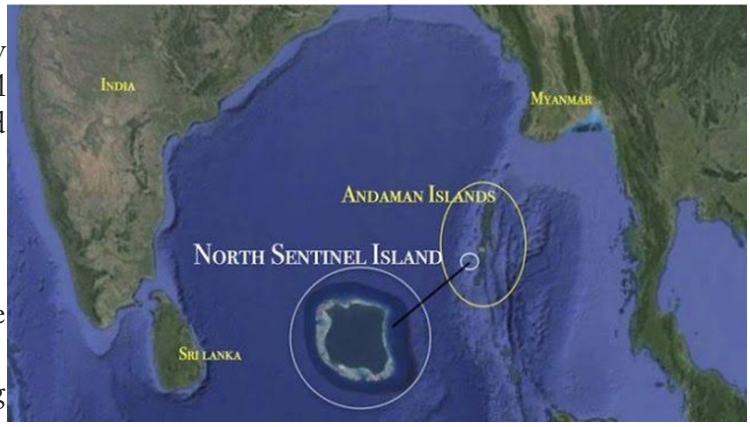
- Gravity-Fed Water Supply: Water is diverted from nearby glacial streams using gravity-driven pipelines, eliminating the need for pumps or electricity.
- Spraying and Freezing Mechanism: At sub-zero temperatures during winter nights, water is sprayed vertically into the air, where droplets freeze mid-air and settle over a support frame.
- Vertical Cone Formation: The ice accumulates into a cone-shaped structure (stupa), which reduces sunlight exposure and insulates the core, minimizing early melting.
- Seasonal Melting for Irrigation: In spring, the stupa melts gradually from top to bottom, releasing water slowly to irrigate crops like apples, apricots, wheat, and barley.
- Scientific Concepts Involved: The process uses phase change, latent heat storage, heat transfer, and hydraulic gradient to create a natural, low-cost water storage solution.

Significance:

- Climate Adaptation: Addresses water scarcity in arid mountain areas affected by warming.
- Agro-innovation: Enables multiple crop cycles annually instead of just one.
- Low-cost, Low-tech: Sustainable, community-driven innovation requiring no heavy infrastructure.
- Disaster Mitigation: Reduces dependency on rapidly melting glaciers, lowering flood risk.

North Sentinel Island

Context:



A 24-year-old U.S. citizen, was arrested for illegally entering the restricted tribal zone of North Sentinel Island, a protected territory in the Andaman and Nicobar Islands.

About North Sentinel Island:

Location:

- Located in the Bay of Bengal, part of the South Andaman administrative district
- Lies about 50 km west of Port Blair, covering an area of ~60 sq. km

Key Geographic Features:

- Surrounded by coral reefs and lacks natural harbours.
- Enclosed by white-sand beaches, mangroves, and dense tropical forests
- Uplifted by the 2004 Indian Ocean earthquake, expanding land mass due to exposed reefs

Flora and Fauna:

- Vegetation: Dense forests with species like Malabar silk cotton and bulletwood trees.
- Wildlife: Includes Indian wild boar, coconut crabs, sea turtles, sharks, and diverse birdlife.

Indigenous Inhabitants – The Sentinelese:

- Known for hostility towards outsiders, they reject any contact with the outside world
- Likely to be descendants of the first human migrations out of Africa
- Dependent on hunting, fishing, and gathering; use bows, arrows, and spears
- Culture, language, and population estimates remain unknown and unstudied

Historical Encounters:

- Maurice Vidal Portman's expeditions forcibly brought natives to Port Blair, resulting in deaths due to lack of immunity

Governance of Island:

- Andaman & Nicobar (Protection of Aboriginal Tribes) Regulation, 1956:
- Prohibits entry within 5 nautical miles (9 km).
- No prosecution of Sentinelese for hostile acts (self-defence).
- Restricted Area Permit (RAP): Removed in 2018, but contact remains banned.
- The Indian Navy patrols the island.

Northwest Passage (Artic)

Context:

The Northwest Passage is back in focus amid rising geopolitical tensions, with Canada and the U.S. disputing its legal status as internal waters vs international strait.

About the Arctic Region:

What is the Arctic?

- The Arctic is the northernmost polar region of Earth, centered around the North Pole and defined by the Arctic Circle (66°30 N latitude).
- Characterized by permafrost, polar climate, tundra vegetation, and extreme cold.
- It includes parts of eight countries: Canada, Denmark (via Greenland), Finland, Iceland, Norway, Russia, Sweden, and the U.S.

Key Features:

- Rich in natural resources: 13% of undiscovered oil, 30% of untapped gas, and vast reserves of rare earths and fisheries.
- Region experiencing rapid warming — almost four times faster than the global average.
- Hosts important shipping routes like the Northwest Passage and Northeast Passage.
- No singular treaty governs it like the Antarctic however it falls under UNCLOS (United Nations Convention on the Law of the Sea).

About Northwest Passage Dispute:

- The Northwest Passage is a potential Arctic Sea route passing through Canada's Arctic Archipelago.
- Canada claims it as internal waters, giving it controls over navigation.
- USA and others view it as international waters, ensuring freedom of passage.
- This legal dispute has intensified due to the melting of Arctic ice and increasing interest in commercial shipping.

About the Arctic Council:

Establishment:

- Founded in 1996 via the Ottawa Declaration.
- Serves as the leading intergovernmental forum for Arctic cooperation.
- Member Nations (8): Canada, Denmark (via Greenland), Finland, Iceland, Norway, Russia, Sweden, and United States.

Key Features:

- Focuses on sustainable development, environmental protection, and indigenous rights.
- Observer States include India, China, UK, Germany, and others.
- Post-Ukraine war, cooperation with Russia has declined, affecting Council unity.
- Unlike the Antarctic Treaty, the Arctic lacks a binding, demilitarized governance treaty.

Naini Lake

Context:

Naini Lake in Nainital has recorded a five-year low water level at 4.7 feet, raising fears of water scarcity ahead of summer.

- Experts attribute this to reduced winter snowfall, unregulated construction, and climate change-induced hydrological shifts.

About Naini Lake:

What is it?

- Naini Lake is a natural freshwater lake, tectonic in origin, and crescent-shaped due to repeated landslides.
- Located in the heart of Nainital town, Uttarakhand, it is the third largest lake in the state by surface area.

Location:

- Situated in the Kumaon region, surrounded by seven hills including Naina Peak, Tiffin Top, and Snow View.
- Lies between Mallital (north) and Tallital (south) ends, connected by a bridge that houses the world's only post office on a lake bridge.

Historical Significance:

- First recorded by British businessman P. Barron in 1839, leading to the development of Nainital as a colonial hill station.
- Has inspired cultural and literary references, forming a key part of Kumaoni heritage and tourism.

Key Features:

- Fed by 26 major drains including Balia Nala, its main perennial stream.
- Subsurface inflows and outflows account for nearly 50% of the lake's hydrological balance.
- Lake supplies ~76% of Nainital's drinking water demand.
- It also supports boating, tourism, and recreation.

Chapter-
4

ENVIRONMENT

India's Waste Management Crisis

Context:

A new global study in Nature names India as the world's largest plastic polluter, emitting 9.3 million tonnes annually.

- The Supreme Court's verdict on Vellore tanneries offers a judicial template—via continuing mandamus—to enforce waste remediation and environmental justice.

About India's Waste Management Crisis:

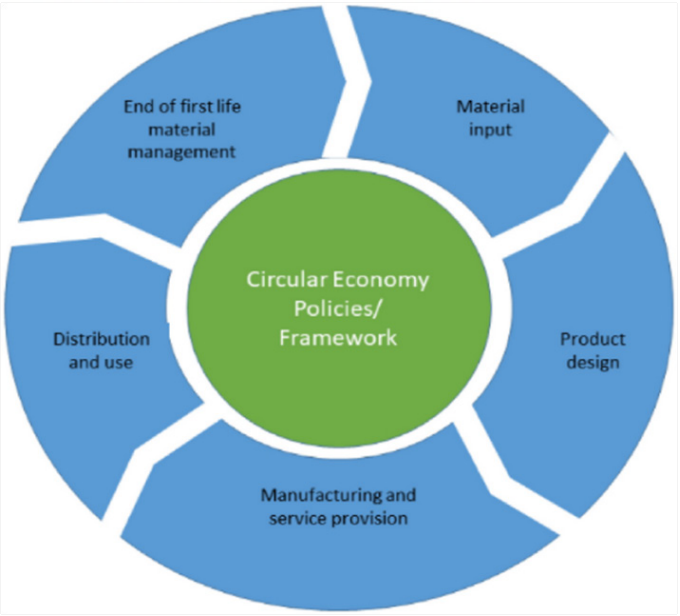
What is Waste Management?

- Waste management refers to the collection, segregation, treatment, and disposal of solid, liquid, and plastic waste to prevent environmental degradation.
- Despite claims of 95% national waste collection, Nature (2025) estimates India's per capita plastic waste generation at 0.54 kg/day, far exceeding official estimates of 0.12 kg/day—indicating underreported rural waste and informal sector exclusion.

Initiatives for Waste Management in India:

1. Plastic Waste Management Rules (2016–2024): These progressive rules introduced segregation at source, Extended Producer Responsibility (EPR), and bans on specific single-use plastic items to minimize generation and improve accountability.
2. Mandatory Jute Packaging Act, 2010: Enforces eco-friendly jute packaging for key commodities to reduce dependency on plastic and combat pollution from artificial packaging.
3. Extended Producer Responsibility (EPR) Framework: Applies to producers, importers, and brand owners, mandating collection, recycling, and reuse targets with environmental compensation for non-compliance.
4. Decentralized Waste Governance: The responsibility for waste management extended to Gram Panchayats, emphasizing local-level accountability and rural waste coverage.

Key Issues in India's Waste Management System:



- Data Inaccuracy: Official waste statistics exclude rural areas, open burning, and the informal sector.
- No uniform waste audit methodology or third-party validation exists.
- Lack of Infrastructure: Most areas rely on dumpsites; sanitary landfills are outnumbered 10:1.
- No mandatory geotagging or universal linkage to MRFs, recyclers, or EPR kiosks.
- Urban-Rural Divide: Rural regions, under panchayati raj institutions, remain outside formal collection systems, worsening the problem.
- Weak Implementation of EPR: While PIBOs have obligations, on-ground infrastructure for collection, segregation, and deposit remains patchy.
- Non-Compliance Culture: SC noted that laws exist but remain on paper, with schemes failing due to absence of timely enforcement.

Way Forward

- Adopt 'Continuing Mandamus' Judicial Oversight: Like in the Vellore tanneries case (2024), courts must

ensure time-bound compliance through regular updates and reporting.

- Strengthen Data Systems: Mandate waste audits, third-party verification, and real-time public data dashboards for transparency.
- Mandatory Infrastructure Mapping: All urban and rural local bodies must be linked to Material Recovery Facilities (MRFs) and sanitary landfills.
- Decentralised EPR Execution: Set up EPR kiosks at the local level, manned by PIBOs, to ensure accessible and scalable plastic recovery.
- Government Pay Principle: As per SC, the State must compensate victims, recover costs from polluters, and initiate ecological restoration promptly.
- Leverage Technology: Use AI, GIS-based tracking, and geotagged waste maps for real-time monitoring and compliance.

Conclusion:

India's waste crisis reflects not just a failure in policy, but in enforcement, monitoring, and equity. The judiciary's intervention through continuing mandamus and the polluter pays principle is essential for accountability. For sustainable development, environmental compliance must be people-centric, data-driven, and time-bound.

Bandhavgarh National Park

Context:

The Supreme Court dismissed a plea alleging illegal mining in Bandhavgarh National Park, Madhya Pradesh, calling it a frivolous abuse of law and imposed a ₹1 lakh penalty on the petitioner.

About Bandhavgarh National Park:

- Located in: Umaria district, Madhya Pradesh, nestled within the Vindhya ranges.
- Declared a national park in 1968, and designated a Tiger Reserve in 1993 under Project Tiger.

Historical Significance:

- The Bandhavgarh Fort, believed to date back to Treta Yuga, contains ancient inscriptions, rock art, and references to Vakataka, Sengar, Kalchuri, and Baghel dynasties.
- Once the hunting grounds of the Maharaja of Rewa, the region is rich in archaeological remains and legends from the Ramayana.

Flora:

- Dominated by dry deciduous forests, especially Sal (Shorea robusta) in valleys.
- Other species include: Bamboo, Tendu, Saj (Terminalia tomentosa), Dhaora, Arjun, Amla, Palas (Butea monosperma).

Fauna:

- Known for the highest density of Royal Bengal Tigers in the world.
- Key prey species: Chital, Sambhar, Barking Deer, Nilgai, Chinkara, Wild Pig, Chowsingha.
- Major predators: Tiger, Leopard, Wild Dog, Wolf, Jackal. It is also home to Langurs and Rhesus Macaques.

Topography:

- No major rivers flow through the park, but seasonal streams and rivulets support local biodiversity.
- It forms part of the central Indian highland ecosystem and plays a key role in tiger conservation corridors.

AIM4NatuRe initiative

Context:

FAO launched the AIM4NatuRe initiative with UK support to enhance global monitoring of ecosystem restoration under the Kunming-Montreal Biodiversity Framework.

About AIM4NatuRe Initiative:

What is AIM4NatuRe?

- Accelerating Innovative Monitoring for Nature Restoration (AIM4NatuRe) is a global initiative to improve the monitoring and reporting of ecosystem restoration efforts.
  - o Launched by: Food and Agriculture Organization (FAO) of the United Nations.
  - o Funding Partner: United Kingdom, contributing GBP 7 million.

Objective:

- Strengthen countries' ability to monitor and report restoration progress.
- Support achievement of Target 2 of the Kunming-Montreal Global Biodiversity Framework — restoring at least 30% of degraded ecosystems by 2030.

Features:

- Technology Driven: Leverages cutting-edge satellite and data analysis tools.
- Global Dataset Creation: Builds a harmonized global dataset on restoration.
- Capacity Development: Trains countries to use data-driven restoration tracking methods.
- Data Interoperability: Establishes standardized data formats for seamless integration across nations.
- Inclusivity Focus: Supports Indigenous Peoples' monitoring efforts with pilot projects in Brazil and Peru.
- Expansion: Builds upon the success of FAO's AIM4Forests programme, extending from forests to all ecosystems including wetlands, grasslands, and marine areas.

Significance:

- Fosters transparency, accountability, and ownership of restoration goals.
- Bridges major data and reporting gaps — addressing the needs highlighted by 80% of countries in the CBD capacity survey.
- Promotes nature-based solutions to tackle climate change, biodiversity loss, and land degradation.

Bio-Input Resource Centres

Context:

The Ministry of Agriculture and Farmers' Welfare released guidelines for setting up Bio-Input Resource Centres (BRCs) to promote natural farming under the National Mission on Natural Farming (NMNF).

About Bio-Input Resource Centres:

- What is Bio-Input Resource Centres?
- BRCs are cluster-level enterprises that provide farmers with locally prepared natural farming inputs like bio-fertilizers, bio-pesticides, and organic formulations.
- They also act as knowledge hubs to train and guide farmers transitioning to natural farming practices.
- Established Under: Launched under the National Mission on Natural Farming (NMNF).

Objectives:

- Facilitate easy availability of quality bio-inputs for farmers.
- Support farmers with technical knowledge on natural farming methods.
- Promote the scaling-up of natural farming practices across villages.

Features:

- Financial Support: Rs. 1 lakh per centre in two tranches of Rs. 50,000 each.
- Entrepreneur Eligibility: Must practice or be willing to adopt natural farming.
- Customized Inputs: Inputs to be developed based on local soil, crop patterns, and farmer needs.
- Training Support: Train farmers on botanical extracts, bio-input preparations, and pest management tools.
- For-Profit Model: BRCs are intended to be sustainable ventures supporting local economies.
- Market Facilitation: Explore convergence with FPOs, SRLMs, and agriculture marketing boards.

About National Mission on Natural Farming (NMNF)

What is NMNF?

- NMNF is a Centrally Sponsored Scheme aimed at promoting chemical-free, sustainable agriculture rooted in local agro-ecology and indigenous knowledge.

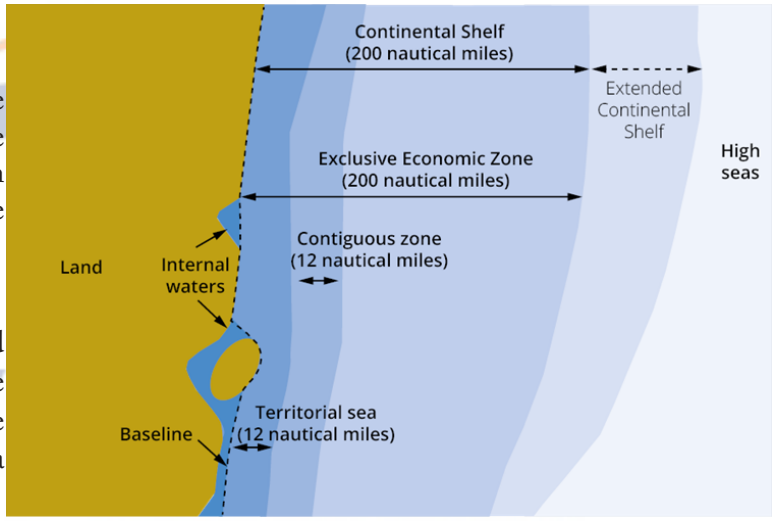
Objectives:

- Promote natural farming to ensure safe and nutritious food.
- Reduce dependency on external chemical inputs and lower cultivation costs.
- Build healthy soil ecosystems, promote biodiversity, and enhance climate resilience.

High Seas Treaty (BBNJ Treaty)

Context:

Delegates have gathered in New York for the first Preparatory Commission session of the BBNJ Treaty, aiming to finalize implementation rules. India is a signatory but has yet to ratify the agreement.



About the BBNJ Treaty (High Seas Treaty):

- What It Is: The Biodiversity Beyond National Jurisdiction (BBNJ) Treaty is the third implementing agreement under the UN Convention on the Law of the Sea (UNCLOS).

Objective:

1. Protect marine biodiversity in the high seas.
2. Ensure fair benefit-sharing from marine genetic resources.
3. Mandate Environmental Impact Assessments (EIAs) for high-seas activities.

- Coverage: Applies to areas beyond 200 nautical miles from national EEZs, which make up 64% of global oceans.
- India's Status: India has signed the treaty but has not yet ratified it.

Why the BBNJ Treaty Is Needed?

- Marine Protection Gap: Only 1.44% of high seas are currently protected despite covering two-thirds of ocean space.
- Unregulated Activities: Deep-sea mining, overfishing, and pollution operate with minimal international oversight.
- Marine Genetic Resources (MGR): Rising commercial use of MGRs in pharmaceuticals and biotechnology necessitates a regulatory framework.
- Equity in Ocean Use: Aims to prevent dominance by developed nations and ensure Global South access to ocean wealth.

Challenges to the BBNJ Treaty:

- Low Ratification: As of April 2025, only 21 countries have ratified the treaty out of the required 60 for enforcement.

- Geopolitical Tensions: Disputes in the South China Sea and Bay of Bengal delay consensus on Marine Protected Areas (MPAs).
- Weak Enforcement: Lack of enforcement mechanisms and opt-out options risk weakening compliance.
- Overlap with Other Conventions: Potential conflict with the Convention on Biological Diversity (CBD) over MGRs.
- Financial Burden on Developing Nations: Capacity-building and tech transfer provisions lack binding support commitments.
- Implementation Gaps: Treaty does not cover oil and gas exploration or pollution in EEZs, undermining ecological coherence.

Way Ahead:

- Fast-Track Ratification: Urgent diplomatic push needed to achieve 60 ratifications, especially by UNOC-3 in France.
- Inclusive Decision-Making: Scientific and technical bodies must have balanced regional representation and expertise.
- Funding Mechanism: Ensure operationalization of the special fund with tailored contributions from developed countries.
- Integrated Ocean Governance: Bridge governance between high seas and EEZs to address interconnected marine threats.
- Monitoring & Transparency: Develop digital tools and global dashboards for tracking MPAs and EIA compliance.

Conclusion:

The BBNJ Treaty is a transformative tool for global ocean conservation. But without strong political will, institutional design, and equity-focused implementation, its goals will remain aspirational. The oceans, already under stress, can no longer wait for half-measures.

Chlorpyrifos Pesticide

Context:

Ahead of the Basel, Rotterdam, and Stockholm Conventions (BRS COP) in Geneva, Indian civil society groups have urged the government to impose a complete ban on chlorpyrifos, a pesticide banned in over 40 countries but still used in India.

About Chlorpyrifos Pesticide:

What is Chlorpyrifos?

- Chlorpyrifos is an organophosphate insecticide, acaricide, and miticide.
- Chemical Formula: $C_9H_{11}Cl_3NO_3PS$.
- Used to control soil-borne and foliage-feeding insects in crops like cotton, paddy, soy, wheat, and maize.
- Neurotoxic Agent: Disrupts the enzyme acetylcholinesterase, critical for nerve function.
- Health Impacts: Linked to reduced IQ, developmental delays, memory loss, and birth defects, especially in unborn children.
- Acute Effects: Can cause convulsions, respiratory failure, or death in extreme exposures.

Environmental Concerns:

- Bio accumulative and persistent in nature.
- Can travel thousands of miles, contaminating remote ecosystems, including polar regions.
- Harms pollinators and aquatic life, threatening food chains and biodiversity.
- Chlorpyrifos is not yet officially listed under either the Stockholm or Rotterdam Convention, but global efforts are actively pushing for its inclusion.

About Rotterdam Convention (2004) – On Prior Informed Consent (PIC) for Hazardous Chemicals and Pesticides

- Objective: Promotes shared responsibility in the international trade of hazardous chemicals to protect human health and the environment.
- Key Mechanism: Prior Informed Consent (PIC) — exporting countries must notify and obtain consent before shipping restricted chemicals.
- Scope: Covers pesticides, industrial chemicals, and Severely Hazardous Pesticide Formulations (SHPFs).

Annexures:

- Annex I: Information requirements for notification.
- Annex II: Scientific criteria for listing.
- Annex III: List of chemicals (52 total – 35 pesticides, 16 industrial chemicals, 1 both).
- Annex IV: Criteria for listing SHPFs.
- Recent Focus: Push to include chlorpyrifos and paraquat under Annex III.

About Stockholm Convention (2004) – On Persistent Organic Pollutants (POPs)

- Objective: Protects health and ecosystems from POPs – chemicals that persist, bioaccumulate, and are toxic.
- Initial Focus: "Dirty Dozen" – 12 highly toxic chemicals

Key Features:

- Annex A: Chemicals to be eliminated.
- Annex B: Chemicals to be restricted.
- Annex C: Chemicals for release reduction.
- Financial Mechanism: Global Environment Facility (GEF).

PM10 Pollution in India

Context:

A new four-year analysis by Respirer Living Sciences revealed that all 11 major Indian metro cities, including Delhi and Patna, exceeded PM10 safety limits continuously from 2021–2024, indicating chronic air pollution.

About PM10 Pollution in India:

What is PM10?

- PM10 refers to particulate matter with a diameter of 10 microns or less, capable of entering the respiratory tract.
- It includes dust, pollen, mold, and emissions from vehicles, industries, and construction activities.

Characteristics of PM10:

- Contains inorganic compounds, heavy metals, and biological material.
- Includes both primary particles (directly emitted) and secondary particles (formed through chemical reactions in the air).
- Sources include vehicular emissions, construction, industrial activities, stubble burning, and waste combustion.

Permissible Limits in India:

- As per National Ambient Air Quality Standards (NAAQS) by CPCB:
- Annual Average: 60 $\mu g/m^3$
- 24-Hour Average: 100 $\mu g/m^3$

Impacts of PM10:

- Respiratory Issues: Inhalation leads to asthma, bronchitis, and chronic obstructive pulmonary disease exacerbation.

- Cardiovascular Damage: Long-term exposure linked to heart disease and strokes.
- Impaired Lung Growth: Children exposed to PM10 show reduced lung function development.
- Environmental Damage: Reduces visibility, affects plant health, and damages buildings.
- Increased Mortality Risk: IARC classified outdoor air pollution (PM inclusive) as carcinogenic in 2015.

Water Bears and Axiom – 4 Mission

Context:

ISRO is set to send tardigrades (water bears) to the International Space Station as part of the Axiom-4 mission, marking India's first human experiment in microgravity using these resilient micro-animals.

About Water Bears and Axiom – 4 Mission:

About Axiom-4 Mission:

- What it is: A 14-day crewed mission to the International Space Station (ISS) under the Axiom Space program, involving research in microgravity biology, biotechnology, and sustainability.
- Organizations Involved: Joint initiative by ISRO (India), NASA (USA), and ESA (Europe), with astronaut Group Captain Shubhanshu Shukla representing India.

Mission Objectives:

- Explore life science, space agriculture, and human physiological responses.
- Assess microbial resilience, muscle regeneration, and food growth in zero gravity.
- Contribute towards India's Gaganyaan Mission and future long-duration spaceflight.

About Tardigrades (Water Bears):

What are Tardigrades?

- Micro-animals also known as "water bears" or "moss piglets".
- Size: Between 0.3 to 0.5 mm, visible only under a microscope.
- Discovered in 1773 by German zoologist Johann Goeze.

Key Characteristics:

- Found in extreme habitats — from polar ice caps to deep oceans.
- Have eight legs with claws, segmented bodies, and tough outer skin.
- Survive extreme conditions: vacuum of space, radiation, dehydration, and high/low temperatures.
- Enter a cryptobiosis state (suspended animation) to survive harsh environments.

Importance of the Experiment:

- Voyager Tardigrades Experiment will study:
- Revival and reproduction in microgravity.
- Gene expression differences between space-exposed and Earth-bound groups.

Why it matters:

- Helps uncover molecular mechanisms of resilience.
- Can inform biotech innovations and astronaut protection strategies.
- Supports bio-preservation techniques for long-duration missions.

India's Trade Triumph and Its Environmental Toll

Context:

India's trade contribution is projected to reach 6% of global trade growth by 2025 (DHL Trade Atlas report), but rising exports of pollution-intensive products have triggered serious concerns over environmental sustainability.

About India's Trade Triumph and Its Environmental Toll:

Success of Indian Trade:

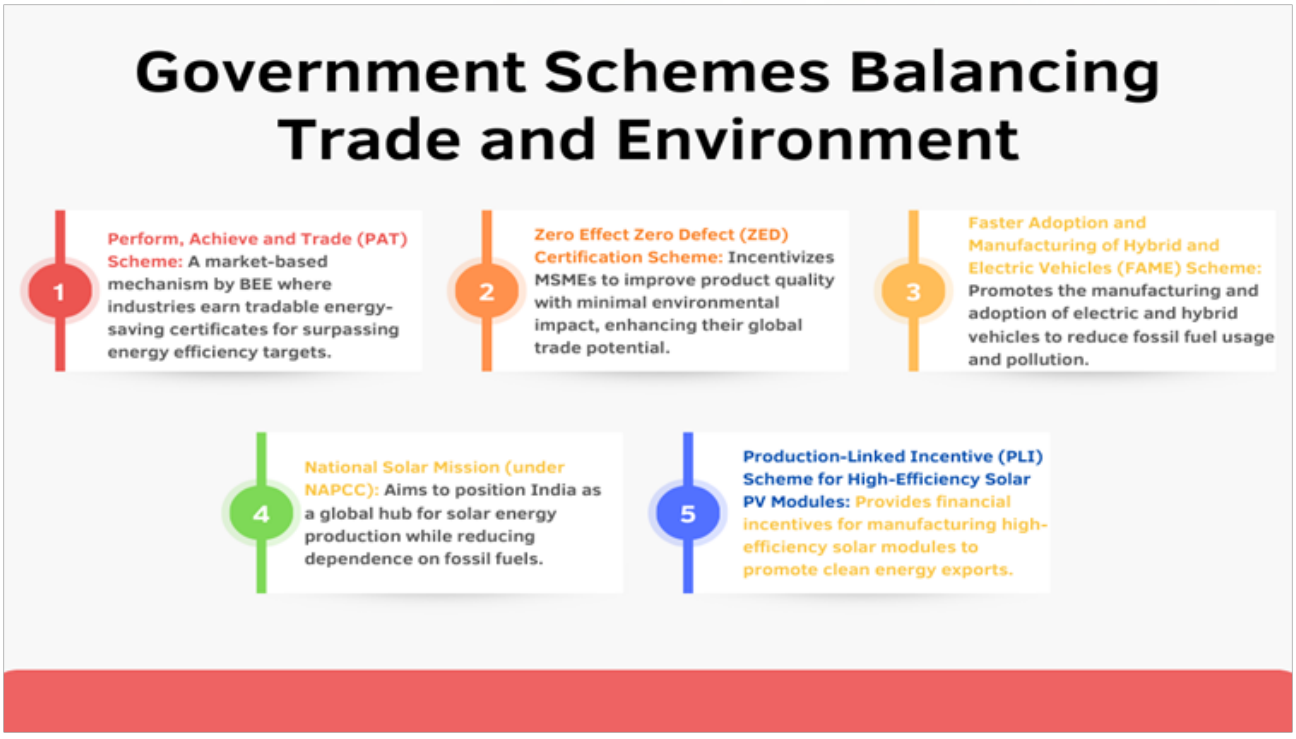
- Expanding Global Footprint: India's merchandise exports reached USD 231.48 billion from pollution-intensive sectors alone by 2023, growing faster than overall exports (12.5% vs. 11%).

Sectoral Dominance:

- Petroleum and coal products accounted for 38% of pollution-intensive exports.
- Alongside chemicals, pharmaceuticals, and automobiles, these sectors formed 84% of India's pollution-linked exports.

FDI Attraction:

- Between 2000 and 2024, pollution-intensive sectors attracted USD 149.26 billion FDI, contributing nearly 21% of India's total inflows.
- Economic Gains: Industries like cement, steel, and pharma boosted GDP, employment, and foreign reserves, strengthening India's global competitiveness.



Environmental Toll of Trade Growth:

- Rising Emissions: India's industrial and energy sector emissions rose from 699 $MtCO_2e$ (1991) to 2606 $MtCO_2e$ (2021) — a nearly five-fold
- Hazardous Waste Generation: Sectors like pharmaceuticals and chemicals contribute to water, air, and soil contamination, threatening biodiversity.
- Weak Regulatory Enforcement: Environmental laws like the Environmental Protection Act (1986) remain poorly enforced; industry exemptions dilute environmental safeguards.
- Policy Incoherence: Disconnect between trade policies and environmental standards (e.g., dilution controversies of Draft EIA Notification 2020) undermines sustainability goals.

Way Ahead: Balancing Trade and Environment

- Promote Cleaner Technologies: Incentivize industries to adopt low-carbon, energy-efficient production methods with targeted subsidies and green certification norms.

- Strengthen Regulatory Frameworks: Enforce stringent compliance with environmental norms through third-party audits and transparent disclosure mechanisms.
- Integrate Trade and Environmental Policies: Link export incentives with sustainability standards to ensure cleaner industrial growth.
- Develop Green Industry Sectors: Diversify trade by investing in green technology, renewable energy, and sustainable manufacturing sectors.
- International Collaboration: Partner with countries and institutions for technology transfer, capacity building, and climate finance to foster a green transition.

Conclusion:

India's trade success marks a powerful economic transformation, but the environmental costs are mounting. Balancing growth with sustainable practices is no longer optional but necessary for long-term prosperity.

DPS Wetland

Context:

The DPS Wetland in Navi Mumbai has been officially declared a Flamingo Conservation Reserve by the Maharashtra State Wildlife Board.

About DPS Wetland:

Location:

- Situated in Seawoods, Navi Mumbai, Maharashtra.
- Spread over 30 acres, adjacent to the Thane Creek Ramsar site.

River Drainage:

- DPS Lake forms part of the Thane Creek ecosystem, a tidal waterbody fed by numerous freshwater sources and marine influences.
- Supports migratory birds on the Central Asian Flyway.

Key Features:

- Acts as a critical feeding and resting ground for thousands of migratory flamingos.
- Restoration of tidal flow and algae clearance initiatives were pivotal in reviving the wetland ecosystem.
- A sensitive ecological buffer that strengthens climate resilience against floods and sea-water intrusion.

About Flamingos:

What are Flamingos?

- Flamingos are large, pink-hued wading birds known for their graceful necks, long legs, and downward-bent bills.
- Scientific Name: The Greater Flamingo (found in India) is scientifically named Phoenicopterus roseus.

Key Features:

Physical:

- Height ranges between 90 to 150 cm; striking pink or rosy plumage due to carotenoid pigments from their diet.

Biological:

- Specialized filter-feeding with comblike structures inside their bills to sieve algae, crustaceans, and diatoms.
- Nests are conical mud mounds where one or two eggs are laid, with both parents incubating.

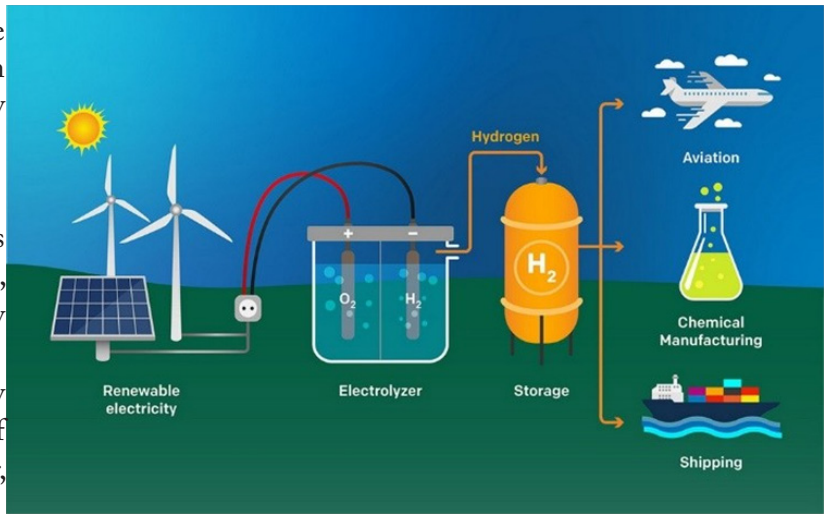
Social:

- Highly gregarious birds forming large colonies; engage in synchronized group movements and nesting.

India, rising power demand and the 'hydrogen factor'

Context:

India's energy experts have stressed the importance of integrating hydrogen production and nuclear power to meet rising energy demand.



India's Energy Goals:

- Net Zero Target by 2070: India aims to achieve net-zero emissions by 2070, requiring massive shifts in energy systems.
- 500 GW from Non-Fossil Sources by 2030: India plans to install 500 GW of non-fossil capacity (solar, wind, nuclear, hydro).
- Nuclear Energy Expansion: Government aims for 100 GW of nuclear power capacity by 2047 to meet base-load requirements.
- Green Hydrogen Mission: Focus on using renewable electricity for green hydrogen to decarbonise industries.
- Electrification of End-Use Sectors: Transition to electric vehicles, heat pumps, and electric furnaces to cut fossil fuel dependency.

Reasons for Rising Energy Demand in India:

- Economic Growth Aspirations: India targets to become a developed economy, increasing energy use across sectors.

  E.g. Per capita electricity use expected to triple by 2040.
- Population Growth and Urbanisation: Expanding cities and middle-class lifestyle adoption are intensifying energy needs.

  E.g. Urban energy use per capita is double that of rural India.
- Industrial Decarbonisation: Transitioning steel, cement, and fertilizer sectors to clean inputs raises electricity demand.

  E.g. Hydrogen replacing coal in iron ore reduction.
- Digital and Automation Push: Data centres, smart infrastructure, and AI systems require constant power supply.

  E.g. IT and digital economy's share in energy demand growing rapidly.
- Climate Adaptation Needs: More cooling, irrigation, and disaster mitigation require reliable electricity.

  E.g. Power needed for flood pumps, drought irrigation, and cooling appliances.

Existing Solutions to Rising Demand:

- Renewable Energy Expansion: Solar, wind, and hydro projects have grown significantly in capacity.
- Base-Load Nuclear Power: Nuclear offers reliable, low-carbon electricity to complement intermittent sources.
- Battery Storage Systems: Used to store solar/wind energy for non-generating hours.
- Electrolyser-Based Hydrogen Production: Uses surplus electricity to produce green hydrogen for industries.
- Flexing Coal Plants Temporarily: Coal-fired plants are adjusted to balance renewable inputs during peak solar hours.

Challenges Faced by Existing Solutions:

- Intermittency of Renewables: Solar and wind can't provide round-the-clock supply

  E.g. Solar only works during daytime; wind is seasonal.
- Flexing Nuclear Is Cost-Inefficient: Nuclear has high capital cost and low marginal cost, making flexing uneconomical.

E.g. Variable costs remain same even at lower output.

- Battery Storage Still Expensive: Large-scale battery deployment faces cost and material challenges.

  E.g. Lithium and rare-earth supply risks.
- Separate Treatment of Hydrogen & Storage: Hydrogen and electricity storage are treated as different systems, reducing synergy.

  E.g. Parallel setups increase overall infrastructure cost.
- Lack of Clear Hydrogen Taxonomy: Green hydrogen is currently defined only through renewables, excluding nuclear.

  E.g. Nuclear-based hydrogen is low-carbon but not officially "green."

Way Ahead: Hydrogen as Solution

- Redefine Green Hydrogen as Low-Carbon: Adopt carbon threshold-based taxonomy to include nuclear-based hydrogen.

  E.g. <2 kg CO_2/kg H_2 criterion aligns nuclear with green label.
- Synergise Hydrogen with Storage Systems: Combine electrolyser-based hydrogen and battery storage for economic efficiency.

  E.g. Reduces need for curtailment and standalone batteries.
- Accelerate Nuclear Deployment: Invest in faster roll-out of PHWRs and BSRs using indigenous tech.

  E.g. NPCIL's 26-unit plan under execution.
- Incentivise Industrial Hydrogen Use: Encourage fertiliser, steel, and transport sectors to switch to green/low-carbon hydrogen.

  E.g. Use surplus grid power to feed hydrogen electrolyzers during off-peak.
- Strengthen Grid Flexibility Tools: Deploy AI-based demand response and grid balancing systems.

  E.g. Smart metering and load shaping via digital platforms.

Conclusion:

India's path to clean energy leadership lies in integrating low-carbon nuclear, renewables, and hydrogen solutions efficiently. Synergising electricity storage and hydrogen can balance intermittent power and ensure round-the-clock clean energy. With the right policy push and strategic reforms, India can lead the global energy transition sustainably.

Golden Tiger

Context:

A rare golden tiger, also known as a golden tabby tiger, was recently sighted and photographed in Kaziranga National Park, Assam

About Golden Tiger:

- What it is: Golden tiger or "golden tabby" is a rare colour variant of the Bengal tiger, not a separate subspecies.
- Location: Only four are known in the wild, all found in Kaziranga National Park, Assam.

Scientific Reason:

- Caused by a mutation in the wideband gene that extends reddish-yellow pigment production (pheomelanin).
- Both parents must carry the mutated gene for the golden color to appear.
- Color is harmless, but inbreeding may cause genetic weaknesses.

About Kaziranga National Park:

- Location: Situated in Golaghat and Nagaon districts of Assam, at the edge of the Eastern Himalayas.

- Water Body: Nourished by the Brahmaputra River and several tributaries.

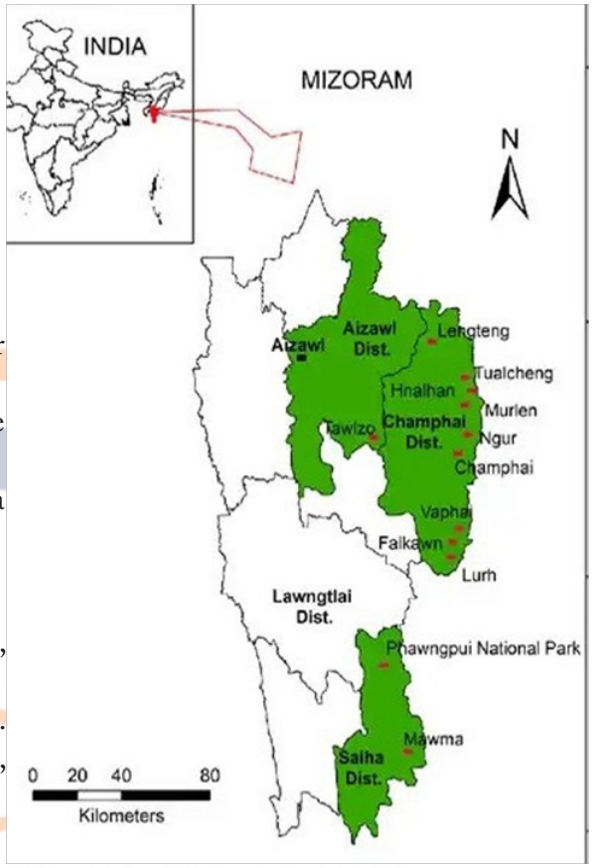
Features:

- Home to 2,200+ one-horned rhinoceroses — nearly 2/3rd of global population.
- Kaziranga Park is home to world's largest population of Indian Rhinoceros.
- UNESCO World Heritage Site since 1985.
- Declared a Tiger Reserve in 2006 due to rising tiger numbers.
- Recognized as an Important Bird Area by BirdLife International.
- Rich flora includes elephant grass, rhododendrons, cotton tree, and aquatic plants.

Phawngpui National Park

Context:

Nearly one-ninth of Mizoram's Phawngpui National Park was affected by forest fires that originated from a jhum cultivation site in March 2025.



About Phawngpui National Park:

Location:

- Situated in southeastern Mizoram, near the Myanmar border.
- Known as the Blue Mountain, it is the highest peak in the state at 2,157 metres.
- Covers an area of approximately 50 sq. km and features a 10 km-long ridge with steep cliffs and grassy glades.

Biodiversity:

- Hosts diverse Montane Sub-tropical forests with oak, rhododendrons, and rare bamboo species.
- Critical habitat for endangered fauna such as the Mrs. Hume's Pheasant (State Bird), Slow Loris, Tiger, Leopard, Asiatic Black Bear, and Capped Langur.

Ecological Uniqueness:

- Only known habitat in India for Mount Victoria Babax, shared with Myanmar.
- Cliff ecosystems support rare birdlife like the Dark-rumped Swift, Blyth's Tragopan, and Peregrine Falcon.

Conservation Challenges:

- Popular for trekking and eco-tourism, especially the Far Pak glade.
- Increasing frequency of forest fires due to jhum cultivation threatens habitat integrity and wildlife breeding cycles.

Marine Litter

Context:

The global spotlight on marine litter has intensified, with India yet to implement a direct policy targeting mitigation. Experts now emphasize the need to prioritize local-level implementation to address escalating ecological and economic impacts.

What is Marine Litter?

- Definition: Marine litter refers to human-generated waste that ends up in oceans and seas, primarily through rivers, drains, and coastal activities.

- Plastic Dominance: Over 80% of marine debris is plastic, including bags, bottles, microplastics, and fishing gear.

  Example: Sea turtles mistake plastic bags for jellyfish, leading to fatal blockages.
- Ghost Gear Hazard: Discarded fishing nets (ghost gear) trap and kill marine life long after their utility ends.

  Example: Over 650,000 marine mammals die yearly due to entanglement (UNEP).
- Bioaccumulation Risk: Microplastics enter the food chain, impacting marine biodiversity and human health.
- Navigation Threat: Litter impedes shipping, fishing, and tourism sectors—posing safety and economic risks.

Global Data Insights on Marine Litter:

- Plastic Surge: Global plastic production in the last decade surpassed the entire 20th-century output (UNESCO Ocean Literacy).
- 2050 Warning: Oceans may contain more plastic than fish by weight if trends continue (UNESCO).
- COVID Impact: Disruption of waste systems during the pandemic intensified litter flows.
- Microplastics: Detected from Arctic ice to deep-sea trenches—showing global scale and irreversibility.
- Global Mortality: Over 1 million marine animals die annually due to plastic ingestion or entanglement (WWF).

Global Initiatives Against Marine Litter:

1. MARPOL Annex V (1983): It is a global agreement that bans ships from dumping plastics and other garbage into the ocean.
2. UNCLOS (1994): The United Nations Convention on the Law of the Sea requires countries to protect the ocean environment. It covers all types of pollution, including waste from land, ships, and offshore sources.
3. Honolulu Commitment (2011): Signed by many countries and groups, it aims to reduce waste entering the ocean from land and sea. It promotes cooperation among governments, NGOs, and industries to clean up the oceans.
4. UNEP's Clean Seas Campaign (2017): Launched by the UN, this campaign encourages countries to reduce plastic use, especially single-use plastics.
5. Sustainable Development Goal (SDG) 14.1: This global goal asks all countries to reduce marine pollution by 2025, especially plastic waste. It pushes for cleaner seas through better waste management and reduced dumping.

India is Lagging Behind in Controlling Marine Litter:

- Lack of Standalone Policy: India lacks a direct national policy for marine litter mitigation.
- Over-reliance on Plastic Waste Management Rules (2016): These rules focus on general waste but lack marine-specific enforcement.

  E.g. EPR implementation remains inconsistent across states.
- Delayed Action Plan: While a National Action Plan is being developed, its implementation remains pending.
- Land-based Litter Ignored: Rivers and drains funnel untreated solid waste into oceans.
- Sectoral Focus: Existing maritime pollution control focuses primarily on shipping, not comprehensive waste streams.

Way Forward:

- Adopt a National Marine Litter Policy: India must formalize a comprehensive marine litter law incorporating land-sea continuum.

  E.g. Modelled on Japan's Marine Litter Act or EU's Marine Strategy Framework Directive.
- Community-Based Monitoring: Engage coastal communities in local-level waste surveillance and clean-up.

  E.g. Kerala's 'Suchitwa Sagaram' project mobilized fisherfolk to collect marine plastic.
- Leverage Extended Producer Responsibility (EPR): Enforce plastic recovery targets and traceability at coastal and riverine levels.

- Circular Economy Approach: Promote biodegradable alternatives, waste segregation, and recycling near coasts.

  E.g. Link with Swachh Bharat 2.0 and National Green Hydrogen Mission for sustainability.
- Scientific Collaboration and Innovation: Partner with GESAMP, GPML, and UNEP for R&D on bio-remediation and microplastic removal.

Conclusion:

Marine litter is a growing ecological and economic crisis. While global frameworks offer guidance, India must act decisively at the local level with a dedicated policy, robust community participation, and innovation-driven solutions. Only then can our blue economy be truly sustainable.

Nilgiri Thar

Context:

Kerala and Tamil Nadu will jointly conduct a Nilgiri Tahr census in April, across 265 census blocks to mark 50 years of Eravikulam National Park.

About Nilgiri Tahr:

What it is?

- The Nilgiri Tahr (Nilgiritragus hylocrius) is the only mountain ungulate endemic to southern India and the state animal of Tamil Nadu.

Conservation Status:

- IUCN Red List: Endangered
- Wildlife Protection Act, 1972: Schedule I

Key Biological Features:

- A sure-footed herbivore found at elevations of 1,200–2,600 metres.
- Displays sexual dimorphism; males are larger and darker.
- Adapted to wet, tropical montane climates and active during the day (diurnal).

Habitat and Distribution:

- Endemic to the Southern Western Ghats, across Kerala and Tamil Nadu.
- Eravikulam National Park (Kerala), Mukurthi National Park and Grass Hills National Park (Tamil Nadu), Silent Valley and Agasthyamalai ranges (Kerala–TN border areas).
- Prefers montane grasslands, shola forests, and rocky highlands.
- Historical range extended across 400 km; now reduced to fragmented patches.
- Project Nilgiri Tahr (2022–2027) aims to conserve Tamil Nadu's state animal through scientific surveys, radio telemetry, and reintroduction into historical habitats.
- According to the recent survey, there are about 1,229 Nilgiri Tahrs in Tamil Nadu and around 827 in Kerala.

One-Horned Rhinoceros

Context:

The Wildlife Institute of India has proposed a national action plan for translocation of one-horned rhinoceroses to reduce habitat pressure in Assam's Kaziranga and Pobitora, through reintroduction in new protected areas across five states.

About One-Horned Rhinoceros:

- Scientific Name: Rhinoceros unicornis
- IUCN Status: Vulnerable
- Habitat: Terai grasslands, alluvial floodplains, swamps, and subtropical savannahs.

Key Features:

- Largest of all Asian rhino species with a height of 5.75–6.5 ft and weight up to 6,000 pounds.
- Recognisable by its single black horn (8–25 inches) and armour-plated skin folds.
- Solitary grazers that feed on grasses, aquatic plants, shrubs, and fruits.

Key Protected Areas for One-Horned Rhinos as of now in India:

- Kaziranga National Park (Assam) – Largest population (~2,613 as of 2022).
- Pobitora Wildlife Sanctuary (Assam) – Highest rhino density (107 rhinos in 16 sq. km).
- Jaldapara National Park (West Bengal)
- Gorumara National Park (West Bengal)
- Dudhwa National Park (Uttar Pradesh)

Proposed Translocation Sites under New Action Plan:

- Assam: Dibru-Saikhowa National Park (Reintroduction of 5 rhinos within 13 years.)
- West Bengal: Gorumara & Jaldapara National Parks (Exchange and introduction of 5 rhinos every 3 years from Kaziranga and Pobitora.)
- Arunachal Pradesh: D'Ering Memorial Wildlife Sanctuary (Suitable for long-term reintroduction of 5 rhinos.)

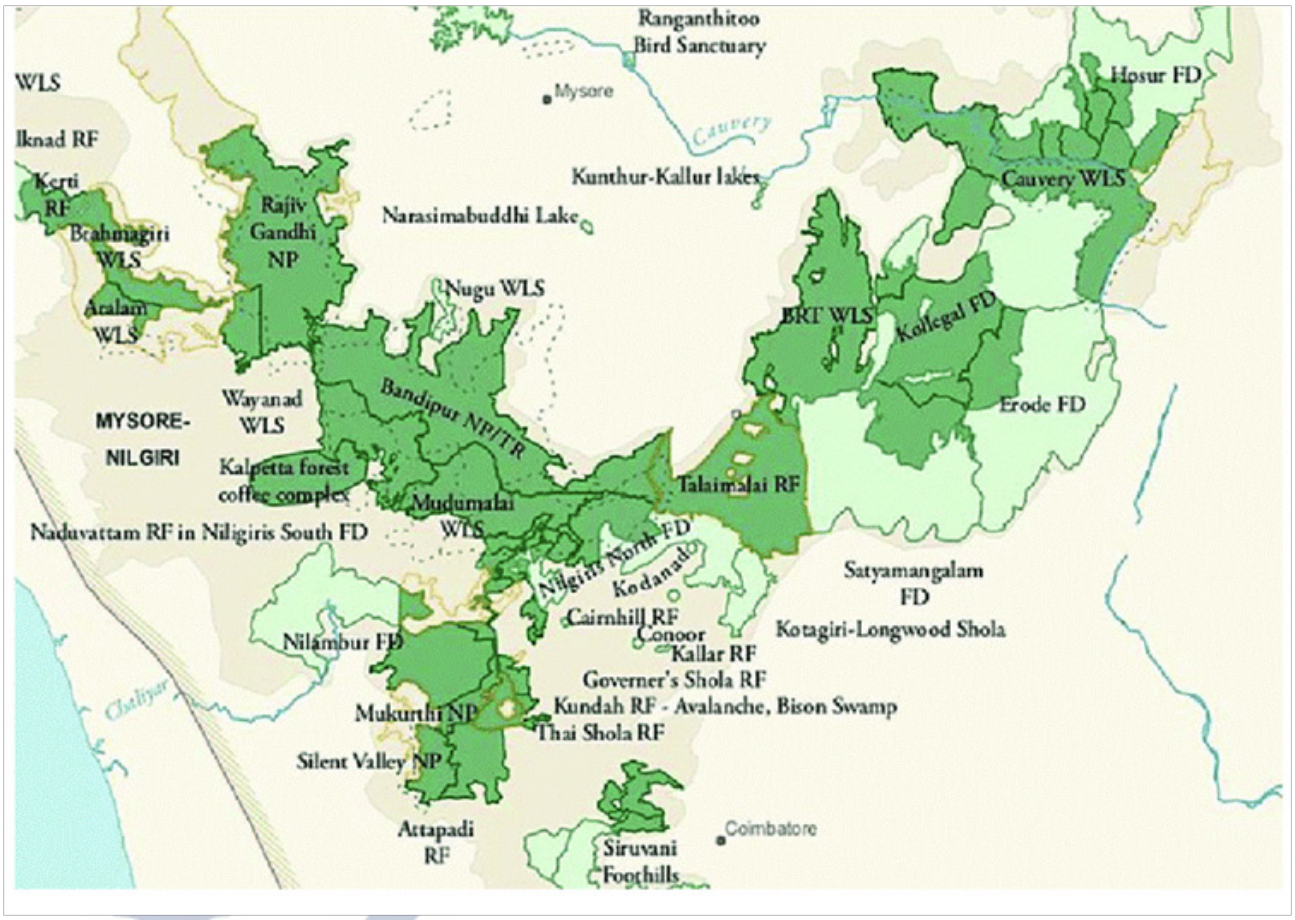
Bihar: Valmiki Tiger Reserve

- Uttar Pradesh: Dudhwa National Park, Pilibhit Tiger Reserve, Katarniaghat Wildlife Sanctuary
- Uttarakhand: Surai Range

Nagarahole National Park

Context:

Concerns have been raised over the proposed land grants within the core area of Nagarahole National Park (Nagarahole Tiger Reserve), specifically in its ecologically sensitive swampy grasslands.



About Nagarahole National Park:

What it is:

- A notified Tiger Reserve and one of India's premier Project Tiger sites.
- Officially known as Rajiv Gandhi National Park, named after the Nagarahole stream ("Nagara" – serpent, "Hole" – stream).

Location & Geography:

- Spans across Kodagu and Mysuru districts in Karnataka.
- Covers 847.98 sq. km (Core: 643.39 sq. km, Buffer: 204.59 sq. km).
- Contiguous with: Bandipur Tiger Reserve, Wayanad Wildlife Sanctuary.
- Situated between Mysuru Plateau and Nilgiri Hills.

Ecological History:

- Initially declared a wildlife sanctuary in 1955 and later upgraded to a National Park in 1988.
- Designated as a Tiger Reserve under Project Tiger in 1999.

Flora & Fauna:

- Flora: Tropical moist and dry deciduous forests, swampy grasslands (Hadlus), teak, rosewood, sandalwood.
- Fauna: Tiger, Leopard, Wild Dog, Sloth Bear, Asiatic Elephant, Gaur, Sambar, Chital, Muntjac, Mouse Deer, and South-western Langur.

Rivers:

- Nagarahole River: Flows through the park.
- Kabini River: Forms the northern boundary of the park.
- Taraka River: Flows through the southeastern parts of the park.

Significance:

- Part of Nilgiri Biosphere Reserve and a key wildlife corridor in the Western Ghats.
- Hosts the world's largest herd of Asiatic elephants.
- Supports high biodiversity and is vital for ecological connectivity and conservation.

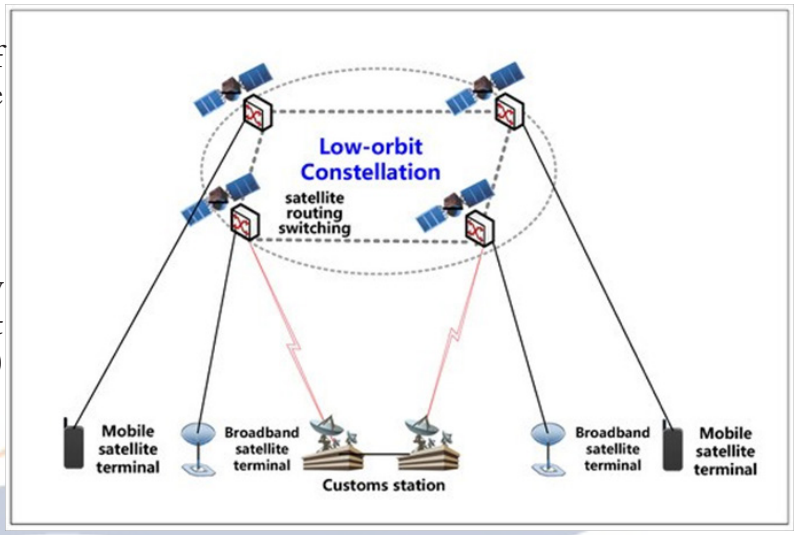
Chapter-
5

SCIENCE & TECHNOLOGY

Project Kuiper: Satellite-Internet Constellation

Context:

Amazon launched the first 27 satellites of Project Kuiper via the Atlas V rocket from Cape Canaveral, USA.



About Project Kuiper:

What is it?

- A satellite-based broadband initiative by Amazon to provide high-speed internet globally via Low Earth Orbit (LEO) satellites.

Organisation Involved: Amazon

Key Features:

- Global Satellite Network: 3,232 satellites in low orbit (630 km) for fast, low-latency internet worldwide
- Speed Options for All Needs: 100 Mbps (homes), 400 Mbps (schools/hospitals), and 1 Gbps (governments/large orgs)
- Life-Changing Connectivity: Powers education (e-learning), healthcare (telemedicine), businesses & emergency services in unreachable zones

Other Global Satellite-Based Internet Networks

- Starlink (SpaceX): Over 6,000 satellites launched; aims for 40,000+.
- OneWeb: 648 satellites planned (UK/India collaboration).
- Telesat Lightspeed: 298 satellites by Canada.
- China's Guowang: 13,000+ satellites under planning.

About Satellite-Internet Constellation:

What is a Satellite-Internet Constellation?

- A satellite constellation is a group of satellites working in coordination to provide seamless internet coverage worldwide.

How Satellite Internet Works?

- Satellites in Orbit: Hundreds of small satellites fly in Low Earth Orbit (LEO, 500-2,000 km up), moving in sync to cover the globe.
- Ground Stations: Earth-based stations send and receive signals between users and satellites.
- Satellite Links: Satellites talk to each other using lasers or radio waves (inter-satellite links) for seamless data transfer.
- Smart Data Routing: AI manages traffic, choosing the fastest path to avoid delays.

Key Features

- Low Latency (20-40 ms): Much faster than old geostationary satellites (600+ ms), good for video calls and gaming.
- Global Coverage: Works in remote areas like deserts, oceans, and mountains.
- Backup Connections: If one satellite fails, others take over, reducing outages.

Technical Details:

Frequency Bands:

- Ka-band – Fast speeds but weak in rain.
- Ku-band – Balanced speed and reliability.
- C-band – Slower but works in bad weather.
- V-band (Experimental) – Super-fast but easily blocked.
- Adaptive Coding & Modulation (ACM) – Adjusts signal strength based on weather conditions.

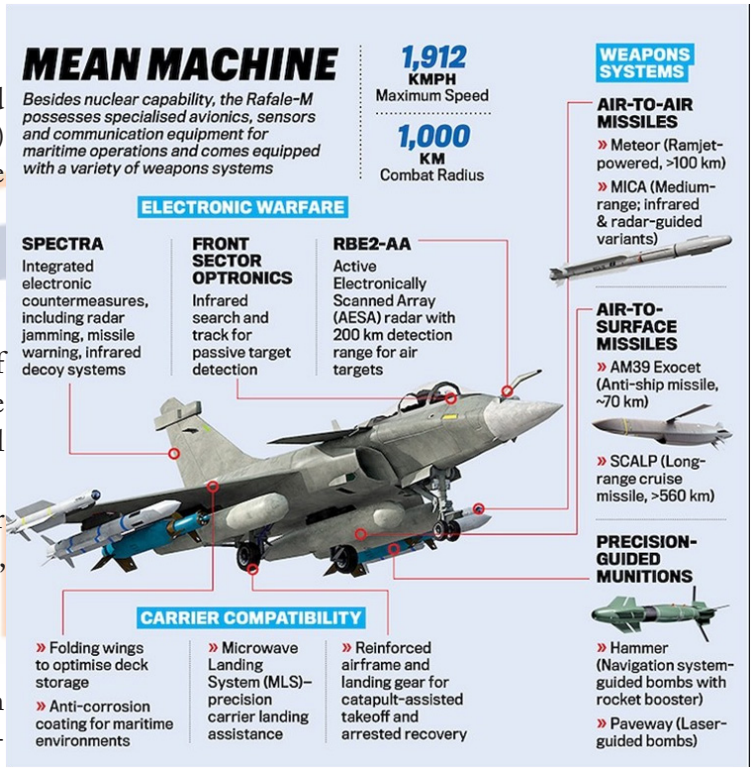
Limitations:

- Expensive: Launching satellites is costly, and user dishes are pricier than regular broadband.
- Weather Problems: Heavy rain or storms can weaken signals (especially Ka/V-band).
- Space Junk Risk: Thousands of satellites increase collision risks, creating more debris.
- Hurts Astronomy: Bright satellites interfere with telescopes, making it harder to study space.

Rafale-M Jets

Context:

The Cabinet Committee on Security (CCS) approved the procurement of 26 Rafale Marine (Rafale-M) jets from France, enhancing India's maritime strike capabilities amid rising Indo-Pacific tensions.



About Rafale-M Jets:

What is Rafale-M Jets?

- Rafale-M is the carrier-borne variant of Dassault Aviation's 4.5-generation Rafale fighter jet, designed specifically for naval operations from aircraft carriers.
- It offers multirole capabilities — air superiority, deep strike, reconnaissance, nuclear deterrence, and anti-ship missions.

Recent Agreement Between India and France:

- Procurement: 26 Rafale-M jets worth 63,000 crore through a government-to-government deal.
- Breakdown: 22 single-seaters + 4 twin-seater trainers, including weapons, simulators, crew training, and logistics support for five years.
- Timeline: Deliveries to begin in 2029 and complete by 2031.
- Compatibility: Will operate from INS Vikrant, India's first indigenous aircraft carrier.

Key Features of Rafale-M Jet:

- Advanced Weapons: Equipped with Meteor air-to-air missiles, SCALP cruise missiles (range 560 km), and Exocet anti-ship missiles.
- Superior Sensors: RBE2-AA AESA radar, Front Sector Optronics (FSO), and SPECTRA electronic warfare suite for long-range detection and survivability.
- Carrier-Adapted Design: Reinforced airframe, corrosion resistance, folding wings, and stronger undercarriage for maritime conditions.
- Multifunctionality: Capable of both air-to-air and air-to-ground missions during a single sortie; service ceiling of 50,000 feet.
- Data Fusion Capability: Integrates information from sensors to present pilots with a consolidated operational picture.

Competition:

Against China:

Shenyang J-15:

- Primary 4.5-generation carrier-based multirole fighter.
- Known as the "Flying Shark"; 59 jets currently in service.

Shenyang J-11:

- 4th-generation air superiority fighters.
- 50 jets currently operational.

Against Pakistan:

- Pakistan has no carrier and thus no naval fighter jets.
- Pakistan's JF-17 and F-16 jets are fighter aircraft used by the Pakistan Air Force.

RNA Silencing Technology

Context:

Researchers at Martin Luther University, have developed a highly effective RNA-based antiviral agent against cucumber mosaic virus (CMV), offering strong defence for crops.

About Cucumber Mosaic Virus (CMV):

- What It Is: CMV is a widespread and devastating plant virus affecting over 1,200 plant species including food and medicinal crops.
- Caused By: Transmitted primarily by sap-sucking aphids; nearly 90 species of aphids can spread CMV.
- Impact on Plants: Causes mosaic discoloration, stunted growth, malformed fruits, and severe yield loss (up to 70% in cucurbits).
- India and CMV: In India, CMV causes 25–30% banana crop loss and up to 70% infection in pumpkins, melons, and cucumbers.

About RNA Silencing Technology:

What It Is?

- RNA silencing is a natural immune mechanism in plants where double-stranded RNA (dsRNA) triggers the production of small interfering RNAs (siRNA) to degrade viral RNA and stop infection.

How It Works?

- When a virus infects a plant, it releases double-stranded RNA. The plant detects this as a danger signal.
- Special enzymes called Dicer-like enzymes then cut the dsRNA into small pieces called siRNA.
- These siRNAs help the plant identify and destroy the virus's RNA.

Types of RNA-Based Protection:

Host-Induced Gene Silencing (HIGS):

- Plants are genetically modified to produce virus-specific dsRNA internally.
- Offers continuous, lifelong protection but faces regulatory hurdles and higher costs.

Spray-Induced Gene Silencing (SIGS):

- External application of dsRNA sprays without genetic modification.
- More flexible, environment-friendly, and cost-effective.

RNA Silencing Counters CMV:

- Scientists designed "effective dsRNA" enriched with potent siRNA targeting CMV's genetic weak points.
- Enhanced immunity led to 80% lower viral loads and near-complete protection in lab experiments.

Significance:

- Precision targeting of virus genomes prevents viral mutation and resistance.
- Broader application potential for other viral, fungal, and bacterial plant pathogens.
- Paves way for eco-friendly, GMO-free crop protection technologies.

AI in Weather Forecasting

Context:

India is leveraging AI/ML under Mission Mausam (2,000 crore outlay) to boost weather prediction accuracy, especially for extreme events like heatwaves and cloudbursts.

- IIT-Delhi and IIIT-Delhi teams have developed AI-based monsoon models outperforming traditional systems.

How AI Can Assist in Weather Forecasting

- Data-Driven Predictions: AI learns complex patterns from past data to predict rainfall, cyclones, or heatwaves, unlike physics-based models which rely on fixed equations.

  E.g. IIT Delhi's ML model for monsoon showed 61.9% accuracy (2002–2022) surpassing traditional models.
- Faster, Scalable Forecasts: AI models can produce short-term forecasts quickly and at lower computational cost, ideal for nowcasting and real-time alerts.
- Better Prediction of Extremes: AI helps capture nonlinear interactions among variables—useful in predicting rare and sudden weather events like flash floods or tornadoes.
- Hybrid Modelling: Combines strengths of physics-based models and AI tools to improve reliability and interpretability of forecasts.

Challenges in AI-based Weather Forecasting

- Data Scarcity and Quality Issues: High-resolution, clean, and long-term weather datasets are essential. Historical data may be sparse or inconsistent.

  E.g. Many Indian weather datasets face gaps due to poor sensor coverage in remote regions.
- Lack of Interdisciplinary Talent: Climate scientists may lack AI/ML expertise, while ML engineers often lack meteorological grounding, limiting deep collaborations.
- Black Box Nature: AI models lack transparency, making it hard to explain their outputs to policymakers or meteorologists.
- Infrastructural Constraints: Most forecasters rely on model outputs from external agencies due to lack of local computational or technical capability.
- Trust and Verification Issues: Model predictions need rigorous validation; without this, false alarms or missed warnings can reduce public trust.

Way Ahead:

- Establish Hybrid Weather Institutes: Create dedicated centres integrating meteorology and AI under one roof for seamless collaboration.

  E.g. Ministry-supported AI-Climate Centre at IITM Pune already operational.
- Enhance Data Systems: Standardise and integrate real-time, historical data from Doppler radars, satellites, and ground sensors.
- Capacity Building: Train a new cadre of meteorologists fluent in AI/ML and engineers trained in earth

system science.

- Model Customisation: Develop AI models tailored to India's diverse climatic zones and terrain for hyperlocal forecasts.
- Public-Private Collaboration: Engage startups, academia, and government institutions to co-develop and deploy verified AI models.

Conclusion:

AI has the potential to revolutionise India's weather forecasting, especially for managing extreme events. However, it requires a blend of robust data, skilled manpower, and institutional innovation. With strategic collaboration, AI can become central to India's climate resilience planning.

Nano Sulphur

Context:

TERI scientists have developed nano sulphur that significantly boosts mustard yield by 30–40%, offering a viable solution to India's chronic low oilseed productivity.

About Nano Sulphur:

What is Nano Sulphur?

- A nano-formulation of sulphur applied via foliar spray to improve nutrient uptake and crop yield.
- It uses plant-growth promoting bacteria for eco-friendly, enzyme-driven nutrient delivery.
- Developed by: The Energy and Resources Institute (TERI).

Key Features:

- Enhances yield: Boosts mustard production by 30–40% (up to 3.7 tonnes/ha).
- Increases oil content: Raises oil content by 28–30%.
- Replaces 50% traditional sulphur: Cuts input cost and dependency on bulky sulphur fertilisers.
- Efficient absorption: 90–100% availability through foliar application vs. 10–15% in conventional forms.
- Non-leaching: Prevents nutrient loss in sandy or compact soils.

Significance:

- Economic gain: Farmers can earn up to 12,000/acre in additional revenue.
- Soil health: Addresses sulphur deficiency in 41–45% of Indian soils, especially in major oilseed-producing states (MP, Gujarat, Maharashtra, Andhra Pradesh).
- Sustainability: Completely green formulation with biological agents, unlike chemical-based nano urea or
- Supports self-sufficiency: Offers a sustainable alternative to GM crops like DMH-11 without regulatory hurdles.

Moonlight Solar Panel Technology

Context:

Stanford University researchers have developed an innovative moonlight solar panel technology that allows electricity generation even at night, during rain, and under overcast skies.

About Moonlight Solar Panels Technology:

What it is?

- A new technology that enables solar panels to generate electricity during nighttime and under low-light conditions.

How It Works?

- Utilizes radiative cooling, a natural process where heat radiates from the Earth's surface into space, especially on clear nights.
- Thermoelectric generators are attached to modified solar panels to capture the heat dissipating from the panels and convert it into electricity.
- This method taps the temperature difference between the panel and the surrounding air to produce energy.

Key Features:

- Generates about 50 milliwatts per square meter at night (compared to 200 watts per square meter during the day by traditional panels).
- Can power small devices like LEDs, environmental sensors, and IoT gadgets.
- Retrofit-friendly: Can be integrated into existing solar panel installations without the need for complete replacement.

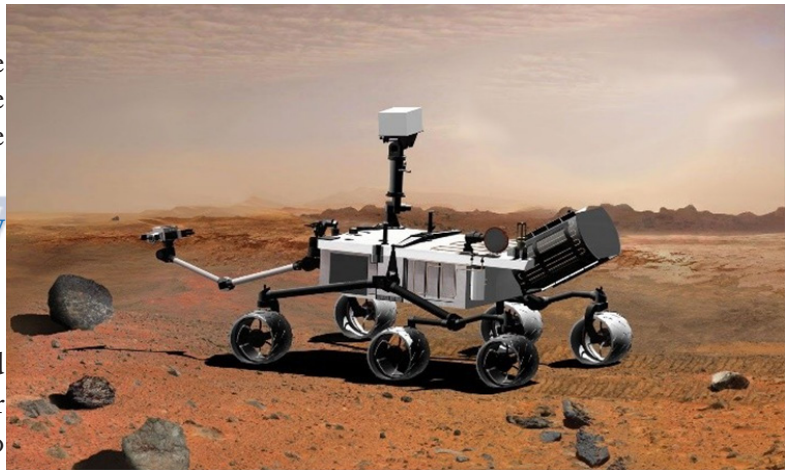
Significance:

- Bridges nighttime energy gaps, reducing reliance on batteries for storage.
- Eco-friendly alternative to battery usage, minimizing pollution from battery production and disposal.
- Enhances renewable energy reliability, especially in off-grid or low-sunlight
- Opens avenues for low-cost, sustainable energy solutions in remote and disaster-prone areas.
- Represents a significant step towards continuous, clean energy generation and addresses one of solar technology's biggest limitations.

NASA Curiosity Rover Discovers New Evidence of Mars' Warm and Wet Past

Context:

NASA's Curiosity rover has discovered siderite mineral deposits on Mars, offering crucial evidence of the planet's warmer, wetter, and more habitable ancient environment.



About NASA Curiosity Rover Discovers New Evidence of Mars' Warm and Wet Past:

What is Curiosity Rover?

- Curiosity Rover is NASA's car-sized robotic rover launched in 2011 under the Mars Science Laboratory mission to explore Gale Crater on Mars.
- Its primary goal is to study the planet's climate, geology, and assess whether Mars ever had conditions suitable for microbial life.
- Mission: NASA's Mars Science Laboratory (Curiosity Rover).
- Launch: November 26, 2011.
- Landing: August 6, 2012.

Key Place in News:

- Curiosity explored Gale Crater, a 154-km wide impact basin featuring sedimentary layers and evidence of ancient water activity.
- Rock samples were drilled at three locations between 2022 and 2023.

Major Discovery: Siderite Mineral

- Siderite (iron carbonate) detected in sedimentary rocks.
- Indicates Mars had a dense, carbon dioxide-rich atmosphere billions of years ago, essential for liquid water stability.
- Supports the hypothesis that carbon dioxide was locked in Mars' crust as minerals after atmospheric thinning.

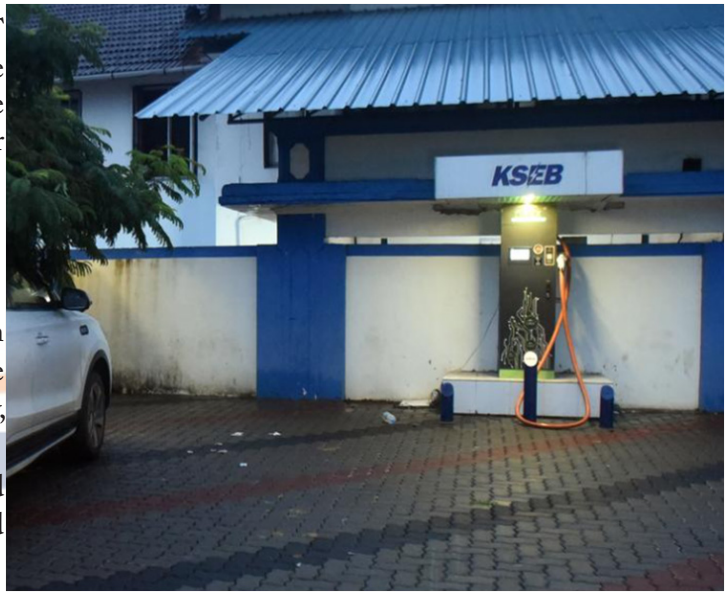
Significance of Discovery:

- Explains the previously missing link between Mars' ancient greenhouse conditions and the lack of widespread carbonate mineral evidence.
- Highlights an imbalanced ancient carbon cycle on Mars, contrasting Earth's balanced cycle maintained by plate tectonics.
- Offers a major clue toward understanding Mars' environmental collapse and current sterile conditions.

Vehicle-to-Grid (V2G) Technology

Context:

The Kerala State Electricity Board (KSEB) and IIT Bombay have launched a pilot project to explore Vehicle-to-Grid (V2G) technology, aiming to integrate Electric Vehicles (EVs) into the State's power grid for enhanced renewable energy management.



About Vehicle-to-Grid (V2G) Technology:

What is V2G Technology?

- Definition: V2G (Vehicle-to-Grid) is a system where Electric Vehicles (EVs) communicate with the power grid to return stored energy, enabling two-way electricity flow.
- Developed by: The concept was first proposed in the late 1990s by Dr. Willett Kempton and researchers at the University of Delaware.

How does V2G Work?

- Grid to Vehicle (G2V): EVs charge from the grid when electricity demand is low or renewable generation is high.
- Vehicle to Grid (V2G): When parked and connected, EVs can discharge power back to the grid during peak demand hours through bi-directional chargers.
- Smart Charging: Utilizes Time-of-Use (ToU) pricing to optimize charging during renewable energy surplus times and discharging during grid shortages.

Significance of V2G Technology

- Grid Stability: Supports grid balance by acting as distributed energy storage, especially during renewable energy fluctuations.
- Boosts Renewable Energy Use: Stores surplus solar and wind power for nighttime or cloudy periods.
- Energy Resilience: EVs can serve as emergency power sources during disasters.
- Economic Incentives: EV owners can earn by supplying electricity back to the grid, seen in models across Europe and the U.S.
- Decarbonization Push: Helps India align with its net-zero carbon emission target by 2070 by reducing reliance on fossil fuels for electricity needs.

James Webb Space Telescope

Context:

Scientists using the James Webb Space Telescope have detected possible biosignature gases Dimethyl Sulfide (DMS) and Dimethyl Disulfide (DMDS) in the atmosphere of exoplanet K2-18 b, suggesting a strong potential for microbial life.

About Recent Discovery and Signs of Life on K2-18 b:

- Discovery: Researchers detected Dimethyl Sulfide (DMS) and Dimethyl Disulfide (DMDS) — gases on Earth typically produced by marine microorganisms — in the atmosphere of K2-18 b.

Significance:

- These are the strongest indicators yet of potential life outside the solar system, representing a new era of observational astrobiology.
- The planet, categorized as a hycean world (water-rich, hydrogen-dominated atmosphere), might harbor microbial oceanic life.
- Scientists caution that more observations are needed before confirming extraterrestrial life.

About the James Webb Space Telescope (JWST)

What it is?

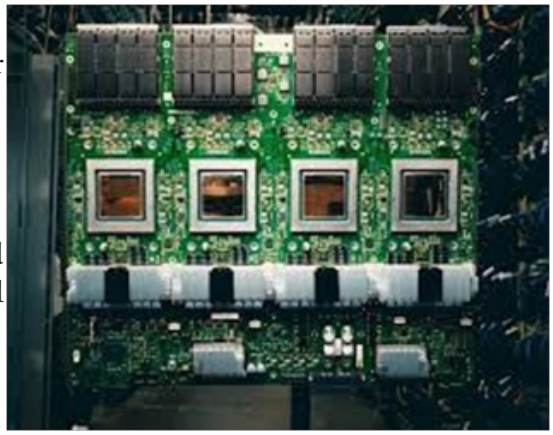
- The James Webb Space Telescope is the largest and most advanced infrared space observatory ever built, designed to study the early universe, stars, galaxies, and exoplanet atmospheres.
- Launched: December 25, 2021.
- Developed by: NASA, in collaboration with ESA (European Space Agency) and CSA (Canadian Space Agency).

Key Features:

- Size: Comparable to a tennis court with a 3-story height; built to fold origami-style to fit inside a rocket.
- Sunshield: A giant silver sunshade protects instruments from solar heat, maintaining a 600°F temperature difference between its sides.
- Infrared Vision: Captures heat signals invisible to the human eye, allowing observation through cosmic dust and the early universe.
- Gold-Coated Mirrors: 18 hexagonal mirrors coated with gold enhance infrared reflection for clearer, deeper space imaging.

Ironwood TPU

Context:



Google has launched Ironwood, its seventh-generation Tensor Processing Unit (TPU) to accelerate AI model processing.

About Ironwood TPU:

What it is?

- Ironwood is the latest TPU (Tensor Processing Unit) developed by Google, designed exclusively for high-performance artificial intelligence workloads.
- Developed by: Google Cloud's AI Infrastructure team.

Feature:

- AI-Specific Design: Ironwood is an ASIC chip built to process tensors—fundamental to machine learning.
- Faster Training: It significantly reduces AI model training time from weeks to just hours.
- Highly Specialised: More focused than CPUs/GPUs, it handles matrix operations and neural networks
- Google Ecosystem Backbone: Powers AI in Google Search, YouTube, and DeepMind
- Cloud-Ready Scalability: Fully integrated with Google Cloud to support large-scale AI applications.

Key Differences between TPU vs GPU vs CPU:

Feature	CPU (Central Processing Unit)	GPU (Graphics Processing Unit)	TPU (Tensor Processing Unit)
Nature	General-purpose processor	Parallel processor, mainly for visual and AI tasks	Application-specific processor for machine learning
Primary Use	Handles routine computing and sequential operations	Ideal for graphics rendering and ML parallel tasks	Specialised for deep learning tensor computations
Cores	2–16 per chip	Thousands per chip for simultaneous task execution	Fewer, highly specialised cores for AI matrix operations
Performance	Efficient in sequential tasks	Better for concurrent, parallel tasks	Fastest in training and inference of ML models
Flexibility	Highly versatile	Moderately flexible	Narrow-purpose, highly optimised
Example Use	Word processing, browsing, OS control	Gaming, video editing, ML model training	Google Search AI, YouTube AI, DeepMind models

Indian Genetic Mapping

Context:

The GenomeIndia Project published preliminary findings in Nature Genetics (April 2025), mapping the genomes of 9,772 Indians across 83 endogamous population groups.

What is Indian Genetic Mapping?

- Definition: Genetic mapping is the process of analyzing DNA sequences to locate genes and variations (mutations) across a population.
- Purpose: It helps understand genetic diversity, disease susceptibility, and enables precision medicine.

How is Genetic Mapping Done?

- Sample Collection: Blood is collected to extract DNA and phenotype data (e.g. weight, height, BP).
- Sequencing: Whole genome sequencing decodes the complete DNA, including coding and non-coding regions.
- Analysis: Advanced bioinformatics tools identify genetic variants and mutations.

  E.g. Genome sequencing carried out by institutes like IISc, CCMB, IGIB, NIBMG, GBRC.

How were Samples Collected?

- Coverage: 83 population groups from 100+ locations; includes 30 tribal and 53 non-tribal groups.
- Demographics: 4,696 males and 5,076 females participated.
- Linguistic Diversity: Covered four major families—Indo-European, Dravidian, Tibeto-Burman, Austro-Asiatic.
- Sample Integrity: Parent-child pairs included to track de novo mutations (random new mutations).

Preliminary Findings:

- Mutation Volume: 180 million mutations identified, of which 130 million are autosomal and 50 million sex-linked.
- Non-Coding DNA: 98% of genome lies in non-coding regions—critical for gene regulation and evolution.
- Unique Genetic Pool: Each group revealed specific mutation patterns due to endogamy.
- Global Underrepresentation: India's genetic diversity was largely missing in earlier global genome projects.

Significance of Mutations in Endogamous Groups:

- Disease Hotspots: Endogamy leads to repeated transmission of certain genetic diseases in specific communities.

  E.g. Population-specific disorders can now be mapped and monitored.
- Preserved Diversity: Genetic signatures provide clues to ancient migrations and ancestry.

  E.g. India has ~4,000 endogamous groups with minimal gene flow between them.
- Targeted Health Interventions: Enables cluster-based medical screening for high-risk mutations.
- Global Contribution: Adds to global genomic data by representing India's ethnolinguistic spectrum.

Medical Implications:

- Precision Healthcare: Enables customized treatments based on individual and community-level genetics.

  E.g. Tailored cancer or cardiovascular risk assessment.
- Early Detection Tools: Population-specific mutations help design predictive diagnostics.

  E.g. New low-cost screening panels for sickle cell anemia in tribal groups.
- Better Drug Response: Pharmacogenomics will improve efficacy of drugs in Indian populations.
- Genomics for Public Health: Helps formulate national policy on genetic disorders and rare diseases.

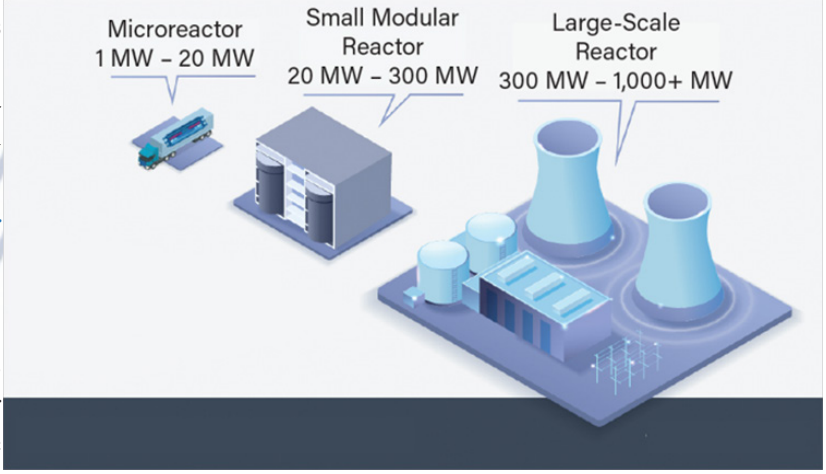
Conclusion:

India's genetic mapping is a landmark step in inclusive, data-driven healthcare. By decoding the rich genetic mosaic of India's diverse groups, the GenomeIndia project empowers policymaking, precision medicine, and conservation of genetic heritage. It's time India moves from "one-size-fits-all" to "one-gene-at-a-time" healthcare.

Thorium-based Small Modular Reactor

Context:

Maharashtra signed an MoU with Russia's ROSATOM to jointly develop a thorium-based Small Modular Reactor (SMR) — a first-of-its-kind initiative by an Indian state in nuclear energy.



About Thorium-Based Small Modular Reactor (SMR):

What is it?

- A Small Modular Reactor (SMR) is a compact, scalable nuclear reactor designed for safe, efficient, and flexible power generation.
- Thorium-based SMRs utilise Thorium-232, a fertile material, to generate Uranium-233 fuel through transmutation.
- Institutions Involved: MAHAGENCO (Maharashtra State Power Generation Company Ltd) and ROSATOM (Russia's State Atomic Energy Corporation).

Key Features of Thorium-Based Small Modular Reactor (SMR):

- Fuel Type – Thorium-232 Uranium-233: Uses thorium, which converts into Uranium-233 through nuclear reaction for clean energy.
- Modular Design: SMRs are built in small units, allowing phased and cost-effective deployment.
- Compact Size: Suitable for remote and smaller regions due to its small footprint and setup ease.
- Passive Safety Systems: Designed to shut down automatically in emergencies, reducing accident risks.
- Regulatory Compliance: Follows Indian nuclear safety norms under AERB and Central guidelines.

Significance:

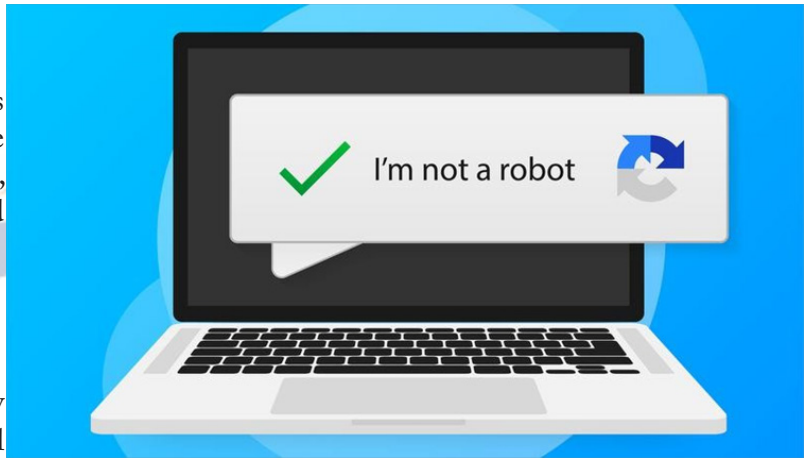
- Thorium Abundance: India has 25% of world's thorium, mainly in Kerala and Tamil Nadu, offering energy independence.

- Energy Security: Reduces dependency on imported uranium and enhances long-term fuel security.
- Eco-Friendly Option: Produces less nuclear waste compared to conventional uranium reactors.
- Decentralised Clean Power: Can provide electricity to off-grid or underserved areas in a clean and reliable way.
- State-Level Innovation: Maharashtra becomes the first state to enter nuclear space, supporting 'Make in India'.

Limitations:

- No Operational Reactor Yet: Thorium-based SMRs are still in testing phase with no active deployment worldwide.
- Needs Central Approval: Nuclear energy is under Central domain; states can't implement it independently.
- High Setup Cost: Building reactors and safety infrastructure needs large investment and time.
- Weak Fuel Cycle Infra: India lacks full reprocessing systems for thorium; tech is still under development.
- Public Fear of Nuclear: Safety concerns and nuclear accidents in the past may affect public acceptance.

CAPTCHA systems



Context:

CAPTCHA systems are once again in focus as debates arise over their role in the recent surge of bot activity and digital security breaches, highlighting both their importance and limitations in today's evolving cyber landscape.

About CAPTCHA systems:

What is CAPTCHA?

- CAPTCHA stands for "Completely Automated Public Turing test to tell Computers and Humans Apart."
- It is a human verification tool designed to distinguish between real users and automated bots.

How CAPTCHA Works?

- Users are prompted to solve puzzles, like identifying distorted text or selecting images (e.g., traffic lights or cars).
- reCAPTCHA, introduced in 2009, used scanned words from books to aid in digitization.
- Invisible reCAPTCHA (2014) detects human presence using mouse movement and user behaviour.

Significance of CAPTCHA:

- Protects websites from spam, fake registrations, and automated attacks.
- Adds a security layer to sensitive actions like logins, payments, and data recovery.
- Used in online forms, comment sections, polls, and e-commerce for human validation.
- Supported by major tech players, including Google, and deployed across thousands of platforms.

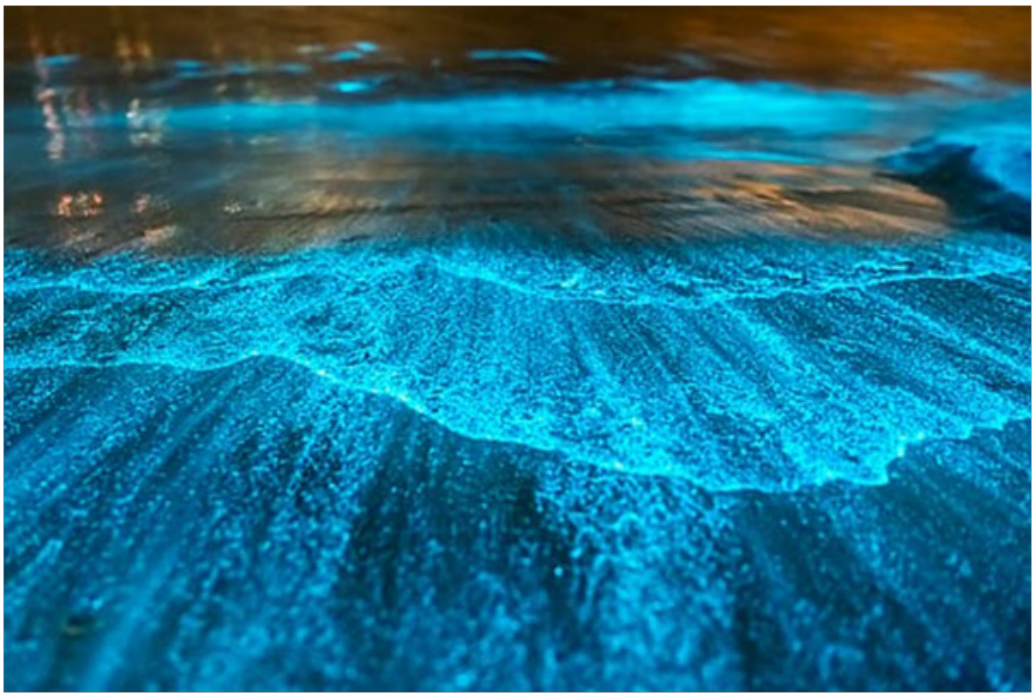
Limitations of CAPTCHA:

- Accessibility issues for people with visual or auditory impairments.
- Can be frustrating for users, especially on mobile devices.
- Advanced bots using AI and machine learning can bypass certain CAPTCHA systems.
- Adds an extra verification step, which may deter users or lower UX quality.

Bioluminescent Bloom

Context:

The bioluminescent bloom in Kochi's backwaters, while visually stunning, has raised ecological and economic concerns due to its harmful effects on marine life and local fishing communities.



About Bioluminescent Bloom:

What is it?

- A natural light-emitting phenomenon (locally known as kavaru) in marine and brackish waters caused by microscopic organisms that produce a glowing effect when disturbed.

Organisms Responsible:

- The most common bioluminescent organism is Noctiluca scintillans, also known as sea sparkle.
- Other contributors include dinoflagellates, fungi, and bioluminescent bacteria.

Where is it Found?

- Common in coastal and estuarine zones with high nutrient loads.
- Majorly found in Thiruvanmiyur Beach (Chennai), Juhu Beach (Mumbai), Bangaram Island (Lakshadweep), and Betalbatim Beach (Goa), raising ecological concerns.

Why Does it Occur?

- Triggered by eutrophication—excessive nutrients (nitrates, phosphates) in water from industrial waste, sewage, and fertilizer runoff.
- Conditions like high salinity, warm temperatures, and turbidity accelerate blooms.

Ecological & Economic Impact:

- Marine Ecosystem Disruption: Bioluminescent blooms lead to Harmful Algal Blooms (HABs), causing hypoxia, fish mortality, and severe biodiversity loss.
- Toxin Release: The blooms emit neurotoxins, hepatotoxins, and dermatoxins, endangering marine life and posing health risks to fishers and consumers.
- Aquaculture Losses: Oxygen depletion and toxic buildup disrupt fish migration and damage fish farms, reducing productivity.
- Livelihood & Export Impact: Declining fish catches and toxin-contaminated seafood affect local incomes and diminish export market value.

Chapter-
6

ECONOMY

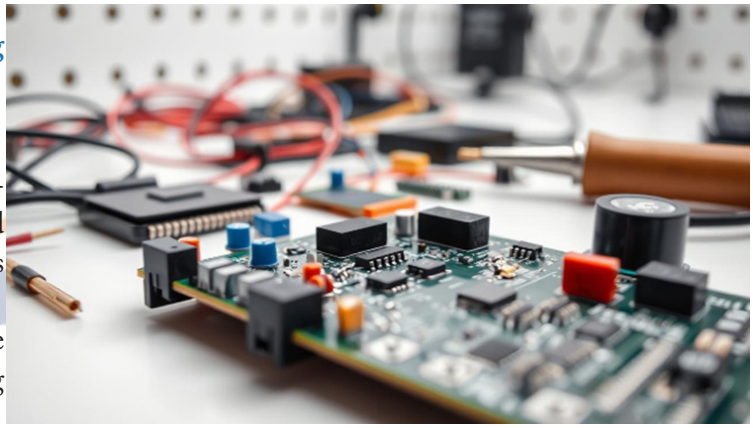
Electronics Component Manufacturing Scheme

Context:

Union Minister for Electronics & IT launched the guidelines and online portal for the Electronics Component Manufacturing Scheme (ECMS).

- Bengaluru-based Sarvam AI was selected to build India's first indigenous AI foundational model under the IndiaAI Mission.

About Electronics Component Manufacturing Scheme (ECMS):



What It Is?

- ECMS is India's first dedicated Production-Linked Incentive (PLI) scheme focused specifically on boosting electronics components manufacturing.
- It aims to strengthen India's role in the global electronics supply chain by enhancing domestic capabilities.
- Ministry Involved: Ministry of Electronics and Information Technology (MeitY)
- Budget: 22,919 crore outlay.
- Tenure: 6 years (FY 2025-26 to FY 2031-32) with 1-year gestation period.

Objective

- To attract global and domestic investments in electronics component manufacturing.
- To increase Domestic Value Addition (DVA) and integrate Indian industries into Global Value Chains (GVCs).
- To create 91,600+ direct jobs and contribute to India's $500 billion electronics production target by 2030.

Key Features:

Incentive Structures:

- Turnover-linked incentives based on revenue generated.
- Capex-linked incentives for investment in plants and machinery.
- Hybrid model combining both turnover and capex incentives.
- Employment Linkage: Incentives directly tied to job creation.

Target Segments:

- Sub-assemblies (e.g., display and camera modules).
- Bare components (e.g., multilayer PCBs, Li-ion cells).
- Capital equipment and supply chain ecosystems.
- Ease of Doing Business: Simple, transparent guidelines and a first-come, first-served application approach.
- Focus on Quality: Companies must meet Six Sigma quality standards and establish domestic design teams.

About Sarvam AI:

What It Is?

- Sarvam AI is a Bengaluru-based startup focused on developing indigenous artificial intelligence models for India.

- Aim: To build India's first indigenous AI foundational model, strengthening national capabilities in AI innovation under the IndiaAI Mission.

Features:

- Specializes in large language models and transformative AI technologies tailored to Indian languages and societal needs.
- Will enable sovereign AI capacity, reducing dependency on global tech giants.

Credit Flow in MSMEs and SMEs

Context:

The credit gap in India's MSME sector is estimated at $330 billion (RBI, 2023), prompting a growing shift toward decentralised, digital credit systems.

About Current Credit Status of SMEs & MSMEs:

- MSMEs contribute ~30% to India's GDP and employ over 110 million people.
- Despite their significance, 80% of MSMEs rely on informal credit, facing high interest rates and scalability issues.
- Traditional banks often reject applications due to lack of collateral or credit history.

Importance of Credit Flow in MSMEs and SMEs:

- Employment Creation: Affordable credit allows MSMEs to expand and hire more, directly impacting employment generation.

  E.g. 1 lakh credit to MSMEs generates 1.5 jobs (Ministry of MSME).
- Boost to GDP Growth: Better credit access improves productivity and enables MSMEs to contribute more to GDP.

  E.g. Digital lending could add 1.5% to GDP by 2025 (BCG report).
- Promotes Financial Inclusion: Digital payments, credit analytics, and online lending formalize micro-businesses, bringing them into the financial mainstream.

  E.g. UPI enabled 18 lakh crore transactions in 2023, easing payments for small vendors.
- Encourages Innovation and Digitisation: Credit flow supports the adoption of new tech tools, which improve business scalability and competitiveness.

  E.g. PSB Loans in 59 Minutes sanctioned 1.5 lakh crore to MSMEs using algorithm-based approvals.
- Stabilizes Cash Flow: Reliable working capital helps small businesses avoid shutdowns during crises.

  E.g. ECLGS loans saved over 1.14 crore MSMEs during the COVID-19 pandemic.

Challenges to Credit Access in MSMEs and SMEs:

- Collateral Constraints: Banks demand property or high-value assets which most MSMEs lack.

  E.g. Street vendors and artisans often operate without land titles.
- Dependence on Informal Sector: MSMEs often choose informal credit due to faster processing despite higher costs.

  E.g. Micro traders in UP and Bihar pay >36% annual interest to local lenders.
- Digital Divide in Rural India: Low internet access and digital illiteracy hinder fintech adoption.

  E.g. A khadi weaver in Odisha may not have a smartphone or UPI access.
- Cybersecurity Risks: Fintech systems may face data breaches, endangering borrower privacy.

  E.g. The 2022 Mobikwik breach exposed millions of user records.
- Lack of Awareness about Government Schemes: Many MSMEs are unaware of existing credit support schemes.

  E.g. Few shopkeepers in tier-3 towns know about CGTMSE benefits.

Way Ahead:

- Encourage Bank-Fintech Collaboration: Use hybrid models to combine reach of fintech and credibility of banks.

  E.g. SBI's partnership with LendingKart to support micro-loans.

- Promote Digital Infrastructure in Rural Areas: Invest in internet connectivity and mobile banking access in villages.

  E.g. BharatNet is expanding optical fibre connectivity to gram panchayats.
- Stronger Regulatory Oversight: Implement safeguards on data sharing and algorithm-based lending.

  E.g. RBI's Digital Lending Guidelines 2022 prevent mis-selling and fraud.
- Wider Awareness Campaigns: Mass campaigns to educate MSMEs about credit options and rights.

  E.g. MSME Champions Portal launched for real-time grievance redressal.
- Boost to Credit Guarantee Schemes: Expand CGTMSE and ECLGS with higher disbursement and outreach.

  E.g. CGTMSE has facilitated 3.7 lakh crore in collateral-free loans.

Conclusion:

Decentralised credit is pivotal in empowering MSMEs, the backbone of India's economy. With improved infrastructure, digital inclusion, and responsible governance, India can bridge the credit gap and foster inclusive growth. Supporting MSMEs is essential for a resilient, equitable, and high-growth economic future.

Decarbonising India's Logistics Sector

Context:

India is prioritizing decarbonisation of its logistics sector as part of the broader Viksit Bharat 2047 vision and its commitment to achieving net-zero carbon emissions by 2070, with pilot projects like electrified highways gaining momentum.

What is Decarbonisation?

- Decarbonisation refers to the process of reducing carbon dioxide (CO_2) emissions across sectors by transitioning to cleaner energy sources, increasing energy efficiency, and adopting low-carbon technologies.
- It works by shifting from fossil fuels to renewables (solar, wind), electrifying transport, and using green fuels like hydrogen and LNG, thereby cutting carbon intensity across value chains.

Need for Decarbonising India's Logistics Sector:

- High Emissions Share: Logistics contributes around 13.5% of India's total greenhouse gas emissions, with road transport responsible for 88% (IEA, 2020).
- Energy Dependency: Nearly 90% of passenger movement and 70% of freight depend on road transport, increasing carbon footprint.
- Vision 2047 Goals: Achieving inclusive and resilient growth for Viksit Bharat needs a future-ready and eco-friendly logistics network.
- Sustainable Global Competitiveness: Green logistics will boost India's global trade attractiveness and meet international climate obligations.

Challenges to Decarbonisation:

- Road Freight Dominance: Heavy dependence on trucks, which contribute to 38% of CO_2 emissions (IEA, 2023), makes transition difficult.
- High Transition Costs: Electrification of trucks and infrastructure like e-highways require large upfront investments.
- Inland Waterways and Rail Share: Limited modal share of inland shipping and railways restricts faster low-carbon transitions.

- Warehouse Energy Use: Conventional warehousing is energy-intensive, with low penetration of renewable energy systems.
- Slow Maritime Transition: Clean fuels like LNG, ammonia, and hydrogen adoption in shipping face technological and financial barriers.

Way Ahead:

- Rail Freight Expansion: Enhance railways' share by expanding electrified routes and freight corridors, following China's model (50% share).
- E-highways for Trucks: Accelerate projects like the Delhi-Jaipur electric highway pilot to introduce overhead electric wires for trucks.
- Green Shipping: Invest in LNG-powered vessels, solar-assisted boats, and hydrogen fuel initiatives in inland waterways.
- Renewable Warehousing: Promote solar, wind, and geothermal energy adoption in warehouses to reduce operational carbon footprint.
- Policy Push and Incentives: Provide financial incentives for green logistics innovation and create integrated decarbonisation strategies across transport sectors.

Conclusion:

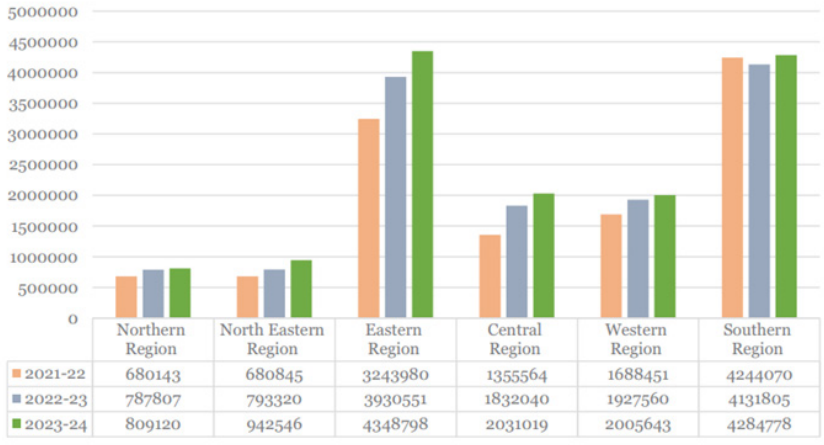
Decarbonising India's logistics sector is essential not only for climate commitments but also for building a resilient, competitive, and inclusive economy. With strategic investments and faster execution, India can lead the global green logistics transformation by 2047.

Microfinance Institutions (MFIs) in India

Context:

Karnataka passed the Micro Loan and Small Loan (Prevention of Coercive Actions) Bill, 2024, following rising borrower suicides and public backlash against coercive recovery tactics by unregistered microfinance agents.

Fig 1.4 : Region wise number of SHGs saving linked



	Northern Region	North Eastern Region	Eastern Region	Central Region	Western Region	Southern Region
2021-22	680143	680845	3243980	1355564	1688451	4244070
2022-23	787807	793320	3930551	1832040	1927560	4131805
2023-24	809120	942546	4348798	2031019	2005643	4284778

What is Microfinance?

- Microfinance provides small loans, savings, insurance, and remittance services to low-income, unbanked populations.
- Evolved in the 1980s with SHG-Bank Linkage Programme; institutionalised via NABARD and later regulated by RBI.

  E.g. As of FY25 Q3, India's microfinance loan portfolio touched 3.91 lakh crore (CRIF report).

Significance of Microfinance Institutions (MFIs) in India

- Financial Inclusion Catalyst: MFIs reach rural poor, especially women, outside the scope of formal banking.

  E.g. Karnataka alone has 63 lakh unique microfinance borrowers (MFIN data).
- Women Empowerment: Many MFIs lend primarily to women, promoting financial independence and social mobility.
- Livelihood Generation: Microloans support agriculture, dairy, petty trade, and MSMEs.
- SHG-Driven Development: SHG-Bank Linkage Model has mobilized over 1 crore SHGs across India.

  E.g. 100,000 crore credit disbursed via SHGs in FY24 (NABARD).
- Rural Credit Flow: Reduces informal sector borrowing and exorbitant interest rates.

  E.g. MFIs offer loans at 18–26% interest vs 60–120% by moneylenders.

Problems Plaguing Microfinance Institutions:

- Coercive Recovery Practices: Aggressive recovery by unregulated MFIs leads to harassment, suicides.
  E.g. Karnataka reported 22–38 deaths in 6 months due to loan stress (The Hindu).
- Unregulated Players: Fly-by-night lenders operating without RBI registration.
- Political Interference & Moratorium Culture: Election promises of waivers disrupt repayment culture.
  E.g. Assam's 2021 MFI crisis due to loan waiver announcements.
- Over-indebtedness & Multiple Loans: Lack of centralized credit tracking causes debt spirals.
- Data Transparency & Credit Risk: Poor credit assessment models and NPA surges.
  E.g. Karnataka MFI loan book dropped from 42,000 crore to 34,000 crore in 2024.

Way Forward:

- Legal Framework & Licensing: Implement the RBI's Fair Practices Code & restrict unregistered lenders.
- Grievance Redressal Mechanism: Set up local ombudsman system for borrower complaints.
- Credit Information Integration: Use credit bureaus to prevent over-lending and borrower overexposure.
- Financial Literacy Campaigns: Educate borrowers on debt limits, repayment norms, and legal protections.
- Ethical Lending Practices: Encourage social performance rating of MFIs and community monitoring.
  E.g. Post-2011 reforms in Andhra Pradesh improved transparency and borrower rights.

Conclusion:

While microfinance plays a pivotal role in fostering financial inclusion and women's empowerment, the Karnataka crisis reveals systemic flaws in regulation and borrower protection. A balanced approach is needed—one that ensures credit access while upholding borrower dignity and institutional accountability.

Accommodative Stance

Context:

The Reserve Bank of India (RBI), in its latest Monetary Policy Committee (MPC) meeting, retained its accommodative stance to support economic recovery amidst moderating inflation and sluggish growth signals.

About Accommodative Stance:

What is an Accommodative Stance?

- An accommodative stance is a monetary policy approach adopted by central banks like the RBI to stimulate economic activity. It generally involves keeping interest rates low and ensuring ample liquidity in the system.

When is it Adopted?

- When economic growth slows or is below potential.
- When inflation is low or within target range.
- During periods needing boosts in consumption, investment, and employment.
- In response to financial shocks or global economic uncertainties.

Objectives of the Accommodative Stance:

- Promote credit flow and private investment.
- Encourage borrowing and spending by lowering the cost of capital.
- Revive demand in the economy.
- Ensure liquidity support to stressed sectors.

Tools Used by RBI under Accommodative Stance:

- Reducing Repo Rate: Lowers borrowing cost for commercial banks.
- Open Market Operations (OMOs): RBI purchases government securities to inject liquidity.
- Long-Term Repo Operations (LTROs): Provide longer-term liquidity at low rates.
- Cash Reserve Ratio (CRR) adjustments: Temporarily reduce CRR to enhance bank liquidity.
- Moral Suasion & Regulatory Forbearance: RBI nudges banks to increase lending.

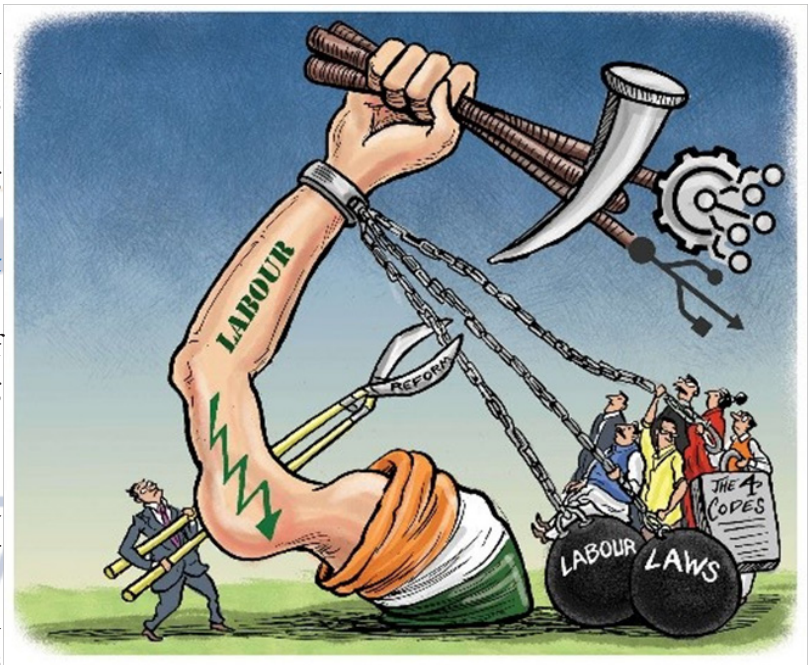
Implications on the Indian Economy:

- Boosts consumption and investment, driving GDP growth.
- Reduces interest burden on borrowers.
- May lead to asset price inflation if excess liquidity persists.
- If prolonged, it may fuel inflationary pressures and weaken the rupee.
- Supports employment generation in the short term.

Labour Reforms for Viksit Bharat

Context:

India faces a jobs deficit with only 6 crore formal jobs created for 9 crore new working-age citizens since 2017-18. Rapid automation and capital-heavy growth threaten employment, needing urgent reforms for Viksit Bharat.



Importance of Labour Force for Viksit Bharat:

- Demographic Dividend: With 65% of India's population under 35, providing productive employment is key to long-term growth.

  Ex.: China leveraged youth power via labour-intensive manufacturing from 1990–2010.
- Structural Transformation: Transition from agriculture to high-value sectors like IT and pharma requires a skilled workforce.

  Ex.: These sectors contribute 8% to GDP but employ only 5% of the workforce.
- Inclusive Growth: Formal employment helps reduce poverty and income gaps by raising consumption.

  Ex.: MGNREGA boosted rural wages but lacks skilling for sustainable upliftment.
- Global Competitiveness: Low-cost labour enhances India's attractiveness for FDI in export-oriented sectors.

  Ex.: Vietnam's textile boom was driven by wage competitiveness.
- Social Stability: Joblessness can lead to social unrest and migration crises.

  Ex.: 2020 lockdown saw mass distress among unemployed migrant workers.

Challenges Faced by India's Labour Force – Explained

- Skill Deficit: Only 10% of the workforce has formal vocational training, limiting employability.

  Ex.: PLI in electronics faces hiring issues due to unskilled labour shortages.
- Capital-Intensive Growth: Automation and AI are reducing demand for low-skilled, repetitive jobs.

  Ex.: 30% manual textile jobs lost to robotics (ICRA, 2024).
- Informalization: 90% workforce remains informal, without social protection or legal safeguards.

  Ex.: Gig workers lack EPFO, health or insurance coverage.
- Regulatory Hurdles: Rigid labour laws deter mass-scale hiring by small and medium enterprises.

  Ex.: Post-reform Rajasthan saw a 25% rise in MSME registration.

- Wage Stagnation: Real wage growth remains sluggish at just 2% annually (ILO 2012–2022).

  Ex.: This reduces income-led demand and impacts consumption-driven growth.

Balancing Labour & Capital for Viksit Bharat:

- PLI-ELI Synergy: Link production incentives with employer incentives for hiring trained workers.

  Ex.: Drone firms rewarded for hiring ELI-certified youth.
- Graded Skill Subsidies: Offer higher EPFO subsidies for firms employing skilled youth in niche sectors.

  Ex.: Germany's dual system blends industry training with formal education.
- Labour Reforms: Enable flexible hiring and fixed-term contracts to boost employment elasticity.

  Ex.: Gujarat's fixed-term policy encouraged formal job creation.
- ITI Revamp: Align ITI curriculum with market demands and tech advancements.

  Ex.: Toyota's JIM model integrates auto-sector skill training.
- R&D in Labour-Intensive Sectors: Promote AI-complementary employment in sustainable and traditional sectors.

  Ex.: India's solar energy sector added 3 lakh jobs over 5 years.

Conclusion:

To realize Viksit Bharat, India must balance skill development with capital investment to create a tech-ready workforce. Flexible labour reforms should formalize jobs while maintaining worker protections. Data-driven policies like NSDC-NSO partnerships can align training with industry needs for sustainable employment growth.

Domestically Manufactured Iron & Steel Products (DMISP) Policy – 2025

Context:

The Centre has unveiled the Domestically Manufactured Iron & Steel Products (DMISP) Policy – 2025 to curb rising steel imports and promote self-reliance.

- It mandates exclusive use of Indian steel in government procurement, with a reciprocal clause targeting non-reciprocating nations like China.

About Domestically Manufactured Iron & Steel Products (DMISP) Policy – 2025:

What is the Policy?

- A revised procurement framework by the Government of India, prioritising Indian-made steel for public sector contracts and infrastructure projects to boost local industry and reduce dependence on imports.

Ministry Responsible: Ministry of Steel

Objectives of the Policy

- Promote Atmanirbhar Bharat: Ensure self-reliance in steel by encouraging domestic production and procurement.
- Curb Surging Imports: Tackle rising imports threatening Indian steel mills.
- Protect Indian Industry: Shield Indian manufacturers from foreign competition in government contracts.
- Enhance Domestic Value Addition: Ensure capital goods used in steel manufacturing are locally sourced.

Key Features of DMISP Policy – 2025:

Mandatory Indian Steel Usage:

- Applicable to all government ministries, PSUs, trusts, and statutory bodies.
- Covers flat-rolled steel, rods, bars, rails, etc.
- Steel must meet the 'Melt & Pour' condition – i.e., melted and solidified in India.

Reciprocal Clause:

- Countries that bar Indian firms from public procurement are denied access to Indian government tenders (e.g., China, targeted specifically).
- Ministry approval is mandatory for exceptions.

Ban on Global Tenders:

- No Global Tender Enquiries (GTEs) for iron & steel products.
- GTEs for capital goods only allowed above 200 crore with prior clearance.

Domestic Value Addition Mandate:

- Capital goods (like furnaces, rolling mills) must have at least 50% local value addition.
- Certified by statutory or cost auditors for authenticity.

Procurement Thresholds:

- Applies to all contracts above 5 lakh, including centrally funded and state-executed schemes.

Monitoring & Compliance:

- A Standing Committee headed by the Secretary (Steel) to oversee the compliance checks, grievance redressal and granting exemptions (only if local supply is inadequate)

Penalties for False Declarations:

- False self-certification may lead to Blacklisting and Forfeiture of earnest money deposits.

Government e-Marketplace (GeM)

Context:

Over 1 million manpower resources were hired through the Government e-Marketplace (GeM) in FY 2024–25, marking a major milestone in digital public procurement.

About Government e-Marketplace (GeM):

What is GeM?

- Government e-Marketplace (GeM) is a paperless, cashless, and contactless online procurement platform used by Government Departments, PSUs, and ministries to acquire goods and services transparently and efficiently.

Launched in: 2016

- Under Ministry: Ministry of Commerce and Industry
- Developed by: Directorate General of Supplies & Disposals (DGS&D) with support from National e-Governance Division (MeitY)
- Legal Mandate: Authorized under Rule 149 of General Financial Rules (GFR), 2017
- Governing Notification: Included under the Government of India (Allocation of Business) Rules, 1961

Core Objectives:

- Enhance transparency and efficiency in public procurement.
- Speed up procurement cycles using digital tools.
- Achieve value for money through competitive bidding.
- Promote ease of doing business with simplified, system-driven transactions.

Key Features of GeM:

Comprehensive Digital Platform:

- Offers over 33,000 services including manpower hiring.
- Functions as a one-stop procurement portal for government bodies.

E-Procurement Tools:

- E-bidding, reverse auctions, and demand aggregation to ensure competitive pricing.
- Reduces human interface, minimizing corruption and delays.
- Inclusive and Diverse Vendor Base: Empowers MSMEs, startups, SHGs, women entrepreneurs, and tribal artisans via dedicated storefronts.

Innovation and Customization:

- Bamboo Market Window launched in collaboration with National Bamboo Mission.
- Country of Origin tag mandatory to promote Make in India.
- Labour Compliance & Service Level Agreements: Especially for manpower outsourcing services, ensures strict compliance through SLAs, promoting fair labour practices.

Green Credit Programme

Context:

The Green Credit Programme (GCP), launched in 2023, faces criticism for potentially incentivizing forest diversion and promoting plantations on ecologically sensitive lands.

About Green Credit Programme (GCP):

- Launched in: October 2023 (notified under Green Credit Rules)
- Officially unveiled: At COP28 (2023) by Prime Minister of India and UAE President
- Implementing Agency: Indian Council of Forestry Research and Education (ICFRE), Dehradun

Aim of GCP:

- Incentivize voluntary environmental actions (afforestation, water conservation, waste management) through tradable green credits.
- Support Mission LiFE (Lifestyle for Environment) by encouraging eco-friendly practices.
- Allow industries/entities to use credits for compensatory afforestation and ESG (Environmental, Social, Governance) compliance.

Key Features:

- Voluntary Participation: Open to individuals, corporates, and PSUs, allowing diverse stakeholders to contribute to environmental sustainability initiatives.
- Participation is non-mandatory, encouraging proactive ecological investment aligned with Mission LiFE.
- Seven Activities Covered: These include tree plantation, water conservation, sustainable farming, waste management, air quality improvement, mangrove protection, and eco-restoration.
- Tradable Credits: Participants earn green credits for verified eco-actions, which are marketable on a domestic platform.
- Compliance Use: Credits can be used to fulfill compensatory afforestation obligations under the Forest Conservation Act, 2023 (Van Adhiniyam).
- They can also help meet Environmental, Social, and Governance (ESG) commitments under SEBI norms.

How it works:

- Registration: Interested entities must apply and register with the Indian Council of Forestry Research and Education (ICFRE).

- ICFRE acts as the nodal authority for verifying and processing green credit applications.
- Land Allocation: State forest departments allocate degraded land parcels of at least 5 hectares for green activities.
- Plantation Drive: After allotment, forest departments execute and maintain plantation efforts using the funds provided.
- The activity must be completed within two years of approval and payment.
- Credit Generation: One grown tree equals one green credit, with a minimum density of 1,100 trees per hectare.
- Credits are validated based on local silvi-climatic suitability and verified by the department.
- Trading: Generated green credits can be traded on a domestic market to industries and organisations.

NITI NCAER States Economic Forum Portal

Context:

Finance Minister will launch the "NITI NCAER States Economic Forum" portal today. The portal offers 30 years of consolidated data on social, economic, and fiscal parameters of all Indian states.

About the NITI NCAER Portal:

What is it?

- A digital platform offering comprehensive, state-wise data from 1990-91 to 2022-23, to support evidence-based policymaking and research.
- Developed by: NITI Aayog in partnership with National Council of Applied Economic Research (NCAER).
- Launch by: Ministry of Finance.

Objective / Aim:

- To serve as a centralised data hub for tracking state-level trends.
- To aid researchers, policymakers, and academics in comparative analysis and development planning.
- To encourage data-driven policy discussions and fiscal transparency.

Four Key Components of the Portal:

- State Reports: Covers 28 States and structured around demography, economic structure, socio-economic and fiscal indicators.
- Data Repository: Access to raw and categorised data under 5 verticals: Demography, Economic Structure, Fiscal, Health, and Education.
- State Fiscal and Economic Dashboard: Visualizes key economic trends and provides easy access to graphs, summaries, and downloadable datasets.
- Research and Commentary: In-depth analyses and expert views on state finances and fiscal policies. This supports long-term academic and policy research.

Features & Significance:

- 30 years of historical trends (1990-91 to 2022-23)
- Facilitates benchmarking across states and against national averages.
- Bridges data accessibility gaps for informed policymaking.
- Offers insights for evidence-based reforms and public finance planning.
- Encourages transparency and cooperative federalism.

Red-Crowned Roofed Turtles

Context:

After 30 years, 20 critically endangered Red-Crowned Roofed Turtles (Batagur kachuga) were successfully reintroduced into the Ganga River under the Namami Gange Mission, marking a key biodiversity milestone.

About Red-Crowned Roofed Turtles (Batagur kachuga):

- Scientific Name: Batagur kachuga

Native Range:

- Countries: India, Nepal, Bangladesh
- Rivers: Ganga, Brahmaputra (historical); Chambal (current viable habitat)

Protection Status:

- IUCN (Global): Critically Endangered
- Indian Wildlife Act: Schedule I (Highest Protection)
- CITES (International Trade): Appendix I (Banned)

Key Features:

- Size: Females grow up to 56 cm (about 2 feet) long and weigh 25 kg (55 lbs), while males are half as small, making them much lighter.
- Shell: Their hard, ridged shell helps them swim in strong currents, and young turtles have angled undersides (plastron) for protection.
- Snout: They have a short, slightly pointed snout, which helps them breathe while staying mostly underwater.
- Colours: During breeding season, males develop bright red, yellow, and blue streaks on their necks to attract females.

Behaviour & Habitat:

- Home: They live in deep, fast-flowing rivers and need sandy beaches or sandbars to lay their eggs.
- Food: They are strict herbivores, feeding only on aquatic plants and algae.
- Breeding Season: They mate and nest between March and April, when temperatures are warm.
- Eggs: Females dig nests in sand and lay 11 to 30 eggs per clutch, which hatch after about 60–70 days.

Threats:

- Habitat Damage: Pollution, dam construction, and excessive water use destroy their river habitats.
- Nesting Problems: Sand mining and farming on riverbanks ruin nesting sites, leaving no safe place for eggs.
- Hunting & Trade: They are poached for their meat (considered a delicacy) and shells (used in ornaments), despite being protected by law.

National Industrial Corridor Development Corporation (NICDC)

Context:

The National Industrial Corridor Development Corporation (NICDC) was honoured with the Udyog Vikas Award for its outstanding contribution to developing Greenfield Industrial Smart Cities.

About National Industrial Corridor Development Corporation (NICDC):

- What it is: NICDC is India's premier government body for planning, developing, and implementing industrial corridors and smart cities to boost manufacturing and logistics.
- Established in: 2007, initially under the Delhi-Mumbai Industrial Corridor Development Corporation (DMICDC) and later expanded as NICDC.
- Ministry: Ministry of Commerce and Industry, Government of India.

Objectives:

- Develop futuristic industrial cities integrated with smart technologies.
- Create globally competitive manufacturing hubs.
- Foster industrial investments, innovation, and regional economic growth.
- Support India's vision of becoming a global manufacturing powerhouse.

Functions:

- Develop and manage industrial corridors like Delhi-Mumbai Industrial Corridor, Chennai-Bengaluru Industrial Corridor, Amritsar-Kolkata Industrial Corridor and Bengaluru-Mumbai Industrial Corridor.
- Coordinate infrastructure planning—transport, logistics, utilities, and IT—across sectors.
- Implement multimodal connectivity to enhance access and reduce logistics costs.
- Facilitate public-private partnerships (PPP) for faster project execution.
- Act as a catalyst for employment generation and socio-economic development

Indian Inland Waterways

Context:

India recorded an all-time high of 145.5 MMT cargo movement through inland waterways in FY 2024–25, up from just 18.1 MMT in FY 2013–14. This marks a CAGR of 20.86%.

Key Statistics on Indian Inland Waterways:

- Cargo Traffic: Increased from 18.1 MMT (FY14) to 145.5 MMT (FY25).
- National Waterways: Expanded from 5 (2014) to 111 (2024) under the National Waterways Act, 2016.
- Operational Length: Increased from 2,716 km (2014–15) to 4,894 km (2023–24).
- Passenger Movement: Touched 1.61 crore in FY 2023–24.
- Top Commodities: Coal, iron ore, sand, fly ash — accounting for over 68% of cargo.

Achievements in Inland Waterways:

- Digital Innovations: LADIS, RIS, PANI, Car-D, MIRS improve navigational safety and efficiency.
- Infrastructure Push: 3 MMTs (Varanasi, Sahibganj, Haldia), 1 IMT (Kalughat), community jetties, green vessels introduced.
- Policy Milestones: Launch of Jalvahak Scheme, extension of Tonnage Tax to inland vessels.
- Global Model: IWT seen as cost-effective and sustainable alternative to rail/road.

Challenges to Inland Waterways:

- Sparse Industrial Hubs: Lack of major industries near waterways reduces freight volume, affecting viability of IWT corridors.
- Multimodal Bottlenecks: Poor connectivity with rail and road networks delays cargo movement and increases logistics costs.
- Seasonal Depth Fluctuations: Water levels in rivers drop during dry seasons, disrupting year-round navigability and consistency in services.
- Environmental Concerns: Large-scale dredging can harm aquatic ecosystems; sustainable development is crucial to preserve biodiversity.
- Low Modal Share: Only 2% of total cargo uses waterways despite potential; underutilization keeps freight costs higher than optimal.

Way Ahead:

- Boost Private Sector Participation: Encourage PPP projects for developing terminals, jetties, and cargo-handling facilities to enhance efficiency.
- Capacity Building: Train inland vessel crews, logistics staff, and port operators to improve operational readiness and safety.
- Environmental Norms: Implement green dredging technologies and eco-friendly port designs to minimize ecological footprint.
- Awareness Campaigns: Highlight economic and environmental benefits of IWT to attract industries and shift cargo from road/rail.
- Expand Multimodal Hubs: Develop integrated logistics parks linking waterways with highways and rail to streamline end-to-end transport.

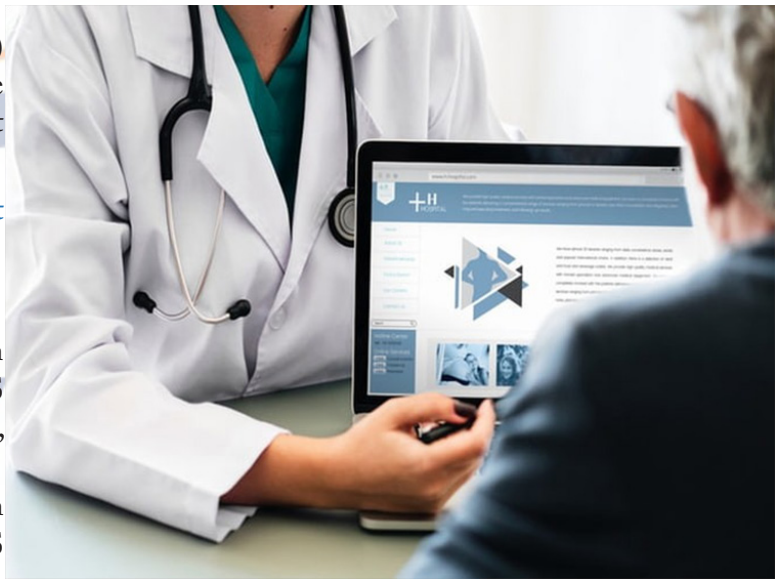
Conclusion:

India's inland water transport is witnessing a transformational shift, from policy inertia to proactive development. The future lies in maintaining this momentum through green technology, digital transparency, and industrial synergy. A well-oiled IWT sector can redefine India's logistics landscape for the 21st century.

Next-Generation Health Management Information System (HMIS)

Context:

The Central Government Health Scheme (CGHS) will undergo a complete digital overhaul with the launch of its next-generation Health Management Information System (HMIS).



About Next-Generation Health Management Information System (HMIS)

What is HMIS?

- A comprehensive digital healthcare platform for managing and delivering CGHS services to central government employees, pensioners, and their dependents.
- Launched In: Scheduled to go live on 28th April 2025, replacing the outdated CGHS software developed in 2005.

Part of Which Initiative?

- Part of the Digital Health Transformation under Ayushman Bharat Digital Mission (ABDM).

Ministry Involved:

- Launched by the Ministry of Health and Family Welfare, Government of India.
- Developed by the Centre for Development of Advanced Computing (C-DAC).
- Objective: To modernise CGHS service delivery, improve transparency, eliminate duplication, and ensure real-time digital access for beneficiaries.

Key Features of the New HMIS:

- PAN-Based Unique Identification: Each beneficiary will be linked with a PAN number to eliminate duplicate records and streamline entitlements.
- Digital Contribution Tracking: Integrated with Bharat Kosh for real-time, automated verification of payments.
- Pre-Payment Scrutiny: Application eligibility and contribution checked before payment, improving user awareness and system efficiency.
- Online Card Management: Beneficiaries can digitally process requests like card transfers, category updates, and dependent status changes.
- Real-Time Alerts: SMS and email notifications for each application stage ensure transparency and reduce physical follow-up.

Khadi and Village Industries Commission (KVIC)

Context:

The Khadi and Village Industries Commission (KVIC) achieved a historic turnover of ₹1.7 lakh crore for the first time in India's history.

About Recent Achievements by KVIC:

- Record Turnover: Khadi and Village Industries crossed ₹1.70 lakh crore turnover in FY 2024–25.

Massive Growth in 11 Years:

- Sales Growth: Jumped by 447% compared to FY 2013–14.
- Production Growth: Increased by 347% during the same period.
- Employment Generation: 1.94 crore employment opportunities created, registering a 49.23% rise.
- Skill Development: 7.43 lakh artisans trained, of which 57.45% were women.
- PMEGP Success: 10.18 lakh units established under the Pradhan Mantri Employment Generation Programme (PMEGP).

कामये दुःखतप्तानाम्।
प्राणिनाम् आर्तिनाशनम्॥

About Khadi and Village Industries Commission (KVIC):

What is KVIC?

- KVIC is a statutory body established for promoting and developing Khadi and village industries in rural India.
- Established in: Constituted in April 1957 by merging the functions of the All-India Khadi and Village Industries Board under the KVIC Act of 1956.
- Headquarters: Located at Mumbai, Maharashtra.
- Ministry: Ministry of Micro, Small and Medium Enterprises (MSME).

Objectives:

- Employment Generation: Create maximum rural employment opportunities.
- Production and Sales: Boost production of saleable Khadi and village industry goods.
- Self-reliance: Foster a strong, self-sufficient rural economy.

Major Functions:

- Raw Material Supply: Build reserves and supply raw materials to artisans.
- Artisan Training: Train and skill artisans through departmental and non-departmental centres.
- Market Linkages: Promote sale of Khadi products through tie-ups with marketing agencies.

Research and Innovation:

- Encourage R&D in production technologies.
- Use of renewable and non-conventional energy to enhance productivity.
- Financial Assistance: Provide grants, subsidies, and technical support to entrepreneurs.
- Quality Assurance: Set and monitor quality standards for Khadi and village industry products.
- Pilot Projects and Studies: Launch experimental projects to solve sector-specific challenges.

The First Commercial Sea Shipment of Indian Bhagwa Pomegranates

Context:

In a major boost to India's fresh fruit exports, the first commercial sea shipment of Indian Bhagwa Pomegranates successfully arrived in New York.

Recent Consignment of Pomegranates to the USA:

What it is?

- A landmark commercial sea shipment carrying Indian Bhagwa variety pomegranates arrived on the U.S. East Coast in March.
- Origin: The fruits were sourced from farms affiliated with Kay Bee Exports, Maharashtra, and processed through APEDA's supported irradiation facility in Navi Mumbai.
- Variety: Bhagwa – known for its deep red color, superior taste, high antioxidant content, and long shelf life (up to 60 days under trial conditions).
- Significance: The successful shipment opens new opportunities for Indian farmers to access premium international markets sustainably through sea freight.

About Agricultural and Processed Food Products Export Development Authority (APEDA):

- What it is: The Agricultural and Processed Food Products Export Development Authority (APEDA) is a statutory body promoting agricultural exports.
- Headquarters: New Delhi, India.
- Established: Under the APEDA Act of 1985; operational from 13th February 1986.
- Ministry: Operates under the Ministry of Commerce and Industry, Government of India.

Major Functions:

- Registration of exporters and promotion of scheduled product exports.
- Fixing quality standards and specifications for exports.
- Providing financial assistance for packaging, marketing, and infrastructure development.
- Organizing pre-clearance programs and facilitating international market access.
- Conducting surveys, training, and publishing trade statistics.
- Promoting export-oriented production and sustainability in agricultural exports.

Indian Heritage Sites

Context:

World Heritage Day 2025, themed "Heritage under Threat from Disasters and Conflicts: Preparedness and Learning from 60 years of ICOMOS Actions," is being celebrated globally, reaffirming the need to protect cultural and natural legacies.

About Indian Heritage Sites:

What are Heritage Sites?

- Heritage Sites are locations officially recognized by UNESCO for possessing outstanding cultural, natural, or mixed universal value.
- They represent humanity's shared legacy, preserving achievements in history, architecture, biodiversity, and culture for future generations.

India's Status:

- As of 2024, India proudly holds 43 UNESCO World Heritage Sites, showcasing its rich and diverse civilizational history.
- India's journey began in 1983 with the listing of Agra Fort, Taj Mahal, Ajanta Caves, and Ellora Caves as the first recognized sites.

Categories of Sites in India:

- Cultural Sites (e.g., Taj Mahal, Hampi): Reflecting India's monumental architecture, spirituality, and artistic excellence.
- Natural Sites (e.g., Western Ghats, Sundarbans): Celebrating India's ecological richness and biodiversity.
- Mixed Sites (e.g., Khangchendzonga National Park): Having both cultural and natural significance.

Significance of Heritage Sites in India:

- Cultural Identity: Heritage sites safeguard India's centuries-old traditions, culture, and legacy for future generations.

  E.g: Ajanta Caves showcase early Buddhist art from the 2nd century BCE.
- Tourism and Economy: UNESCO-recognized sites boost India's tourism-driven economy, creating jobs and local development.

  E.g: Taj Mahal attracts over 6 million visitors annually, contributing massively to revenue.
- Global Recognition: India's heritage strengthens its global image and cultural diplomacy efforts on international platforms.

  E.g: India hosted the 46th UNESCO World Heritage Committee in 2024.
- Environmental and Scientific Value: Natural heritage sites serve as vital zones for biodiversity preservation and scientific research.

  E.g: Western Ghats, a UNESCO site, are a global biodiversity hotspot.

Challenges to Heritage Conservation:

- Urbanization Pressure: Unplanned urban expansion encroaches and damages nearby heritage structures and ecosystems.

  E.g: Rapid encroachment issues threaten the integrity of Hampi's heritage zones.
- Climate Change: Global warming accelerates environmental degradation, impacting sensitive heritage ecosystems.

  E.g: Coral bleaching increasingly threatens Lakshadweep's Biosphere Reserve.
- Conflict and Disaster Risks: Natural calamities and conflict zones often cause irreparable damage to historic monuments.

  E.g: Earthquakes have previously damaged heritage sites like Dharahara Tower (Nepal).
- Resource Constraints: Lack of skilled manpower and underfunding hampers long-term conservation efforts.

  E.g: Many ASI-listed monuments suffer neglect due to budgetary shortages.
- Pollution and Tourist Pressure: Heavy footfall and pollution cause physical wear, discoloration, and structural damage.

  E.g: Air pollution has discolored the Taj Mahal's white marble facade.

Way Ahead:

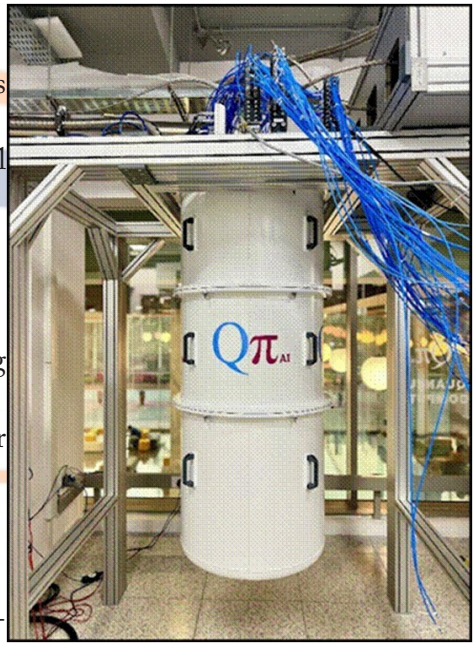
- Integrated Management Plans: Disaster-resilient, community-driven plans should be mandated for all major heritage sites.
- Sustainable Tourism Models: Encourage ticketed access limits, promote virtual tours, and regulate eco-sensitive zones around monuments.
- Increased Budget and Private Partnerships: Expand government funding and CSR engagement through Adopt-a-Heritage and PPP models.
- Heritage Education Campaigns: Launch campaigns and curricula in schools to foster early awareness about heritage conservation.
- Strengthen Local Community Involvement: Empower local communities through training and eco-tourism models to sustainably protect heritage.

Conclusion:

World Heritage Day reminds us that heritage is not merely history but a living bridge across generations. India's steadfast efforts in conserving its treasures ensure that its legacy continues to inspire, educate, and unify humanity amid global challenges.

India's First Full-Stack Quantum Computer

Context:



On World Quantum Day 2025, Bengaluru-based QpiAI launched India's first full-stack quantum computer with 25 qubits.

- The innovation is part of India's broader efforts under the National Quantum Mission (NQM) to lead in quantum technologies.

About India's First Full-Stack Quantum Computer:

What it is?

- QpiAI-Indus is India's first full-stack quantum system, integrating quantum hardware, software, and AI-enhanced hybrid computing.
- Developed by: Created by QpiAI, a DST-supported startup under the National Quantum Mission.

Key Features:

- Powered by 25 superconducting qubits.
- Equipped with next-gen Quantum-HPC platforms and AI-integrated software.
- Supports scalable control systems for real-world quantum applications.
- Sectors Impacted: Enables solutions in drug discovery, life sciences, logistics, climate action, and materials science.

About National Quantum Mission (NQM):

What it is?

- A strategic national initiative to develop and deploy quantum technologies across computing, communication, sensing, and materials.
- Launched in: Approved by the Union Cabinet in 2023, with a total budget of 6,003.65 crore (2023–2031).
- Nodal Organisation: Implemented by the Department of Science and Technology (DST).

Core Objectives:

- Build intermediate-scale quantum computers (50–1000 qubits).
- Develop quantum communication networks, secure quantum satellites, and atomic clocks.
- Promote quantum sensing, metrology, and quantum-grade materials.

Mission Components:

Four Thematic Hubs (T-Hubs) for:

- Quantum Computing
- Quantum Communication
- Quantum Sensing & Metrology
- Quantum Materials & Devices
- Promote basic & applied research, innovation, and global competitiveness in quantum technologies.

STELLAR Model

Context:

The Central Electricity Authority (CEA) launched STELLAR, India's first fully indigenous resource adequacy model, aimed at optimizing electricity generation, transmission, and storage planning across states.

सत्यमेव जयते
MINISTRY OF POWER
GOVERNMENT OF INDIA
CENTRAL ELECTRICITY AUTHORITY

About STELLAR Model:

What it is?

- STELLAR (State of the art Totally indigenously developed Resource adequacy model) is a next-gen software tool for integrated planning of power generation, transmission, storage, and demand response.
- Developed by: Central Electricity Authority (CEA) in collaboration with The Lantau Group (TLG) and supported by the Asian Development Bank (ADB).
- Aim: To help states and power distribution companies (Discoms) prepare annual dynamic resource adequacy plans, ensuring uninterrupted power supply and system-wide efficiency.

Key Features of STELLAR:

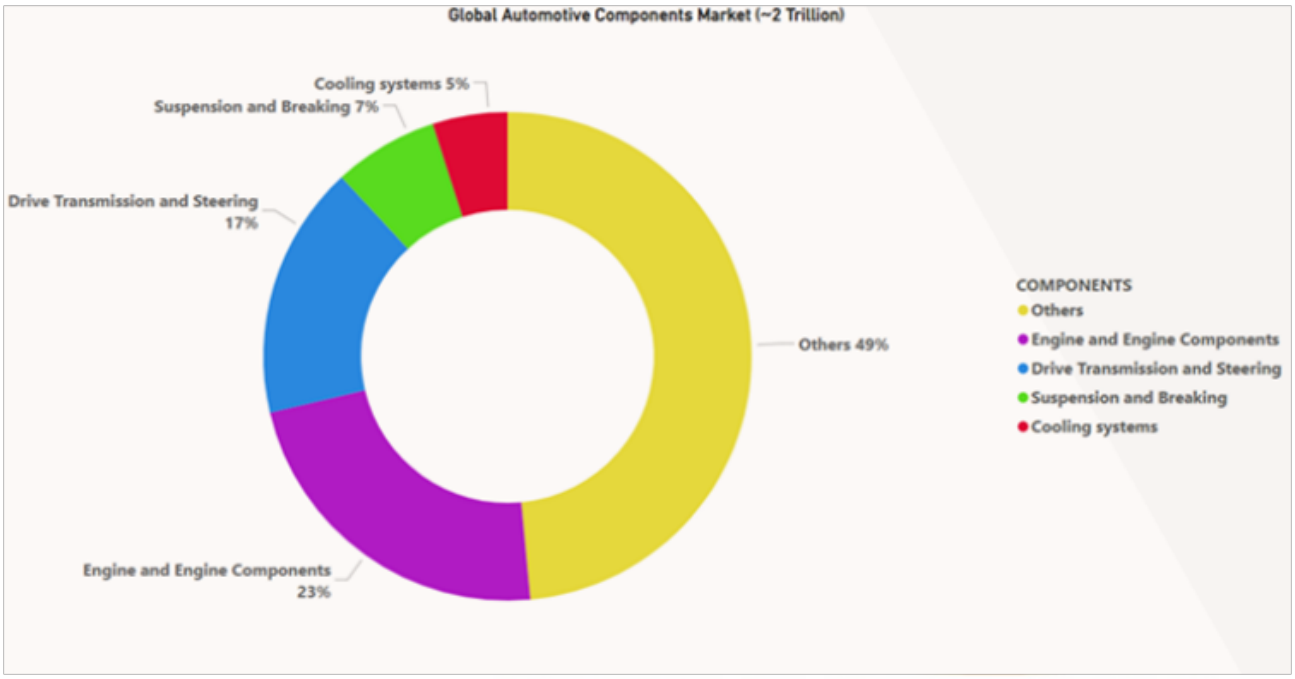
- Chronological Power System Modelling: Simulates real-time power system operations with load flow, ramp rates, and unit constraints.
- Integrated Planning: Simultaneously models generation, transmission, storage expansion, and demand-side response till FY 2034-35.
- Endogenous Demand Response: Considers consumer flexibility in electricity use, optimizing overall load and cost.
- Ancillary Services Optimization: Ensures grid stability by factoring in services like frequency control and reserves.
- Transparent, Customizable, and Open Access: Shared with all states free of cost; designed for regular updates and user feedback.

Significance:

- Zero Load Shedding: Assures uninterrupted electricity supply with right-sized capacity.
- Cost-Efficient Power System: Enables least-cost planning while incorporating storage and renewable integration.
- Strategic Storage Planning: Helps determine ideal storage size and placement, vital for renewable energy growth.
- Policy-Technology Synergy: Supports the 2023 Resource Adequacy Guidelines, aligning state planning with national goals.
- Atmanirbhar Bharat in Energy Tech: Represents India's capability in developing high-end energy simulation tools indigenously.

Automotive Industry Landscape in India

Context:



India's premier think tank, NITI Aayog, in collaboration with CRISIL, released the report titled "Automotive Industry: Powering India's Participation in Global Value Chains", outlining a strategic roadmap to make India a key global auto component manufacturing hub.

About Automotive Industry Landscape in India:

- Global Ranking & Output: India is the 4th largest automobile producer globally, with 28 million vehicles manufactured in 2023–24 across all segments (two-wheelers to commercial vehicles).
- Export Trends: Auto component exports reached $20 billion, forming 3% of global trade in 2023. India aims to triple exports to $60 billion by 2030.
- Domestic Market Growth: A booming middle class and policy incentives have led to increased demand for EVs and small cars.
- Value Chain Positioning: India's trade ratio of auto components is 0.99 (balanced import-export), highlighting untapped export potential.
- Policy Support: Key government schemes include PLI, FAME-II, PM E-Drive, and ACC Battery Storage—catalysts for manufacturing scale-up.

Importance of Automotive Sector in Indian Economy:

- GDP Contribution: Accounts for 7.1% of India's GDP and nearly 49% of manufacturing GDP.
  E.g. India's auto industry supports over 3 million direct jobs.
- Linkages with Other Sectors: Strong backward and forward linkages with steel, rubber, electronics, glass, IT etc.
  E.g. 15% of India's steel goes to automotive sector.
- Employment Generation: Potential to add 2–2.5 million jobs by 2030 with planned scaling.
  E.g. Skilled and semi-skilled roles in OEMs, ancillaries, and EV startups.
- Technology Spillovers: Driving AI, battery innovation, and Industry 4.0 adoption across sectors.
  E.g. Automotive is the biggest consumer of semiconductors after electronics.
- Export Competitiveness: Aims to increase GVC share from 3% to 8%.
  E.g. India's current share in global component trade: ~$20B out of $700B.

Key challenges faced by automotive industry:

- Cost Disadvantages: India faces ~10% cost disability compared to China, mainly due to higher material and capital costs.
  E.g. India has a 100% depreciation rate vs. China's 50%.

- Low Share in Precision Components: Only 2–4% share in engine and transmission systems, which form 60% of global auto component trade.

  E.g. Weak competitiveness in ADAS, steering systems.
- Import Dependence: Heavy reliance on China, South Korea, Germany for high-end parts.

  E.g. Imports from China: $2.8B in 2023–24.
- Infrastructure & Logistics Bottlenecks: Delays in multimodal connectivity and insufficient auto clusters.

  E.g. Higher domestic freight costs reduce export margins.
- R&D and Skill Gaps: Inadequate industry-academia linkages, limited skilled workforce in EV and software-led automotive technologies.

  E.g. EV battery cell manufacturing talent is limited.

Way Ahead:

- Expand Component Production: Scale up to $145 billion output by 2030, focus on emerging & precision segments.

  E.g. Focus areas: EV batteries, ADAS, smart sensors.
- Boost R&D and IP Support: Strengthen innovation through fiscal R&D incentives, testing labs, and tech transfer schemes.

  E.g. Cluster-based approach with IP cells and CoEs.
- Build Smart Infrastructure: Invest in logistics parks, plug-and-play clusters, and testing facilities.

  E.g. Smart automotive hubs in Tamil Nadu and Maharashtra.
- Deepen Global Trade Linkages: Leverage FTAs, joint ventures, and branding support for "Made in India" auto components.

  E.g. India-EU and India-UK trade deals in focus.
- Skill India for Auto GVCs: Launch GVC Skilling India Scheme to train for high-tech auto jobs.

  E.g. Emphasis on battery tech, mechatronics, and vehicle software.

Conclusion:

India's automotive sector is at a critical inflection point, offering immense opportunities to integrate into global value chains. With targeted reforms, skilling, and investment support, India can become a world-class hub for EV components, auto electronics, and precision systems, driving both domestic growth and global competitiveness.

Modernization of Command Area Development and Water Management

Context:

The Union Cabinet has approved the "Modernization of Command Area Development and Water Management (M-CADWM)" as a sub-scheme under the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) for FY 2025–26, with a total outlay of ₹1,600 crore.

About Pradhan Mantri Krishi Sinchayee Yojana (PMKSY):

What it is?

- A comprehensive national irrigation scheme aimed at expanding irrigation coverage and improving efficiency of water use at the farm level.

Launched in: 2015

- Ministries Involved: Ministry of Jal Shakti, Ministry of Agriculture and Farmers Welfare, and Ministry of Rural Development

Implementing Agencies:

- Ministry of Jal Shakti for irrigation infrastructure creation
- Ministry of Rural Development for watershed development
- Department of Agriculture and Farmers Welfare for promoting precision irrigation

Objectives:

- Ensure convergence of investments in irrigation at the grassroots level
- Achieve the target of "Har Khet Ko Pani" (Water for Every Field)
- Promote water-saving irrigation methods like drip and sprinkler systems under the slogan "Per Drop More Crop"
- Conserve water and encourage the reuse of treated wastewater in peri-urban agriculture

Key Features:

- Merges ongoing schemes: Accelerated Irrigation Benefit Programme, Integrated Watershed Management Programme, and On-Farm Water Management.
- Emphasises decentralised planning via District Irrigation Plans and State Irrigation Plans
- Establishes State-Level Sanctioning Committees for state oversight and a National Steering Committee for inter-ministerial coordination

About Modernisation of Command Area Development and Water Management (M-CADWM):

What it is?

- A newly reformulated sub-scheme under the Pradhan Mantri Krishi Sinchayee Yojana focusing on the modernisation of irrigation networks using digital and pressure irrigation technologies.
- Launched in: April 2025 (originally initiated as Command Area Development Programme in 1974–75)
- Aim: To increase the utilisation of created irrigation potential, enhance water use efficiency on farms, and promote sustainable agricultural practices.

Key Features:

- Develops underground pressurised piped irrigation systems for water delivery up to 1-hectare farms
- Employs Supervisory Control and Data Acquisition systems and Internet of Things technologies for real-time water accounting and monitoring
- Transfers irrigation asset management to Water User Societies to ensure sustainability
- Facilitates partnerships of Water User Societies with Farmer Producer Organisations and Primary Agricultural Credit Societies
- Aims to attract rural youth to agriculture through modern water management practices

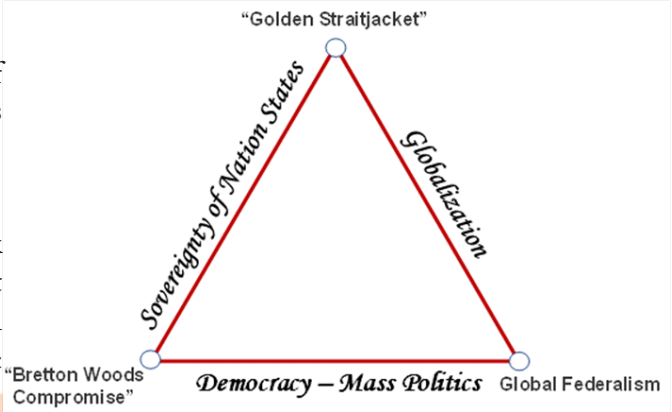
Chapter-
8

INTERNATIONAL RELATION

Political Trilemma and the West

Context:

Recent global trends highlight the growing relevance of Dani Rodrik's Political Trilemma as Western democracies face a crisis of polarisation, mistrust, and populism.



About the Political Trilemma:

- What it is: Proposed by economist Dani Rodrik in 2000, the Political Trilemma suggests that nations cannot simultaneously maintain national sovereignty, democracy, and deep economic integration (globalisation).

Components:

1. National Sovereignty: Independent decision-making.
2. Popular Democracy: Mass political participation and accountability.
3. Globalisation: Deep international economic integration.

Features of the Theory:

- Countries can at best achieve only two out of the three goals.
- Trying to achieve all three leads to systemic tensions and instability.

Examples:

- EU model sacrifices sovereignty for democracy and globalisation.
- Technocratic regimes sacrifice democracy for sovereignty and globalisation.
- Protectionist economies like China prioritize sovereignty and democracy, limiting globalisation.

Issues Plaguing the West:

- Rising Populism: Leaders like Donald Trump and Viktor Orbán gain support by opposing free trade and immigration.
- Erosion of Trust: Traditional democratic institutions face scepticism, reflected in declining voter turnouts and protests.

  E.g., France's Yellow Vest movement.
- Economic Dislocation: Job losses in traditional industries have widened inequality

  E.g., Midwest US deindustrialisation.
- Insular Policies: Withdrawal from global cooperation frameworks like Paris Climate Accord and WHO indicates growing inward focus.
- Polarisation: Societies are increasingly divided along ideological, racial, and economic lines, weakening collective national identity.

Challenges to Political Trilemma and the West:

- Sovereignty vs Globalisation: Nationalist movements seek to reclaim sovereignty at the cost of international cooperation (e.g., Brexit).
- Democracy vs Globalisation: Independent central banks and global financial institutions, like the IMF, sometimes sideline popular will in favour of investor interests

E.g., fiscal reforms in Kenya.

- Democracy vs Sovereignty: Democratic demands often push for welfare spending, but sovereign fiscal constraints block such initiatives, causing public dissatisfaction.
- Technocratic Drift: Excessive reliance on unelected experts in economic policymaking alienates the common populace.
- Social Unrest: Economic dislocation combined with restricted democratic expression risks fuelling further populism and extremism.

Way Ahead:

- Inclusive Globalisation: Policies must ensure that benefits of globalisation are equitably distributed
  E.g., retraining programmes for displaced workers.
- Strengthen Democratic Institutions: Restoring trust requires transparent governance, citizen engagement, and institutional accountability.
- Balanced Sovereignty: Strategic participation in international bodies while safeguarding core national interests.
- Innovative Social Contracts: Redesign welfare and labour systems to adapt to technological disruptions and global competition.
- Counter Populism Constructively: Address legitimate grievances without resorting to isolationism or xenophobia.

Conclusion:

Rodrik's Political Trilemma remains more relevant today than ever before, illustrating the structural tensions in the global order. Navigating between democracy, sovereignty, and globalisation requires delicate balancing and visionary leadership. Without course correction, Western democracies risk deeper division and long-term decline.

Cross-Border Infiltration

Context:

Following the Pahalgam terror attack that killed 26 tourists, the focus has shifted to strengthening India's counter-infiltration grid along the Pakistan border.

About Cross-Border Infiltration:

- Cross-border infiltration refers to unauthorized movement of armed militants across international borders to carry out terror activities.
- Region Affected: Primarily impacts Jammu & Kashmir, particularly the Pir Panjal region, Poonch, Rajouri, Kathua, Doda, and now areas like Pahalgam.

Reasons Behind Cross-Border Infiltration:

- Porous Terrain: Rugged mountains and dense forests like Pir Panjal facilitate undetected movement.
- Seasonal Factors: Winter damages border fencing, creating gaps exploited by militants.
- Stealth Tactics: Highly trained terrorists use advanced, encrypted communication and minimal local contact.
- External Support: Active backing from Pakistan-based terror groups exacerbates infiltration attempts.

Government Steps Taken:

- Border Fencing: Initiated post-2003 ceasefire; as of 2010, infiltration success rate reduced to about 20% of attempts.
- Comprehensive Integrated Border Management System (CIBMS): Use of thermal imagers, radars, ground sensors, and aerial surveillance like aerostats.
- Smart Fencing Push: Plans for sensor-triggered alerts upon fence breaches to minimize human dependence.

- Deployment of Additional Forces: Heavy troop presence along LoC with night vision equipment and rapid repair units.

Challenges to Counter Cross-Border Infiltration

- Harsh Climate: Heavy snowfall damages nearly one-third of fencing annually, leading to temporary security gaps.
- Technology Constraints: Night vision devices have limited operational hours and face power supply issues in remote terrains.
- Human Fatigue: Difficult terrain and extreme cold exhaust personnel, reducing constant alertness.
- Delayed Infrastructure Modernization: Comprehensive sealing of the India-Pakistan border, initially targeted for 2018, now delayed to 2025.

Way Ahead:

- Smart Fence Technology: Deploy intelligent fencing capable of withstanding extreme weather and detecting breaches automatically.
- Improved Aerial Surveillance: Use of drones and aerostats for real-time monitoring of sensitive border zones.
- Rapid Repair Teams: Specialized teams for quick fencing restoration after snow damage.
- Enhanced Border Patrol Training: Equip soldiers with advanced surveillance gear and specialized mountain warfare skills.
- Strategic Investments: Allocate sufficient budget for upgrading surveillance infrastructure and resilience of border posts.

Conclusion:

Countering cross-border infiltration is crucial to ensuring internal security. Strengthening the physical barrier, deploying smarter surveillance, and investing in resilient forces are necessary to thwart future terror attacks and ensure peace in border areas.

Line of Control (LoC)

Context:

Tensions escalated along the Line of Control (LoC) after ceasefire violations by Pakistan, following the Pahalgam terror attack which killed 26 people.

About Line of Control (LoC):

What It Is?

- The Line of Control is the de facto military boundary between India and Pakistan in the regions of Jammu and Kashmir and Ladakh.
- It is not an internationally recognized border but a ceasefire line accepted bilaterally under the Simla Agreement.

Established In:

- Originated from the Ceasefire Line (CFL) post-India-Pakistan war of 1947-48.
- Redefined formally as the Line of Control following the Simla Agreement signed on July 2, 1972.

History:

- 1947-1948 War: First ceasefire line established after UN intervention and the Karachi Agreement of 1949.
- 1965 War: Pakistan violated CFL, leading to another ceasefire and the Tashkent Agreement.
- 1971 War: Resulted in a decisive Indian victory and new ceasefire lines; led to Simla Agreement 1972 establishing the LoC.

Region and Spread:

- The LoC stretches over 740 km from Manawar near Jammu to NJ9842 near the Siachen Glacier.
- It separates Pakistan-Occupied Kashmir (POK) from Indian-administered Jammu & Kashmir and Ladakh.

Key Features:

- Military Control: Both sides maintain heavy military presence along the LoC.
- Non-Recognition: It is not recognized as an international boundary, maintaining the dispute on Kashmir.
- Simla Agreement Provisions: Both sides pledged not to alter the LoC unilaterally and to resolve differences peacefully.
- Strategic Importance: Vital for defense operations, maintaining ceasefire, and national security management.

World Trade Organisation

Context:

The relevance of the WTO is under debate as critics argue it has lost direction and needs major reforms, especially amid rising protectionist measures like reciprocal tariffs.

About World Trade Organisation:

- Established: 1 January 1995, replacing GATT (1947).
- Headquarters: Geneva, Switzerland.

Key Functions:

- Facilitate global trade negotiations.
- Resolve trade disputes through a binding mechanism.
- Monitor trade policies of member states (164 members as of 2025).
- Uphold the Most Favoured Nation (MFN) and National Treatment

WTO Losing Its Relevance:

- Dispute Settlement Dysfunction: The Appellate Body is paralyzed due to the U.S. blocking appointments since 2017.
- Negotiation Paralysis: The Doha Round (2001) failed to reach consensus on agriculture, subsidies, and trade facilitation.
- Rise of FTAs: Nations now prefer bilateral/multilateral FTAs, sidestepping WTO's MFN obligations.
- Lack of Compliance Tools: WTO cannot enforce transparency in trade barriers or subsidy disclosures (e.g., China's market practices).
- Consensus Deadlock: All decisions require unanimity, which stalls any reform (e.g., India and U.S. blocked voting reforms).

Yet, WTO Remains Relevant:

- Global Forum for Dialogue: It is still the only universal trade platform with binding rules and a common framework.
- Fisheries Agreement (2022): A modest success showing potential for consensus.
- Rule-Based Order: WTO remains a bulwark against protectionism (e.g., Smoot-Hawley era risks).
- Monitoring Role: Despite limitations, WTO offers transparency through Trade Policy Reviews.

Recent Failures of WTO:

- Agriculture Talks Collapse: Ongoing impasse on public stockholding, AMS limits, and domestic support.
- Appellate Body Dysfunction: No dispute can reach a final resolution due to a non-functional appellate system.
- Inability to Regulate China: WTO failed to predict or address market access asymmetries and state-led excess capacities.

- US Tariff Wars: Trump's Section 301 and 232 tariffs undermined the WTO's dispute mechanism and MFN principles.

Way Ahead:

- Appellate Reform: Rebuild trust by modifying the Dispute Settlement Body (DSB) to address concerns of overreach.
- Revisiting Consensus Rule: Introduce a weighted voting mechanism to prevent unilateral blockages.
- Digital Trade Rules: WTO must urgently frame rules on e-commerce, data flow, and digital goods.
- China Integration Review: Reassess rules to address market distortions caused by state-owned enterprises (SOEs).
- Inclusive Agenda: Acknowledge development needs of Global South while pushing for labour and environmental standards.

Conclusion:

The WTO, while facing a legitimacy crisis, remains central to a rule-based global trade order. Reforming its dispute resolution, consensus-based functioning, and digital trade agenda is essential. Without urgent reform, it risks fading into irrelevance amid growing protectionism.

India-Saudi Arabia Relations

Context:

Prime Minister of India visit to Saudi Arabia aims to strengthen the growing India-Saudi Strategic Partnership, with new agreements expected in trade, defence, and investment under the Strategic Partnership Council framework.

About India-Saudi Arabia Relations:

- Historical Background of India-Saudi Arabia Relations
- Establishment of Diplomatic Ties: Formal diplomatic relations were established in 1947.

Major Milestones:

- Delhi Declaration (2006) during King Abdullah's visit laid the foundation for a strategic partnership.
- Riyadh Declaration (2010) during PM Manmohan Singh's visit elevated the relationship to a new strategic level.

Recent Developments:

- PM Modi's visits in 2016, 2019, and 2025 have expanded the scope to energy, defence, space, and culture.
- Saudi Crown Prince Mohammed bin Salman's visits to India in 2019 and 2023 further deepened ties.

Existing Opportunities for India-Saudi Arabia:

Economic Partnership:

- Saudi Arabia is India's 5th largest trading partner with bilateral trade of USD 42.98 billion (FY 2023-24).
- Huge investment potential, including PIF's USD 10 billion investment in sectors like retail, technology, and agriculture.

Energy Cooperation:

- Saudi Arabia remains India's 3rd largest crude oil supplier, contributing 3% of India's oil imports in 2023-24.
- Collaboration in renewables through the International Solar Alliance (ISA).
- Defence and Security Ties: Increasing defence exchanges, naval exercises like Al Mohed Al Hindi, and joint land forces exercise Ex-Sada Tanseeq-I held in 2024.

Cultural and People-to-People Linkages:

- Indian diaspora in Saudi Arabia numbers 7 million, acting as a vital socio-economic bridge.
- Cultural MoUs, yoga cooperation, and growing tourism and sports engagement.
- Strategic Convergence: Alignment between Vision 2030 (Saudi Arabia) and Viksit Bharat 2047 (India) fosters synergies in infrastructure, innovation, and human capital development.

Challenges in India-Saudi Arabia Relations:

- Geopolitical Instability: Regional conflicts like the Yemen War or Iran-Saudi tensions could affect bilateral dynamics.
- Competition with China: Saudi Arabia's parallel engagement with China, including joining BRICS Plus, could create strategic balancing challenges for India.
- Oil Dependence: India's high dependency on Saudi oil (14.3%) makes it vulnerable to energy market fluctuations.
- Labour Issues: Issues related to the rights and welfare of Indian workers in Saudi Arabia occasionally surface, needing sustained consular intervention.
- Cultural Sensitivities: While reforms in Saudi Arabia are underway, navigating religious and cultural norms remains delicate for expanding people-to-people relations.

Way Forward:

- Diversify Economic Cooperation: Move beyond oil to sectors like fintech, renewable energy, food security, and digital economy.
- Strengthen Defence and Security Ties: Enhance cooperation in defence production, cyber security, and counter-terrorism training.
- Promote People-to-People Connect: Expand educational exchanges, cultural festivals, and tourism promotion between both nations.
- Support Saudi Arabia's Vision 2030: Invest in Saudi megaprojects like NEOM city and emerging sectors like entertainment and tourism to leverage growth opportunities.
- Build Multilateral Collaboration: Work closely with Saudi Arabia in multilateral platforms like G20, BRICS+, ISA, and in regional forums to push for a multipolar, rule-based global order.

Conclusion:

India-Saudi Arabia ties have matured into a multifaceted strategic partnership driven by strong political will and economic complementarities. The current visit strengthens this trajectory, promising greater cooperation in emerging sectors critical for both nations' growth stories.

Operation Atalanta

Context:

Commander of EUNAVFOR ATALANTA (Operation Atalanta), proposed a joint naval exercise with the Indian Navy to strengthen maritime security cooperation in the Western Indian Ocean and Red Sea.

About EUNAVFOR ATALANTA (Operation Atalanta):

What is Operation Atalanta?

- Operation Atalanta is the European Union's maritime security operation, launched in 2008, aimed at protecting international shipping routes off the coast of Somalia and the Western Indian Ocean.
- It operates under the Common Security and Defence Policy (CSDP)

Nations Involved:

- Core participants: EU member states including Spain, Italy, Germany, France, and others.
- Supported by associated partners like Norway and Serbia at different points.

Objectives:

- Protect World Food Programme (WFP) vessels delivering aid to Somalia.
- Deter, prevent, and repress piracy and armed robbery at sea.
- Monitor fishing activities and support other EU missions in the region.

Significance:

- Enhances security along critical shipping lanes such as the Bab-el-Mandeb Strait and Gulf of Aden.
- Strengthens EU's global maritime presence and supports international efforts for a free, open, sustainable, and inclusive Indian Ocean.
- Partnership with major naval powers like the Indian Navy ensures greater coordination in anti-piracy operations, humanitarian aid protection, and regional stability.

ASEAN-India Trade in Goods Agreement (AITIGA)

Context:

The 8th Meeting of the ASEAN-India Trade in Goods Agreement (AITIGA) Joint Committee concluded in New Delhi, focusing on modernizing the pact to boost trade.

About ASEAN-India Trade in Goods Agreement (AITIGA):

What is AITIGA?

- A free trade agreement (FTA) between India and the 10 ASEAN member states.
- Covers trade in physical goods, eliminating tariffs and reducing non-tariff barriers.
- Aims to enhance economic integration and bilateral trade.

Origin:

- Signed in 2009 at the 7th ASEAN-India Economic Ministers' Meeting in Bangkok.
- Implemented in 2010, often termed the ASEAN-India FTA.
- 2014: ASEAN and India signed a separate Trade in Services Agreement.

Key Features:

- Tariff Liberalization: Gradual reduction of import duties on over 75% of traded goods.
- Rules of Origin: Ensures only ASEAN-India goods get preferential treatment.
- Exclusion Lists: Sensitive items (e.g., agriculture, auto parts) excluded from tariff cuts.
- Trade Expansion: Bilateral trade reached $121 billion (2023-24), making ASEAN 11% of India's global trade.

Recent Developments:

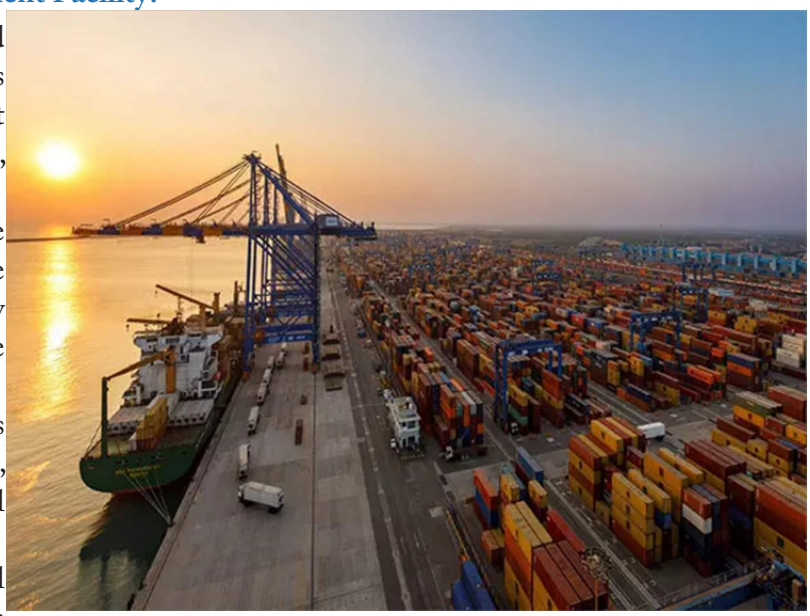
- Ongoing Review: Discussions to modernize AITIGA for better usability and trade facilitation.
- 8th Joint Committee Meet (2024): Focused on making the agreement more trade-friendly and effective.

India-Bangladesh Transshipment Facility

Context:

India revoked the 2020 transshipment facility allowing Bangladesh to use its territory for third-country exports, citing logistical and strategic concerns. The move has significant implications for trade and regional diplomacy.

What Was the India-Bangladesh Transshipment Facility?



- Policy Overview (2020): India allowed Bangladesh to use its Land Customs Stations (LCSs) and ports to send export cargo to third countries like Nepal, Bhutan, and Myanmar.
- Primary Objective: It aimed to reduce transportation costs and improve logistical efficiency for Bangladesh's key export sectors, particularly readymade garments (RMG).
- Implementation Scope: Cargo was routed via Indian ports (e.g., Kolkata, Delhi Airport) to enable faster global access, especially for landlocked regions.
- India's Support: Seen as a goodwill gesture enhancing regional trade integration under India's "Neighbourhood First" policy.

Why India Withdrew the Facility

- Domestic Industry Concerns: The Apparel Export Promotion Council (AEPC) pushed for withdrawal, citing competition with Bangladeshi textile exports.
- Logistics Burden: Rising freight costs and congestion at Indian ports and airports, particularly Delhi, impacted India's own exporters.
- Strategic Unease: Bangladesh's growing proximity to China and remarks undermining India's strategic position in the northeast added to concerns.
- Security Dimensions: Bangladesh inviting Chinese investments near India's Siliguri Corridor (e.g., Lalmonirhat airbase) raised red flags.
- Political Signals: The move could be interpreted as a diplomatic message to discourage geopolitical drift away from India's influence.

Implications:

On Bangladesh:

- Trade Disruption: Increases export cost and delays delivery to third countries, especially RMG exports which earned $50 billion in 2024.
- Infrastructure Stress: Bangladesh lacks equivalent logistical infrastructure to compensate quickly for this gap.
- Market Access Loss: Access to Indian airports like Delhi, a hub for Europe and US-bound goods, is now limited.
- Strategic Setback: Affects Bangladesh's positioning as a transit hub and weakens confidence among global investors.

On India:

- Reduced Congestion: Eases pressure on Indian airports and ports handling both domestic and Bangladeshi cargo.
- Domestic Textile Boost: Protects Indian exporters from losing market share in Europe/US to Bangladeshi rivals.
- Strategic Control: Reinforces India's hold over regional logistics amid China's growing regional footprint.
- Possible Image Setback: May be perceived as reactive rather than cooperative diplomacy, affecting India's soft power.

Way Ahead:

- Structured Dialogue: India and Bangladesh should open high-level diplomatic channels to clarify trade expectations.

- Policy Balance: India must balance domestic industry interests with strategic regional engagement.
- Joint Infrastructure Projects: Instead of exclusion, invest in shared logistics like dry ports or transshipment corridors.
- Regional Cooperation Frameworks: Use SAARC, BBIN, or BIMSTEC to formulate region-wide transit agreements.
- Revise with Conditions: India could reinstate a conditional version of the facility with better security and economic clauses.

Conclusion:

India's revocation of the transshipment facility underscores the complex interplay between trade, strategy, and diplomacy. While protecting domestic interests is key, ensuring long-term regional stability and economic integration requires transparent, consultative policymaking.

India – Sri Lanka Relation

Context:

Prime Minister of India visit to Sri Lanka strengthened bilateral ties with 7 key MoU's in defence, energy, and digitization. The visit also addressed China's growing influence in the Indian Ocean region.
Recent Outcomes of India-Sri Lanka Bilateral Meet:

1. Defence Cooperation Agreement:

- Umbrella MoU signed for structured military collaboration, countering China's Hambantota port presence.

  Example: Joint exercises like SLINEX (Navy), MITRA SHAKTI (Army) to expand.

1. Energy & Infrastructure Boost:

- Trincomalee Energy Hub development with UAE partnership.
- Solar power plant launched in Trincomalee; railway projects worth $106M inaugurated.

2. Economic Support:

- $100M Indian loans converted to grants; interest rates reduced on existing debt.

  Example: Sri Lanka's economic crisis (2022) saw India provide $4B aid.

1. Cultural & Religious Ties:

- Buddha relics from Gujarat to be displayed in Sri Lanka for Vesak 2025.
- India to renovate Thirukoneswaram Temple and Sita Eliya Temple.

2. Digital & Health Collaboration:

- MoUs on e-governance, healthcare, and Eastern Province development.

Historical India–Sri Lanka Relations:

- Ancient Civilizational Links: Emperor Ashoka sent his children to Sri Lanka in the 3rd century BCE to propagate Buddhism, linking Bodh Gaya with Anuradhapura's Mahabodhi Temple.
- Colonial & Post-Independence Ties: Both nations shared anti-colonial struggles, and formal diplomatic

relations began in 1948 soon after Sri Lanka's independence from British rule.
- IPKF & Civil War: India's 1987–1990 peacekeeping mission during the LTTE conflict strained ties, despite intentions to stabilize the ethnic crisis.
- Trade & Connectivity: The 2000 India–Sri Lanka FTA boosted trade to $5.54 billion in 2023–24, with resumed ferry services reconnecting Tamil Nadu and Jaffna.
- Humanitarian Assistance: Since 2014, India has built 60,000 houses for war-affected Tamils and provided essential aid during Sri Lanka's 2022 economic crisis.

Challenges to Bilateral Ties

- China's Strategic Inroads: The 99-year lease of Hambantota Port to China and docking of Yuan Wang 5 in 2022 raise major security concerns for India.
- Fishermen Disputes: Frequent arrests of Tamil Nadu fishermen near Katchatheevu Island highlight unresolved maritime boundaries and livelihood tensions.
- Sri Lanka's Debt Crisis: A $3.7 billion Chinese oil refinery deal in 2025 deepens Colombo's economic dependency, limiting India's strategic influence.
- Political Instability: Shifting coalitions in Sri Lanka, including pro-China factions, challenge sustained engagement with India-friendly policies.
- Ethnic Reconciliation: Post-war Tamil grievances remain unresolved, with limited progress on devolution under the 13th Amendment supported by India.

Way Forward

- Counter China's Influence: India must accelerate Trincomalee port development and strategic investments to counterbalance China's expanding Indian Ocean footprint.
- Boost Trade & Investment: Finalizing the ETCA will deepen economic ties and attract Indian investment in tourism, manufacturing, and digital infrastructure.
- Maritime Security: India should expand the Colombo Security Conclave with Mauritius and Maldives to ensure regional maritime domain awareness.
- Cultural Diplomacy: Promoting Buddhist heritage circuits linking Bodh Gaya and Anuradhapura can strengthen soft power and people-to-people ties.
- People-Centric Projects: Scaling Indian housing, education, and skills initiatives, especially in Tamil-majority areas, will foster goodwill and trust.

Conclusion:

India-Sri Lanka ties, rooted in history and geography, must adapt to 21st-century geopolitics. Balancing development aid, security cooperation, and cultural bonds will ensure Colombo remains a trusted partner, not a Chinese satellite.

India – USA Nuclear Deal 2025

Context:

The US Department of Energy has approved Holtec International to transfer Small Modular Reactor (SMR) technology to India marking a major milestone in operationalizing the Indo-US Civil Nuclear Deal (123 Agreement) signed in 2007.

Recent Indo-US Nuclear Deal Breakthrough:

1. Technology Transfer Approved: The US DoE has permitted Holtec International to share unclassified SMR technology with Indian firms under 10CFR810 regulations.
   - The deal is under the restrictive regulation of the US, '10CFR810', with the approval being valid for 10 years and will be re-evaluated every five years.
1. Strategic Collaboration: Indian partners include L&T, Tata Consulting Engineers, and Holtec Asia, with regulatory compliance to ensure no retransfer without US consent.
2. Manufacturing within India: For the first time, US-designed reactors can be co-developed and manufactured in India—previously prohibited.
3. Linked to Energy Security Dialogue: The move follows Modi-Trump discussions in Feb 2025 focused on energy resilience and decarbonisation goals.
4. Scope for Expansion: The government is exploring amendments to the Atomic Energy Act, 1962 to allow more private sector participation in civil nuclear power.

   E.g. The Kovvada project in Andhra Pradesh is planned with six 1208 MWe reactors under Indo-US collaboration.

Significance of Nuclear Energy in India

- Clean Baseload Power: Nuclear energy offers low-carbon, reliable power unaffected by weather like solar or wind.
- Reduces Fossil Fuel Dependency: Helps India reduce its ~70% fossil fuel dependence, supporting energy sovereignty.
- Supports Net-Zero Targets: Critical for achieving 500 GW of non-fossil fuel energy by 2030 and Net-Zero by 2070.
- Promotes Industrial Decarbonisation: BSRs and SMRs can be installed near industries for clean captive power.
- Geostrategic Edge: Enhances India's global standing in clean energy tech and addresses energy security.

India's Achievements in Nuclear Energy:

- Installed Capacity Growth: Nuclear capacity rose from 4,780 MW in 2014 to 8,180 MW in 2025, across 24 reactors.
- Indigenous Reactor Development: Kakrapar Units 3 & 4 (700 MWe PHWRs) are fully Indian-designed and operational.
- Fast Breeder Breakthrough: The Prototype Fast Breeder Reactor (PFBR) achieved key commissioning milestones in 2024.
- Joint Venture Models: NPCIL and NTPC launched the ASHVINI JV to co-develop nuclear plants within the legal framework.
- New Uranium Discovery: The Jaduguda mine discovery adds 50+ years of life to India's uranium supply.

  E.g. RAPP-7 in Rajasthan reached criticality in 2024, showcasing indigenous reactor capability.

Challenges Associated with Nuclear Energy in India:

- Legislative Constraints: The Atomic Energy Act, 1962 restricts private investment and innovation in reactor development.
- High Capital Costs: Nuclear projects require long gestation periods and high upfront costs compared to renewables.
- Public Perception and Safety Concerns: Despite a good safety record, public resistance remains high post-Fukushima.
- Limited Fuel Security: India imports uranium and is yet to fully utilise its thorium potential.
- Regulatory Delays: Multi-layered clearances from AERB, MoEF, and local bodies delay project timelines.

  E.g. The delay in initiating work at Kovvada due to regulatory complexities reflects procedural bottlenecks.

Way Ahead:

- Amend Atomic Energy Laws: Reforms to enable private sector and ease entry barriers for tech partnerships are essential.

- Accelerate SMR and BSR Deployment: Fast-track indigenous development of at least five SMRs by 2033 with 20,000 crore allocation.
- Build Domestic Supply Chains: Promote Make-in-India initiatives for nuclear component manufacturing and fuel supply.
- Focus on Thorium Cycle R&D: Strengthen India's long-term energy security by unlocking Stage-3 of Homi Bhabha's plan.
- Improve Public Awareness and Transparency: Boost confidence in nuclear safety protocols through education and community engagement.

  E.g. The BARC-developed SMRs will repurpose retired coal plants, addressing land and infrastructure reuse.

Conclusion:

India's nuclear energy push marks a bold step toward clean, secure, and scalable energy infrastructure. With global collaborations, indigenous innovation, and legal reforms, the sector is poised to become a cornerstone of India's energy independence. Strategic execution will determine how swiftly India realises its 100 GW nuclear target by 2047.

BIMSTEC Summit

Context:

The 6th BIMSTEC Summit will be held on April 4, 2025, in Bangkok, Thailand with the theme "Prosperous, Resilient, and Open BIMSTEC."

- It aims to enhance regional cooperation on trade, security, connectivity, and endorse the Bangkok Vision 2030.

About BIMSTEC (Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation):

What is BIMSTEC?

- A regional grouping connecting South Asia and Southeast Asia to promote technical and economic cooperation among nations bordering the Bay of Bengal.
- Established On: 6 June 1997, via the Bangkok Declaration.
- Originally named BIST-EC (Bangladesh, India, Sri Lanka, and Thailand Economic Cooperation).
- On 22 December 1997 during a special Ministerial Meeting in Bangkok, the Group was renamed 'BIMST-EC' (Bangladesh, India, Myanmar, Sri Lanka and Thailand Economic Cooperation).

In 1998, Nepal became an observer.

- In February 2004, Nepal and Bhutan became full members and renamed as BIMSTEC in 2004.
- Headquarters: Dhaka, Bangladesh (Operational since 2014).
- Members (7 Countries): Bangladesh, Bhutan, India, Myanmar, Nepal, Sri Lanka, and Thailand.
- Chairmanship Procedure: Rotational leadership in alphabetical order of member states.

Objectives of BIMSTEC:

- Promote economic cooperation among countries bordering the Bay of Bengal.
- Facilitate sectoral collaboration in trade, technology, energy, transport, and environment.
- Address shared regional challenges including terrorism, poverty, and climate change.
- Foster regional connectivity through cross-border infrastructure and digital links.
- Enable people-to-people ties, cultural exchanges, and academic partnerships.

Key Features of BIMSTEC:

- Bridge between SAARC and ASEAN: Offers a unique geostrategic platform uniting South and Southeast Asia.
- Sector-led cooperation: Began with six sectors in 1997, now streamlined to seven core sectors post-2021 reforms.
- Focus on Security and Trade: Includes counter-terrorism, disaster management, and maritime cooperation.
- Vision-based Agenda: 6th Summit to adopt Bangkok Vision 2030 and Maritime Transport Agreement.
- Institutional Strengthening: BIMSTEC Charter signed in 2022; Secretariat operational since 2014.

9 DISASTER MANAGEMENT

Dust Storm

Context:

A severe dust storm hit Delhi-NCR with wind speeds reaching up to 80 kmph, killing one and injuring three. The IMD issued a red alert, and 15 flights were diverted due to poor visibility and high-speed winds.

Understanding Dust Storms:

What are Dust Storms?

- Dust storms are intense winds that lift loose sand and dust from dry surfaces into the atmosphere, reducing visibility and air quality.

Causes of Dust Storms:

- Natural Causes: Droughts, arid conditions, low vegetation, and strong pressure gradients.
- Human-Induced Factors: Overgrazing, deforestation, unsustainable farming, and land degradation.

Regions Impacted in India:

- Rajasthan, Haryana, Delhi, Gujarat, and parts of Uttar Pradesh frequently experience dust storms during pre-monsoon months.

Consequences of Dust Storms:

Human Impact:

- Respiratory illnesses like asthma and bronchitis increase due to PM2.5 and PM10 particles.
  E.g. Delhi's AQI dropped to 164, but exposure risk remained.
- Risk of injuries and fatalities from flying debris, collapsing structures.
  E.g. Death of a 67-year-old in Delhi due to wall collapse.

Governance Impact:

- Disruption of power supply, damage to infrastructure and public services.
  E.g. Power outages in North-West Delhi, tree falls blocking roads.
- Air and rail traffic delays affect emergency responses and logistics.
  E.g. 15 flights diverted from IGI Airport.

Animal Impact:

- Livestock face dust inhalation, eye irritation, and dehydration.
  E.g. Reported cases of animal distress in storm-prone regions of Rajasthan.
- Migration patterns of birds disrupted due to low visibility and altered air currents.

Geographic/Environmental Impact:

- Topsoil erosion reduces land fertility, worsening desertification.
- Dust storms carry pathogens, impacting water bodies and crops.
  E.g. UNCCD reports 2000 million tons of dust emitted globally every year.

Measures to Counter Dust Storms:

- Early Warning Systems: IMD alerts, satellite tracking, and AI-based forecasting for real-time action.
- Urban Planning and Infrastructure: Underground cabling, wind-resistant structures, and green belts to block dust movement.
- Natural Resource Management: Reforestation, afforestation, and sustainable soil conservation practices.
- Health Preparedness: Medical advisories, free distribution of masks, and mobile health units in storm-prone areas.
- International Collaboration: Support from UNCCD, WMO, and regional bodies for joint mitigation strategies and policy frameworks.

Conclusion:

Dust storms, intensified by both natural and anthropogenic causes, pose significant threats to human health, infrastructure, and ecosystems. A holistic approach integrating early warnings, sustainable land use, and community resilience is vital for mitigating their impact.

Chapter-
10

INTERNAL SECURITY

Pahalgam Terror Attack

Context:

A terror attack in Pahalgam, Anantnag (J&K) killed over 26 civilians, including tourists, making it the deadliest such attack since 2019.

- The strike coincided with PM Modi's visit to Saudi Arabia and US Vice President JD Vance's trip to India, signalling calculated geopolitical messaging.

About the Pahalgam Terror Attack:

What Happened?

- Terrorists ambushed a group of ~40 tourists at the popular Baisaran meadow using automatic rifles and small arms.
- Victims were identified by name (and likely religion) before being executed. Injured tourists were later evacuated by helicopter to Army hospitals.

Claimed by The Resistance Front (TRF):

- TRF, believed to be a Lashkar-e-Taiba affiliate, claimed responsibility, citing opposition to "demographic changes" through domicile certificates.

Historical Parallels:

- 2000 Chittisinghpora massacre: 36 Sikhs killed during Clinton's India visit.
- 2002 Kaluchak attack: 23 civilians, including 10 children, killed during US diplomat's visit.
- These patterns underline terrorists' intent to attract global attention by targeting civilians during high-profile diplomatic visits.

Consequences of the Attack:

- Security Reversal in Kashmir: The attack undermines the perceived peace post-Article 370 abrogation, casting doubt on the success of developmental narratives.
- Tourism and Economy: Pahalgam, a tourism hub, will suffer a sharp dip in footfall, hurting local livelihoods during peak summer season.
- International Repercussions: With global leaders in India, the attack projects instability, risks diplomatic fallout, and gives leverage to adversarial narratives from Pakistan.
- Communal Tensions: Selective targeting based on identity may spark religious polarization, which terrorists aim to provoke.

Way Ahead:

- Swift Intelligence-Based Operations: Neutralize perpetrators using actionable intelligence with coordinated action between Army, CRPF, and J&K Police.

- Strategic Communication: Avoid communal rhetoric. Government must reassure the public and promote unity to deny terrorists their intended outcome.
- Revive Tourism Confidence: Offer compensation, security guarantees, and engage with tourism stakeholders to prevent economic distress in the Valley.
- Enhance Surveillance in Sensitive Zones: Deploy tech-driven solutions such as UAVs, facial recognition, and terrain mapping in high-altitude non-motorable zones.
- Diplomatic Messaging: Use platforms like UN, G20, and bilateral forums to expose cross-border terrorism and gather international support.

Conclusion:

The Pahalgam attack revives Kashmir's troubled past and highlights the evolving nature of terror threats. India must respond decisively — balancing security, diplomacy, and communal harmony. A united front is essential to defeat the designs of terror actors and uphold the nation's integrity.

Taurus Missiles

Context:

Russia warned Germany that any Ukrainian strikes using Taurus missiles would be considered direct participation in the ongoing conflict.

About Taurus Missiles:

What it is?

- The Taurus KEPD-350 is a long-range, air-launched cruise missile capable of precision strikes on fortified and high-value targets.

Developed by:

- Jointly developed by the European missile manufacturer MBDA and Saab Bofors Dynamics (Germany and Sweden partnership).

Aim:

- Designed for deep penetration strikes against heavily fortified structures such as bunkers, bridges, and command centres.

Key Features:

- Speed: Nearly 1,170 km/h, close to the speed of sound.
- Range: Can hit targets up to 500 kilometres
- Navigation Systems: Equipped with four independent navigation systems, including satellite-supported GPS, resistant to jamming.
- Low Detectability: Flies at an altitude of 35 meters, making radar detection extremely difficult.
- Bunker Penetration: Engineered to penetrate multiple reinforced concrete layers before warhead detonation, maximizing internal destruction.
- Stealth and Precision: High survivability due to low radar cross-section and extreme targeting accuracy.

Saras Mk2 Aircraft

Context:

The first test flight of India's indigenously designed Saras Mk2 aircraft is expected in December 2027, marking a significant step in regional air connectivity and civilian aviation capabilities.

About Saras Mk2 Aircraft:

- What it is: Saras Mk2 is a 19-seater, multipurpose civilian aircraft designed to improve regional air travel across India, especially to tier-2 and tier-3 towns with

minimal airport infrastructure.

- Developed by: CSIR–National Aerospace Laboratories (CSIR–NAL), under the Ministry of Science and Technology, with manufacturing support from Hindustan Aeronautics Limited (HAL).
- Aim: To promote indigenous civilian aircraft manufacturing, reduce import dependence, and support UDAN (Ude Desh ka Aam Naagrik) scheme for regional air connectivity.

Key Features of Saras Mk2:

- Upgraded Variant: An advancement over the original 14-seater Saras, first flown in 2004; redesigned with improved aerodynamics and engine placement.
- Multi-utility Role: Can serve as a commuter aircraft, air ambulance, or for charter operations in remote locations.
- Made in India Components: Avionics by Genesis, brake and environmental systems developed in-house by CSIR–NAL; composite wings produced in-house.
- Twin Prototype Plan: Two aircraft will be built to fast-track certification and minimize developmental delays.
- Digital & Modular Design: Incorporates a CSIR-NAL-developed aircraft computer, enabling future integration of automation and AI-based upgrades.

Significance of Saras Mk2:

- Boosts Regional Aviation: Enables air connectivity to underserved regions, aligning with government's UDAN goals.
- Revives Civil Aviation R&D: Reinforces India's position as a technology developer in civilian aviation.
- Reduces Foreign Dependence: Offers an indigenous alternative to imported aircraft like the Dornier or ATR.
- Cost-effective Aviation: Ideal for short-haul routes, enhancing passenger volumes on low-demand sectors.
- Defence-Civil Synergy: Indian Air Force has shown interest in procuring 15 aircraft—strengthening civil-military production integration.

Project Varsha

Context:

India is set to commission its first dedicated nuclear submarine base, INS Varsha, in Andhra Pradesh in 2026, as part of Project Varsha, and plans to operationalise its third nuclear-powered submarine, INS Aridhaman.

About Project Varsha:

What is Project Varsha?

- A classified naval infrastructure project launched by the Indian Navy to build INS Varsha, a state-of-the-art nuclear submarine base.
- Located near Rambilli, about 50 km south of Visakhapatnam in Andhra Pradesh.

Aim:

- To enhance India's maritime strike capabilities in the Bay of Bengal and Indian Ocean Region (IOR).
- Acts as a counterbalance to China's strategic expansion in the region.

Key Features:

- Underground submarine pens and tunnels for stealth deployment.
- Capacity to dock up to 12 nuclear submarines.
- Provides protection from aerial surveillance and satellite detection.
- Built near BARC Atchutapuram, enabling access to advanced nuclear infrastructure.
- Ensures rapid submarine access to key chokepoints like the Strait of Malacca.

Strategic Significance:

- Counters China's dual-use naval facilities like Hambantota (Sri Lanka) and BNS Sheikh Hasina (Bangladesh).
- Enhances India's second-strike capability under the nuclear triad.

About India's Third SSBN – INS Aridhaman:

What is INS Aridhaman?

- A 7,000-tonne nuclear-powered ballistic missile submarine (SSBN) under the Advanced Technology Vessel (ATV) project.
- Built by the Shipbuilding Centre, Visakhapatnam, with BARC and DRDO support.

Key Features:

- Equipped to carry more K-4 SLBMs (3,500 km range) than its predecessors.
- More advanced than INS Arihant and INS Arighaat, India's first two SSBNs.
- Part of India's underwater nuclear deterrence component.
- Expected commissioning in 2025, strengthening India's nuclear triad.
- Aims to operate undetected in deep seas during deterrence patrols.

Chapter-
11

SOCIETY

Role in a Risk Society: Women and the Unequal Burden

Context:

The concept of "risk society," coined by Ulrich Beck, highlights how modern crises amplify risks globally, with women disproportionately bearing the impact, especially in developing countries.

About Role in a Risk Society:

What is Risk Society?

- Risk society describes a phase where manufactured risks from technological and environmental developments dominate modern life, unlike the natural risks of the past.
- It focuses on managing risks rather than just distributing wealth, reflecting the unintended consequences of industrialization.

Features:

- Reflexive Modernization: Societies must constantly adapt to problems created by earlier technological advances.
- Globalized Risks: Threats like pandemics, nuclear disasters, and climate change transcend national boundaries.
- Unpredictability: Manufactured risks are complex, harder to foresee, and harder to control.

Three Distinctive Epochs of Modernity:

- Pre-Industrial Society: Risks were localized and natural, like famine and plagues, managed through traditional systems.
- Industrial Society: Urbanization and technological advances created new risks, including pollution and resource depletion.
- Risk Society: Today, human activities are the primary source of global, unpredictable hazards like nuclear accidents and pandemics.

Types of Risk:

Natural Risk:

- Originates from natural phenomena like earthquakes, floods, or disease outbreaks.

  Example: The 2004 Indian Ocean Tsunami was a major natural risk affecting millions.

Manufactured Risk:

- Emerges from human activities, particularly industrial and technological development.

Example: The Chernobyl nuclear disaster (1986) caused lasting environmental and human health impacts.

Women and the Unequal Burden in Risk Society:

- Higher Exposure to Health Risks: Women's roles in water collection and use of biomass fuels for cooking expose them to contaminated water and indoor air pollution
- Increased Disaster Mortality Risk: UNDP studies show women are 14 times more likely to die in climate disasters due to mobility restrictions, care responsibilities, and inadequate early warning access.
- Loss of Livelihood Security: Women in agriculture (43% of India's rural workforce) suffer first when climate-induced droughts, floods, or soil degradation destroy crops and reduce rural income (FAO 2023 report).
- Invisible and Unpaid Care Burden: Post-disaster recovery tasks like caregiving, food preparation, and healthcare fall heavily on women without financial recognition.
- Water and Food Insecurity Amplification: Climate change-induced resource scarcity leads to women traveling longer distances for water and receiving less food during shortages.

Way Ahead:

- Gender-Disaggregated Disaster Data Systems: Mandate gender-sensitive risk assessments and data collection to design policies that directly target vulnerabilities
- Community-Led Natural Resource Management: Empower women-led cooperatives for water management, seed preservation, and sustainable farming.
- Climate-Resilient Social Protection Schemes: Expand MGNREGA-style cash-for-work programs post-disaster, prioritizing women-headed households for immediate recovery.
- Financial Access Reforms: Promote special microfinance and insurance packages for rural women to rebuild livelihoods after environmental or health crises.
- Inclusive Climate Governance: Set mandatory quotas for women's representation in local climate adaptation bodies and Panchayati Raj institutions handling natural resource management.

Conclusion:

The concept of a risk society underscores the growing complexity and unpredictability of modern hazards. It also reveals the systemic inequalities that make women especially vulnerable to these risks. Ensuring gender equity in risk management is critical for building a resilient, sustainable future.

India's Elderly Population

Context:

A 2025 feature highlights India's increasing geriatric population and the urgent need for integrated healthcare, social security, and support services. With over 300 million elderly projected by 2050, India faces critical challenges in caring for its ageing citizens.

About India's Elderly Population:

- In India, persons aged 60 and above are considered elderly as per government schemes and census classifications.
- As per 2020 Population Projections Report, India had 103.8 million elderly in 2011, expected to reach 193.4 million by 2031.
- By 2050, India's senior citizen population may cross 300 million, driven by declining fertility and increased life expectancy.

Challenges Faced by Elderly in India:

- Multiple Morbidities: Ageing leads to multiple chronic illnesses, demanding lifelong medications and specialist care.

  E.g. Geriatric patients at NCA often take 8–9 medications (polypharmacy).

- Mental Health Issues: Depression, dementia, and loneliness are rising, especially post-COVID and among elderly in nuclear families.

  E.g. Elderline helpline reports increasing cases of abandonment and isolation.
- Economic Insecurity: Many elderly lack regular income, pensions, or health insurance, making long-term care unaffordable.

  E.g. Expensive elderly insurance restricts access to treatment.
- Caregiver Crisis: With younger generations migrating, a shortage of trained caregivers and family support has emerged.

  E.g. Tamil Nadu launched caregiver training to bridge demand-supply gap.
- Inadequate Infrastructure: Few age-friendly hospitals, assisted living homes, or transport systems cater to senior needs.

  E.g. Only a limited number of cities implement MBBL for elder-safe buildings.

Government Initiatives for Elderly Care:

- Atal Vayo Abhyudaya Yojana (AVYAY): Offers elderly homes, continuous care centers, and Mobile Medicare Units.
- National Programme for Health Care of Elderly (NPHCE): Provides dedicated healthcare at primary to tertiary levels.
- SACRED Portal: Enables re-employment of senior citizens and supports their dignity in work.
- Rashtriya Vayoshri Yojana (RVY): Distributes assistive devices to BPL seniors to aid mobility and independence.
- Social Pension Schemes (NSAP): IGNOAPS provides direct pension support to poor elderly aged 60–79.

Way Ahead:

- Expand Geriatric Infrastructure: Set up geriatric departments in every medical college and increase specialist doctors.

  E.g. Tamil Nadu government advised to establish geriatric units in all medical colleges.
- Integrated Health & Social Care: Combine hospital care with community-level screening, follow-up, and home visits.

  E.g. Makkalai Thedi Maruthuvam brings medical services to the doorsteps of elderly.
- Regulate & Expand Assisted Living: Develop affordable, safe, and regulated elder homes and care centers.

  E.g. Current assisted living options are unregulated and unaffordable for most.
- Promote Intergenerational Bonding: Sensitize children in schools to elderly needs and encourage family support.

  E.g. Schools can integrate elderly empathy modules in curricula.
- Digital & Financial Inclusion: Enable elderly access to online services, banking, and social safety nets.

  E.g. Senior Citizens helpline (14567) provides emergency and welfare support.

Conclusion:

India's ageing population demands a paradigm shift from reactive to preventive, community-centric elderly care. Alongside health reforms, emotional, financial, and social support systems must evolve to ensure graceful ageing. The time to build an elder-inclusive society is now.

Age-Tech Revolution in India

Context:

India is witnessing the rapid rise of age-tech—a new sector using digital tools to support senior citizens—amid growing concerns over loneliness, cognitive health, and employability in a shrinking family setup.

About Age-Tech Revolution in India:

- Rise of Age-Tech Startups: Platforms like Sukoon and Wisdom Circle use technology to reduce loneliness and support purposeful ageing.

  E.g. Sukoon's AI tool interacts with seniors in over 100 languages, fostering companionship.
- Virtual Communities for Seniors: Digital groups enable seniors to build friendships, join events, and stay socially active in nuclear family settings.

  E.g. WhatsApp groups for seniors in Bengaluru plan community trips and regular meetups.
- Post-Retirement Employment: Platforms like Wisdom Circle connect retirees with flexible job roles, enhancing dignity and productivity.

  E.g. Over 95,000 retirees and 1,500 employers are on the platform.
- Health Tech & Mobility Aids: Startups like Ivory and Translead Medtech offer cognitive tests and assistive chairs to support brain health and mobility.

  E.g. Ivory offers cognitive-age assessments; assistive chairs address rising knee-replacement trends.
- Digital Literacy & Inclusion: Startups like Elderra help seniors learn digital tools, reducing tech gaps and promoting safer online use.

  E.g. Seniors struggle with app-based autorickshaw booking and online grocery services.

Significance of Age-Tech:

- Demographic Urgency: India's elderly population is projected to double by 2050, necessitating scalable, tech-based support systems.
- Mental Health Advocacy: Age-tech acknowledges emotional health as vital, promoting connection, purpose, and well-being.
- Economic Inclusion: Encourages productive ageing through flexible job roles, reducing dependency and enhancing dignity.
- Healthcare Revolution: Early detection of neurodegenerative risks and accessible assistive tools improve quality of life.
- Bridging Tech Gap: Addresses rural-urban divide in accessibility, pushing for inclusive design and government collaboration.

UN report – Trends in Maternal Mortality 2000–2023

Context:

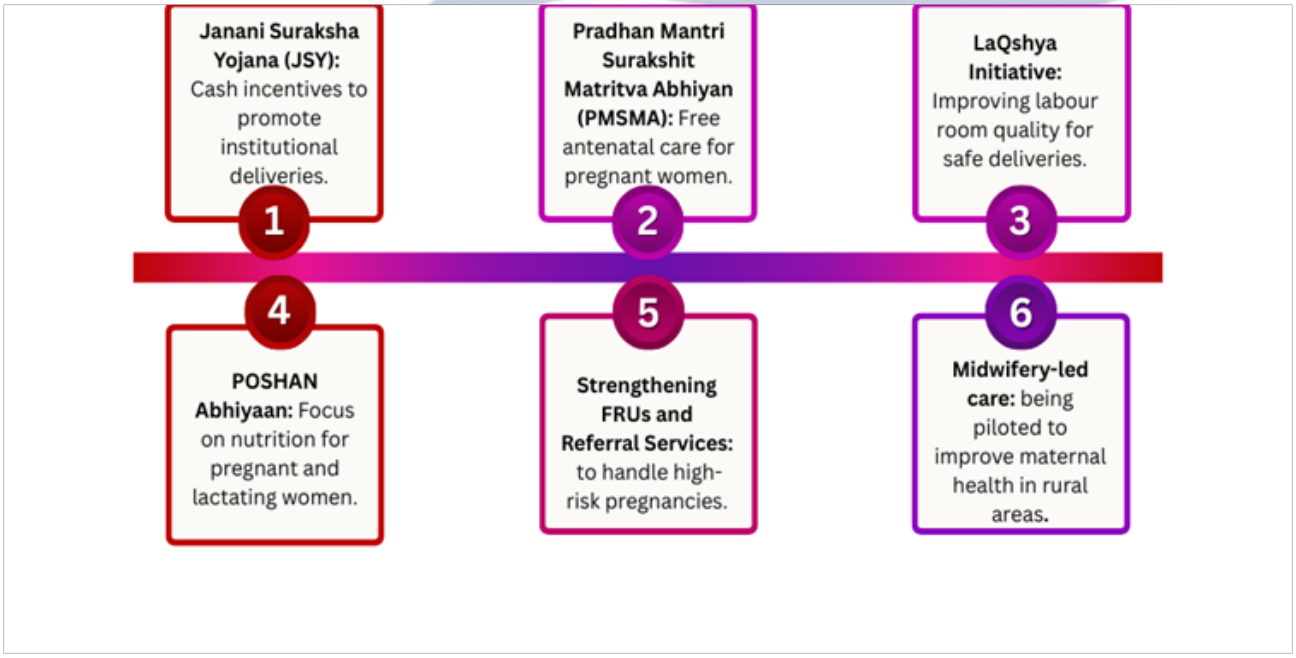
A new UN report titled 'Trends in Maternal Mortality 2000–2023' ranks India second globally in maternal deaths, reporting 19,000 fatalities in 2023 — 52 maternal deaths per day, only behind Nigeria.

Key Findings of the UN Report – 'Trends in Maternal Mortality 2000–2023':

- India, with 19,000 maternal deaths, shares the second spot with the Democratic Republic of Congo, contributing 7.2% of global deaths.
- Nigeria (75,000 deaths) alone accounted for 28.7% of global maternal mortality.
- India's Maternal Mortality Ratio (MMR) fell from 362 (2000) to 80 (2023) – a 78% decline.
- Global maternal deaths fell by 40% between 2000–2023, but progress has slowed since 2016.
- An estimated 260,000 women died globally in 2023 due to complications from pregnancy or childbirth.

Reasons Behind High Maternal Mortality in India:

- Post-partum haemorrhage is the leading cause, followed by hypertensive disorders and pregnancy-related infections.
- Poor emergency obstetric care, especially at Primary Health Centres (PHCs) and Community Health Centres (CHCs).
- Lack of infrastructure, trained personnel, and referral services in rural and underserved areas.
- Non-communicable diseases (diabetes, hypertension, anaemia) also worsen maternal health outcomes.
- In northern India, socio-economic backwardness and low access to private healthcare increase maternal risk.



Education and Nutrition: Learn to Eat Well' Report

Context:

UNESCO released its global report "Education and Nutrition: Learn to Eat Well" in March, during the 'Nutrition for Growth' summit hosted by France.

Data & Statistics from UNESCO Report:

1. Global Reach: 418 million children globally benefit from school meals across 161 countries.
2. Nutritional Gaps: Over 1 in 2 school feeding programs globally lack sufficient fruit and vegetables, with one-third offering sugary drinks.
3. Obesity Rise: Childhood overweight and obesity have doubled in 100+ countries over the past two decades.
4. India Context: The PM-POSHAN scheme feeds 118 million children daily — one of the largest school feeding programs globally.

5. Hidden Hunger: Despite coverage, micronutrient deficiencies remain widespread due to poor dietary diversity.

   E.g. Only 17 countries globally integrate nutrition education into school curricula with strong links to national food standards.

Interlink Between Education and Nutrition:

- Improved Learning Outcomes: Nutritious meals directly improve attention, memory, and classroom performance.
- Equity and Access: School meals act as an incentive for enrolment, especially for girls and low-income families.
- Health Foundation: Childhood nutrition shapes lifelong cognitive and physical development, impacting earning capacity.
- Support for Local Economy: When linked with local agriculture, school feeding creates farm-to-table economies.
- Social Justice Tool: Acts as a safety net for vulnerable populations, reducing inequality in access to food and education.

  E.g. Countries with robust meal programs like Brazil and Finland report both higher retention and better learning metrics.

Key Challenges Highlighted:

- Poor Food Quality: Many school meals contain ultra-processed, sugary, and nutrient-poor items.
- Lack of Nutrition Education: Few countries link feeding with curriculum-based nutrition literacy.
- Overdependence on Staples: Programs overly rely on rice, wheat, and maize, lacking dietary diversity.
- Urban vs Rural Divide: Infrastructure, cold chains, and supply chains differ significantly, affecting consistency.
- Monitoring Gaps: Many nations lack standard indicators to evaluate meal impact on health and education.

  E.g. Only 8% of countries track the nutritional quality of school meals against WHO standards.

Best Practices & Initiatives Mentioned

1. **Japan:** Provides standardised healthy meals with no processed food, along with daily nutrition education.
2. **Brazil:** Implements the National School Feeding Programme (PNAE) — 30% of food sourced from local family farms.
3. **France:** Promotes "sustainable canteens" policy focusing on organic, seasonal, and less meat-heavy meals.
4. **Finland:** Offers free, hot, nutritious meals to every school child with an emphasis on environmental and food literacy.

Way Forward:

- Integrated Curriculum: Embed nutrition education in school syllabi across subjects and grades.
- Standards & Guidelines: Adopt science-backed food standards aligned with WHO dietary guidelines.
- Localised Procurement: Link school meals to sustainable agriculture, ensuring seasonal and diverse food.
- Teacher & Staff Training: Upskill teachers to deliver food education effectively in classrooms.
- Monitoring Framework: Establish national benchmarks and evaluation indicators for nutrition and educational gains.

  E.g. UNESCO calls for every country to develop a national strategy on school nutrition with clear accountability measures.

Conclusion:

The UNESCO report underscores that quality education and quality nutrition must go hand-in-hand. Investing in well-balanced school meals is not merely a welfare gesture but a strategic move for human capital development. A nourished mind learns better — and a better-educated child builds a stronger nation.

1: Enhancing Skills for India's Exports

Introduction

Exports play a pivotal role in driving economic growth, creating employment, and enhancing foreign exchange reserves. For India, an export-led growth strategy is critical to realizing the vision of a USD 20 trillion economy.

- With favorable demographics, rising manufacturing capabilities, and expanding digital infrastructure, India is poised to emerge as a global export powerhouse—particularly in high-tech sectors like semiconductors, electric mobility, and digital services.

Current Trends in India's Exports

1. Sectoral Growth

- Non-petroleum exports grew by 7% in FY23, led by pharmaceuticals, chemicals, electronics, and engineering goods.
- Electronics exports rose from $11 billion (FY21) to $26 billion (FY24), supported by the Production Linked Incentive (PLI) scheme.
- Textiles saw a rebound with 7.6% growth, while renewable energy and EVs are emerging as new drivers of export growth.

2. Global Context

- Amidst a 2% global trade slowdown (2023), India's diversified export base and incentivized policies helped maintain resilience.
- Trade agreements like India-UAE CEPA and India-Australia ECTA are opening up new market access.

Significance of Export-Led Growth

1. Employment Generation and Equity

- Export-oriented industries can potentially generate 200 million+ jobs, addressing chronic underemployment.
- Industrial hubs in Tamil Nadu, Karnataka, and Uttar Pradesh contribute to balanced regional development.

2. Technological Upgradation

- Integration into Global Value Chains (GVCs) enhances competitiveness, innovation, and access to cutting-edge technology.

3. Strategic and Economic Diplomacy

- Enhanced exports bolster India's bargaining power in international negotiations and deepen strategic partnerships through trade pacts.

Challenges to Export Growth

1. Infrastructure and Logistics Bottlenecks

- Logistics costs remain high at 14–16% of GDP, versus 8–10% in developed nations.
- Issues include port congestion, last-mile connectivity gaps, and slow customs processing.

2. Structural and Sectoral Constraints

- Over-reliance on traditional sectors like IT, petroleum products, and gems/jewellery.
- Low value-addition in sectors like textiles and agriculture.

3. Regulatory and Market Access Issues

- on-tariff barriers (NTBs) from EU/US hamper exports (e.g., 3,925 Indian food shipments were rejected by USFDA in 5 years).

- Lack of globally accredited testing and certification infrastructure.

4. Financial and Geopolitical Constraints

- MSMEs face high credit costs and lack awareness of export schemes.
- Global challenges like protectionism, carbon border taxes, and geopolitical conflicts disrupt supply chains.

Government Initiatives

1. Policy and Financial Support

- PLI Schemes across 14 sectors including electronics, EVs, and pharma.
- Export Promotion Mission with ₹2,250 crore to address NTBs and enhance export financing.
- PM Gati Shakti for integrated multimodal logistics infrastructure.

2. Digital Infrastructure

- BharatTradeNet for streamlining trade documentation and finance (modelled on Singapore's TradeNet).
- Unified Logistics Interface Platform (ULIP) to enhance supply chain visibility.

3. Skill Development

- Skill India Mission 2.0 aligned with AI, green technology, and digital trade to prepare future-ready workforce.

Strategies for Enhancing Export Competitiveness

1. Infrastructure Modernization

- Develop export hubs near ports, use AI-driven customs, and strengthen Sagarmala/Bharatmala projects.
- Integrate with dry ports and logistics parks for seamless cargo movement.

2. Diversification and Value Addition

- Focus on high-growth sectors: green hydrogen, semiconductors, aerospace, and precision tools.
- Promote processed agri-products, technical textiles, and organic food for global niche markets.

3. MSME Empowerment

- Scale up RAMP and TIES schemes to boost MSME productivity and market access.
- Enable MSMEs to participate in global public procurement through platforms like GeM.

4. Quality and Compliance

- Build globally accredited testing labs and negotiate Mutual Recognition Agreements (MRAs).
- Promote the adoption of international ISO, Codex, and HACCP standards.

5. Leveraging Digital Trade

- Expand cross-border e-commerce through ONDC and robust digital payment infrastructure.
- Facilitate digital onboarding and product traceability.

6. Brand Building and R&D

- Launch a "Brand India" campaign focused on innovation, sustainability, and quality.
- Increase public-private R&D investment in AI, biotech, semiconductors, and pharmaceuticals.

Conclusion

To unlock its export potential, India must adopt a multi-dimensional strategy: modernising infrastructure, diversifying products and markets, empowering MSMEs, and aligning with Industry 4.0. By addressing supply-side bottlenecks, ensuring regulatory convergence, and leveraging its young workforce, India can emulate the success of nations like South Korea and Vietnam. Policy coherence, global adaptability, and sustainable practices will be crucial in making India a reliable and resilient export engine for the world.

2: India's Turf: A Global Investor Haven

Introduction

India's economic trajectory in the past decade has showcased a structural transformation, evolving from a policy-constrained, cash-strapped economy to a global investment magnet. Guided by initiatives like Viksit Bharat @2047, India is aligning its growth story with inclusive development, sustainability, and global competitiveness. Key enablers such as FDI liberalization, Ease of Doing Business (EoDB) reforms, and strategic infrastructure push are driving investor confidence.

- The PwC Global CEO Survey 2024 places India among the Top 5 global investment destinations, signaling a global endorsement of its economic resilience and reform-centric governance.

Progressive Trends & Strategic Initiatives

A. Domestic Production & Self-Reliance

- Make in India: Targeting strategic sectors like electronics, defense, and pharmaceuticals to reduce import dependency.Eg: India's mobile manufacturing grew 20x in less than a decade.
- PLI Schemes (1.97 lakh crore across 14 sectors): Aimed at boosting domestic manufacturing and job creation.
- IPR Ecosystem: Faster patent approvals, Start-up India incentives, and lower compliance costs encourage innovation.
- Digital India & AI Push: Public digital infrastructure (e.g., Aadhaar stack, DigiLocker, ONDC) forms the backbone for digital entrepreneurship.

B. Structural & Policy Reforms

Reform	Outcome
GST	GST Unified tax structure; improved tax buoyancy and formalization.
IBC	Increased credit discipline; recovery of 2.5 lakh crore as of 2023.
Labor Law Consolidation	Four Labor Codes simplify 44 complex laws (awaiting implementation).
Decriminalization of Minor Offenses	Business-friendly regulatory landscape.
National Single Window System (NSWS)	56 Central Ministries & 23 States onboarded for faster approvals.

C. Global Recognition & Rankings

PwC 2024 CEO Survey:

- India ranked 5th most attractive investment destination (from 9th in 2023).
- 86% Indian CEOs believe the economy will improve in the next 12 months.
- World Bank's Logistics Performance Index (2023): India jumped from 44th to 38th position, indicating better trade facilitation.
- Global Innovation Index (2023): India ranked 40th, up from 81st in 2015.

FDI Liberalization & Ease of Doing Business

A. Foreign Direct Investment (FDI) Trends

- Cumulative FDI (2014–24): Over $650 billion (119% growth vs. previous decade).

Sectoral Surge:

- Manufacturing FDI grew from $98 bn to $165 bn (2014–24).
- Digital and Fintech: Over $70 billion in tech-related FDI in last five years.

B. Ease of Doing Business Outcomes

Startup Ecosystem:

- Over 1 lakh DPIIT-recognized startups; 110+ unicorns.

IPO Boom:

- H1 FY25 saw IPOs raise 2x more funds than in FY24 (KPMG).
- Oversubscription and robust SIP inflows (~ 19,000 crore/month) indicate retail investor confidence.

C. Global Financial Integration

- Inclusion in JP Morgan's GBI-EM index (2024) and expected inclusion in Bloomberg's index to attract $30–40 billion in passive flows.

Ripple Effects on the Economy

A. Employment & MSME Growth

Metric	2013	2024
MSME Jobs	10 crores	24 crores
Overall, Jobs Created	–	17.9 crore under PM Modi govt

PM Gati Shakti, National Logistics Policy, and industrial corridors have spurred local entrepreneurship and supply chain resilience.

B. Skill Development & Inclusion

- Skill India Mission: Over 1.5 crore youth trained across 500+ trades.
- MUDRA Yojana: Over 24 lakh crore disbursed; ~70% beneficiaries are women.
- Jan Dhan-Aadhaar-Mobile (JAM) Trinity: Financial inclusion of 50 crore+ bank accounts.

Infrastructure & Industrial Capabilities

- Semiconductor Mission: 76,000 crore outlay; TATA Group & Micron setting up fabrication plants.

Mega Infra Push:

- PM Gati Shakti, NIP (111 lakh crore), High-Speed Rail, Expressways, Green Energy Corridors.
- RE Sector: India is the 4th largest in RE capacity globally, targeting 500 GW by 2030.

Challenges

- Geopolitical Volatility: Supply chains disrupted by wars and decoupling.

Structural Reforms Pending:

- Land acquisition and labor code implementation face state-level resistance.
- Judicial delays in contract enforcement.
- Skill Gaps: In AI, green hydrogen, semiconductors.

Way Forward for Viksit Bharat @2047

1. Boost R&D Spending: From 0.7% to at least 2% of GDP
2. Integrated Skill Mapping: Align education with future-ready skills (AI, climate tech, robotics).
3. Sustainable Growth Models: Accelerate green finance, carbon credit trading, ESG compliance.
4. Deepen Global Trade: Finalize FTAs with EU, UK; strengthen G20 and IPEF leadership.
5. Institutional Stability: Predictable policy, contract enforcement, and transparency.

Conclusion

India's transformation into a global investment haven is not merely a result of favorable demography, but of deliberate policy calibration, visionary leadership, and stakeholder synergy. If India sustains its reform momentum, invests in human capital, and leverages its geopolitical centrality, the Viksit Bharat 2047 vision is well within reach. It could very well mark India's arrival not just as an economic giant, but as a decisive force in shaping global economic governance.

3: Transforming India's Financial Landscape

Introduction

India's aspiration of becoming a 'Viksit Bharat by 2047' is firmly tied to transformative financial reforms that promote inclusive growth, technological advancement, and global competitiveness.

- Reforms like liberalizing FDI in insurance, expanding rural banking through India Post, and enhancing infrastructure financing via NaBFID reflect the government's commitment to building a resilient, techdriven economy.
- These reforms are aligned with Sustainable Development Goals (SDGs) such as poverty reduction (SDG 1), industry innovation (SDG 9), and financial inclusion.

Key Reforms and Their Implications

1. Liberalizing FDI in Insurance

The cap on Foreign Direct Investment (FDI) in insurance has been raised from 74% to 100% to attract global players.

- This policy change has resulted in $6.5 billion in FDI over the past nine years, with expectations for further inflows.
- It is poised to expand market reach, especially in rural and semi-urban areas, where insurance penetration remains low (3.7% in India vs. 7% globally).
- By 2030, the sector is expected to create 3 million jobs. However, challenges remain, including ensuring compliance with rural service obligations and avoiding market monopolization.

2. GST Rationalization for Insurance

The current 18% GST on insurance premiums restricts affordability. Lowering the GST rate could significantly boost insurance penetration, particularly among low-income groups.

- While the immediate trade-off may involve revenue loss, the long-term benefits of financial inclusion make this proposal vital.

3. Technology-Driven Insurance

The government has allocated Rs 500 crore for AI Centers of Excellence to enhance underwriting, fraud detection, and policy personalization through technology.

- This would improve operational efficiency, customer satisfaction, and product innovation. However, challenges such as the urban-rural digital divide and data privacy concerns need to be addressed for effective implementation.

4. India Post Payment Bank (IPPB) Expansion

IPPB plays a pivotal role in financial inclusion by leveraging 2 lakh postmen/ Gramin Dak Sevaks to offer banking services in over 1.36 lakh post offices.

As a result, India's Financial Inclusion Index (FI-Index) has improved from 53.9 in 2021 to 64.2 in 2024. This initiative has significantly enhanced rural access to savings, insurance, and pensions, but challenges remain in improving last-mile connectivity and digital literacy.

5. NaBFID's Credit Enhancement Facility

NaBFID (National Bank for Financing Infrastructure and Development) facilitates infrastructure financing through Partial Credit Enhancement (PCE) for corporate bonds, with Rs 1.3 lakh crore approved for roads and energy projects.

- This is expected to grow to Rs 3 lakh crore by FY26, significantly boosting the corporate bond market, which currently accounts for 16% of GDP, below the global average of 40%. The key challenge is ensuring bond viability and maintaining investor confidence.

6. Grameen Credit Score (GCS) for SHGs

The introduction of the Grameen Credit Score (GCS) offers data-driven credit assessments for rural borrowers, especially Self-Help Groups (SHGs) and farmers.

- This reduces dependence on informal lenders and complements traditional credit scores like CIBIL. However, issues such as data accuracy and the potential for over-indebtedness need to be managed to ensure sustainable credit access.

Challenges and the Way Forward

Key challenges include finding a regulatory balance that ensures foreign insurers fulfill rural coverage obligations while maintaining competition.

- There is also a need for skill development to match the growing demand for AI-related roles, especially in cybersecurity for the insurance sector.
- Transparent risk-assessment frameworks must be implemented by NaBFID for infrastructure financing.
- Additionally, inclusive policies such as combining GST reductions with targeted subsidies will help mitigate the potential revenue losses from lower taxes.

Conclusion

India's financial reforms are essential for achieving a $10 trillion economy by 2047. By focusing on increasing FDI, leveraging technology, and enhancing financial inclusion, these policies aim to close significant gaps in insurance penetration, rural credit access, and infrastructure financing. The success of these reforms depends on their effective implementation, collaboration across stakeholders, and adaptive regulation. These measures will not only accelerate India's economic growth but also ensure equitable, resilient, and sustainable development, fulfilling the vision of 'Sabka Saath, Sabka Vikas.'

4: Enhancing India's Manufacturing and Trade

India's Union Budget 2025-26 outlines a comprehensive framework to enhance the country's manufacturing sector, reduce trade deficits, and achieve self-reliance under the Atmanirbhar Bharat initiative.

- The budget focuses on policy reforms, fiscal incentives, and infrastructure development to drive growth in key sectors and boost India's integration into global trade.

1. National Manufacturing Mission (NMM)

- Goal: Increase the manufacturing GDP share from 16-17% to 25% by 2030, bringing it in line with global leaders like China (28%) and South Korea (25%).

Focus Areas: The mission emphasizes improving the ease of doing business, enhancing skills development, supporting MSMEs, providing technology access, and ensuring product quality.

- Sustainability Focus: Promotes clean technologies (solar PV, EVs, and batteries) and circular economy practices to reduce environmental impact.
- Trade Deficit Target: Aims to reduce the $250 billion trade deficit by ramping up local production of high-demand goods such as semiconductors and solar panels.

2. Fiscal and Policy Reforms

Customs Duty Exemptions:

- BCD Waivers on critical minerals like lithium and cobalt, and shipbuilding inputs to reduce production costs and attract foreign investment.
- Smartphone Components: The removal of a 2.5% import duty to position India as a global electronics manufacturing hub.
- Simplified Tax Structure: Introduction of a single cess/surcharge to make the tax system more predictable for investors.

3. Production-Linked Incentive (PLI) Scheme Expansion

- Sectors Covered: Expanded to 14 key sectors, including electronics, automobiles, and textiles.

Allocations:

- Electronics/IT: 8,885 crore.
- Automobiles: 2,819 crore for EV component manufacturing.
- Impact: Positioned India as the 2nd-largest mobile phone producer globally, driving significant growth in manufacturing output.

4. MSME Support

- Contribution to Economy: MSMEs account for 35% of manufacturing output, 30% of GVA, and provide employment to 25.18 crore people.

Credit Support:

- Guarantee limit raised to 10 crore for micro and small enterprises (from 5 crore).
- 1.5 lakh crore additional credit over 5 years.
- Entrepreneurship Focus: 2 crore loans for 5 lakh first-time entrepreneurs, with special emphasis on women, SC/ST communities.

5. Labour-Intensive Sectors

- Leather and Footwear: A target to create 22 lakh jobs, with exemptions on BCD for crust and wet blue leather

Textiles:

- Launch of Cotton Productivity Mission for high-quality staple varieties.
- A 57.7% budget increase (5,272 crore) for textiles.
- Toys: Focus on increasing domestic manufacturing hubs to reduce dependency on China, which accounted for 64% of toy imports in FY24.

6. Export Promotion & Digital Infrastructure

- Export Promotion Mission: 2,250 crore allocated to enhance credit access, address non-tariff barriers, and promote cross-border factoring.
- Bharat TradeNet (BTN): A unified digital platform for streamlining trade documentation and reducing non-tariff barriers, fostering smoother trade operations.

7. Infrastructure & Research & Development

- Logistics: Investments in upgrading air cargo infrastructure, particularly for perishables.
- R&D Fund: 20,000 crore allocated for AI, semiconductors, renewable energy, and Industry 4.0.
- SEZ Reforms: The new DESH legislation will replace existing SEZs, enabling faster customs clearances and facilitating state partnerships.

8. Sustainable Growth

- Emphasis on green manufacturing practices, including investments in electric vehicles (EVs) and solar technologies, while improving resource efficiency across industries.

Conclusion

The Union Budget 2025-26 lays out a strategic framework to strengthen India's manufacturing base, boost exports, enhance MSME capabilities, and align with global sustainability trends. By prioritizing domestic production, fiscal incentives, and robust infrastructure, India aims to position itself as a leading global manufacturing hub and a $5 trillion economy.

5: Policy Updates

Incentive Scheme for Low-value BHIM-UPI (P2M) Transactions:

- The Union Cabinet approved an Incentive Scheme for low-value BHIM-UPI (P2M) transactions for small merchants in FY 2024-25, with an outlay of Rs 1,500 crore.
- It covers transactions up to Rs 2,000, offering an incentive of 0.15% per transaction. 80% of the claims will be disbursed without conditions, while the remaining 20% is contingent on technical decline being below 0.75% and system uptime above 99.5%.

- The scheme aims for Rs 20,000 crore in transactions, promotes BHIM-UPI, and targets enhanced penetration in rural areas with products like UPI 123PAY and UPI Lite.
- This initiative supports the less-cash economy and strengthens digital payment infrastructure.
- BHIM (Bharat Interface for Money) is a mobile app that allows users to make payments and send money using the Unified Payments Interface (UPI). BHIM is a safe and secure way to make digital payments.
- The government promotes digital payments for financial inclusion, recovering service costs through Merchant Discount Rate (MDR). MDR for debit cards is up to 0.90%, and for UPI P2M transactions, it is 0.30%. Since January 2020, MDR is waived for RuPay Debit Cards and BHIM-UPI to boost digital transactions.
- The Incentive Scheme supports RuPay and BHIM-UPI transactions, with payouts to acquiring banks, issuer banks, payment service providers, and app providers (TPAPs).

Revised National Programme for Dairy Development (NPDD):

The Union Cabinet approved the Revised National Programme for Dairy Development (NPDD) for the period 2021-2026.

- The scheme focuses on modernizing dairy infrastructure, enhancing milk procurement, processing, and quality control, aimed at improving farmers' access to markets, better pricing, and supply chain efficiency.
- It consists of two components: Component A enhances dairy infrastructure, especially in remote areas, while Component B fosters dairy cooperatives with the help of Japan's cooperation.
- The NPDD has already benefitted over 18.74 lakh farmers, creating 30,000 jobs, and increasing milk procurement capacity by 100.95 lakh liters/day.
- It also upgraded 51,777 village-level milk testing labs and installed 5,123 bulk milk coolers. The revised scheme is expected to establish 10,000 new dairy cooperatives, generate 3.2 lakh jobs, and strengthen rural livelihoods, supporting White Revolution 2.0.

Revised Rashtriya Gokul Mission (RGM)

The Union Cabinet approved the Revised Rashtriya Gokul Mission (RGM) with an enhanced allocation of Rs 3,400 crore for the 2021-2026 period.

- Key additions include 35% capital assistance for Heifer Rearing Centres (30 facilities, 15,000 heifers) and 3% interest subvention on loans for purchasing High Genetic Merit (HGM) IVF heifers.
- The scheme strengthens semen stations, artificial insemination, bull production, and breed improvement. Over the past decade, milk production has increased by 63.55%, and milk availability per person has risen from 307 grams/day (2013-14) to 471 grams/day (2023-24).
- The Nationwide AI Programme has covered 8.39 crore animals and benefitted 5.21 crore farmers. The mission also focuses on preserving indigenous bovine breeds through genomic chips and IVF technology, boosting milk productivity and farmers' incomes.

Chapter 6: News Digest

India's First Indigenous Semiconductor Chip Set for Production by 2025

- India's first indigenous semiconductor chip will be produced by 2025.
- The Madhya Pradesh hosts 85 active electronics companies and two new electronics manufacturing clusters in Bhopal and Jabalpur. 85,000 engineers are being trained in advanced electronics, with 20,000 engineers trained in Madhya Pradesh.
- India's electronics exports are valued at Rs 5 lakh crore, ranking among the top three export categories.

AIKosha

- AIKosha, also known as the IndiaAI Datasets Platform, is a secured repository designed to foster AI innovation in India. It offers access to over 300 datasets and 80 AI models for a wide range of applications.
- The platform features an AI sandbox with an integrated development environment (IDE), tools, and tutorials to support AI research and development.
- Key datasets available include the 2011 Census data, satellite imagery from Indian satellites, Open Governance Data, health data, and meteorological and pollution data, facilitating diverse AI solutions for various sectors.

- This initiative aims to empower developers, researchers, and organizations by providing reliable data for AI-driven innovation.

Jaipur 3R and Circular Economy Declaration (2025–2035)

At the 12th Regional 3R and Circular Economy Forum in Jaipur, Asia-Pacific nations adopted the Jaipur Declaration (2025–2035), aiming for a circular, low-carbon, and resource-efficient economy.

- The declaration promotes 3R principles—Reduce, Reuse, Recycle, aligns with global frameworks like the SDGs, Paris Agreement, and Kunming-Montreal Biodiversity Framework, and builds on the Hanoi 3R Declaration (2013–2023).
- Key outcomes include India's proposal for the Cities Coalition for Circularity (C-3) to foster collaboration and knowledge-sharing, a working group for its operational framework, and an MoU under CITIIS 2.0 for circular projects in urban areas. Focus areas include tackling the triple planetary crisis (climate change, biodiversity loss, pollution), boosting resource efficiency, and promoting local industry and employment.

Maritime Reforms 2025

The government has launched major maritime reforms, including the 'One Nation-One Port Process (ONOP)', aimed at standardizing operations across all major ports to boost efficiency, reduce logistics costs, and improve ease of doing business.

- The Bharat Global Ports Consortium was announced to enhance global trade resilience and support 'Make in India' exports. The MAITRI platform (Master Application for International Trade and Regulatory Interface), leveraging AI and Blockchain, will facilitate a seamless Virtual Trade Corridor.
- Additionally, India Maritime Week 2025 will be held in Mumbai from October 27–31, expecting 1,00,000 delegates from 100 countries, highlighting India's maritime ambitions.

India's First Semiconductor Fab

India's first commercial semiconductor fabrication unit will be set up in Dholera, Gujarat, under a Fiscal Support Agreement (FSA) between India Semiconductor Mission (ISM) and Tata Electronics.

- The project, valued at over Rs 91,000 crore, will receive 50% fiscal support from the Indian government. Backed by Taiwan's PSMC, the fab will manufacture chips for sectors like automotive, computing, AI, and communication, and is expected to generate over 20,000 jobs.
- This initiative marks a major leap in India's journey toward technological self-reliance and semiconductor supply chain resilience.

Khelo India Para Games 2025

The 2nd edition of Khelo India Para Games (KIPG) will be held in New Delhi from March 20–27, 2025, featuring 1,230 para-athletes across six disciplines.

- The event will see participation from top Indian para-athletes, including Paris 2024 Paralympics and 2022 Asian Para Games medallists like Harvinder Singh (archery), Dharambir (club throw), and Praveen Kumar (high jump).

Chapter-
13

Kurukshetra May 2025

1- Devolution to Panchayats in India

Introduction

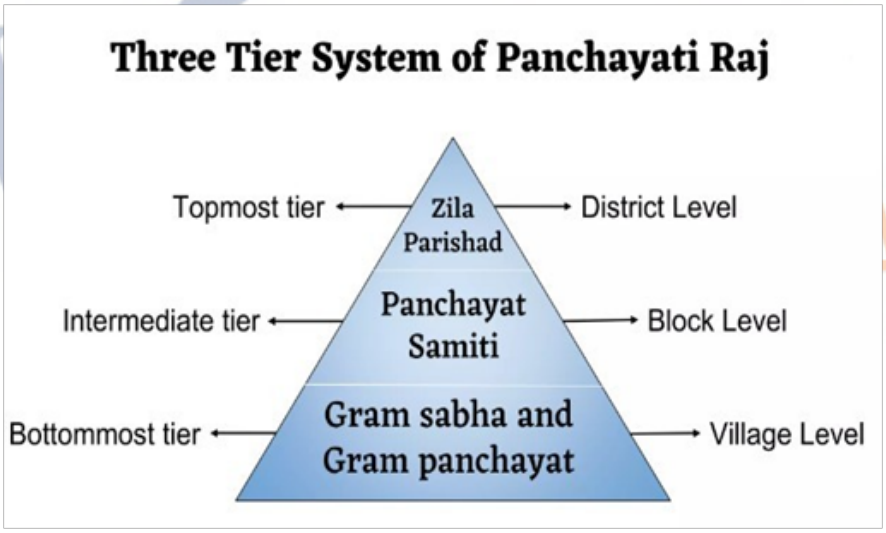
The Ministry of Panchayati Raj has released a comprehensive report titled "Status of Devolution to Panchayats in States – An Indicative Evidence-Based Ranking" (also referred to as the Panchayat Devolution Index 2024), assessing the extent of empowerment of Panchayati Raj Institutions (PRIs) across Indian states and union territories.

Constitutional and Institutional Context

The foundation for democratic decentralization was laid by the 73rd Constitutional Amendment Act, 1992, which institutionalized Panchayati Raj as the third tier of governance. Key constitutional provisions include:

- Article 243G: Empowers State Legislatures to devolve powers, authority, and responsibilities to PRIs to function as institutions of self-government.
- Article 243H: Authorizes PRIs to levy, collect, and appropriate taxes and fees.
- Article 243-I: Mandates constitution of State Finance Commissions (SFCs) every five years.
- Article 280(3)(bb): Directs the Central Finance Commission to recommend measures to augment state funds to supplement PRI resources.

Key Highlights of the Devolution to Panchayats in States 2024 Report



About the Report

- Objective: To assess the actual devolution of powers, functions, finances, and functionaries to PRIs in line with Article 243G.
- Methodology: Ranking based on 6 Dimensions — Framework, Functions, Finances, Functionaries, Capacity Building, and Accountability.

Overall Progress

- Devolution Index increased: From 39.9% in 2013-14 to 43.9% in 2021-22.
- Infrastructure & Digitalization Gains: Functionaries index improved from 39.6% to 50.9%, reflecting better staffing and digital tools.

State-Wise Rankings and Performance

Rank	State	Key Dimension Strength
1	Karnataka	Finances, Accountability
2	Kerala	Framework (Legal and Institutional Setup)

3	Tamil Nadu	Functions (Devolution of Subjects)
4	Maharashtra	Comprehensive Devolution
5	Uttar Pradesh	Improved Institutional Support

Lowest Ranked:

- Dadra & Nagar Haveli and Daman & Diu, Puducherry, and Ladakh show minimal progress with devolution indices around 13–16%.

Challenges in PRI Empowerment

Inconsistent Transfer of Functions:

- The 11th Schedule lists 29 subjects, but most states devolve only a few, fearing erosion of centralized control.

Institutional Gaps:

- District Planning Committees (DPCs) remain largely non-functional.
- Frequent rotation of reserved seats disrupts leadership continuity.

Financial Constraints:

- Non-implementation of SFC recommendations.
- Over-reliance on central transfers (80%) and state grants (15%).

Capacity Deficit:

- Lack of training in budgeting, governance, and service delivery among elected representatives.

Weak Accountability:

- Poor Gram Sabha participation, low transparency, and ineffective social audits.

Status of PRI Funding

Source of Revenue	Percentage Contribution
Own Taxes	~1%
Central Government Grants	~80%
State Government Grants	~15%

Average Revenue per Panchayat:

- Own Taxes: 21,000
- Non-tax Sources: 73,000
- Central Grants: 17 lakh
- State Grants: 3.25 lakh
- Low Revenue Expenditure: PRI spending is <0.6% of GSDP in all states (e.g., Bihar: 0.001%, Odisha: 0.56%).

Inter-State Disparity:

- Kerala and West Bengal: Revenue > 57–60 lakh.
- Andhra Pradesh and Punjab: Revenue < 6 lakh.

Recommendations to Strengthen PRI Devolution

Institutional Measures

- Full Functional Devolution: States must ensure transfer of all 29 subjects as per the 11th Schedule.
- Strengthen DPCs: Operationalize planning bodies for integrated local development.
- Autonomy in Scheme Implementation: Grant PRIs control over flagship schemes like MGNREGA, NHM, and PMAY.

Fiscal Reforms

- Strengthen SFCs: Ensure timely constitution and full implementation of recommendations.
- Enhance Own Revenue: Empower PRIs to collect property tax, land cess, and fees with technical support.

- Special Purpose Grants: Incentivize performance in sanitation, education, rural health, etc.

Capacity and Accountability

- Invest in Capacity Building: Extend training under Rashtriya Gram Swaraj Abhiyan (RGSA) beyond 2026.
- Digital Infrastructure: Promote e-Governance for service delivery and transparency.
- Strengthen Panchayat Bhawans: Make them nodal points for welfare schemes and citizen services.

Conclusion

The Devolution to Panchayats 2024 report reflects a mixed picture—incremental gains in autonomy and capacity, but persistent challenges in functional devolution, fiscal independence, and accountability. Strengthening the third tier of governance is not merely a constitutional requirement but a development imperative to achieve the goals of localised, bottom-up planning and inclusive rural development.

2- The Decade of Empowering Panchayati Raj Institutions

Introduction

Panchayati Raj Institutions (PRIs) have been the cornerstone of grassroots democracy in India since the 73rd Constitutional Amendment Act of 1993.

Historical Context: The 73rd Amendment

The 73rd Constitutional Amendment marked a paradigm shift by granting constitutional status to PRIs, establishing a three-tier system (Gram Panchayat, Block Panchayat, and District Panchayat). Key features include:

- Mandatory elections every 5 years.
- Reservation for SCs, STs, OBCs, and women (%33 seats).
- Devolution of powers through the Eleventh Schedule (29 subjects like agriculture, health, education).
- Article 243G empowering Panchayats to prepare plans for economic development and social justice.

Today, India has 2.7 lakh Gram Panchayats governing 64% of the population, with 31.5 lakh elected representatives, including 46% women.

Key Initiatives in the Last Decade

1. Financial Empowerment

- Increased Allocations: The 15th Finance Commission earmarked 2.36 lakh crore (26-2021) for PRIs.
- e-Gram SWARAJ: A simplified accounting system integrated with PFMS for transparent fund management. Over 2.4 lakh crore transactions processed through e-GSPI.

2. Capacity Building

- Rashtriya Gram Swaraj Abhiyan (RGSA): Trained 111 lakh representatives (25-2022) with 2,116 crore allocated. Collaborations with premier institutes like IIMs and IRMA enhanced leadership skills.
- Sashakt Panchayat-Netri Abhiyan: Focused on empowering women representatives through decision-making training.

3. Technological Integration

- Digital Governance: e-Gram SWARAJ portal now supports 20 regional languages via Bhashini integration.
- Panchayat-Level Weather Forecasting: Collaboration with IMD provides localized weather updates via Meri Panchayat app, aiding farmers.

4. Sustainable Development Goals (SDGs)

- Thematic GPDP: 2.54 lakh Gram Panchayats aligned development plans with 9 SDG themes (e.g., poverty-free villages, clean energy, gender equality).
- National Panchayat Awards: Revamped in 2022 to incentivize performance on SDG metrics.

5. Land Rights and Transparency

- SVAMITVA Scheme: Drone surveys in 3.2 lakh villages issued 2.41 crore property cards, enabling asset monetization and tax collection.
- Audit Online: Over 2.1 lakh audits (24-2023) ensured fiscal accountability.

6. Strengthening PESA

- Awareness Campaigns: Eight PESA states framed rules to empower tribal Gram Sabhas in scheduled areas.

Challenges and the Way Forward

While PRIs have made strides, challenges persist:

1. Incomplete Devolution: Many states lag in transferring functions/funds as per the Eleventh Schedule.
2. Capacity Gaps: Despite training, grassroots representatives often lack technical expertise.
3. Bureaucratic Hurdles: Overlapping schemes and delayed fund transfers hinder efficiency.

Recommendations:

- 3Fs (Funds, Functions, Functionaries): States must fully devolve powers and staff to PRIs.
- Convergence of Schemes: Integrate programs like MGNREGA, Jal Jeevan Mission, and health initiatives at the Panchayat level.
- Community Participation: Strengthen Gram Sabhas through regular meetings and participatory planning.

Conclusion

PRIs embody Mahatma Gandhi's vision of Gram Swaraj, transforming rural India into hubs of participatory democracy. The last decade's initiatives—from SVAMITVA to SDG localization—reflect a holistic approach to decentralization. However, realizing the full potential of PRIs requires collaborative efforts between the Centre and states, adequate resource allocation, and continuous innovation. As India strides toward a Viksit Bharat, empowered Panchayats will remain pivotal in bridging urban-rural divides and ensuring inclusive growth.

3-Revisiting State PRI Acts

Introduction

The 73rd Constitutional Amendment Act, 1992 aimed to empower Panchayati Raj Institutions (PRIs) with fiscal autonomy for effective self-governance. However, even after three decades, Gram Panchayats (GPs) remain fiscally constrained—Own Source Revenue (OSR) contributes merely 6.31% of their total receipts (MoPR 2024, RBI). This overdependence on Central and State grants hampers local autonomy and governance capacity.

Current Fiscal Status of PRIs

Fiscal Indicator	Status
OSR Contribution	6.31% of GP revenues (2022–23)
Per Capita OSR	59 (2017–22 average)
Grants Dependency	Over 90% of receipts
Inter-State Disparity	Kerala, Karnataka: Empowered GPs; Bihar, UP: Minimal tax authority

Despite Constitutional mandates and Finance Commission recommendations, PRIs face significant constraints in mobilizing their own resources due to a combination of institutional, political, and technical bottlenecks.

Key Challenges in OSR Mobilization

1. Legal and Institutional Disconnect

- Asymmetric Tax Powers: States empower PRIs inconsistently. For instance:
- Uttar Pradesh: GPs levy none of the 6 taxes legally permitted.
- Maharashtra: Enables 4 out of 7 possible taxes, but collection remains poor.
- Lack of Implementation Support: Even where laws exist, the absence of administrative capacity or political will renders them ineffective.

2. Weak Assessment and Collection Mechanisms

- Ad-hoc Property Valuation: Most states do not follow a scientific system for tax base identification.
- Underutilization of User Charges: Water, sanitation, and waste charges are rarely linked to usage or cost recovery.
- Non-standardized Practices: Within-state disparities (e.g., GPs in Karnataka have digital tools, but face human resource constraints).

3. Absence of Resource Control

- Limited Ownership of Common Property Resources (CPRs): Water bodies, grazing lands, and forests often remain under state or line department control.
- Parallel Service Delivery Structures: State-level agencies often duplicate or bypass PRIs (e.g., in rural drinking water supply schemes).

Reform Measures for Fiscal Strengthening

A. Institutional & Legal Reforms

- Mandatory Activity Mapping: As recommended by the Second ARC, states must clearly demarcate functions, functionaries, and funds for PRIs, especially around CPRs and essential services.
- Model Taxation Guidelines: Issue model rules for property tax valuation, user charges, and dispute redressal (e.g., Karnataka's categorization by land use and structure type).

B. Capacity Building

- PRI Resource Cells: Create dedicated technical cells at district/block levels to support PRIs in tax assessment and legal compliance.
- Training & IEC Campaigns: Sensitize elected representatives and citizens about the value of local taxes to counter political hesitation.
- Digital Enablement: Develop common software platforms for OSR management (drawing from Odisha's e-PRI and Karnataka's property database models).

C. Policy-Level Interventions

- Expand Tax Base: Allow GPs in backward states (e.g., UP, Odisha) to levy property tax and commercial fees.
- Simplify Collection Processes: Standardize user charges for sanitation, water, and markets to reduce discretion and leakage.
- Introduce Minimum Floor Rates: As per the Fourth State Finance Commission of Kerala, set base rates for taxes and revise them periodically

D. Innovative Financial Models

- Performance-Linked Grants: Incentivize OSR growth by linking a portion of Central Finance Commission grants to local revenue efforts.
- Public-Private Models for Collection: Collaborate with private tech firms for collection mechanisms, especially for market and license fees.
- Revolving Funds for Infrastructure: Use OSR to create revolving funds for small-scale, revenuegenerating infrastructure (e.g., shops, local tourism).

Case Studies & Best Practices

Karnataka

- Digitized Property Records: Web-based systems have categorized properties based on use and type.
- Incentive-Based Grants: Tied grants are partly linked to tax performance.

Kerala

- Activity Mapping and Decentralization: Fully empowered GPs to levy taxes and manage essential services.
- CPR Utilization: PRIs manage and derive revenue from local water bodies and markets.

Maharashtra

- Water Service Transfer: Handed over rural water supply schemes to GPs, enhancing autonomy and OSR.
- Local Infrastructure Use Charges: Markets and marriage halls generate stable revenues for GPs.

Global Parallel: Lessons from South Africa and Brazil

- South Africa: Local governments are empowered by law to raise revenue through property taxes and service charges; the system includes built-in capacity training by provincial governments.

- Brazil: Participatory budgeting ensures that local taxation aligns with citizen priorities, increasing transparency and tax morale.

Conclusion

Fiscal empowerment of PRIs is crucial to actualize true decentralization. Without strong Own Source Revenue, Panchayats function merely as scheme implementers. A holistic strategy combining legal clarity, capacity building, and public engagement is needed. As highlighted by NIPFP, a viable OSR framework must replace the prevailing grant-dependent model to strengthen grassroots democracy.

4- Water Management through Panchayati Raj Institutions

Introduction

Water is central to human survival and sustainable development. In India, where over 65% of the population resides in rural areas, Panchayati Raj Institutions (PRIs) serve as critical agents of decentralized water governance.

- With the 73rd Constitutional Amendment Act (1992) granting PRIs authority over water resources under Schedule XI, and with 97.1% of India's 24.24 lakh water bodies located in rural areas (as per the 2023 Water Body Census), PRIs hold both constitutional responsibility and ground-level relevance in water management.

Constitutional and Institutional Framework

73rd Amendment and Schedule XI

- Delegated 29 subjects to PRIs, including drinking water, minor irrigation, watershed development, and fisheries.
- Empowers PRIs as nodal agencies for planning, implementing, and monitoring water-related schemes through participatory governance.

Water Bodies Census 2023

- Out of 24.24 lakh water bodies, 23.55 lakh (97.1%) are in rural areas.
- Panchayats manage 62.4% of publicly owned water bodies—signifying the criticality of PRI-led conservation and utilization strategies.

Key Initiatives Involving PRIs

Participatory Irrigation Management (PIM)

- Promotes Water User Associations (WUAs) for decentralized irrigation governance.
- PRIs facilitate formation of WUAs, mediate disputes, and ensure equitable distribution.
- Leads to enhanced water-use efficiency and greater local ownership.

Jal Jeevan Mission (JJM)

- Aims for 100% Functional Household Tap Connections (FHTCs) by 2024.
- PRIs prepare Village Action Plans (VAPs), manage assets, and form Village Water & Sanitation Committees (VWSCs).
- Empowers Gram Sabhas to ensure transparency and equity in access.

Repair, Renovation and Restoration (RRR) Scheme under PMKSY

- Involves PRI-led restoration of water bodies, often integrated with the Integrated Watershed Management Programme (IWMP).
- Focuses on groundwater recharge and long-term sustainability.

MGNREGS and Natural Resource Management (NRM)

- 60% of funds earmarked for agriculture and water conservation.
- PRIs implement soil moisture conservation, check dams, ponds, and rainwater harvesting works.
- Enhances drought resilience and employment generation.

Village-Level Water Budgeting

- Empowers PRIs to assess water availability vs. demand (drinking, agriculture, industry).

- Develops Source Sustainability Plans to balance usage.
- Promotes judicious allocation and conservation.

XV Finance Commission Grants (2021-26)

- 2.36 lakh crore allocated to PRIs; 60% tied to water supply, rainwater harvesting, and sanitation.
- Strengthens PRI capacities to implement JJM, SBM, and other water-related programs.

Atal Bhujal Yojana (ABY)

- Focused on groundwater management in water-stressed regions.
- PRIs prepare Water Security Plans, promote community-led governance, and incentivize efficient use.

Localization of Sustainable Development Goals (SDGs)

- PRIs integrate SDG-6 (Clean Water & Sanitation) through: Convergence of schemes like PMKSY, JJM, and MGNREGS & Capacity building by Ministry of Panchayati Raj.

Challenges

Challenge	Explanation
Climate Change	Erratic rainfall, droughts, and floods stress local water systems.
Capacity Gaps	Many PRIs lack technical skills and data-handling ability.
Encroachment & Urban Pressure	Expanding urbanization threatens rural water bodies.
Community Participation	Ensuring inclusion of marginalized sections, especially women, in water governance remains limited.
Fragmentation of Schemes	Lack of integration among various schemes leads to duplication and inefficiencies.

Way Forward

- Jan Bhagidari (People's Participation): Launch awareness campaigns, recognize community water stewards, and incentivize conservation.
- Convergence of Schemes: Integrate JJM, PMKSY, IWMP, ABY, and MGNREGS under unified villagelevel water plans.
- Technology Adoption: Use GIS and remote sensing for water budgeting, groundwater mapping, and real-time monitoring.
- Gender Mainstreaming: Promote women's leadership in VWSCs, Gram Sabhas, and Water Committees.
- Capacity Building: Train PRI representatives in technical aspects, financial management, and SDG localization through continuous education and e-learning modules.

Conclusion

PRIs embody the Gandhian vision of Gram Swaraj, translating national water goals into community-driven action. Their constitutional empowerment, grassroots presence, and participatory ethos uniquely position them to bridge the water divide in rural India. As climate threats loom large and demand-supply mismatches intensify, PRIs must become the fulcrum of integrated water governance, guided by the twin mantras of "Catch the Rain" and "Sabka Saath, Sabka Vikas". Strengthening PRIs is not just a policy imperative—it is a prerequisite for resilient rural India and sustainable development.

5- Strengthening Rural India through Capacity Building in Panchayats

Introduction

The 73rd Constitutional Amendment Act, 1992 heralded a new era of decentralized governance by institutionalizing Panchayati Raj Institutions (PRIs) as the third tier of government. These institutions are instrumental in realizing the ideals of participatory democracy and bottom-up planning.

- However, the real challenge lies not merely in constitutional status but in equipping these bodies with adequate capacity, autonomy, and accountability to function as true agents of rural transformation.

Why is this Important?

- Governance at Grassroots: PRIs are responsible for planning and implementing schemes related to health,

education, sanitation, agriculture, and local infrastructure.

- Achievement of SDGs: Effective Panchayats are key to achieving Sustainable Development Goals (SDGs), particularly poverty alleviation (SDG 1), gender equality (SDG 5), and clean water and sanitation (SDG 6).
- Democratic Deepening: They serve as the first point of interaction between citizens and the state, shaping democratic values and accountability.

Challenges Faced by PRIs

Despite constitutional empowerment, several institutional and functional gaps limit the potential of PRIs:

Domain	Challenges
Administrative	Lack of skilled personnel, poor training modules, bureaucratic apathy
Financial	Delayed fund devolution, limited own-source revenue, overdependence on state grants
Capacity & Awareness	Capacity & Awareness
Community Participation	Lack of awareness about roles/powers among elected members (especially women and first-time representatives)
Digital Divide	Inadequate digital infrastructure and skills in rural governance
Lack of Convergence	Fragmented development planning and weak coordination among departments

Government Interventions for Capacity Building

1. Policy Framework

- National Capacity Building Framework (NCBF), 2022: A guiding framework to streamline and standardize training, focusing on contextual relevance, inclusivity, and technology use.

2. Capacity Building Schemes

- Rajiv Gandhi Panchayat Sashaktikaran Abhiyan (RGPSA) (2012–16): Focused on infrastructure, e-enablement, and capacity building of PRIs.
- Panchayat Sashaktikaran Abhiyan (2016–18): Supported training modules and innovative practices.
- Rashtriya Gram Swaraj Abhiyan (RGSA) (2018–22): Aimed at strengthening governance capabilities through training, ICT, and institutional support.
- Revamped RGSA (2022–26): Aligns PRI efforts with SDGs and enhances leadership, planning, and accountability capacities.

3. Institutional Mechanisms and Innovations

- Leadership & Management Development Programmes (MDPs): Conducted with IIMs and IIT Dhanbad to train Sarpanches and functionaries in innovation, digital tools, and public service delivery.
- Panchayat Resource Centres (PRCs): Knowledge hubs for continuous learning and local planning.
- Collaborations: With institutions like IRMA, NIRD&PR, and State Institutes of Rural Development (SIRDs) to localize training content and methodology.
- e-Panchayat Mission Mode Project: Introduced digital tools like PlanPlus, ActionSoft, and AuditOnline for greater transparency and participatory planning.

Best Practices from States

- Kerala: Decentralized planning with the People's Plan Campaign and extensive training mechanisms.
- Odisha: Ama Gaon Ama Yojana involving Gram Panchayats in formulating local plans.
- Madhya Pradesh: Mobile-based applications for real-time service monitoring and training dissemination.

Way Forward

To make Panchayats engines of inclusive and accountable governance, the following strategies are essential:

1. Institutionalize Continuous Learning: A decentralized, multilingual, and modular training system should be developed to ensure contextual relevance.
2. Strengthen Digital Governance: Expand e-learning platforms and ensure last-mile internet connectivity
3. Ensure Financial Autonomy: Encourage generation of own-source revenues and streamline fund transfers.

4. Promote Women's Leadership: Capacity building with a gender lens, especially in states with 50% reservation for women.
5. Social Accountability Tools: Encourage social audits, citizen report cards, and Gram Sabhas as regular mechanisms.

Conclusion

The Constitutional mandate for Panchayati Raj laid the legal foundation for grassroots democracy, but real empowerment requires sustained capacity building, functional devolution, and community participation. By equipping Panchayat leaders with the knowledge, tools, and autonomy they need, India can transform its rural governance landscape into a resilient, inclusive, and self-reliant model of development — truly embodying the spirit of Antyodaya and Sabka Saath, Sabka Vikas.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