THE EDGE

CURRENT AFFAIRS MAGAZINE

NOVEMBER 2025

DECODING CURRENT EVENTS FOR UPSC SUCCESS

The Assam Prohibition of Polygamy Bill 2025

ALSO USEFULL FOR TGPSC & APPSC

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1. **Implementation of Four Labour Codes**

   Context: The central government has announced the implementation of four new labour codes, rationalising 29 existing labour laws. Based on the recommendations of the 2nd National Commission on Labour (2002), this reform aims to streamline compliance, modernize outdated provisions, and create an efficient framework that promotes ease of doing business while safeguarding worker rights.

   The Four Codes & Key Provisions
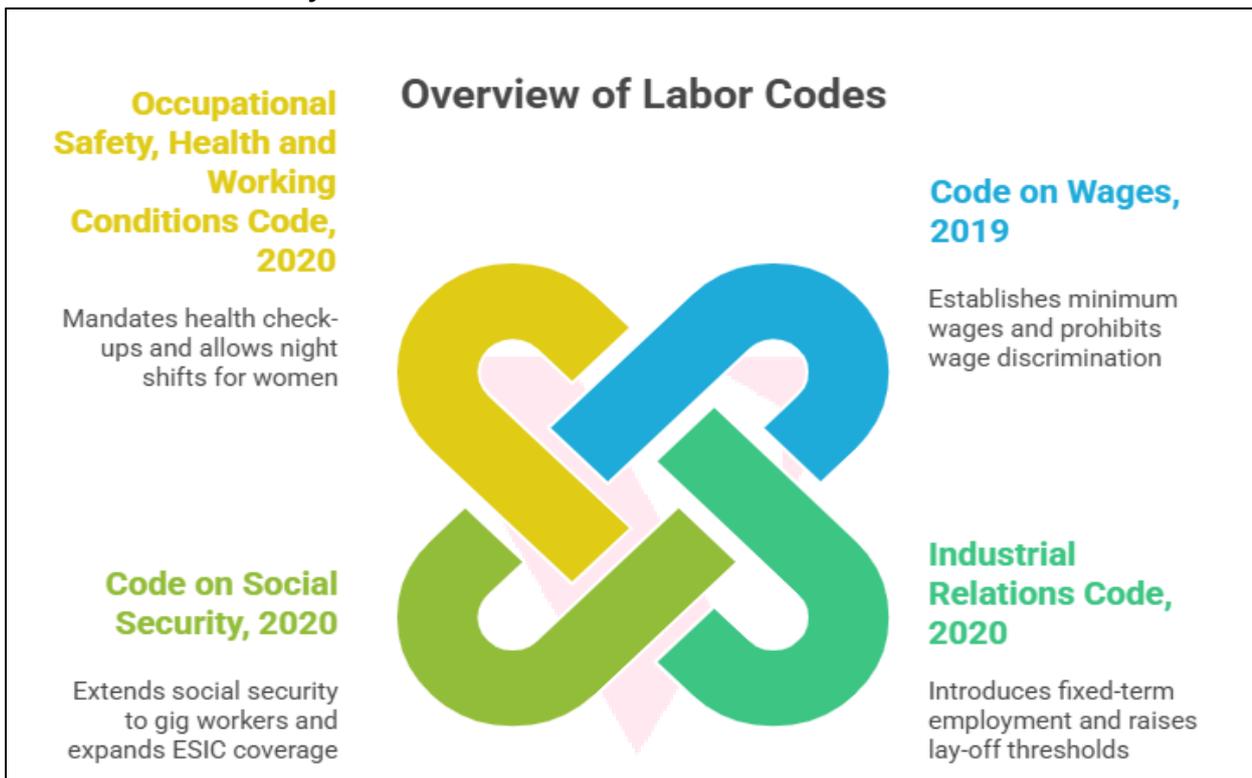
   * **Code on Wages, 2019**
     * ✓ **Subsumes:** 4 laws, including the Minimum Wages Act, 1948 and Equal Remuneration Act, 1976.
     * ✓ **Key Features:** Establishes a statutory right to minimum wages for all employees across organized and unorganized sectors based on skill and geography. It explicitly prohibits discrimination based on gender or transgender identity in recruitment and wages.
   * **Industrial Relations Code, 2020**
     * ✓ **Subsumes:** 3 acts, including the Industrial Disputes Act, 1947.
     * ✓ **Key Features:** Introduces Fixed Term Employment (FTE), allowing time-bound contracts with benefits parity (gratuity after 1 year). It raises the threshold for government approval for lay-offs, retrenchment, or closure from 100 to 300 workers.
   * **Code on Social Security, 2020**
     * ✓ **Subsumes:** 9 acts, including the Employees' Compensation Act, 1923 and Maternity Benefit Act, 1961.
     * ✓ **Key Features:** Extends social security coverage (PF, ESIC) to gig and platform workers for the first time. It expands ESIC coverage pan-India, removing the "notified area" restriction, and creates a dedicated Social Security Fund.
   * **Occupational Safety, Health and Working Conditions Code, 2020**

- **Subsumes:** 13 acts, including the Factories Act, 1948.
- **Key Features:** Mandates free annual health check-ups for workers above 40. It allows safety provisions to be extended to high-risk establishments with even one employee and permits night shifts for women with consent and safety protocols.
- **Significance**: This consolidation addresses the fragmented legal framework of pre-independence laws. It introduces a "Single Registration, Single License, Single Return" mechanism, reducing compliance burdens for MSMEs. It modernizes the labour landscape by recognizing new forms of employment like the gig economy and inter-state migrant workers.

2. **Supreme Court's Advisory Opinion on Governor's Assent Powers**
   Context: A five-judge Constitution Bench of the Supreme Court recently delivered an advisory opinion on the 16th Presidential Reference under Article 143(1). The reference was sought by the President following a controversy over Governors withholding assent to state bills, specifically highlighted in the State of Tamil Nadu vs The Governor of Tamil Nadu case.
   Background: The Supreme Court had earlier ruled that Governors cannot sit indefinitely on bills. The court extended this logic to the President, suggesting a three-month timeline for decisions, which prompted the President to seek clarity on the scope of judicial review over these discretionary powers.
   Key Clarifications by the Supreme Court
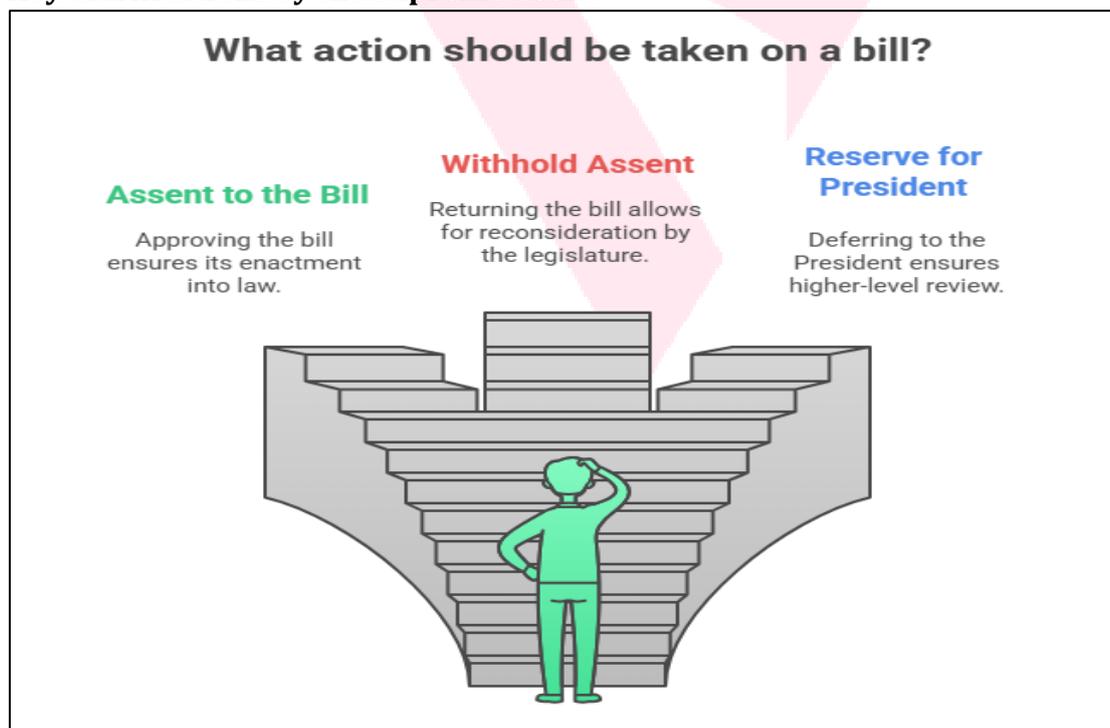
- **Governor's Options (Article 200):** The Governor has only three options:
  - Assent to the Bill.
  - Withhold assent and return the Bill (except Money Bills).
  - Reserve the Bill for the President (Article 201).
  - Crucially, the Court ruled that "sitting indefinitely" is not a valid option.
- **Justiciability of Decisions:**
  - The merits of a decision by the Governor or President to withhold assent are not justiciable.
  - However, indefinite inaction is subject to limited judicial review. The Court can issue a writ of mandamus to prompt a decision within a "reasonable time," balancing constitutional autonomy with accountability.

- **Immunity vs. Accountability:** While Article 361 grants personal immunity to the Governor/President from court proceedings, it does not bar judicial review of their actions if they violate constitutional mandates (e.g., indefinite delays).
  - ✓ No Fixed Timelines: The Court declined to set a rigid judicially prescribed timeline for the President under Article 201, noting the Constitution is intentionally silent. However, "reasonable time" remains the guiding constitutional expectation.
- **Significance**: This advisory opinion reinforces the principle that constitutional discretion is not absolute power. It clarifies that while the judiciary will not interfere in the content of executive decisions, it will intervene to prevent the defeat of the legislative process through inaction, ensuring the smooth functioning of federal governance.
- **Key Articles:**
  - ✓ Article 143: Advisory Jurisdiction of SC.
  - ✓ Article 200 & 201: Assent to Bills by Governor and President.
  - ✓ Article 361: Protection of President and Governors.

3. **Digital Personal Data Protection (DPDP) Rules, 2025**
   Context: The Ministry of Electronics and Information Technology (MeitY) has notified the Digital Personal Data Protection (DPDP) Rules, 2025. These rules establish the operational framework for the DPDP Act, 2023, introducing a phased rollout over 18 months to ensure smooth compliance.
   Key Features of the Rules

Key Features of Data Protection Rules
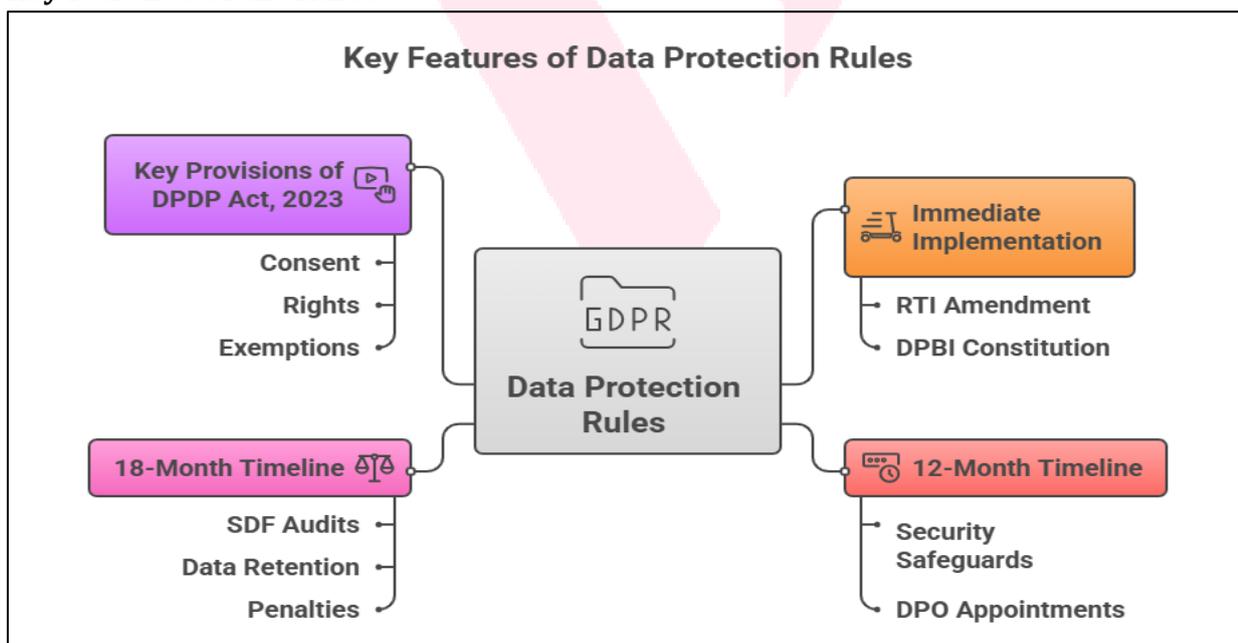
- **Immediate Implementation:**
  - ✓ **RTI Amendment:** Section 44(3) amends the RTI Act, narrowing the scope for disclosing personal information unless a larger public interest is proven.
  - ✓ **Institutional Setup:** Constitution of the Data Protection Board of India (DPBI) to handle grievances and enforcement.
- **12-Month Timeline:**
  - ✓ **Security Safeguards:** Data Fiduciaries must implement encryption, access controls, and breach monitoring mechanisms.
  - ✓ **Appointments:** Mandatory appointment of Data Protection Officers (DPOs) by Data Fiduciaries.
- **18-Month Timeline:**

- ✓ **Significant Data Fiduciaries (SDFs):** Large tech firms must conduct independent audits and Data Protection Impact Assessments.
- ✓ **Data Retention:** Personal data cannot be stored beyond one year unless legally required.
- ✓ **Penalties:** Non-compliance can attract penalties up to ₹250 crore.
- **Key Provisions of the Parent Act (DPDP Act, 2023)**
  - ✓ **Consent:** Data processing is allowed only with free, informed, and unconditional consent, which can be withdrawn anytime.
  - ✓ **Rights:** Data Principals have the right to access, correct, and erase their data, alongside grievance redressal.
  - ✓ **Exemptions:** The Central Government can exempt state agencies from certain provisions on grounds of national security and public order.

4. **Cryptocurrency Recognized as 'Property'**

   Context: In a significant legal interpretation, the Madras High Court has ruled that cryptocurrency qualifies as "property" under Indian law. The court observed that while it is not currency, it is an asset that can be owned, transferred, enjoyed, and held in trust.

   What is Cryptocurrency?

   Cryptocurrency is a digital medium of exchange that utilizes cryptography for security and algorithms to regulate supply. Unlike traditional fiat currency, it is not issued or regulated by a central authority (like the RBI or government). Instead, it operates on Blockchain technology, a decentralized digital ledger that records transactions across a peer-to-peer network. Common examples include Bitcoin (BTC) and Ethereum (ETH).

   Legal & Regulatory Status in India
   - **Not Legal Tender:** The Reserve Bank of India (RBI) does not recognize cryptocurrency as legal tender.
   - **Taxation Framework:**
     - ✓ **Classification:** Under Section 2(47A) of the Income Tax Act, 1961, cryptocurrency is classified as a "Virtual Digital Asset (VDA)".
     - ✓ **Tax Rate:** Gains from the transfer or sale of VDAs are taxed at 30% under Section 115BBH.
     - ✓ **TDS:** A 1% TDS is applicable on transfers under Section 194S.

   Key Highlights of the Judgment
   - **Nature of Asset:** The Court distinguished cryptocurrency from tangible property and currency, categorizing it as an intangible asset capable of beneficial possession and enjoyment.
   - **Functional Characteristics:** Since cryptocurrencies can be stored, traded, and sold, they possess the fundamental characteristics of property.
   - **Fiduciary Duty:** The judgment established that virtual digital assets held electronically by exchanges are meant to be held in trust for the users, thereby creating a fiduciary duty on the part of the exchanges toward their customers.

5. **Supreme Court Recalls Ban on Retrospective Environmental Clearances**

   Context: In a significant 2:1 ruling, the Supreme Court of India has struck down its own 2025 Vanashakti judgment, which had banned ex post facto (retrospective) Environmental Clearances (ECs). The Court reasoned that continuing the ban would put thousands of crores of public investment at risk and cause devastating economic consequences.

   About Ex Post Facto Environmental Clearances
   - **Definition:** These are approvals granted to projects that have already commenced construction or operation without the mandatory prior Environmental Clearance (EC).

- **Legal Conflict:** The Environment (Protection) Act, 1986 and EIA Notifications (1994, 2006) are founded on the principle of prior clearance, mandating assessment before activity begins.
- **The Vanashakti Verdict (2025):** This judgment had struck down government notifications (2017, 2021) permitting retrospective ECs, terming them "gross illegality" and "anathema" to environmental jurisprudence for violating the precautionary principle.

Rationale Behind the Recall

- **Larger Bench Review:** The Chief Justice of India (CJI) noted the Vanashakti ruling was per incuriam (lacking care) as it overlooked conflicting coordinate-bench judgments like D. Swamy (2021) and Alembic Pharmaceuticals (2020), which allowed post-facto ECs in exceptional cases with penalties.
- **Proportionality & Public Interest:** The Court emphasized that strict enforcement of prior approval should not harm the broader public interest. Instead of demolition, heavy penalties can serve as a deterrent.
- **Practicality:** Recognizing that many projects face procedural delays rather than deliberate evasion, the Court ruled that retrospective ECs can be a tool for compliance in exceptional, non-routine cases.
- Dissenting View Justice Ujjal Bhuyan dissented, arguing that allowing retrospective ECs rewards violators and dilutes the precautionary principle, which is rooted in Article 21 (Right to a healthy environment) and Article 51A(g) (Duty to protect nature).

Way Forward Balancing development with ecology requires:

- **Strict Compliance:** Rigorous enforcement of prior ECs and public hearings.
- **Tech-Driven Monitoring:** Using platforms like PARIVESH and GIS to track illegal constructions.
- **Deterrence:** Applying the Polluter Pays Principle through strict restoration costs and CAMPA funds

6. **Supreme Court Strikes Down Key Provisions of Tribunal Reforms Act, 2021**
   Context: In a significant verdict, the Supreme Court has struck down several key provisions of the Tribunal Reforms Act, 2021. The court also directed the Central Government to establish a National Tribunal Commission within four months to ensure the independent functioning of tribunals.
   About Tribunals: Tribunals are specialized quasi-judicial bodies designed to provide speedy and expert resolution of disputes in specific fields such as taxation, environment, and administrative services.

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Tribunal Information

- **Constitutional Basis:** Article 323-A deals with Administrative Tribunals, while Article 323-B covers tribunals for other subjects.

- **Judicial View:** The Supreme Court clarified that the subjects listed under Article 323-B are not exhaustive.

- **Tenure of Members:** The Act fixed a 4-year tenure, which the Court struck down, restoring the 5-year tenure norm.

- **Minimum Age:** The provision setting a minimum age of 50 years for appointment was declared unconstitutional.

- **Selection Committee:** The Court reaffirmed judicial primacy in the selection process, striking down provisions that gave the executive excessive control.

- **Constitutional Basis:**
  - ✓ Article 323-A: Deals with Administrative Tribunals.
  - ✓ Article 323-B: Covers tribunals for other subjects like taxation, land reforms, and labour.
- **Judicial View:** In 2010, the Supreme Court clarified that the subjects listed under Article 323-B are not exhaustive; legislatures can create tribunals for any matter within their legislative competence.

Key Provisions Struck Down: The Supreme Court declared specific sections of the 2021 Act unconstitutional on the grounds that they violated the separation of powers and undermined the independence of the judiciary.

- **Tenure of Members:** The Act fixed a 4-year tenure, which the Court struck down, restoring the 5-year tenure norm to ensure stability and independence.
- **Minimum Age:** The provision setting a minimum age of 50 years for appointment was declared unconstitutional, as it arbitrarily excluded young, meritorious advocates.
- **Selection Committee:** The Court reaffirmed judicial primacy in the selection process, striking down provisions that gave the executive excessive control over appointments.

Significance of the Judgment

- **Judicial Independence:** By striking down the re-enactment of provisions already declared unconstitutional in earlier judgments (like Madras Bar Association cases), the Court asserted that legislative overrides cannot violate constitutional principles.
- **National Tribunal Commission:** The directive to set up this body is crucial to removing tribunals from the administrative control of their parent ministries, thereby preventing conflicts of interest and ensuring autonomy.

7. Appointment of the 53rd Chief Justice of India

Context: Justice Surya Kant has assumed office as the 53rd Chief Justice of India (CJI) on November 24, 2025, succeeding Justice B.R. Gavai.

About the Office of the CJI: The Chief Justice of India is the head of the Indian judiciary and the "Master of the Roster," responsible for the administrative functioning of the Supreme Court and the protection of the Constitution.

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- **Constitutional Provisions**
  - ✓ **Article 124:** Provides for the establishment of the Supreme Court and the appointment of judges, including the CJI.
  - ✓ **Article 145:** Empowers the Supreme Court to make rules for regulating its practice and procedure, under the supervision of the CJI.
  - ✓ **Article 146:** Grants the CJI the authority to appoint officers and staff of the Supreme Court.
  - ✓ **Article 130:** Authorizes the CJI, with the President's approval, to appoint places other than Delhi as the seat of the Supreme Court.
- **Appointment and Eligibility**
  - ✓ **Process:** The CJI is appointed by the President of India. The process typically follows the convention of seniority, where the outgoing CJI recommends the senior-most judge of the Supreme Court as their successor.
  - ✓ **Eligibility:** There are no separate criteria for the CJI; the qualifications are the same as for a Supreme Court Judge:
    - ▪ Must be a citizen of India.
    - ▪ Must have been a Judge of a High Court for at least 5 years; OR
    - ▪ An Advocate of a High Court for at least 10 years; OR
    - ▪ A distinguished jurist in the opinion of the President.
- **Tenure and Removal**
  - ✓ **Tenure:** The CJI holds office until attaining the age of 65 years. The Constitution does not prescribe a fixed tenure duration.
  - ✓ **Resignation:** The CJI can resign by submitting a letter under their hand to the President.
  - ✓ **Removal:** A CJI can be removed from office only by an order of the President passed after an address by each House of Parliament supported by a special majority on the grounds of proven misbehaviour or incapacity.

8. **Bharat NCAP 2.0**

    Context: The Ministry of Road Transport and Highways (MoRTH) has released a draft notification for Bharat NCAP 2.0, proposing a comprehensive upgrade to India's passenger vehicle safety rating system. The updated norms are scheduled to come into effect from October 2027, following the expiration of the current norms on September 20, 2027.

    About Bharat NCAP
    - **Definition:** The Bharat New Car Assessment Programme (Bharat NCAP) is India's independent car safety rating mechanism designed to evaluate the crash safety performance of vehicles sold within the country.
    - **Launch:** It was launched on August 22, 2023, by the Ministry of Road Transport & Highways.
    - **Methodology:** The programme rates vehicles from 0 to 5 stars based on their safety performance for both Adult Occupants (AOP) and Child Occupants (COP). It is based on global NCAP protocols but adapted to suit Indian road conditions.
    - **Scope:** It covers right-hand drive passenger vehicles weighing below 3,500 kg. Testing is voluntary, where manufacturers can nominate their models for evaluation.

    Key Changes Proposed in Bharat NCAP 2.0: The upgrade introduces a holistic Five-Pillar Rating Structure to broaden the scope of safety evaluation beyond just crash impact:
    - **Crash Protection:** Continuing the assessment of structural integrity and occupant safety.
    - **Vulnerable Road User (VRU) Protection:** Enhancing safety for pedestrians and cyclists interacting with the vehicle.
    - **Safe Driving:** Evaluating features that assist in maintaining safe driving practices.

- **Accident Avoidance:** Focusing on active safety technologies that prevent collisions (e.g., Autonomous Emergency Braking).
- **Post-Crash Safety:** Assessing mechanisms that ensure safety after an accident has occurred.

9. National Cooperative Development Corporation (NCDC)

Context: The National Cooperative Development Corporation (NCDC) has witnessed phenomenal growth over the last decade, with its financial disbursements increasing nearly 17 times. Additionally, in a major global achievement, two Indian cooperatives—Amul and IFFCO—have secured the first and second ranks, respectively, in the International Cooperative Alliance (ICA) World Cooperative Monitor 2025 rankings announced in Doha, Qatar.

About National Cooperative Development Corporation (NCDC)

- **Establishment:** It is a statutory body set up in 1963 under the National Cooperative Development Corporation Act, 1962.
- **Nodal Ministry:** It functions under the administrative control of the Ministry of Cooperation, Government of India.
- **Mandate:** NCDC serves as the apex financial institution for the cooperative sector. Its primary objective is to plan and promote programmes for the production, processing, marketing, storage, export, and import of agricultural produce, foodstuffs, and notified commodities.
- **Functions:** It provides financial assistance (loans, grants) and technical support to cooperatives for both farm and non-farm activities, aiming to make them self-reliant and sustainable.

Key Achievements

- **Disbursement Growth:** In FY 2024-25, NCDC disbursed ₹95,182.88 crore, a massive leap from ₹5,735.51 crore in 2014-15.
- **Inclusive Financing:** Between FY 2021-22 and 2024-25, it provided over ₹4,823 crore to women cooperatives and ₹57.78 crore to SC/ST cooperatives, promoting financial inclusion for marginalized groups.

Constitutional & Legal Framework for Cooperatives

- **Constitution:** 'Cooperative Societies' is a subject under Entry 32 of the State List (Seventh Schedule). The 97th Constitutional Amendment Act (2011) added Part IXB specifically dealing with cooperative societies.
- **MSCS Act:** The Multi-State Co-operative Societies (Amendment) Act, 2023 was recently enacted to strengthen governance, transparency, and accountability in cooperatives operating across multiple states.

10. Assam Prohibition of Polygamy Bill, 2025

Context: The Assam Prohibition of Polygamy Bill, 2025 was recently tabled in the Assam Legislative Assembly. The legislation aims to ban the practice of polygamy across the state, introducing stringent penalties for offenders and abettors.

Understanding Polygamy and Current Legal Status

- **Definition:** Polygamy refers to a marital system where a person has more than one spouse simultaneously.
- **Current Laws:** In India, polygamy is generally prohibited under the Hindu Marriage Act, 1955 and the Special Marriage Act, 1954. However, the Muslim Personal Law (Shariat) Application Act, 1937 allows Muslim men to have up to four wives.
- **Prevalence:** According to NFHS-5 (2019-20), the practice exists across communities, with rates of 2.1% among Christians, 1.9% among Muslims, and 1.3% among Hindus.

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Key Provisions of the Bill

Structure of the Anti-Polygamy Bill
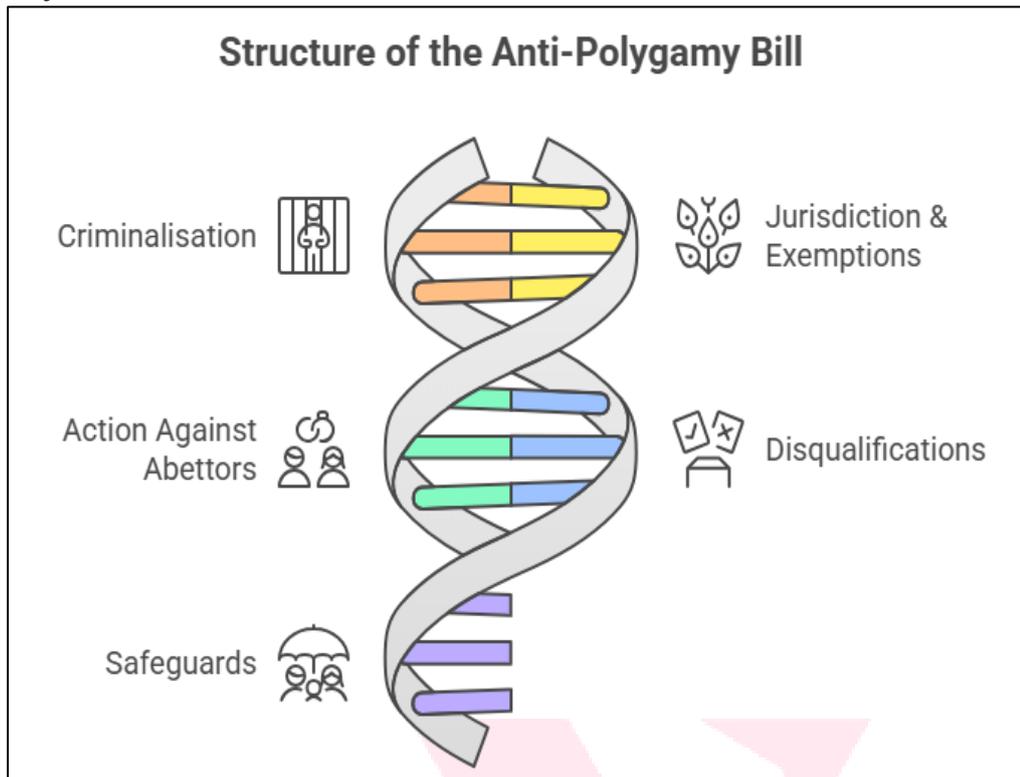
- **Criminalisation:** The Bill classifies polygamy as a criminal offence. Offenders face imprisonment of up to 7 years and a fine. If a previous marriage is concealed from the new spouse, the jail term can extend to 10 years.
- **Jurisdiction & Exemptions:** The law applies to all residents of Assam, even if the marriage is contracted outside the state. However, it exempts tribal communities living in Sixth Schedule areas and members of Scheduled Tribes (Article 342) whose customary laws permit such unions.
- **Action Against Abettors:** Individuals who facilitate such marriages, including family members, village heads, and religious clerics (priests or qazis), are liable for punishment, including jail terms.
- **Disqualifications:** Persons convicted under this law will be barred from government jobs, state welfare schemes, and contesting elections.
- **Safeguards:** The Bill is not retrospective; polygamous marriages solemnized before the Act comes into force remain valid if they complied with existing personal laws.

11. India AI Governance Guidelines: A Balanced Framework

Context: The Ministry of Electronics and Information Technology (MeitY) has released the India AI Governance Guidelines, outlining a strategic roadmap for the development and regulation of Artificial Intelligence in the country.

Nature and Objective

- **Approach:** The framework adopts a "hands-off" regulatory approach, prioritizing responsible innovation and growth over rigid, stringent controls.
- **Goal:** It aims to foster a safe, trusted, and inclusive AI ecosystem, advancing the vision of "AI for All". The focus is on balancing innovation with ethical use, accountability, and user safety.
- **Legal Status:** These guidelines are distinct from the draft amendments to the IT Rules, 2021 (which focus on deepfakes and labelling). Notably, the government has stated there are no

immediate plans for a standalone AI law; instead, existing laws will be amended as needed to address emerging challenges.

Six Pillars of AI Governance To operationalize this vision, the guidelines propose six core pillars:

Foundations of AI Governance

Institutions
Establishing specialized bodies for oversight

Infrastructure
Strengthening digital infrastructure for AI adoption

Accountability
Ensuring transparency and ethical conduct

Capacity Building
Initiatives for skilling and training in AI

Risk Mitigation
Developing risk assessment frameworks

Policy & Regulation
Adaptive governance models for AI

- **Infrastructure:** Strengthening digital infrastructure and leveraging India's Digital Public Infrastructure (DPI) to ensure scalable and inclusive AI adoption.
- **Capacity Building:** Launching initiatives for skilling and training to build a future-ready AI workforce in India.
- **Policy & Regulation:** promoting adaptive and flexible governance models rather than static, restrictive laws.
- **Risk Mitigation:** Developing robust risk assessment frameworks tailored to India's unique socio-economic and technological context.
- **Accountability:** Ensuring transparency across the entire AI value chain, holding developers, deployers, and users responsible for ethical conduct.
- **Institutions:** Establishing specialized bodies for oversight and safety:
  - ✓ AI Governance Group (AIGG): An apex body for high-level policy coordination.
  - ✓ Technology & Policy Expert Committee (TPEC): To provide technical and legal advice to the AIGG.
  - ✓ AI Safety Institute (AISI): Dedicated to conducting safety testing, risk analysis, and fostering global collaboration on AI safety.

12. Challenges and Reforms in India's Lower Judiciary

Context: A recent Constitution Bench of the Supreme Court highlighted that stagnation in the subordinate judiciary is a significant factor contributing to prolonged litigation and the massive backlog of cases in Indian courts.

Structure of the Lower Judiciary Governed by Articles 233 to 237 of the Constitution, the subordinate judiciary operates under a hierarchy that varies by state.

- **District Judges:** Appointed by the Governor in consultation with the High Court, holding both appellate and original jurisdiction.
- **Other Appointments:** Made by the Governor based on rules framed with the State Public Service Commission and High Court.

- **Tiers:** Typically includes District and Sessions Courts at the top, followed by Subordinate Judges/Chief Judicial Magistrates, and Munsif/Judicial Magistrate courts at the bottom.

Reasons for Pendency

- **Judge Shortage:** High vacancy rates and a low judge-to-population ratio (21 per million vs. the recommended 50) hamper efficiency.
- **Inefficient Management:** Frequent adjournments often violate the "three-adjournment rule," and judges spend valuable time on administrative tasks like "call work".
- **Infrastructure Deficit**: There are fewer court halls (20,143) than the sanctioned strength of judges (24,280), with many lacking basic digital facilities or even separate toilets for women.
- **Procedural Delays:** Poor police investigations, delayed charge sheets, and archaic procedural laws (e.g., complex execution rules) prolong trials.

Impact of Pendency: The backlog of 4.7 crore cases in district courts denies timely justice, violating the principle "justice delayed is justice denied". It imposes severe economic costs (over 2% of GDP) and results in human rights violations, with undertrials forming over 70% of the prison population.

Way Forward

- **Recruitment:** Fast-track recruitment to fill vacancies and consider establishing an All India Judicial Service (AIJS) under Article 312.
- **Administrative Reform:** Create dedicated "administrative courts" to handle clerical tasks, allowing judges to focus on hearings.
- **Technology & Infrastructure:** Expand e-Courts and modernize infrastructure to speed up proceedings.
- **ADR Mechanisms:** Strengthen Lok Adalats and mediation to resolve disputes pre-litigation.

13. Supreme Court Directives on Stray Dog Management

Context: The Supreme Court of India has issued urgent directions to all States and Union Territories to address the escalating stray dog crisis. The Court mandated the immediate removal of stray dogs from public institutions such as schools, hospitals, and transit hubs, ordering their relocation to shelters after necessary medical procedures.

Key Highlights of the Order

- **Removal and Relocation:** Local authorities must remove stray dogs "forthwith" from sensitive public premises. Captured dogs must be sterilized and vaccinated in compliance with the Animal Birth Control (ABC) Rules, 2023 before being permanently relocated to shelters, prohibiting their release back into the same locality.
- **Infrastructure Mandates:** Public institutions are directed to install fencing, boundary walls, and gates to prevent the future ingress of stray animals.
- **Standard Operating Procedures (SOPs):** The Animal Welfare Board of India (AWBI) is tasked with drafting uniform SOPs for dog-bite prevention and stray management nationwide.
- **Cattle Removal:** The Court also directed the removal of cattle and stray animals from highways and public roads to ensure safety.

Judicial Evolution & Constitutional Basis: The ruling marks a shift from earlier directives that emphasized the "release back" policy under the Catch-Neuter-Vaccinate-Release (CNVR) model. While balancing public safety with animal welfare, the judgment invokes:

- **Article 21:** Ensuring the right to life and safety for citizens.
- **Article 51A(g):** Upholding the fundamental duty of compassion for living creatures.
- **Parens Patriae:** The doctrine whereby the State acts as a guardian for those unable to protect themselves, extending to animal welfare jurisprudence.

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Way Forward: Effective management requires strengthening the implementation of ABC programmes, which currently suffer from funding and infrastructure deficits. The Court emphasizes scientific population control, proper waste management to eliminate food sources, and community awareness to balance human safety with ethical treatment of animals.

INTERNATIONAL RELATIONS

1. BRICS Pay: An Alternative to SWIFT

Context: BRICS nations are advancing plans to operationalise BRICS Pay, a cross-border payment system designed to facilitate settlements in local currencies and reduce dependence on the U.S.-controlled SWIFT network.

Evolution of the Initiative: The vision began at the 2014 Fortaleza Summit, leading to the creation of the New Development Bank (NDB) and the Contingent Reserve Arrangement (CRA). The push for financial autonomy accelerated following Western sanctions on Russia, culminating in the formation of the BRICS Payments Task Force (BPTF) in the 2020s.

About BRICS Pay

- Mechanism: It is a decentralized system aimed at settling cross-border transactions in local currencies.
- Interoperability: The platform connects existing national payment infrastructures, such as India's Unified Payments Interface (UPI), China's CIPS, Russia's SPFS, and Brazil's Pix.
- Technology: It utilizes a Decentralised Messaging System (DCMS) to offer a secure alternative to SWIFT's centralized model, minimizing single-point failures.

Significance
- Financial Sovereignty: It reduces reliance on the U.S. dollar and lowers the burden on foreign exchange reserves for trade settlements.
- Sanction Immunity: The system provides a secure payment route for nations facing U.S.-led financial restrictions.
- South-South Cooperation: It strengthens economic integration within the Global South by promoting trade in regional currencies.

2. 20th G20 Summit 2025: A Global South Milestone

Context: The 20th G20 Summit was recently convened in Johannesburg, South Africa, marking a historic moment as the first-ever G20 summit hosted by an African nation. Held from November 22-23, 2025, under the theme "Solidarity, Equality, Sustainability," the summit prioritized the developmental aspirations of the Global South.

Members of G 20
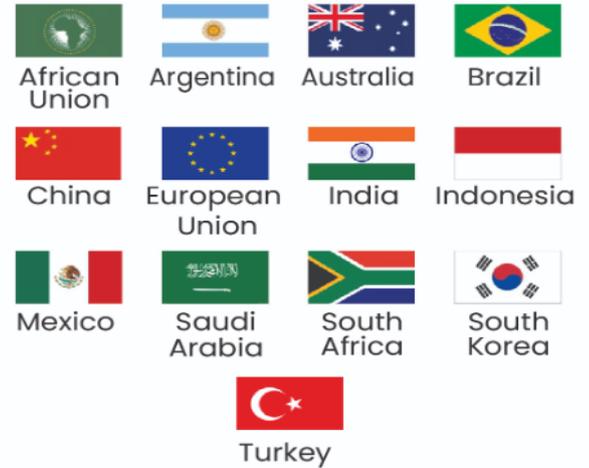
Key Outcomes of the Johannesburg Declaration: The Leaders' Declaration reflected a strong consensus on inclusive multilateralism:

- Geopolitical Reforms: The summit issued a clarion call for the transformative reform of global institutions, particularly the UN Security Council (UNSC), to ensure equitable representation for Africa, Latin America, and Asia-Pacific. It also emphasized the African philosophy of Ubuntu ("I am because we are").
- Climate Action: Leaders committed to tripling global renewable energy capacity and doubling energy efficiency rates. A significant focus was placed on climate adaptation, pledging universal early warning system coverage by 2027.
- Debt Sustainability: The summit prioritized debt relief mechanisms for low-income countries, exploring innovative tools like debt-for-climate swaps.
- Technology & Inclusivity: It recognized the strategic value of Critical Minerals for green transitions, advocating for local industrialization in resource-rich nations.

India's Role and Contribution India championed the philosophy of "Integral Humanism," advocating for a balance between economic progress and ecological integrity.

- Technology Vision: India proposed a "Human-Centric" approach to AI and digital infrastructure, ensuring open-source benefits reach the widest population.
- Bilateral Engagements: India launched the India-Italy Joint Initiative to Counter Terror Financing and announced a trilateral technology partnership with Australia and Canada (ACITI).

3. **India-Bhutan Relations: Strengthening the Himalayan Partnership**
   Context: The Prime Minister of India recently concluded a state visit to Bhutan, coinciding with the 70th birth anniversary of the Fourth King, Jigme Singye Wangchuck. The visit reinforced the unique "Bharat-Bhutan" partnership, focusing on infrastructure, energy, and digital integration.
   Key Highlights of the Visit

Visit Highlights

- Hydropower: Inauguration of the 1,020 MW Punatsangchhu-II Hydroelectric Project, a flagship initiative built with Indian support.
- Connectivity: Announcement of new cross-border rail links (Gelephu-Kokrajhar and Samtse-Banarhat) and the operationalisation of the Darranga Immigration Check Post. India also pledged support for the Gelephu Mindfulness City project.
- Digital Integration: Launch of UPI Phase II, allowing Bhutanese visitors to use local apps in India, deepening financial integration.
- Cultural Ties: India allocated land in Varanasi for a Bhutanese temple and guest house, reinforcing spiritual kinship.
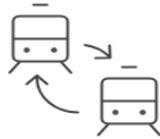
Historical Background: Relations are anchored in the 1949 Treaty of Friendship, updated in 2007 to reflect a partnership of equals. Hydropower has traditionally been the bedrock of economic ties, turning Bhutan's rivers into a sustainable revenue source.

Challenges

- China Factor: Bhutan's ongoing boundary negotiations with China, particularly regarding the Doklam Plateau, pose strategic concerns for India's Siliguri Corridor ("Chicken's Neck").
- Trade Imbalance: Bhutan faces a persistent trade deficit with India and is seeking economic diversification beyond hydropower to address youth unemployment.
- BBIN Motor Vehicle Agreement: Bhutan has withheld ratification due to environmental concerns, aligning with its Gross National Happiness philosophy.

Way Forward To sustain this "model partnership," India must:

- Recalibrate Hydropower: Shift from donor-recipient models to joint ventures with equitable cost-sharing.
- Strategic Coordination: Maintain close consultation on border security and China-related developments while respecting Bhutan's sovereignty.
- Diversify Cooperation: Focus on new areas like space technology, education (STEM), and digital public infrastructure to support Bhutan's economic aspirations.

4. India-Israel Relations

Context: Recently, Israel's Foreign Minister Gideon Sa'ar visited India and held discussions with External Affairs Minister S. Jaishankar. The dialogue focused on intensifying counter-terror cooperation, supporting the Gaza peace plan, and expanding ties in technology, infrastructure, and connectivity initiatives like the India–Middle East–Europe Economic Corridor (IMEC).

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Historical Background: India's relationship with Israel has evolved significantly. While India opposed the partition of Palestine in 1947, it recognized Israel in 1950. Full diplomatic relations were established in 1992. A major shift occurred in 2017 with the first-ever visit by an Indian Prime Minister to Israel, de-hyphenating India's relations with Israel and Palestine.

Key Areas of Cooperation

- **Defence & Security:** Israel is a top arms supplier to India, with imports worth $2.9 billion over the last decade, including radars and drones. Both nations collaborate closely on counter-terrorism.
- **Agriculture & Water:** Cooperation extends to water management and agriculture, leveraging Israeli expertise in arid farming.
- **Technology & Innovation:** The I4F Fund promotes joint industrial R&D. Cooperation has expanded to semiconductors and cybersecurity.
- **Multilateral Platforms:** Engagement through the I2U2 group (India, Israel, UAE, USA) and IMEC highlights shared regional strategic interests.

Challenges

- Regional Balancing: India faces the diplomatic tightrope of maintaining strong ties with Israel while preserving strategic interests with Arab nations and Iran (crucial for energy and connectivity via Chabahar).
- Geopolitical Conflicts: The Israel-Hamas conflict forces India to adopt a nuanced stance, supporting counter-terrorism while advocating for regional stability and the two-state solution.
- China Factor: Israel's strong tech and trade ties with China complicate security cooperation with India.

Way Forward: To deepen this strategic partnership, India must move from a buyer-seller defence relationship to co-development under 'Make in India'. Institutionalizing counter-terror frameworks and finalizing a Free Trade Agreement (FTA) are vital. Simultaneously, utilizing platforms like I2U2 can help India balance its interests across West Asia while fostering regional connectivity and innovation

5. **32nd Asia-Pacific Economic Cooperation (APEC) Summit**

   Context: The 32nd Asia-Pacific Economic Cooperation (APEC) Summit was recently convened in Gyeongju, South Korea. A significant highlight of the event was the pledge by Chinese President Xi Jinping to uphold global free trade and strengthen multilateral cooperation amidst evolving geopolitical dynamics.

   Key Highlights of the APEC 2025 Summit

   - Host & Theme: Hosted by South Korea in the city of Gyeongju, the summit was anchored on the theme "Building a Sustainable Tomorrow: Connect, Innovate, Prosper," emphasizing the need for interconnected growth.
   - Focus Areas: Leaders from the 21 Asia-Pacific Rim economies deliberated on critical issues, including:
   - Economic Integration: Strengthening regional trade and ensuring supply chain resilience.
   - Technology: Enhancing cooperation in Artificial Intelligence (AI) governance and development.
   - Demography: Addressing the economic implications of ageing populations.
   - Sustainability: Promoting green growth strategies to ensure a sustainable future.

   About Asia-Pacific Economic Cooperation (APEC)

- Establishment: Founded in 1989, APEC is a premier regional economic forum designed to promote free trade, regional economic integration, and sustainable growth across the Asia-Pacific region.
- Nature: Unlike treaty-based organizations (e.g., WTO), APEC operates as a non-binding forum where decisions are reached by consensus, and commitments are undertaken on a voluntary basis.
- Secretariat: Located in Singapore.
- Membership: It comprises 21 member economies, including major global powers like the U.S., China, Russia, Japan, Australia, Canada, and Indonesia.
- India's Status: India is currently an Observer and is not a full member of the grouping.

6. India-US 10-Year Defence Partnership Framework (2025–2035)

Context: India and the United States recently signed a new 10-year Framework for the Major Defence Partnership (2025–2035). The agreement was finalized on the sidelines of the 12th ASEAN Defence Ministers' Meeting-Plus (ADMM-Plus) in Kuala Lumpur, Malaysia, succeeding the previous 2015–2025 framework.

Key Features of the Framework

- Strategic Alignment: It establishes a unified policy roadmap for the next decade, focusing on production, logistics, and innovation. It also aligns with multilateral objectives of the Quad, ASEAN, and IORA to ensure a rules-based maritime order in the Indo-Pacific.
- Industrial Collaboration: A core pillar is the co-production of advanced platforms under 'Make in India', guided by the 2023 Defence Industrial Cooperation Roadmap. This includes technology transfer for jet engines, drones, and space systems.
- MRO Hub: The framework aims to position India as a regional Maintenance, Repair, and Overhaul (MRO) hub for US-origin assets, enhancing logistical efficiency.
- Emerging Domains: Cooperation extends to cyber, space, and autonomous warfare. Initiatives like INDUS-X and the Autonomous Systems Industry Alliance (ASIA, 2025) facilitate industry-to-industry collaboration in high-tech defence sectors.

Significance for India

- Strategic Autonomy: The partnership supports India's policy of diversifying weapon sources beyond Russia. The US's pragmatic stance on CAATSA regarding India's S-400 acquisition reflects an acknowledgment of India's strategic autonomy.
- Capacity Building: Access to high-end technology and integration into global supply chains boosts indigenous defence manufacturing. Agreements like BECA and LEMOA enhance India's role as a net security provider in the Indian Ocean Region.

Challenges

- Technology Transfer: Intellectual property barriers and export control regimes remain potential hurdles.
- Geopolitical Balancing: India must navigate this deepening partnership carefully to manage sensitivities with Russia and China.

Way Forward: To maximize this partnership, both nations must focus on building supply-chain resilience and operationalizing INDUS-X to shift from government-led to industry-led innovation. Sustained bipartisan support is crucial for long-term stability.

7. Gavi–UNICEF Agreement: Boosting Malaria Vaccine Access

Context: Gavi, the Vaccine Alliance, and UNICEF have signed a landmark procurement agreement to enhance the affordability and availability of the R21/Matrix-M malaria vaccine. This initiative aims to scale up access in malaria-endemic regions, particularly in Africa.

About R21/Matrix-M Vaccine

- Development: It is a next-generation malaria vaccine developed by the University of Oxford in collaboration with the Serum Institute of India (SII).
- Status: In October 2023, the World Health Organization (WHO) recommended the R21/Matrix-M for widespread use. It became the second WHO-approved malaria vaccine, following the RTS,S vaccine.

About Gavi (Global Alliance for Vaccines and Immunization)

- Establishment: Gavi is a public-private global health partnership launched in 2000 at the World Economic Forum in Davos.
- Headquarters: Geneva, Switzerland.
- Mandate: Its primary mission is to save lives and reduce disease burden by improving access to new and underused vaccines in low- and middle-income countries. It focuses on strengthening health systems, cold-chain infrastructure, and ensuring equitable vaccine distribution.
- Stakeholders: The alliance brings together governments (donor and recipient), international organizations like WHO, UNICEF, and the World Bank, the Bill & Melinda Gates Foundation, vaccine manufacturers, and civil society.

India's Role in Gavi

- Transition: India graduated from Gavi's support framework in 2017, transitioning from a beneficiary to a strategic partner.
- Contributor: Today, India has emerged as a key global vaccine supplier and donor. As part of its commitment to global immunization, India pledged $10 million during the previous funding cycle.

Significance: This agreement marks a critical step in the global fight against malaria, leveraging India's manufacturing prowess (via SII) to deliver life-saving interventions to the most vulnerable populations.

8. **UN-Backed Gaza Peace Plan**

Context: In a significant geopolitical development, the UN Security Council has adopted a 20-point Gaza Peace Plan proposed by US President Donald Trump. The plan aims to establish long-term stability and reconstruction in the war-torn region.

Key Features of the Plan

INDIA WELCOMES THE US'S PLAN FOR GAZA PEACE

Key Provisions of the Peace Plan

- Gaza to become a deradicalised, terror-free zone without threats to its neighbours
- Immediate ceasefire and suspension of all military operations
- Hostage (living or dead) release within 72 hours of Israel's acceptance
- An interfaith dialogue will be launched to promote tolerance and reconciliation
- Creation of a special economic zone, an international investment drive, and job creation

- Oversight Mechanism: A "Board of Peace" chaired by Donald Trump will serve as the central coordinating body. Its mandate is to supervise Gaza's economic recovery and reconstruction efforts.
- **Security Architecture (ISF):**
  - ✓ International Stabilization Force (ISF): The plan proposes the deployment of an ISF to manage internal security.
  - ✓ Objectives: The ISF is tasked with preventing the inflow of munitions, securing the movement of humanitarian aid, and creating stable conditions for rebuilding.
  - ✓ Command Structure: Notably, the ISF will operate under the supervision of the Trump-led Board rather than direct UN command, though it will report to the UNSC.
- Transitional Governance: A Technocratic Palestinian Committee will be established to manage day-to-day administration, municipal functions, and public services during the transition phase, ensuring an apolitical approach to governance.
- Political Pathway: The plan outlines a conditional pathway to Palestinian statehood. It posits that self-determination will be considered once the Palestinian Authority undergoes reform and reconstruction efforts stabilize the region.
- Economic Framework: Reconstruction will be financed through a World Bank-backed trust fund, ensuring multilateral funding flows are monitored and transparent.
- Hostage & Prisoner Swap: The agreement includes provisions for Hamas to release hostages in exchange for Israel releasing 250 life-sentence prisoners and 1,700 detainees, including women and children.

9. **India-Bangladesh Extradition Treaty**
   Context: The interim government of Bangladesh has officially requested India to extradite former Prime Minister Sheikh Hasina, terming it a "treaty obligation." This move has brought the 2013 India-Bangladesh Extradition Treaty into sharp focus.
   About the Treaty: Signed in January 2013, this bilateral agreement aims to strengthen cooperation in criminal justice, counter-terrorism, and border security. It provides a legal framework for handing over individuals wanted for serious crimes who are found in each other's territory.
   Key Principles & Provisions
- Principle of Dual Criminality: Extradition is applicable only for offences that are punishable under the laws of both countries with imprisonment of at least one year.
- Scope of Offences: It covers serious crimes such as terrorism, organized crime, murder, kidnapping, and economic offences. Liability extends to attempts, abetment, and conspiracy.
- **The "Political Offence" Exception:**
  - ✓ General Rule: Individuals cannot be extradited for offences deemed "political" in nature.
  - ✓ Crucial Exclusion: To prevent misuse, the treaty explicitly excludes heinous crimes like murder, manslaughter, bombings, and terrorism from the definition of a political offence. This implies that even politically motivated violence may not grant immunity from extradition.
- Safeguards Against Persecution: Extradition can be refused if there are substantial grounds to believe the request is made to persecute a person based on race, religion, nationality, or political opinion.
- Rule of Speciality: An extradited individual can be tried only for the specific offence for which they were surrendered, ensuring they are not prosecuted for other prior acts.

10. Major Non-NATO Ally (MNNA) Status

Context: The United States has officially designated Saudi Arabia as a Major Non-NATO Ally (MNNA). This move significantly upgrades the defence cooperation between the two nations, signaling a deepening of strategic ties in the Middle East.

About Major Non-NATO Ally (MNNA) Status

- Definition: MNNA is a designation given by the U.S. government to close allies that have strategic working relationships with the U.S. Armed Forces but are not members of the North Atlantic Treaty Organization (NATO).
- Benefits: While it does not offer a mutual defence guarantee (unlike NATO membership), it provides significant military and financial advantages:
  - ✓ Priority delivery of defence articles and surplus war reserves.
  - ✓ Participation in joint counter-terrorism exercises and cooperative research and development projects.
  - ✓ Eligibility for loans of material, supplies, and equipment for cooperative research, development, testing, or evaluation purposes.
- Origin: The status was first created in 1987 through the Sam Nunn Amendment to the U.S. Foreign Assistance Act.
- Current Allies With the inclusion of Saudi Arabia in 2025, there are now 21 countries designated as MNNAs. These include major partners such as Australia, Israel, Japan, South Korea, Pakistan, and Taiwan (de facto).

India's Status

- Not an MNNA: India is not designated as a Major Non-NATO Ally.
- Unique Partnership: Instead, India holds the unique status of a "Major Defence Partner" (MDP), granted in 2016. This designation was created specifically for India to elevate its status to that of the U.S.'s closest allies for the purpose of technology transfer and defence trade, without the formal alliance structure of MNNA.

11. Kazakhstan Joins Abraham Accords

Context: In a significant diplomatic development, Kazakhstan has become the first nation from the C5 Central Asian grouping to officially join the Abraham Accords. This move marks a pivotal expansion of the accords beyond the Middle East and North Africa, signaling changing geopolitical dynamics in Central Asia.

About the Abraham Accords

- Definition: The Abraham Accords are a series of joint normalization statements and agreements between Israel and several Arab or Muslim-majority nations.

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- Objective: The initiative, brokered by the United States, aims to normalize diplomatic relations, promote peace, and foster regional stability in West Asia and beyond.
- Origin & Evolution: Launched in 2020, the accords sought to reshape West Asian diplomacy by encouraging open cooperation with Israel, moving past decades of non-recognition.
- Key Parties: The initial wave of signatories included the United Arab Emirates (UAE) and Bahrain, followed by Sudan and Morocco. Kazakhstan's entry represents a widening of this diplomatic circle into the strategic heart of Asia.

Understanding the C5 Central Asian Nations

- Composition: The "C5" refers to the five Central Asian states: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan.
- Historical Context: All five nations are former Soviet republics that gained independence following the dissolution of the Soviet Union.
- Strategic Importance: Geographically, these countries occupy a critical position, sandwiched between major global powers—Russia to the north and China to the east—while also bordering South Asia. This location makes them vital for energy transit, trade routes, and regional security architecture.

12. Bangladesh Accedes to UN Water Convention

Context: In a significant development for regional water governance, Bangladesh has become the first South Asian country to officially accede to the UN Water Convention (2025). This move highlights the growing importance of international legal frameworks in managing shared water resources in climate-vulnerable regions.

About the UN Water Convention

- Formal Title: The treaty is formally known as the Convention on the Protection and Use of Transboundary Watercourses and International Lakes.
- Origins: It was adopted in Helsinki in 1992 and officially entered into force in 1996.
- Secretariat: The convention operates under the aegis of the United Nations Economic Commission for Europe (UNECE).
- Evolution from Regional to Global: Originally, the framework was designed as a regional organization for Europe and Central Asia. However, following a crucial amendment in 2013, it was opened to all UN Member States globally in 2016.

Key Mandate: The Convention serves as a unique global legal and intergovernmental framework. It aims to ensure the sustainable use of transboundary water resources by facilitating cooperation between countries. It obliges parties to prevent, control, and reduce water impacts across boundaries, which is vital for regions facing water stress and climate change challenges.

India's Position

- Status: India is not a signatory to the UN Water Convention.
- Implication: While neighbors like Bangladesh are joining global frameworks to manage transboundary rivers (of which India and Bangladesh share 54), India currently relies on bilateral treaties (like the Ganges Water Treaty) rather than multilateral conventions for its transboundary water management.

ECONOMIC SCENARIO

1. India's Green Hydrogen Production Potential

Context: The Union Minister of State for Science and Technology recently addressed the 3rd International Conference on Green Hydrogen (ICGH–2025) at Bharat Mandapam, New Delhi. The

event highlighted India's ambitious roadmap to become a global leader in the green hydrogen ecosystem.

Key Initiatives Announced

- Hydrogen Valley Innovation Clusters (HVICs): Four distinct Hydrogen Valleys are being developed across the country. These clusters aim to demonstrate the complete hydrogen value chain—from production and storage to transport and end-use utilization—creating integrated ecosystems.
- R&D Boost: A major structural shift is being driven by the ₹1 Lakh Crore Research, Development & Innovation (RDI) Scheme, launched in November 2025, to fund high-impact research.
- Institutional Support: The Anusandhan National Research Foundation (ANRF), a statutory body under the ANRF Act, 2023, was highlighted as a landmark reform to integrate scientific research with industrial application.
- MAHA-EV Mission: The Mission for Advancement in High-Impact Areas – Electric Vehicle (MAHA-EV) focuses on indigenous development of fuel cells, EV components, and scalable hydrogen refuelling infrastructure to reinforce Atmanirbhar Bharat in green mobility.
- Mission Innovation 2.0: Coined by PM Narendra Modi, this initiative aims to reduce the cost of clean hydrogen to USD 2 per kilogram and replicate the Hydrogen Valley model globally by 2030.

About Green Hydrogen

- Definition: Green hydrogen is produced using renewable energy (solar, wind) via electrolysis, splitting water into hydrogen and oxygen. It is classified as "green" if total emissions are ≤ 2 kg of CO_2 equivalent per kg of Hydrogen.
- Production: The process relies on electrolyzers powered by renewable energy. It is water-intensive, requiring approximately nine tons of water to produce one ton of hydrogen.

2. **India's Leap in Research and Innovation**

   Context: The Union Government recently launched the Research, Development, and Innovation (RDI) Scheme during the Emerging Science, Technology and Innovation Conclave (ESTIC) 2025 in New Delhi. The event, themed "Viksit Bharat 2047," underscores India's commitment to pioneering sustainable innovation.

   Institutional and Policy Framework: To strengthen the R&D ecosystem, India has introduced several transformative measures:

   - Anusandhan National Research Foundation (ANRF): Established under the 2023 Act, it provides strategic direction and aims to mobilize ₹50,000 crore (2023–28) to foster high-impact research and academia-industry linkages.

- Sectoral Policies:
  - ✓ National Geospatial Policy, 2022: Liberalizes access to geospatial data to make India a global leader by 2035.
  - ✓ Indian Space Policy, 2023: Encourages private participation through IN-SPACe.
  - ✓ BioE3 Policy, 2024: Focuses on biotechnology for the economy, environment, and employment.
- Missions & Schemes: The Atal Innovation Mission (AIM) 2.0 fosters entrepreneurship, while schemes like FIST, SATHI, and Vigyan Dhara strengthen infrastructure and capacity building in scientific institutions.

Key Challenges Despite these efforts, the ecosystem faces structural hurdles:
- Low R&D Intensity: India's Gross Expenditure on R&D (GERD) remains stagnant at 0.6-0.7% of GDP, far below the global average of 2-3%.
- Private Sector Deficit: The private sector contributes only 36% to R&D, compared to over 70% in developed nations.
- Talent & Infrastructure: Issues like "brain drain," lack of operational autonomy in institutions, and fragmented data systems hinder the scalability of innovations.

Way Forward: To achieve the vision of a developed India by 2047:
- Boost Investment: Increase GERD to 2% of GDP through targeted mission budgets and stable grants.
- Private Engagement: Incentivize corporate R&D through tax credits and co-funded challenge grants.
- Global Partnerships: Forge big-science collaborations in emerging fields like AI, Quantum Computing, and 6G to position India as a global research hub.

3. **Rules for Sustainable Harnessing of Fisheries in the EEZ**
   Context: The Union Government has notified new Rules for Sustainable Harnessing of Fisheries in the Exclusive Economic Zone (EEZ). This initiative aligns with the vision of a prosperous Blue Economy and fulfills the Budget 2025-26 commitment to promote sustainable, technology-driven marine fishing.
   Need for the Rules
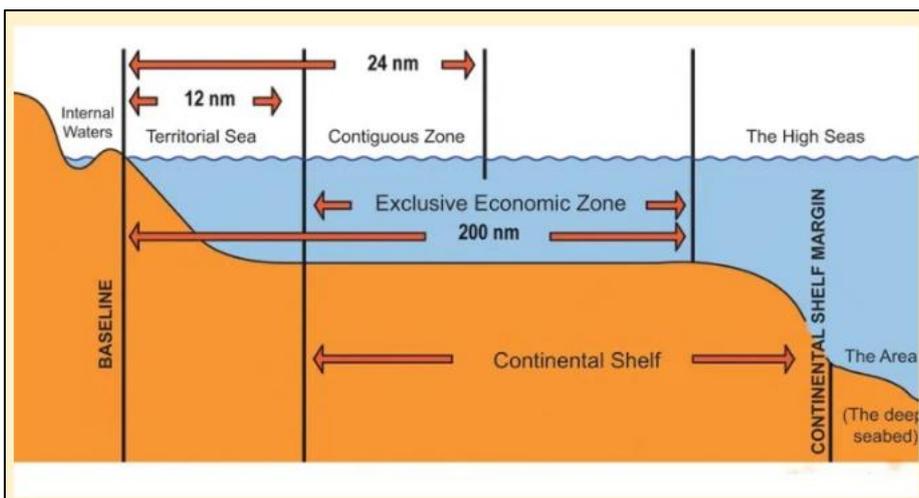
- Underutilized Potential: India's deep-sea resources, particularly tuna, remain largely untapped compared to nations like Sri Lanka and Indonesia which actively fish in the Indian Ocean.
- Capacity Gap: Indian fleets have largely been restricted to nearshore waters. These rules aim to bridge the gap by encouraging deep-sea fishing.

- Strategic Focus: Special emphasis is placed on the Andaman & Nicobar and Lakshadweep Islands, which together constitute 49% of India's EEZ.

Key Features of the Rules

- Empowerment of Cooperatives: Priority is given to Fishermen Cooperative Societies and Fish Farmer Producer Organizations (FFPOs) for deep-sea operations.
- Sustainability Measures:
  - ✓ Ban on Harmful Practices: Techniques like LED light fishing, pair trawling, and bull trawling are prohibited to protect marine ecology.
  - ✓ Mariculture: Promotion of sea-cage farming and seaweed cultivation to reduce pressure on nearshore ecosystems.
- Digital Governance: Integration with the ReALCRaft portal mandates digital "Access Passes" for mechanized vessels, ensuring transparent, paperless operations. Traditional and small-scale fishers with non-motorized crafts are exempted.
- Security & Surveillance: Mandatory QR-coded Aadhaar/Fishers ID cards and transponders for vessels. Real-time tracking is enabled through the Nabhmitra Application.

About ReALCRaft Portal

- A national online platform developed by the Department of Fisheries for the registration and licensing of fishing vessels.
- Vessels registered on this portal are exempted from obtaining separate Access Passes for fishing in the EEZ, promoting ease of doing business.

4. Marine Fisheries Census (MFC) 2025

Context: The Marine Fisheries Census (MFC) 2025 was officially launched on October 31, 2025, by the Union Minister of State for Fisheries at the ICAR-Central Marine Fisheries Research Institute (CMFRI) in Kochi.

About the Census

- Edition & Frequency: This marks the fifth edition of the national marine fisheries census, which has been conducted every 5 years since 2005.
- Slogan: The 2025 census operates under the slogan "Smart Census, Smarter Fisheries".
- Nodal Agency: The census is spearheaded by the ICAR-Central Marine Fisheries Research Institute (CMFRI), Kochi.
- Coverage: It is a massive exercise covering approximately 1.2 million fisher households across 4,000–5,000 marine fishing villages in 13 coastal States and Union Territories, including the Andaman & Nicobar and Lakshadweep islands.
- Unique Features: A Digital Leap MFC 2025 is the first-ever fully digital marine census in India, featuring real-time data flow from the field to central servers.

Technological Integration:

- VYAS App Suite: The census utilizes the VYAS mobile application suite developed by CMFRI for data collection:
  - ✓ VYAS-NAV: For validating fishing villages and landing centers.
  - ✓ VYAS-BHARAT: For enumerating households and infrastructure.
  - ✓ VYAS-SUTRA: For real-time supervision and monitoring.
- Drone Technology: Drones are being deployed for the first time to validate fishing crafts aerially, ensuring neutral verification.
- Geo-tagging: Implementation of geo-tagging and live dashboards enhances data accuracy and transparency.

Data Collection Scope: The census goes beyond simple counting to capture comprehensive socio-economic, infrastructural, and institutional data:

- It records household income, asset ownership, liabilities, credit sources, and insurance coverage.
- It assesses the impact of COVID-19 and the reach of government schemes like PMMSY (Pradhan Mantri Matsya Sampada Yojana) and PM-MKSSY.
- It maps institutional structures like Fish Farmer Producer Organisations (FFPOs) and Self-Help Groups (SHGs).

5. India Skills Report 2026

Context: The India Skills Report (ISR) 2026 has been released, offering comprehensive insights into the nation's employability landscape. The report serves as a critical guide for policymakers, industry leaders, and educational institutions to align workforce planning with market demands.

About the Report

- Launch & Publisher: First launched in 2014, the 2026 edition is published jointly by the Educational Testing Service (ETS) in collaboration with the Confederation of Indian Industry (CII), AICTE, and the Association of Indian Universities (AIU).
- Methodology: The findings are based on over 100,000 candidate assessments conducted through the Global Employability Test (G.E.T.).
- Theme: The 2026 theme focuses on "The Future of Work: Gig Workforce, Freelancing, AI-Supplemented Workforce, Remote Work & Entrepreneurship".

Key Findings

- Rising Employability: India's overall employability has improved to 56.35%, up from 54.81% in 2025. Notably, Tier-2 and Tier-3 cities like Lucknow, Kochi, and Chandigarh are emerging as new employability hubs, helping to narrow the urban-rural divide.
- Historic Gender Shift: For the first time, women's employability (54%) has surpassed that of men (51.5%). This shift is attributed to the rise of hybrid work models and increased digital skilling.
- Hiring Intent: The hiring intent for FY 2026–27 has surged to 40% (up from 29% last year), driven by expansion in technology, BFSI, healthcare, and renewable energy sectors.
- Workforce Composition: While permanent employment remains dominant at 72%, the gig economy is maturing, with gig and third-party roles now constituting 16% of the workforce.

- AI Integration: AI adoption in recruitment has risen sharply, with 70% of IT and 50% of BFSI companies integrating AI into their hiring processes.

State & Domain Performance

- Top States: Uttar Pradesh, Maharashtra, and Karnataka lead in employability, with Kerala ranking fourth nationally.
- Top Domains: Computer Science (80%) and IT engineers remain the most employable candidates, fueled by the demand for AI and analytics roles.

6. Draft Seeds Bill, 2025

Context: The Ministry of Agriculture and Farmers Welfare has released the Draft Seeds Bill, 2025 for public feedback. This legislation aims to overhaul the existing regulatory framework by replacing the Seeds Act, 1966 and the Seeds (Control) Order, 1983, aligning India's seed sector with modern agricultural needs.

Need for the Bill

- Combating Spurious Seeds: In 2024–25, nearly 13% of tested seed samples (32,525 out of 2.53 lakh) were found to be sub-standard. Fake seeds that mimic popular brands lead to germination failure, lower yields, and financial distress for farmers.
- Market Growth: With India's seed market valued at $3.82 billion (2025) and projected to reach $5 billion by 2030, a robust regulatory environment is essential.
- Modernization: This is the third attempt (after 2004 and 2019) to update the 1966 Act, addressing technological advancements and complex market dynamics.

Key Regulatory Provisions

- **Mandatory Registration:**
  - ✓ Dealers: All seed distributors and dealers must obtain a valid registration certificate from the State Government to sell, stock, or export seeds.
  - ✓ Varieties: Under Section 13, no seed variety (except farmers' varieties or export-exclusive seeds) can be sold unless registered under Section 14(2). Varieties notified under the old 1966 Act are deemed registered.
- **Classification of Offences:** The Bill categorizes offences into three tiers: Trivial, Minor, and Major.
- **Penalties & Decriminalisation:**
  - ✓ Minor technical offences are decriminalised to ease the compliance burden on small producers.
  - ✓ Major violations, such as the deliberate manufacture or sale of spurious/unregistered seeds, will attract stringent financial penalties.
  - ✓ Seed Imports: The Central Government retains the power to permit the import of unregistered seeds specifically for research and trial purposes under defined conditions.

7. National Industrial Classification (NIC) 2025

Context: The Ministry of Statistics & Programme Implementation (MoSPI) recently released the National Industrial Classification (NIC) 2025. The framework was unveiled in Udaipur during the dual celebration of World Statistics Day and the 75th anniversary of the National Sample Survey.

About National Industrial Classification (NIC)

- Definition: The NIC is India's official statistical standard used to classify and categorize various economic activities.

- Mandate: Developed and maintained by MoSPI, its primary purpose is to provide a standardized framework for collecting, analyzing, and disseminating economic data. This ensures consistency across national accounts, industry surveys, and government databases.
- Applications: NIC codes are integral to administrative and regulatory processes, including company registration, GST filings, industrial licensing, labour surveys, and the calculation of national income.

Key Features of NIC 2025: The 2025 edition introduces significant updates to reflect the evolving economic landscape:
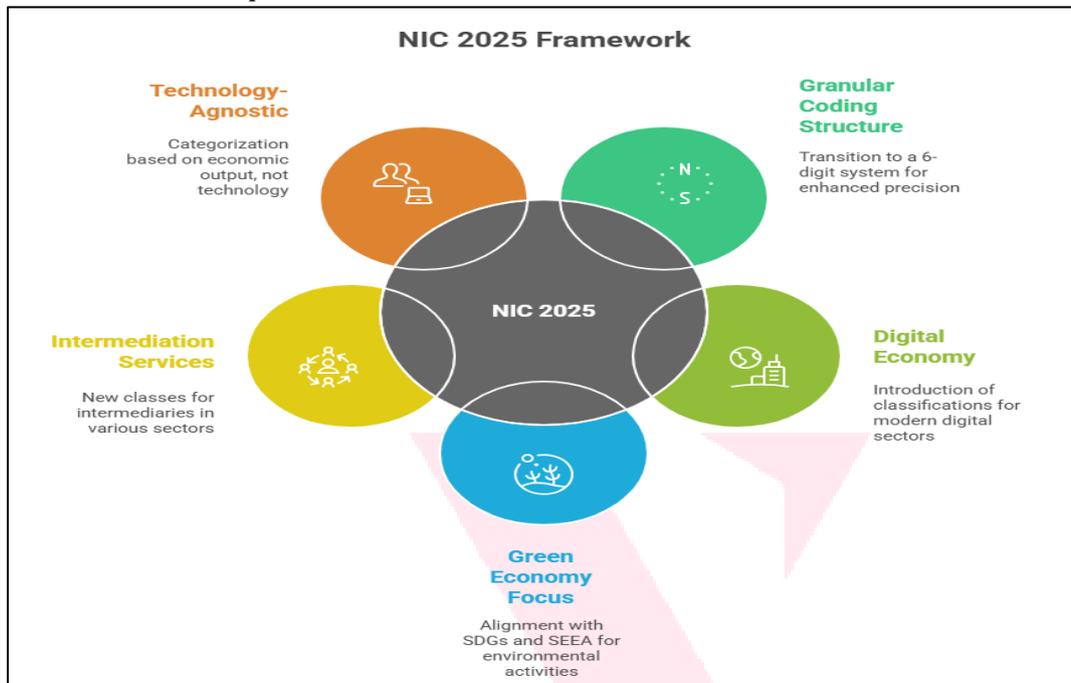
- Granular Coding Structure: It transitions from the previous 5-digit system (NIC-2008) to a new 6-digit coding structure. This expansion allows for greater flexibility and precision in capturing emerging economic activities.
- Digital Economy: Recognizing the digital transformation, NIC 2025 introduces distinct classifications for modern sectors such as cloud infrastructure, blockchain, web search portals, and platform-based services.
- Green Economy Focus: It aligns with Sustainable Development Goals (SDGs) and the SEEA framework (System of Environmental-Economic Accounting) by expanding coverage of activities like carbon capture, waste management, and environmental remediation.
- Intermediation Services: New classes have been added to account for the growing role of intermediaries in sectors like retail, logistics, real estate, and healthcare (specifically Ayush-based services).
- Technology-Agnostic: The classification categorizes activities based on the economic output or activity itself, rather than the specific technology employed to achieve it.

8. **India Re-elected to Codex Executive Committee**
   Context: In a significant development for global food safety governance, India was unanimously re-elected to the Codex Executive Committee during the 48th session of the Codex Alimentarius Commission (CAC48). This re-election underscores India's growing leadership in shaping international food safety and trade standards.
   About Codex Alimentarius Commission (CAC)

- Establishment: The CAC is an international food standards-setting body established jointly by the Food and Agriculture Organization (FAO) and the World Health Organization (WHO) in 1963.
- Mandate: Its primary objective is to develop globally harmonized food safety and quality norms to protect consumer health and ensure fair practices in the food trade.
- Membership: The Commission comprises 189 members, consisting of 188 member countries (including India) and the European Union.
- Headquarters: It is headquartered in Rome, Italy. The Commission's annual sessions alternate between Rome and Geneva.

About the Codex Executive Committee (CCEXEC)

- Role: The Executive Committee functions as the executive arm of the Commission. Its responsibilities include:
- Reviewing standards before they are formally adopted.
- Guiding coordination between various committees.
- Ensuring strategic and scientific coherence across all Codex work.
- Composition: The committee is composed of the Chairperson, Vice-Chairpersons, and regional representatives from designated Codex regions (including Asia), alongside representatives from the FAO and WHO.

9. **World Inequality Database Report**

Context: A recent report by the World Inequality Database (WID), led by Nobel laureate Joseph Stiglitz, has brought to light alarming trends in wealth concentration. The study reveals that India's richest 1% now hold a staggering 62% of the nation's total wealth, underscoring a sharp rise in economic disparity.

About the Report

- Commissioned By: The report was commissioned by the South African Presidency of the G20, signaling a growing recognition of inequality as a central issue for global economic governance.
- Objective: Its primary aim is to highlight global trends in wealth concentration and analyze their broader socio-political and environmental impacts.
- **Key Findings The report presents a stark picture of global and regional inequality:**

The Widening Divide: A Snapshot of Global Wealth Inequality

RICHEST 1% Control 41% of Global Wealth — This illustrates a massive imbalance in worldwide resource distribution.

BOTTOM 50% Receive Only 1% of Global Income — Highlights the extreme gap between the wealthiest and the majority.

A Spotlight on Nations

INDIA'S TOP 1% HOLD 62% OF THE NATION'S WEALTH — This concentration surged significantly between 2000 and 2023.

CHINA'S TOP 1% CONTROL 54% OF ITS WEALTH — Shows a similar trend of high wealth concentration in another major economy.

IN THE U.S., THE TOP 1% EXPANDED THEIR WEALTH SHARE BY 5% — This growth occurred since 1980, showing a long-term trend in developed nations.

- ✓ Global Trends: The world's wealthiest 1% now control 41% of total global wealth. In contrast, the bottom 50% of the population receives only 1% of total income, highlighting a massive imbalance in resource distribution.
- ✓ India's Wealth Concentration: India has witnessed a significant surge in inequality over the last two decades. The wealth share of the top 1% increased to 62% between 2000 and 2023. For comparison, the top 1% in China control 54% of the wealth.
- ✓ Comparative Insight: The trend is not unique to developing nations; the United States has also seen the top 1% expand their wealth share by 5% since 1980.
- **Broader Impact** The report draws a critical link between rising economic inequality and political stability. It notes that increasing disparities correlate with a decline in democratic values and severely limit access to essential services like food and healthcare for billions of people worldwide.
- Recommendations To address this crisis, the report urges G20 nations to spearhead coordinated global efforts to tackle income and wealth disparities, suggesting that international cooperation is essential for meaningful reform.

10. Dumpsite Remediation Accelerator Programme (DRAP)

Context: The Ministry of Housing and Urban Affairs (MoHUA) has launched the Dumpsite Remediation Accelerator Programme (DRAP) as a strategic intervention under the Swachh Bharat Mission-Urban 2.0 (SBM-U 2.0). This initiative aims to fast-track the cleanup of legacy waste dumpsites across urban India.

About the Programme (DRAP)

- Objective: DRAP is a year-long mission designed to accelerate the remediation of dumpsites and reclaim valuable urban land. The ultimate goal is to achieve "Lakshya Zero Dumpsites" by September 2026.
- Target: The programme prioritizes high-impact locations, targeting the remediation of approximately 8.8 crore Metric Tonnes (MT) of legacy waste.
- Legacy Waste: This refers to aged municipal solid waste that has accumulated in landfills or dumpsites over years. It typically consists of a mix of partially or completely decomposed biodegradable waste, plastics, and other inert materials.

Key Features & Support

- Nodal Ministry: The programme is implemented by the Ministry of Housing and Urban Affairs (MoHUA).
- Financial Assistance: To incentivize and support urban local bodies (ULBs) in this resource-intensive task, the Central Government is providing financial support of ₹550 per tonne for the remediation of legacy waste.

Significance: Legacy waste dumpsites pose severe environmental and health hazards, including groundwater contamination, air pollution (from landfill fires), and greenhouse gas emissions. DRAP is a critical step towards achieving the vision of "Garbage Free Cities" and sustainable urban development by transforming these hazardous sites into green zones or utilizing the reclaimed land for developmental projects.

1. 10 Years of the Paris Agreement

Context: A decade has passed since the historic 2015 Paris Agreement. While carbon emissions and climate disasters continue to rise, the accord has successfully catalyzed a global transition toward clean energy, demonstrating that collective action can alter climate outcomes.

Evolution from Kyoto to Paris: The climate governance framework shifted from the Kyoto Protocol (1997), which imposed binding targets on developed nations based on Common but Differentiated Responsibilities (CBDR), to the Paris Agreement (2015). The Paris pact introduced a universal, inclusive framework where all nations commit to voluntary Nationally Determined Contributions (NDCs), though critics argue this diluted historical accountability.

The Paris Agreement: 10 Years of Progress

A decade after the 2015 Paris Agreement, a global transition towards clean energy is underway. The agreement shifted from the Kyoto Protocol's binding targets to a universal framework where all countries set their own climate goals, known as Nationally Determined Contributions (NDCs).
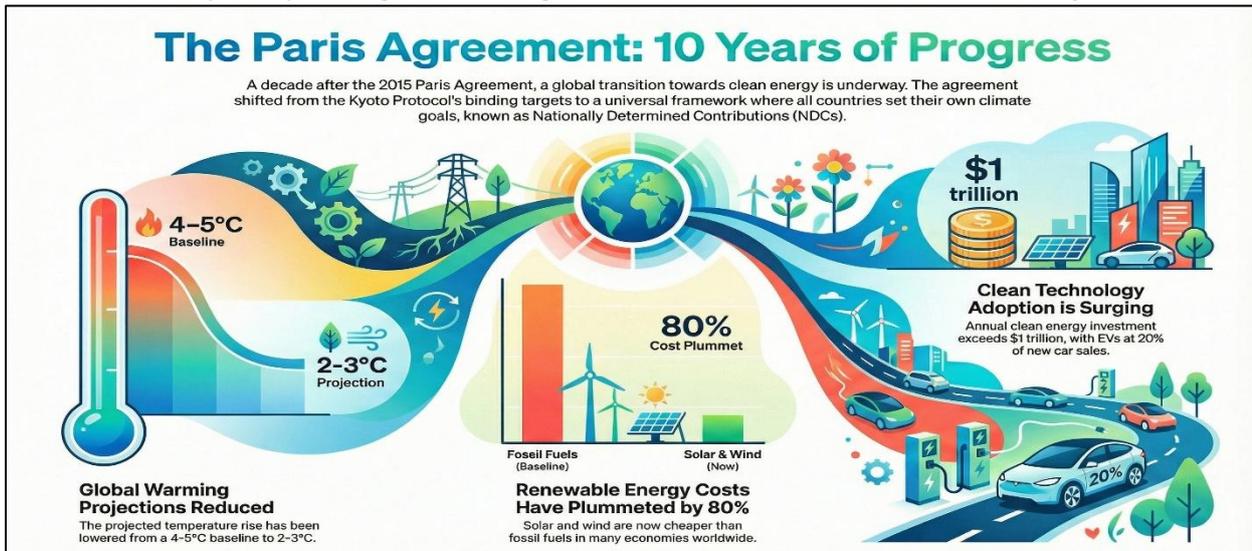
Key Achievements

- Temperature Trajectory: Global warming projections have decreased from 4–5°C (2015 baseline) to approximately 2–3°C, signalling progress.
- Renewable Energy: Solar and wind power costs have plummeted by nearly 80%, making them cheaper than fossil fuels in many economies.
- Net-Zero Momentum: Over 140 countries have now set Net-Zero targets.
- Clean Tech: Electric Vehicles (EVs) comprise nearly 20% of global new car sales, and annual clean energy investments have surpassed $1 trillion.

Persistent Challenges

- Emissions Gap: The world remains on a 2.7°C trajectory, missing the 1.5°C target, with implementation lagging behind pledges.
- Finance Deficit: While developing nations need $6 trillion annually, actual flows are insufficient. The recent Baku Deal (2025) raised the target to only $300 billion from 2035, leaving a massive gap.
- Geo-Economic Frictions: "Green protectionism" measures like the EU's Carbon Border Adjustment Mechanism (CBAM) and the US Inflation Reduction Act create trade barriers for developing nations.

India's Leadership

- Milestones: India achieved 50% non-fossil installed power capacity five years ahead of its 2030 target and has pledged Net Zero by 2070.
- Global Initiatives: India leads institutional efforts through the International Solar Alliance (ISA) and the Coalition for Disaster Resilient Infrastructure (CDRI).

Way Forward: Future climate action must prioritize accessible finance, technology transfer for green hydrogen and carbon capture, and South-South collaboration. Integrating climate resilience into national budgeting is essential to manage the transition equitably.

2. UNFCCC COP30

Context: The 30th Conference of the Parties (COP30) to the UNFCCC concluded in Belém, Brazil, on November 22, 2025. Dubbed the "Implementation COP," the summit shifted focus from making new pledges to operationalizing the Paris Agreement goals, emphasizing multilateralism, people-centric climate action, and implementation.

Key Outcomes

- Belém Political Package: While it stopped short of a fossil fuel phase-out, it mandated a two-year negotiation on climate finance, including Article 9.1 obligations for developed nations. It also emphasized 1.5°C alignment and addressed concerns over trade measures like CBAM.
- Tropical Forests Forever Facility (TFFF): Brazil launched this innovative "payment-for-performance" model to fund tropical forest conservation, aiming to mobilize $125 billion. India joined as an Observer.
- Belém Health Action Plan: Unveiled on Health Day, this is the first global plan targeting climate-health risks, prioritizing resilient health systems and heat preparedness.
- Global Mutirão Decision: Parties committed to mobilizing $1.3 trillion in climate finance annually by 2035 and tripling adaptation finance.
- India's Stance and Initiatives India strongly advocated for climate finance equity, pushing for compliance with Article 9.1 and opposing unilateral trade measures like CBAM. It supported the TFFF and the Belém Health Action Plan, while leveraging its leadership in the Global Biofuels Alliance (GBA) to back sustainable fuel pledges.

Significance & Challenges: Hosting the summit in the Amazon brought critical attention to forest conservation and indigenous rights. However, the conference faced challenges, including weak commitments on fossil fuel phase-outs and persistent gaps in climate finance delivery. The deadlock on trade and transparency tracks highlighted continuing North-South polarization.

Way Forward: To build on COP30, nations must operationalize the New Collective Quantified Goal (NCQG) on finance and establish a just transition framework for fossil fuels. Integrating public health with climate resilience and scaling nature-based solutions like the TFFF will be crucial for equitable global climate governance

3. **Policy Framework for Relocation and Co-existence in Tiger Reserves**
   Context: The Ministry of Tribal Affairs (MoTA) has released a policy brief titled "Reconciling Conservation and Community Rights: A Policy Framework for Relocation and Co-existence in India's Tiger Reserves". This document serves as a guideline for the treatment of forest-dwelling Scheduled Tribes during relocation from tiger reserves.
   Key Features of the Framework
   - Voluntary Relocation: Relocation is designated as a last resort, permissible only when human-wildlife coexistence poses a proven ecological threat. It mandates Free, Prior, and Informed Consent (FPIC) from the Gram Sabha, verified by independent observers.
   - Institutional Mechanisms:
     - ✓ NFCCR: A National Framework for Community-Centred Conservation and Relocation, jointly managed by MoTA and the Ministry of Environment, Forest and Climate Change (MoEFCC), will standardize procedures.
     - ✓ NDCCI: A centralized National Database on Conservation-Community Interface will track relocation details, compensation, and livelihood status to ensure transparency.
   - Grievance Redressal: The framework establishes a three-tier grievance redressal system (District-State-National) and mandates annual independent audits.
   - Co-existence Models: It promotes in-situ development (infrastructure, education) and the inclusion of Gram Sabha members in conservation bodies where relocation is not preferred.
   Impact of Forced Relocation & Challenges
   - Socio-Economic Distress: Forced removals often lead to marginalization, poverty, and wage dependence due to inadequate rehabilitation packages.
   - Rights Violations: Evictions frequently occur without settling rights under the Forest Rights Act (FRA), 2006, a practice flagged by the UN Committee on the Elimination of Racial Discrimination (CERD).
   - Implementation Gaps: Challenges include weak verification of "voluntary" consent, a lack of scientific evidence justifying relocation, and the absence of robust post-relocation monitoring.
   Way Forward: To reconcile conservation with justice, the government must prioritize FRA compliance before initiating any relocation. Decisions should be evidence-based, relying on scientific criteria rather than administrative targets. Promoting in-situ conservation and co-existence models, alongside rigorous transparency through digital databases like NDCCI, is essential to protect both wildlife and community rights.

4. **India's Forest Conservation Efforts**
   Context: To balance economic growth with ecological sustainability, the Union Cabinet has approved the Revised Green India Mission (GIM). This initiative aligns with India's climate pledge (NDC) to create an additional carbon sink of 2.5 to 3 billion tonnes of CO_2 equivalent by 2030, targeting the restoration of 25 million hectares of degraded land.
   About Green India Mission (GIM)
   - Objective: To restore degraded ecosystems, enhance forest quality, and boost carbon sequestration.
   - Funding: The mission leverages funds from the Compensatory Afforestation Fund Management and Planning Authority (CAMPA) and other sources.
   Evolution of Afforestation in India
   - Colonial & Early Post-Independence: Forests were viewed primarily as economic assets for timber.

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- National Forest Policy, 1952: Focus shifted to social forestry and increasing cover for industrial needs.
- National Forest Policy, 1988: A landmark shift towards ecological restoration and community participation, setting a goal of 33% forest cover.
- CAMPA Act, 2016: Established a corpus (approx. ₹95,000 crore) for compensatory afforestation to offset forest land diversion.

Significance of Forests
- Ecological: Forests act as critical carbon sinks, aiding climate mitigation. They ensure water security through groundwater recharge and support biodiversity (e.g., Project Tiger).
- Socio-Economic: Over 250 million people depend on forests for Non-Timber Forest Products (NTFPs). The Forest Rights Act (FRA), 2006 secures tenure for tribal communities.

Key Challenges
- Monoculture: Past efforts often relied on fast-growing species like eucalyptus, which offer limited biodiversity benefits compared to native forests.
- Implementation Gaps: Inconsistent utilization of CAMPA funds and bypassing local stakeholders hinder success.
- Climate Stress: Rising temperatures and wildfires are reducing the photosynthetic efficiency of forests (by 12% as per IIT Kharagpur).

State Best Practices
- Tamil Nadu: Doubled mangrove cover in three years.
- Himachal Pradesh: Biochar programme to generate carbon credits and reduce fire risks.
- Uttar Pradesh: Launched 'Green Chaupal' for community-led plantation drives.

Way Forward: India must shift from monocultures to biodiversity-based restoration using native species. Integrating innovative financing (carbon markets), ensuring community participation, and using technology for real-time monitoring are essential to achieve the vision of a "Green and Viksit Bharat."

5. **NITI Aayog Report**
   Context: NITI Aayog has released a pivotal report titled "Water Budgeting in Aspirational Blocks," aiming to operationalize data-driven water planning at the block level. The initiative introduces the Varuni web platform to help achieve Water Vision@2047 by piloting the framework in 18 diverse Aspirational Blocks across India.

   What is Water Budgeting? Water budgeting is a scientific accounting framework that quantifies all water inflows (supply) and outflows (demand) within a specific geography to assess the water balance.
   - Supply Components: Rainfall, surface water (ponds, tanks), groundwater (IN-GRES data), and inter-basin transfers.
   - Demand Components: Human consumption (55 LPCD rural / 150 LPCD urban), livestock, agriculture (often 70–90% of usage), and industry.

   Key Highlights of the Report
   - The Varuni Platform: A simplified, automated web application that uses publicly available datasets to quantify water gaps. Unlike complex global models relying on satellite data, Varuni is designed for practical, field-level application by local administrators.
   - Diverse Pilot Study: The pilot covered 18 blocks across 8 agro-climatic zones, ranging from the Himalayan cold deserts to the arid regions of Rajasthan and coastal belts, ensuring a comprehensive understanding of regional water stress.

   Systemic Challenges Identified

- Agricultural Dominance: In many blocks (e.g., Gangetic plains), agriculture consumes 80-90% of available water, leaving negligible buffers for domestic or ecological needs.
- Groundwater Dependence: Behavioral over-reliance on groundwater persists even in areas with abundant surface water. For instance, Kukarmunda (Gujarat) relies 96% on groundwater despite having significant dam capacity.

Regional Vulnerabilities:
- Bundelkhand: Faces acute stress due to hard-rock aquifers and low recharge.
- Coastal Blocks: Suffer from salinity intrusion.
- Himalayan Blocks: Vulnerable to drying springs despite apparent surpluses.

Way Forward: Key Action Points To ensure sustainable water security, the report recommends:
- Efficiency: Promoting micro-irrigation and crop diversification in agriculture-heavy blocks.
- Region-Specific Strategies: Implementing spring-shed management (Dhara Vikas model) in the Himalayas and salinity barriers in coastal regions.
- Governance: Institutionalizing community-centric water governance by empowering Gram Panchayats to conduct seasonal water audits and integrating Varuni data into schemes like the Jal Jeevan Mission.

6. Outcomes on the Sidelines of COP30

Context: Several significant initiatives were launched on the sidelines of COP30 in Belém, Brazil, addressing diverse challenges from health and information integrity to finance and ocean conservation.

Major Initiatives Launched
- **Belém Health Action Plan (BHAP)**
  - ✓ Objective: To elevate health as a central pillar of climate adaptation, addressing threats like heatwaves and vector-borne diseases.
  - ✓ Principles: Anchored in health equity and climate justice, it provides a roadmap for nations to build resilient health systems capable of withstanding climate pressures.
- **Declaration on Information Integrity on Climate Change**
  - ✓ Global First: A historic commitment by 12 nations (including Brazil, Canada, and France) to combat climate misinformation and disinformation.
  - ✓ Rationale: Recognizes that accurate, evidence-based information is as critical to climate action as finance or mitigation, especially in the age of deepfakes and greenwashing.
- **India's National Platform for Climate Finance**
  - ✓ India's Stance: India termed COP30 the "COP of Adaptation," urging stronger focus on the Global Goal on Adaptation (GGA).
  - ✓ The Platform: India, alongside 13 other nations, launched a unified "National Platform for Climate and Nature Finance." This mechanism replaces fragmented efforts, streamlining access to global funds (like the Green Climate Fund) to improve coordination and efficiency.
- **Food Waste Breakthrough**
  - ✓ Goal: A UNEP-led initiative to halve global food waste by 2030.
  - ✓ Impact: Targeting food waste is a high-impact strategy, as waste contributes to 10% of global GHG emissions and 14% of methane emissions. It is supported by the Global Environment Facility (GEF).
- **Blue NDC Challenge**
  - ✓ Purpose: Launched by France and Brazil, this initiative urges countries to integrate ocean-based solutions into their Nationally Determined Contributions (NDCs), bridging the gap where oceans were historically underrepresented in climate policy.

- **ISA-SIDS Platform**
  - ✓ Context: A joint initiative by the International Solar Alliance (ISA) and the World Bank.
  - ✓ Function: It serves as a digital-financial ecosystem to accelerate solar adoption in Small Island Developing States (SIDS). By offering aggregated procurement and blended finance, it addresses the unique scale and resource challenges faced by island nations.

7. Gogabeel Lake: India's 94th Ramsar Site

Context: Gogabeel Lake, located in the Katihar district of Bihar, has been officially designated as India's 94th Ramsar Site. With this addition, Bihar now boasts six Ramsar sites. India retains its position as 1st in Asia and 3rd globally (after the UK and Mexico) in terms of the number of designated wetlands, covering a total area of 13.6 lakh hectares.

About Gogabeel Lake

- Geography: It is an oxbow lake situated between the Ganga and Mahananda rivers. Its unique location allows it to connect with these rivers during floods, aiding in natural flood regulation.
- Conservation Status: It holds the distinction of being Bihar's first community reserve. This status highlights a participatory conservation model where the lake is managed jointly by the local community and the Forest Department.
- Ecological Role: The wetland is a thriving ecosystem supporting migratory birds, diverse aquatic flora, and rich fishery resources. It plays a crucial role in maintaining wetland biodiversity.

Socio-Economic Importance:
- It sustains local livelihoods through fishing and the harvesting of reeds.
- The lake contributes significantly to groundwater recharge and acts as a buffer against climate change impacts.
- It holds potential for eco-tourism, benefiting the local economy.

About the Ramsar Convention
- Origin: Adopted on February 2, 1971, in Ramsar, Iran (celebrated annually as World Wetlands Day).
- Mandate: It is an intergovernmental treaty dedicated to the conservation and "wise use" of wetlands.

- India's Participation: India acceded to the convention in 1982. The secretariat is based at the IUCN Headquarters in Gland, Switzerland.
- List of Ramsar Sites in Bihar
  - ✓ Kanwar Lake (Begusarai)
  - ✓ Nagi Lake (Jamui)
  - ✓ Nakti Lake (Jamui)
  - ✓ Gokul Jalashay (Buxar)
  - ✓ Udaipur Jheel (West Champaran)
  - ✓ Gogabeel Lake (Katihar) – Latest addition (2025)

Significance: The designation of Gogabeel Lake underscores the growing recognition of community-led conservation efforts in India and strengthens the national framework for protecting vital wetland ecosystems against degradation.

8. **Uniform Penalty Framework for Van Adhiniyam, 1980**
   Context: The Forest Advisory Committee (FAC), under the Union Environment Ministry, has recommended the implementation of a uniform penalty framework for violations of the Van (Sanrakshan Evam Samvardhan) Adhiniyam, 1980. This move aims to standardize enforcement across states.

   About Van Adhiniyam, 1980
   - Mandate: Formerly known as the Forest Conservation Act, 1980, this legislation regulates the diversion of forest land for non-forestry purposes (e.g., mining, infrastructure, industry).
   - Key Provision: It mandates prior approval from the Central Government for any de-reservation, leasing, or non-forest use of forest areas.
   - Violation: Any activity involving de-reservation or non-forest use without central clearance is treated as a violation.

   Issues with Current Implementation
   - Inconsistency: Due to the absence of standardized guidelines, different states impose varying penalties for similar violations, leading to unequal enforcement.
   - Ambiguity: The coexistence of Penal Compensatory Afforestation and Penal Net Present Value (NPV) created confusion regarding proportional enforcement.
   - Reporting Delays: Lack of clear reporting formats resulted in communication gaps between state authorities and the Ministry.

   Background of the Reform
   - 2017: The Supreme Court directed the introduction of Penal Net Present Value (NPV) for forest violations.
   - 2023: The Van Adhiniyam Rules, 2023 were notified to streamline the approval and penalty mechanisms.

   Key FAC Recommendations
   - Uniformity: Rationalize penalties to ensure proportionality and consistency across all states, preventing arbitrary enforcement.
   - Penal Compensatory Afforestation: Violators should be charged for compensatory afforestation equivalent to the extent of the forest area violated, in addition to other financial penalties.
   - Institutional Mechanism: A dedicated committee of ministry officials has been formed to draft these uniform guidelines and standard reporting formats, ensuring strict adherence to the Supreme Court's directives.

Significance: This framework is crucial for strengthening the deterrence mechanism against illegal forest diversion and ensuring that environmental costs are recovered uniformly across India.

9. **ICAR Study on Soil Organic Carbon (SOC) Degradation**
   Context: A comprehensive study conducted by the Indian Council of Agricultural Research (ICAR) has highlighted a concerning degradation of Soil Organic Carbon (SOC) across India's arable lands. Analyzing 2.54 lakh soil samples from 620 districts between 2017 and 2023, the research underscores the urgent need for soil restoration.

   About Soil Organic Carbon (SOC)
   - Definition: SOC is the carbon component of organic matter in the soil, derived from decomposed plants, roots, and microorganisms.
   - Significance: It serves as the foundation of soil health, influencing fertility, water retention, and microbial activity. Crucially, it acts as a natural carbon sink, helping mitigate climate change by storing carbon dioxide.
   - Impact: High SOC levels improve soil structure, enhance nutrient availability, and reduce erosion. Conversely, its depletion leads to higher micronutrient deficiencies.

   Key Findings of the Study
   - Drivers of Depletion: The primary causes of SOC loss are imbalanced fertilizer use (particularly excessive urea and phosphorus) and climate change (rising temperatures).
   - **Geographical Correlation:**
     - ✓ Elevation & Temperature: SOC is positively correlated with elevation; cooler, high-altitude regions retain more organic carbon. In contrast, hotter regions like Rajasthan and Telangana exhibit lower SOC levels.
     - ✓ Regional Disparities: States with heavy, unbalanced fertilizer use, such as Punjab, Haryana, and Western Uttar Pradesh, show significant SOC decline. Eastern states like Bihar, with relatively balanced usage, maintain better soil status.
   - **Impact of Cropping Systems:**
     - ✓ Rice and pulse-based systems help maintain higher SOC due to better microbial activity.
     - ✓ Wheat and coarse-grain systems contribute less organic matter, reducing SOC over time.

   Agri-Ecological Base' Map: To address these challenges, ICAR scientists have developed an 'Agri-Ecological Base' map. This tool links climate, geography, and cropping patterns to SOC levels, identifying high-risk areas. It is designed to guide policy planning for soil restoration, land degradation assessment, and the development of carbon credit systems.

10. **High Seas Treaty (BBNJ Agreement) to Enters Force in 2026**
    Context: The High Seas Treaty, formally known as the Biodiversity Beyond National Jurisdiction (BBNJ) Agreement, is set to come into force in January 2026. This marks a historic milestone in international maritime law and environmental conservation.
    Background: While the UN Convention on the Law of the Sea (UNCLOS), 1982, defined maritime zones and sovereign rights, it did not adequately address the protection of marine life in international waters. To bridge this gap, negotiations began in 2004, culminating in the treaty's adoption in June 2023 after extensive intergovernmental conferences.
    About the High Seas Treaty
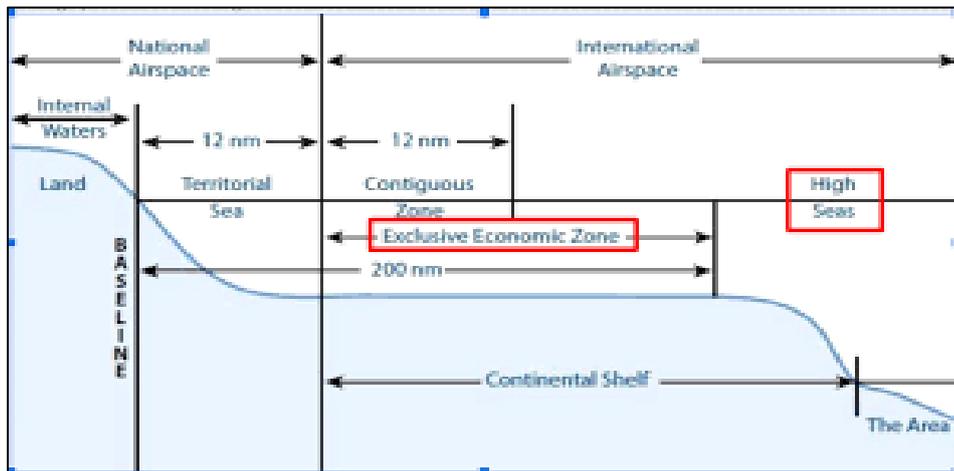
- Purpose: It establishes a comprehensive legal framework for the conservation and sustainable use of marine biodiversity in areas beyond national jurisdiction.
- Legal Status: Operating under UNCLOS, it is the first legally binding international agreement dedicated to safeguarding marine life in the high seas.

What are High Seas?
- These are ocean areas that lie beyond the jurisdiction of any single state, specifically extending past a nation's Exclusive Economic Zone (EEZ) (typically 200 nautical miles from the coast).
- They are governed by principles of freedom of navigation, overflight, and scientific research.

Implementation and Global Status
- Entry into Force: The treaty becomes international law 120 days after at least 60 countries ratify it.
- Current Progress: As of November 1, 2025, 145 countries have signed the treaty, and 75 countries have ratified it, triggering its impending enforcement.
- India's Position: India signed the treaty in 2024, signalling its commitment to marine conservation, but has not yet ratified it.

Significance The treaty is pivotal for regulating activities like deep-sea mining and bioprospecting (marine genetic resources) and is essential for achieving global conservation targets, such as protecting 30% of the world's oceans by 2030.

11. **Global Phase-Out of Mercury-Based Dental Amalgams**
    Context: In a landmark decision at the sixth meeting of the Conference of the Parties to the Minamata Convention on Mercury (COP-6) in Geneva, member countries agreed to a global phase-out of mercury-based dental amalgams by 2034.
    About Dental Amalgams
    - Composition: Dental amalgam is a filling material used for cavities, created by mixing liquid mercury (approximately 50%) with a powdered alloy of metals like silver, tin, and copper.
    - Concerns: While popular for being durable and cost-effective, these fillings release toxic mercury vapors over time, posing health risks to both patients and dental professionals.
    - Alternatives: The shift is towards safer options like Composite Resins (plastic and glass mixtures) and Glass Ionomer Cements (biocompatible, fluoride-releasing materials).

    The Minamata Convention
    - Mandate: Adopted in 2013 and enforced in 2017, the convention aims to protect human health and the environment from anthropogenic emissions of mercury.

- India's Stance: India ratified the convention in 2018. It has agreed to the 2034 phase-out target established by the 2025 amendment, committing to the development of safe, mercury-free dental technologies.

Impact of Mercury Pollution
- Health Risk: The World Health Organization (WHO) classifies mercury as one of the top 10 chemicals of major public health concern.
- Bioaccumulation: Mercury contaminates air, water, and soil, entering the human food chain through bioaccumulation in fish (as methylmercury).
- Minamata Disease: Severe mercury poisoning leads to Minamata disease, characterized by neurological damage, muscle weakness, and loss of peripheral vision.

Significance: This agreement marks a critical step in reducing the global burden of mercury pollution, ensuring a transition to safer healthcare practices while addressing the environmental lifecycle of toxic chemicals.

12. India Drops in Climate Change Performance Index (CCPI)

Context: In the latest edition of the Climate Change Performance Index (CCPI), India has slipped 13 positions, now ranking 23rd globally. This marks a decline from its previous position in the top 10.

About the Climate Change Performance Index (CCPI)
- Publishers: The index has been published annually since 2005 by Germanwatch, the NewClimate Institute, and Climate Action Network International.
- Scope: It evaluates the climate protection performance of 63 countries and the European Union, which collectively are responsible for over 90% of global greenhouse gas (GHG) emissions.
- Objective: The index aims to enhance transparency in international climate politics and enables comparison of climate protection efforts and progress made by individual countries.
- Assessment Methodology: Countries are assessed based on 14 indicators across four weighted categories:
- Greenhouse Gas Emissions (40% weightage)
  - ✓ Renewable Energy (20%)
  - ✓ Energy Use (20%)
  - ✓ Climate Policy (20%)

India's Performance Highlights
- Ranking: India currently stands at the 23rd spot, a significant drop from its previous 10th rank.
- G20 Comparison: Despite the slide, India continues to perform better than several major G20 economies. It ranks higher than China (54th), Russia (64th), the United States (65th), and Saudi Arabia (67th), which are among the worst performers.
- Renewable Energy Progress:
  - ✓ India has made notable strides in expanding its green energy footprint.
  - ✓ Between 2015 and 2023, the share of renewables in India's energy mix reached nearly 14%.
  - ✓ Currently, over 50% of India's total installed electric power capacity (approximately 256 GW) is derived from non-fossil fuel sources, reflecting a strong commitment to energy transition.

13. Climate Inequality Report 2025

Context: The Climate Inequality Report 2025, co-authored by Lucas Chancel and Cornelia Mohren of the World Inequality Lab, was recently released. The report brings a paradigm shift to the climate debate by revealing that the world's wealthiest 1% are responsible for 41% of global emissions linked to private capital ownership.
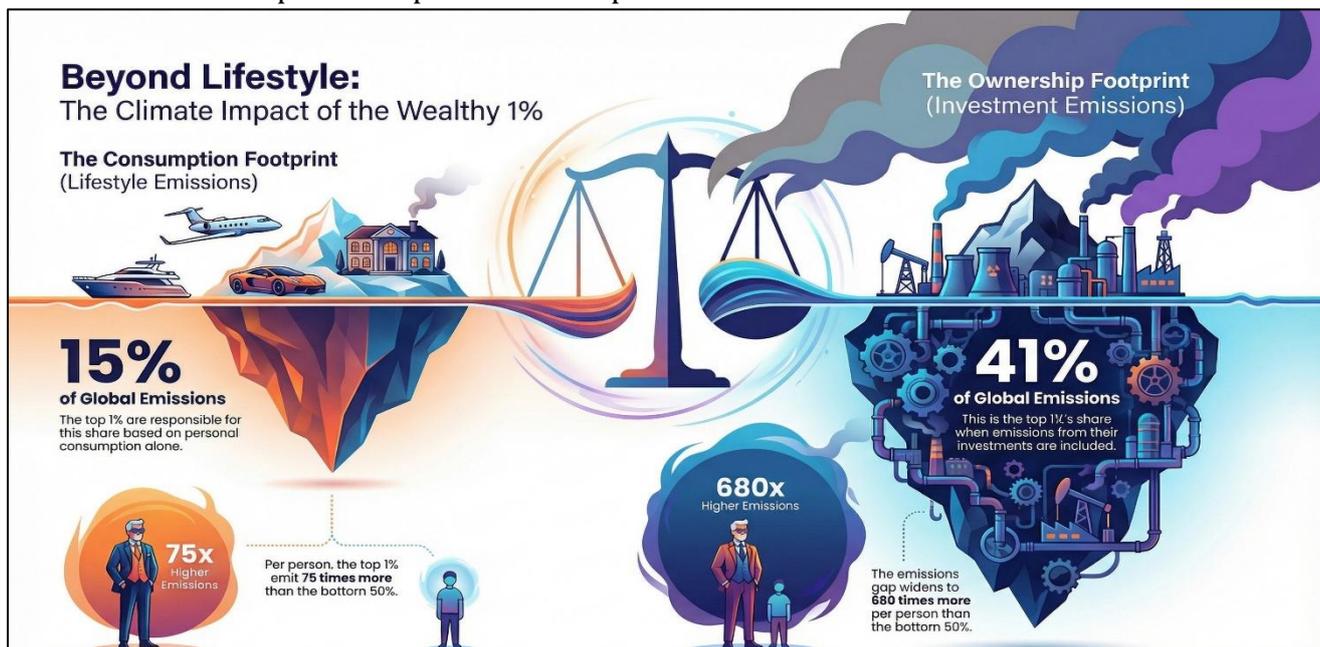
- Key Insights: Ownership vs. Consumption The report emphasizes that climate change is driven not merely by what individuals consume, but significantly by the assets they own (e.g., shares in fossil fuel companies and heavy industries).
- The Data Gap: While the top 1% contribute 15% of global emissions based on personal consumption (lifestyle), this figure surges to 41% when their investment portfolios are considered.
- Stark Disparities: The report highlights extreme inequality:
  - ✓ Consumption Basis: Per capita emissions of the top 1% are 75 times higher than those of the bottom 50%.
  - ✓ Ownership Basis: This gap widens dramatically to 680 times higher when asset ownership is factored in.
- **Significance**: The findings suggest that the "ownership-based approach" offers a truer measure of climate responsibility than the traditional consumption-based metrics. It shifts the focus from individual lifestyle choices to the structural power of capital allocation.
- **Policy Recommendations:** To address this, the report proposes taxing the carbon content of assets and investments held by the wealthy. Such a tax would target producers and asset owners rather than consumers, creating a financial incentive to diversify capital away from high-carbon industries

14. Global Carbon Project's 2025 Assessment

Context: The Global Carbon Project (GCP) has released its 2025 assessment, highlighting a positive shift in India's emissions trajectory. The report notes that India's carbon emissions rose by only 1.4% in 2025, a significant slowdown compared to the 4% growth recorded in 2024.

About Global Carbon Project (GCP)

- Establishment: Set up in 2001, GCP operates as a Global Research Project of Future Earth and a research partner of the World Climate Research Programme.

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- Mandate: Its core function is to track global trends in greenhouse gas emissions (carbon dioxide, methane, nitrous oxide) and sinks. It provides a science-based knowledge base to inform policy debates aimed at mitigating climate change.

Key Trends: India

- Drivers of Slowdown: The reduced rate of emission growth is attributed to a favourable monsoon (lowering cooling-related electricity demand) and strong growth in renewable energy, which curbed the dependency on coal.
- Global Standing: Despite the slowdown, India remains the third-largest global emitter, contributing 3.2 billion tonnes of CO_2 annually. It follows China (12 billion tonnes) and the United States (4.9 billion tonnes).
- Per Capita Emissions: Notably, India's per capita emissions stand at 2.2 tonnes/year, which is the second lowest among the 20 largest economies, reflecting a low individual carbon footprint.

Global Scenario & Carbon Budget Warning

- Global Emissions: Global fossil fuel CO_2 emissions are projected to rise by 1.1% to reach 38 billion tonnes. Major economies like the US (+1.9%), EU (+0.4%), and China (+0.4%) continue to show rising trends.
- The 1.5°C Threshold: The report issues a dire warning that the Carbon Budget—the cumulative amount of CO_2 humanity can emit to limit warming to 1.5°C—is "virtually exhausted." With only 170 billion tonnes remaining, the world is on track to deplete this budget in just four years at current emission levels

15. Global Cooling Watch 2025

Context: The United Nations Environment Programme (UNEP) released its Global Cooling Watch 2025 report at the 30th UN Climate Change Conference (COP30) in Belém, Brazil. The report, published in collaboration with the Cool Coalition, assesses global trends in cooling demand and emissions while proposing sustainable pathways for the future.

Key Findings

- Surging Demand: Under a Business-as-Usual (BAU) scenario, global installed cooling capacity is projected to triple, rising from 22 TW in 2022 to 68 TW by 2050. This surge is driven by population growth, urbanization, rising incomes, and the increasing frequency of extreme heat events.
- Rising Emissions: Despite efficiency improvements, cooling-related emissions could nearly double, jumping from 4.1 Gt CO_2e in 2022 to 7.2 Gt CO_2e by 2050.
- Extreme Heat Hazard: Heatwaves have become the deadliest climate-related hazard. The Urban Heat Island effect further exacerbates this, adding 5–10°C to local temperatures and amplifying the need for artificial cooling.

Pathways for Sustainable Cooling: The report outlines a comprehensive strategy to manage this demand:

- Passive Cooling: It emphasizes combining shading, ventilation, reflective materials, and green spaces with low-energy systems. These measures can reduce indoor temperatures by up to 8°C and cut energy use by 30%.
- Technology & Refrigerants: The pathway advocates for the adoption of high-efficiency cooling technologies and a faster phase-down of hydrofluorocarbon (HFC) refrigerants to ensure cleaner, sustainable cooling solutions.

16. Land Gap 2025 Report

Context: The Land Gap 2025 Report was recently released at the 30th UN Climate Change Conference (COP30). The report issues a stern warning regarding the global over-reliance on land availability to meet climate pledges, highlighting a dangerous disconnect between net-zero strategies and ecological reality.

IPCC's Estimated Potential of Various Carbon Removal Approaches
Gigatonnes of CO_2e per year of carbon removal by 2050

Approach	High	Low
Afforestation/Reforestation	10.1	0.5
Soil Carbon Sequestration in Croplands and Grasslands	8.6	0.4
Bio-Energy with Carbon Capture and Storage	11.3	0.4
Biochar	4.9	0.03
Enhanced Weathering	4	0.5
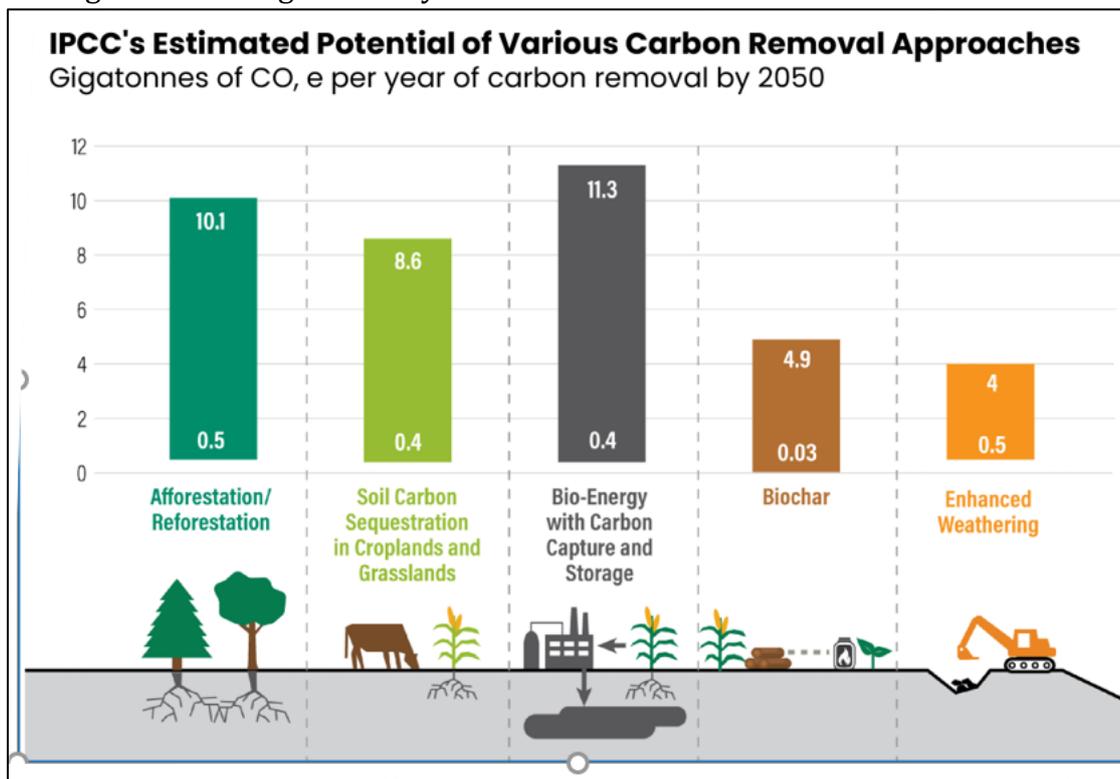
About the Report
- Publisher: The report is published by the University of Melbourne.
- Objective: Its primary goal is to assess whether the net-zero strategies proposed by various countries align realistically with the planet's available land surface and the requirements of ecological sustainability. It scrutinizes the feasibility of allocating vast tracts of land solely for carbon mitigation.

Key Findings: The Scale of the Problem
- Unrealistic Land Demands: The report reveals that if current climate pledges are to be fulfilled, they would require an aggregate of more than one billion hectares of land. To put this into perspective, this area is larger than the entire continent of Australia.
- Misplaced Priorities: There is a critical critique of government strategies that rely excessively on Land-Based Carbon Removal (LBCR) mechanisms. The report suggests that instead of prioritizing the protection of existing primary forests and the restoration of natural ecosystems, nations are banking on unrealistic land-use changes to offset emissions.

Understanding Land-Based Carbon Removal (LBCR)
- Definition: LBCR encompasses a broad suite of climate mitigation strategies designed to harness terrestrial ecosystems to absorb and store atmospheric carbon dioxide.
- Scope: This includes the use of forests, soils, wetlands, peatlands, and agricultural landscapes as carbon sinks. While natural sinks are vital, the report argues that relying on them to offset continued fossil fuel emissions—rather than cutting emissions at the source—creates an insatiable demand for land that simply does not exist without compromising food security or biodiversity.

17. Climate Risk Index (CRI) 2026

Context: The Climate Risk Index (CRI) 2026 was released during the 30th UN Climate Change Conference (COP30) held in Belem, Brazil, in November 2025. The report underscores the disproportionate impact of climate change on developing nations.

About Climate Risk Index (CRI)

- Publisher: The CRI is an annual analytical index published by the environmental think tank Germanwatch since 2006.
- Methodology: It analyses the extent to which countries and regions have been affected by the impacts of weather-related loss events (storms, floods, heatwaves, etc.). It uses data from the Munich Re NatCatSERVICE and socio-economic data from the IMF.
- Significance: While it is not a binding UN index, it is widely cited in UNFCCC negotiations and IPCC discussions to highlight the urgency of climate action and the necessity of support for vulnerable nations.

Key Global Findings (1995–2024)

- Vulnerability of the Global South: A striking finding of the 2026 report is that all top ten most affected countries over the last three decades belong to the Global South.
- Saint Vincent and the Grenadines was identified as the worst-affected nation in 2024.
- Human and Economic Toll:
  - ✓ Fatalities: Over 832,000 people have lost their lives globally due to approximately 9,700 extreme weather events.
  - ✓ Financial Loss: The global economy suffered losses exceeding $4.5 trillion (in purchasing power parities) during this period.

India-Specific Findings

- Rankings: India ranks 9th overall among the most affected countries in the long-term assessment (1995–2024). Specifically for the year 2024, India was ranked 15th.
- Scale of Impact:
  - ✓ Frequency: The country endured approximately 430 extreme weather events over the last 30 years, impacting over a billion people.
  - ✓ Economic Loss: India faced cumulative inflation-adjusted economic losses of approximately $170 billion.
  - ✓ Human Cost: These disasters resulted in more than 80,000 fatalities, highlighting the country's high exposure to climate hazards.

18. Emissions Gap Report 2025: "Off Target"

Context: The United Nations Environment Programme (UNEP) has released its flagship annual report, the Emissions Gap Report 2025, titled "Off Target". The report provides a bleak assessment of global climate action, highlighting the widening disparity between national promises and the actual emissions reductions needed to avert catastrophic warming.

Understanding the "Emissions Gap" The "Emissions Gap" quantifies the difference between:

- Projected Emissions: Where global greenhouse gas (GHG) levels are heading based on current country commitments (Nationally Determined Contributions or NDCs).
- Required Emissions: Where GHG levels need to be to limit global temperature rise to 1.5°C or 2°C above pre-industrial levels.

Key Global Findings

- Record High Emissions: Global GHG emissions surged by 2.3% in 2024, reaching a record 57.7 gigatonnes of CO_2 equivalent ($GtCO_2e$). This growth rate is alarming, being over four times the average growth rate observed in the 2010s.

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- Temperature Trajectory: Even if all unconditional and conditional NDCs are fully implemented, the world is on track for a temperature rise of 2.3–2.5°C. While this is a marginal improvement from last year's estimate (2.6–2.8°C), it remains far above safe limits.
- The Implementation Gap: To limit warming to 1.5°C, global emissions must fall by 55% by 2035 relative to 2019 levels. However, current NDCs put the world on a path to only a 15% reduction, making the overshoot of 1.5°C "very likely" within the next decade.

India's Performance
- Emission Growth: India's emissions grew by 3.6% in 2024. However, its overall share in global emissions remains relatively low at approximately 7%.
- Per Capita Contrast: The report underscores global inequity. India's per capita emissions stood at 3 tCO_2e, which is significantly lower than major emitters like China (11 tCO_2e) and the United States (17.4 tCO_2e).
- Role of Major Emitters The report criticizes the G20 bloc (excluding the African Union), which accounts for 77% of global emissions. Despite some members submitting new NDCs, the group collectively remains off track to meet 2030 climate goals.

19. Global Methane Status Report 2025
Context: The Global Methane Status Report (GMSR) 2025 was recently released by the United Nations Environment Programme (UNEP) and the Climate and Clean Air Coalition (CCAC) at the 30th UN Climate Change Conference (COP30). The report issues a critical warning: global efforts to curb methane emissions are progressing far too slowly to meet the targets set for 2030.

Key Findings
- Rising Emissions: Instead of decreasing, methane emissions are on an upward trajectory. From 352 million tonnes (Mt) in 2020, emissions are projected to rise to 369 Mt by 2030 under current legislative frameworks.
- Primary Drivers: The report identifies the continued growth in agriculture and waste generation as the main drivers fueling this increase.
- Climate Risk: This rising trend jeopardizes the global goal of limiting warming to 1.5°C, as reducing methane is considered one of the fastest ways to slow near-term warming.

About the Global Methane Pledge (GMP)
- Launch: The pledge was launched at COP26, co-led by Canada and the European Union.
- Membership: It is a major international coalition comprising 159 countries and the European Commission.
- Core Target: The central commitment of the GMP is to reduce global methane emissions by at least 30% by 2030 (relative to 2020 levels). The GMSR 2025 highlights that the world is currently moving away from, rather than towards, this essential target.

GEOGRAPHY & DISASTER MANAGEMENT

1. Atlantic Meridional Overturning Circulation (AMOC)
Context: Iceland has officially recognized the potential collapse of the Atlantic Meridional Overturning Circulation (AMOC) as an existential threat to its national security. This declaration highlights the urgency of monitoring this critical global climate system.
About AMOC
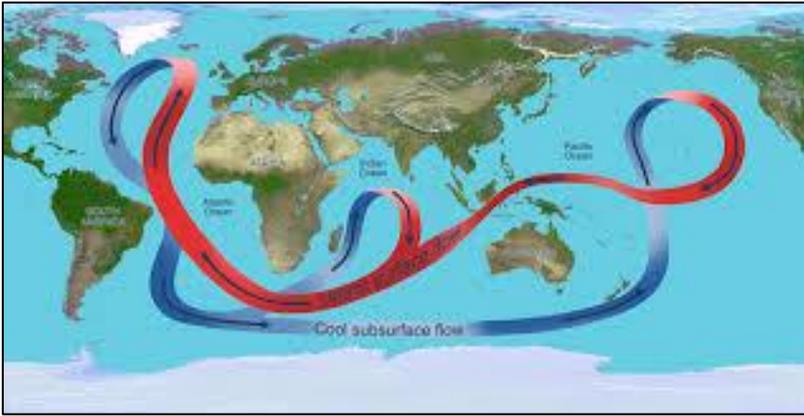
- Definition: Often referred to as the "ocean's conveyor belt," AMOC is a vast system of ocean currents that continuously circulates warm and cold water between the tropics and the polar regions of the Atlantic.
- Drivers: The circulation is driven by thermohaline forces—variations in temperature, salt content, and water density.

Mechanism

- Northward Flow: Warm, salty surface water moves from the tropics towards the North Atlantic. This process releases heat into the atmosphere, playing a crucial role in moderating the climate of Western Europe.
- Sinking: As the water reaches the North Atlantic, it cools and becomes denser (due to high salinity and low temperature), causing it to sink to the ocean floor.
- Southward Flow: This cold, dense deep water flows southward along the ocean bottom, eventually returning to the tropics to complete the cycle.

Importance

- Climate Regulation: AMOC acts as a global thermostat by redistributing heat from the equator to the poles.
- Weather Patterns: It significantly influences regional weather systems, including rainfall distribution and storm tracks.

Potential Impacts of Collapse

- Regional Cooling: A collapse could trigger a dramatic temperature drop in Northern Europe, leading to severe cold and ice conditions.
- Sea Level Rise: A weakened system could exacerbate sea-level rise along the US East Coast and other regions, increasing flood risks.
- Marine Disruption: Changes in currents would severely impact marine ecosystems and fisheries distribution.
- Historical Precedent: Paleoclimate records from the Younger Dryas period (~12,900 years ago) show that a major weakening of AMOC previously caused abrupt cooling in the North Atlantic, delaying the onset of stable Holocene conditions.

2. **Hayli Gubbi Volcano and the East African Rift**
   Context: A significant geological event occurred recently when the Hayli Gubbi volcano in Ethiopia erupted in 2025, ending a 12,000-year dormancy. The eruption sent massive ash plumes up to 14 km into the atmosphere, affecting multiple East African nations.
   About Hayli Gubbi Volcano
   - Type & Location: It is a shield volcano located in the Afar Region of Ethiopia.
   - Geological Setting: It forms part of the Erta Ale Range, a volcanic chain situated within the East African Rift System (EAR).

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- Significance: The volcano had been dormant for millennia, making this sudden explosive activity a rare geological phenomenon.

Geological Framework: The East African Rift (EAR)

- Tectonic Activity: The EAR is a major continental rift system where the African Plate is actively splitting into two new tectonic plates: the Nubian Plate and the Somali Plate.
- Extent: This rift zone stretches from the Red Sea in the north, through Ethiopia, and down to Mozambique in the south.

Reasons for the Recent Eruption

- Magma Recharge: The divergent movement of the African and Arabian plates widened the rift, allowing hot mantle material to rise and recharge the magma chamber.
- Gas Pressure: The long-term accumulation of gas-rich magma created immense pressure, which was eventually released explosively.
- Crustal Fractures: New faults likely opened a pathway for the magma to breach the surface after thousands of years of inactivity.

Key Geographical Facts: Ethiopia

- Status: A landlocked country in the Horn of Africa.
- Borders: It shares boundaries with six nations:
  - ✓ North: Eritrea
  - ✓ Northeast: Djibouti
  - ✓ East: Somalia
  - ✓ South: Kenya
  - ✓ West: South Sudan
  - ✓ Northwest: Sudan

3. **Fujiwhara Interaction: The Dance of Cyclones**

Context: Weather models indicate a rare possibility of a Fujiwhara-type interaction occurring in the Bay of Bengal, where two developing cyclonic storms may influence each other's paths and intensities.

About the Fujiwhara Effect

- Definition: Also known as a binary interaction, the Fujiwhara Effect is a phenomenon where two nearby tropical cyclones or hurricanes interact with each other in the mid-to-upper atmospheric layers.
- Origin: It was first identified in 1921 by the Japanese meteorologist Dr. Sakuhei Fujiwhara, after whom the effect is named.
- Conditions: The interaction typically commences when two cyclonic systems come within a distance of approximately 1,400 km of each other, though this threshold varies based on their size and intensity.

Mechanism

- Mutual Orbiting: During the interaction, the centers of the two cyclones begin to rotate around a common pivot point (centroid) located between them. This dance typically occurs in a counter-clockwise direction in the Northern Hemisphere.
- Pivot Point: The location of this central point is determined by the relative mass and intensity of the two vortices. If one is significantly stronger, it dominates the interaction.

Possible Outcomes: The interaction creates complex scenarios that make forecasting highly challenging:

- Merger: The stronger cyclone may absorb the weaker one, leading to a single, larger system.
- Intensification: The interaction can fuel the development of a more powerful cyclone.

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- **Repulsion:** In some instances, the systems may influence each other and then move apart.
- **Track Alteration:** The most critical impact is often an erratic change in trajectory, where the "dance" diverts the original paths of one or both storms, complicating disaster preparedness.

4. Cryosphere Melting: The 2025 Status Report

Context: The State of the Cryosphere 2025 Report, released by the International Cryosphere Climate Initiative (ICCI) ahead of COP30 in Brazil, issues a dire warning: global ice loss is accelerating exponentially, threatening catastrophic sea-level rise and water crises, particularly in the Himalayan regions.
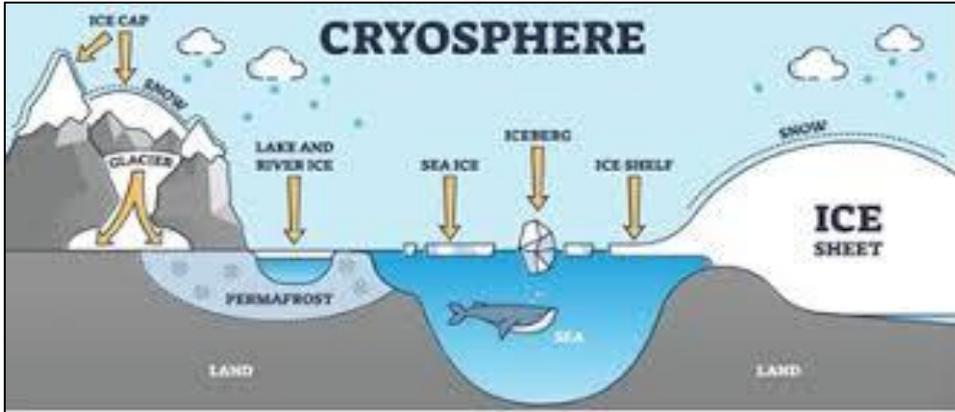
Key Findings of the Report

- **Ice Sheets:** Losses from Greenland and Antarctica have quadrupled since the 1990s, pushing these regions dangerously close to irreversible tipping points.
- **Glaciers:** Global glacier ice loss has surged to 273 gigatons per year, with a marked 36% increase in the last two decades.
- **Sea Ice:** Both polar regions have seen a 40–60% decline in sea ice extent since 1979, with multi-year Arctic ice nearly vanishing.
- **Permafrost:** Over 210,000 km² of permafrost is thawing per decade, releasing trapped ancient carbon.

Drivers of Melting

- **Greenhouse Gases:** Even a warming of 1°C–2°C is sufficient to trigger massive cryosphere loss.
- **Arctic Amplification:** The loss of reflective ice (albedo effect) exposes darker surfaces, accelerating local warming.
- **Black Carbon:** Pollutants settling on snow reduce reflectivity, causing faster melting, a critical issue for the Himalayas.
- **Ocean Warming:** Warm waters are thinning protective ice shelves from below, destabilizing inland glaciers.

Impact on Ecosystems

- **Climate Feedback:** Thawing permafrost releases methane (80x more potent than CO_2), creating a vicious warming cycle.
- **Marine Disruption:** The influx of freshwater alters ocean salinity, potentially stalling major currents like the AMOC, and disrupts marine food webs by reducing algae populations.
- **Disease Risk:** Thawing ice may release dormant pathogens.

Way Forward: The report emphasizes that "there is no negotiating with the melting point of ice." Urgent measures include:

- Phasing out fossil fuels completely by the 2060s.
- Mitigating Short-Lived Climate Forcers (SLCFs) like black carbon and methane.

- Scaling up Carbon Dioxide Removal (CDR) technologies and strengthening transboundary cooperation for glacier-fed basins in the Global South.

5. Typhoon Kalmaegi (Tino)

Context: Typhoon Kalmaegi, known locally in the Philippines as "Tino," struck the archipelago in early November 2025. It was a powerful late-season tropical cyclone that caused widespread devastation across the central Philippines before moving towards Vietnam.

About Typhoon Kalmaegi

- Origin: The system originated as a low-pressure area in the Philippine Sea, east of the Visayas region. It rapidly intensified into a typhoon due to favorable environmental conditions, including warm sea surface temperatures.
- Intensity: At its peak, Kalmaegi was a strong typhoon with maximum sustained winds reaching 150 km/h and gusts peaking around 205 km/h.
- Path & Landfall: The typhoon made eight distinct landfalls as it traversed the country. Its first landfall occurred in Silago, Southern Leyte, followed by subsequent landfalls in Cebu, Negros Occidental, Iloilo, and Palawan. This "island-hopping" trajectory exposed multiple provinces to its destructive eyewall.

Key Impacts

- Human Toll: The storm resulted in significant casualties, with reports indicating over 180 fatalities and hundreds injured or missing. Millions of residents were affected, with massive displacement observed in the Visayas region.
- Infrastructure & Economy: The typhoon caused extensive damage to infrastructure, destroying thousands of homes and disrupting power and communication lines. Agriculture suffered heavily, with vast swathes of cropland flooded.
- Compounding Disasters: Kalmaegi was part of a challenging period for the Philippines, striking shortly before Super Typhoon Fung-Wong (Uwan), which further strained disaster response capabilities.

6. Volcanic Lightning

Context: In November 2025, researchers revisited the phenomenon of volcanic lightning, a rare and powerful electrical display observed during major eruptions, distinguishing it from standard meteorological thunderstorms.

About Volcanic Lightning

- Definition: It refers to flashes of electricity generated directly within a volcanic plume during an eruption, independent of weather-related storms.
- Historical Record: The phenomenon has been documented since antiquity, most notably by Pliny the Younger during the eruption of Mount Vesuvius in 79 AD.

Mechanism of Formation

- Triboelectric Charging: The primary driver is the collision of ash particles, rock fragments, and ice crystals within the turbulent eruption column. These collisions generate static electricity (similar to rubbing a balloon on hair).
- Discharge: As positive and negative charges separate and build up, they discharge as lightning bolts, either near the vent or high in the plume.
- Role of Water Vapour: Magma releases significant water vapour, which freezes into ice crystals at high altitudes. These crystals play a crucial role in enhancing the electrical activity within the plume.

1. **Denmark Bans Social Media for Children**

   Context: In a decisive move to protect adolescent well-being, Denmark has announced a ban on social media usage for children under the age of 15. This policy mirrors growing global concern, following Australia's recent ban for under-16s, regarding the impact of digital platforms on youth mental health and data privacy.

   Key Highlights of the Ban

   - Restrictions: Children under 15 are prohibited from creating or holding social media accounts. Adolescents aged 13–15 may access specific platforms only with explicit parental consent.
   - Targeted Platforms: The ban encompasses major applications such as Instagram, TikTok, Snapchat, and YouTube.
   - Rationale: The Danish government argues that social media "steals childhood," contributing significantly to mental health decline, social isolation, and addiction.

   Reasons for Advocating the Ban

   - Mental & Physical Health: Excessive screen time is linked to ADHD, depression, aggression, and sleep disorders. The dopamine-driven feedback loops of these platforms create addictive behaviors similar to substance abuse.
   - Content Risks: Children are vulnerable to cyberbullying, violent content, and pornography, which can distort cognitive development. A UNICEF study noted that only 2% of children possess the critical literacy to identify misinformation.
   - Safety: The platforms often act as catalysts for exposing minors to predators and harmful viral trends.

   Arguments Against the Ban

   - Implementation Hurdles: Enforcing digital bans is technically difficult; experiences in South Korea (Cinderella Law) showed children often bypass restrictions or resort to identity theft.
   - Loss of Opportunity: Social media serves as a learning tool and a platform for civic engagement, as seen with climate activists like Greta Thunberg.
   - Digital Divide: In countries with lower digital literacy, like India, shared device usage makes strict age verification and parental oversight challenging.

   Way Forward

   - Age-Appropriate Design: Adopting frameworks like the U.K.'s 2020 Age-Appropriate Design Code to ensure default safety settings for minors.
   - Curriculum Integration: Introducing Digital Safety Literacy in schools to teach safe online navigation.
   - Regulation of 'Sharenting': Creating laws to prevent parents from over-publicizing sensitive content about their children.
   - Role Modeling: Parents must regulate their own usage to foster a healthy digital environment at home.

2. **From Food Security to Nutritional Security**

   Context: At the recent Emerging Science, Technology and Innovation Conclave, the Prime Minister urged scientists to pivot India's focus from merely ensuring food security to achieving nutritional security. He emphasized the need for innovation in health, agriculture, and clean energy to support this transition.

   Understanding the Shift

- Food Security: Defined by the 1996 World Food Summit, it focuses on the physical and economic access to sufficient food (Availability, Access, Utilization, Stability).
- Nutritional Security: Goes beyond quantity to highlight the biological utilization of food, ensuring dietary needs are met for an active, healthy life.

Challenges to Nutritional Security in India
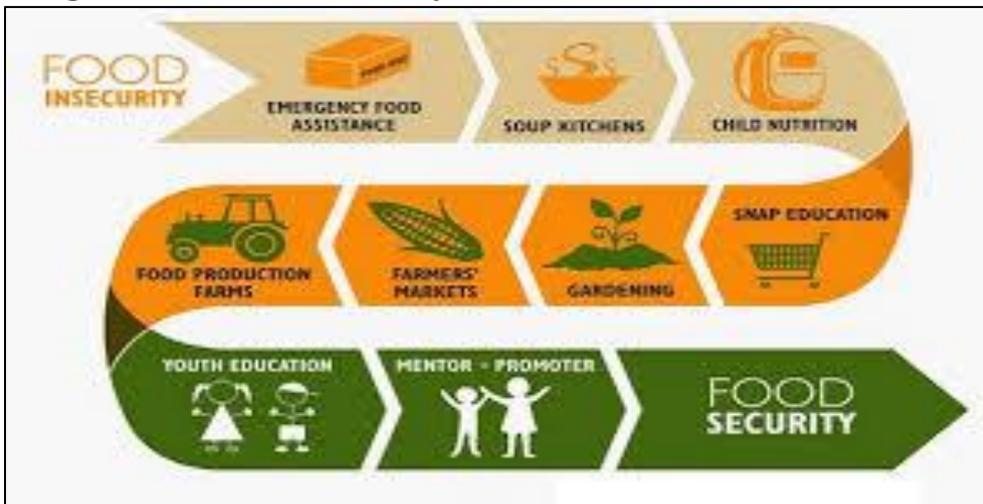
- Inequality & Poverty: High rates of undernutrition (stunting at 35.5%, wasting at 19.3% as per NFHS-5) are linked to poverty. In 2024, nearly 42.9% of Indians could not afford a healthy diet due to rising costs ($4.07 PPP).
- Systemic Gaps:
  - ✓ PDS Limitations: The Public Distribution System still largely focuses on cereals (calorie security) rather than protein-rich pulses or millets.
  - ✓ Environmental Enteropathy: Poor sanitation leads to nutrient malabsorption in children.
  - ✓ Budget Constraints: Public health expenditure remains low at ~1.3% of GDP.

Key Government Initiatives

- National Food Security & Nutrition Mission (NFSNM): A 2024 rebrand of the NFSM to include a focus on nutrition and soil health.
- Rice Fortification: Achieved 100% coverage by 2024 to combat anemia (iron, folic acid, vitamin B12).
- PM POSHAN: Provides hot cooked meals to school children to improve nutritional outcomes.
- SMART-PDS: Digitization of the PDS supply chain for better transparency.

Way Forward To build a healthier nation, India must:

- Promote Biofortification: Scale up R&D for crops rich in iron and zinc.
- Diversify Diets: Shift agricultural focus from rice/wheat to nutrient-dense crops like millets.
- Enhance Funding: Studies suggest $1 spent on nutrition generates ~$34-38 in economic returns.
- Leverage Technology: Use genomic mapping for personalized nutrition and strengthen digital governance in PDS.

3. Violence Against Women

Context: A 2025 report by the UN Office on Drugs and Crime (UNODC) and UN Women reveals a staggering global crisis: a woman or girl is killed every 10 minutes worldwide. With 83,000 femicides recorded in 2024, the report underscores that the home remains the most dangerous place for women, as nearly 60% of victims were killed by intimate partners or family members.

Alarming Global Trends

- Regional Disparities: Africa records the highest femicide rates, followed by the Americas.
- Digital Violence: Technological advancements have birthed new threats like cyberstalking, deepfakes, and doxxing, which often escalate into physical harm.
- Stagnation: Efforts to prevent violence are stalling due to weak justice delivery and underreporting.
- Understanding Violence Against Women and Girls (VAWG) Defined by the UN as any act of gender-based violence resulting in harm or suffering, VAWG is rooted in patriarchal structures and systemic gender inequality.
- Origins: It stems from historical male dominance, discriminatory norms, and harmful cultural practices that justify violence as "family honour."
- Impact: Beyond physical and mental trauma (including PTSD), VAWG restricts women's autonomy and participation in public life.
- Economic Cost: The World Bank estimates VAWG costs the global economy 2% of GDP (~$1.5 trillion) annually.

The Crisis in India Despite legal progress, India faces persistent challenges:
- High Prevalence: In 2023, nearly 4.5 lakh crimes against women were reported (NCRB). Domestic cruelty (IPC 498A) remains the top category.
- Patriarchal Roots: NFHS-5 data shows 31.2% of married women have faced spousal violence, driven by dowry practices and rigid gender roles.
- Digital Vulnerability: Cybercrimes against women have more than doubled recently, with AI-enabled abuse rising.
- Justice Gap: A court pendency rate of 90.8% and low conviction rates deter reporting.

Way Forward To achieve SDG 5 (Gender Equality), a multi-pronged approach is essential:
- Legal Reform: Harmonize laws to tackle technology-facilitated violence (doxxing, deepfakes).
- Institutional Capacity: Train police and cyber cells in gender-sensitive handling of cases.
- Platform Accountability: Enforce stricter regulations on social media and AI developers to curb algorithmic abuse.
- Prevention: Invest in digital literacy and community awareness to dismantle patriarchal norms.

4. **Artificial Intelligence in School Education**
   Context: The Ministry of Education has announced the integration of Artificial Intelligence (AI) and Computational Thinking (CT) into the school curriculum starting from Class 3, effective from the 2026–27 academic session. This initiative aligns with the National Education Policy (NEP) 2020 and the National Curriculum Framework (NCF-SE) 2023, aiming to promote "AI for Public Good."
   Significance & Need

The Future of Learning: How AI is Transforming Education

Highlighting key benefits of integrating Artificial Intelligence into the education system to prepare students and educators for the future.

- **Future Readiness:** Bridging the gap between traditional schooling and Industry 4.0 demands, preparing students for an AI-driven economy.
- **Personalized Learning:** AI tools can enable adaptive learning systems, catering to diverse needs, including multilingual and special-needs education.
- **Teacher Empowerment:** Automation of administrative tasks (grading, attendance) allows educators to focus on creative engagement and data-informed lesson planning.
- **Innovation:** Fostering a research mindset by connecting technology with social problem-solving and Sustainable Development Goals (SDGs).

Key Challenges
- **Digital Divide:** With only 34% of Indian schools having internet access (UDISE+ 2021–22) and many lacking functional computers, introducing AI may widen existing inequalities.
- **Teacher Preparedness:** A significant shortage of qualified teachers and lack of specific AI training pose hurdles to effective implementation.
- **Pedagogical Mismatch:** The cognitive readiness of 10–13-year-olds to grasp complex AI concepts is debatable; without specialized pedagogy, learning risks becoming rote memorization of jargon.

Psychological & Ethical Concerns
- **"Dis-education":** Psychologists warn that excessive reliance on AI tools (like chatbots) may erode intrinsic motivation and critical thinking.
- **Data Privacy:** Introducing AI raises concerns regarding student data protection and surveillance anxiety.
- **Ethical Grounding:** Education must pivot from merely "using" AI to critically understanding its societal impact, bias, and responsible citizenship.

Way Forward: To ensure success, the government must prioritize equitable infrastructure development and teacher capacity building. A phased approach—focusing on digital literacy in lower grades and advanced AI skills in higher classes—combined with robust ethical safeguards and age-appropriate curriculum design, is essential to make this ambitious transition effective and inclusive.

5. Functional Foods & Smart Proteins

Context: India is currently grappling with a dual challenge: persistent malnutrition alongside a rise in lifestyle diseases. To address this, the food system is evolving towards functional foods and smart proteins, which offer sustainable and innovative nutritional solutions.

Functional Foods

- Definition: These are conventional foods that have been enriched or fortified to provide health benefits that go beyond basic nutrition (e.g., Vitamin D-fortified milk).
- Key Technologies: The development of these foods relies on advanced technologies such as nutrigenomics (studying gene-nutrition interactions), biofortification, 3D food printing, and bioprocessing.
- Examples in India:
  - ✓ Zinc-enriched rice developed by IIRR, Hyderabad.
  - ✓ Iron-rich pearl millet developed by ICRISAT.

Smart Proteins

- Definition: These are proteins produced through biotechnology, designed to mimic animal-derived products while reducing dependence on traditional livestock farming.
- Types:
  - ✓ Plant-based Proteins: Derived from legumes, cereals, and oilseeds to replicate meat or dairy.
  - ✓ Fermentation-derived Proteins: Use microbial systems to produce protein analogues.
  - ✓ Cultivated Meat: Produced by growing animal cells in bioreactors, eliminating the need for slaughter.

Global Trends:

- Singapore became the first country to approve cultivated chicken in 2020.
- China has integrated alternative proteins into its national food security strategy.
- The European Union is investing in this sector under its "Farm to Fork" strategy.

6. National Action Plan on Antimicrobial Resistance (NAP-AMR) 2.0

Context: India has launched the National Action Plan on Antimicrobial Resistance (NAP-AMR 2.0) for the period 2025–2029. This updated strategy aims to address the shortcomings of the first plan (2017–2021) and align India's efforts with the WHO's Global Action Plan on AMR.

About Antimicrobial Resistance (AMR)

- Definition: AMR refers to the ability of microbes (bacteria, viruses, fungi, parasites) to resist medicines that previously killed them. This renders standard treatments like antibiotics ineffective, making infections harder or impossible to treat.
- Threat Level: The World Health Organization (WHO) has recognized AMR as one of the top 10 global public health threats.
- Rationale for NAP-AMR 2.0 The update was necessitated by the rapid rise of AMR across sectors, the emergence of high-risk "superbugs," and growing evidence of environmental contamination driving resistance. A more coordinated, cross-sectoral strategy was deemed essential.

Key Features of NAP-AMR 2.0

- One Health Approach: The plan adopts a holistic framework, addressing AMR across human, animal, agricultural, and environmental sectors simultaneously.
- Nodal Ministry: The initiative is led by the Ministry of Health & Family Welfare but involves multi-ministry participation with specific timelines and budgets for each stakeholder.
- Strategic Focus Areas:

- ✓ Awareness: Educating citizens, prescribers, and community health workers about responsible antibiotic use.
- ✓ Surveillance: Expanding microbiology laboratories and strengthening AMR surveillance networks in both public and private hospitals.
- ✓ Training: Sensitizing doctors, veterinarians, and pharmacists to AMR risks.
- Collaboration: It actively engages the private sector, pharmaceutical industry, NGOs, and international partners to create a unified front against drug resistance.

7. State of the World's Children 2025 Report

Context: UNICEF released its flagship annual report, "The State of the World's Children 2025," on World Children's Day (November 20, 2025). This year's report, titled "Ending Child Poverty: Our Shared Imperative," underscores the urgent need to address the multifaceted deprivations faced by children globally.

About the Report
- Legacy: First published in 1980, this is UNICEF's primary publication analyzing global trends affecting children.
- Purpose: It aims to raise awareness, influence policy, and provide data-driven insights to governments and civil society.
- Definition: Following the 1989 Convention on the Rights of the Child (CRC), it defines a child as anyone under the age of 18.

Key Global Findings The report paints a stark picture of the Global Child Poverty Crisis:
- Widespread Deprivation: More than one in five children in low- and middle-income countries are deprived of at least two essential factors for well-being (e.g., health, housing, nutrition).
- Monetary Poverty: Approximately 412 million children live in extreme monetary poverty, surviving on less than $3 per day.
- Multidimensional Impact: Around 417 million children suffer severe deprivation in critical areas such as education, sanitation, and clean water.

India-Specific Insights
- Demographics: India is home to approximately 460 million children under 18, making its progress pivotal for global goals.
- SDG Progress: The report notes that India is on track to meet Sustainable Development Goal (SDG) 1.2, which aims to reduce poverty by half in all its dimensions by 2030.
- Poverty Reduction: Citing NITI Aayog's National Multidimensional Poverty Index (MPI), the report highlights that India lifted 248 million people (including children) out of multidimensional poverty between 2013–14 and 2022–23. The poverty rate significantly dropped from 29.2% to 11.3% during this period.

8. Kerala: Extreme Poverty-Free State

Context: In a historic milestone, the Chief Minister of Kerala officially declared the state as India's first "extreme poverty-free" state during a special assembly session. This announcement fulfills a key mandate set by the state government in 2021 to eradicate the most severe forms of deprivation.

Defining Extreme Poverty

- Global Standard: The World Bank (2025) defines extreme poverty as living on less than $3 per day (PPP, 2021 prices), a benchmark raised from the earlier $2.15.
- National Standard: In India, the NITI Aayog utilizes the Multidimensional Poverty Index (MPI), based on the Alkire-Foster methodology. It assesses poverty beyond income, focusing on 12 indicators across health, education, and living standards (nutrition, shelter, dignity, etc.).

Kerala's Distinct Approach Unlike standard global or national metrics, Kerala adopted a localized, bottom-up approach to identify the "poorest of the poor."

- Criteria: The State's Local Self-Government Department (LSGD) formulated four core distress parameters: Income deprivation, Health vulnerability, Housing insecurity, and Food insufficiency.
- Identification: Through the Extreme Poverty Eradication Programme (EPEP), the state identified approximately 64,006 families in distress.

Implementation Strategy

- Micro-Level Planning: Instead of a "one-size-fits-all" scheme, micro-plans were tailored for each identified family, addressing their specific needs (e.g., housing for the homeless, medical aid for the sick).
- Institutional Role: The Kudumbashree Mission played a pivotal role, acting as both a community monitor and a service provider to ensure last-mile delivery.
- Rights-Based Campaigns: Initiatives like "Avakasam Athivegam" ensured these families received basic entitlements such as Aadhaar cards, ration cards, and social security pensions.
- Digital Monitoring: A digitized Management Information System (MIS) tracks the progress of every family, ensuring transparency and preventing relapse into poverty.

9. **Ultra-Processed Foods (UPFs) & Health Crisis**
   Context: A recent series in The Lancet warns that the consumption of ultra-processed foods (UPFs) is fueling a global rise in obesity, diabetes, and chronic diseases. The report highlights that this trend is rapidly intensifying in India, which has become one of the fastest-growing markets for these products.
   Rising UPF Consumption in India

- **40-Fold Sales Surge**: Retail sales of UPFs in India skyrocketed from $0.9 billion in 2006 to $38 billion in 2019, marking a massive 40-fold increase.
- **Obesity Epidemic**: Parallel to this sales boom, obesity rates in India doubled during the same period, corroborating global evidence linking industrial food diets to weight gain.
- **High-Growth Market**: UPF sales grew by 150% in 15 years, signaling a shift where traditional diets are being displaced by industrial formulations.

About Ultra-Processed Foods (UPFs)
- **Definition**: Defined under the NOVA classification, UPFs are industrial food products containing ingredients rarely used in home kitchens, such as emulsifiers, stabilizers, artificial flavors, and sweeteners.
- **Characteristics**: These foods are typically ready-to-eat/heat, highly palatable, and have a long shelf life. They are usually high in fat, sugar, and salt (HFSS) but devoid of fiber and essential micronutrients.
- **Examples**: Carbonated soft drinks, packaged chips, mass-produced ice creams, sweetened breakfast cereals, nuggets, and instant noodles.

Health Impacts
- **Chronic Diseases**: High UPF intake is strongly linked to Type-2 diabetes, hypertension, cardiovascular diseases, fatty liver disease, and certain cancers.
- **Biological Effects**: Experts warn of addictive eating behaviors, disruptions to the gut microbiome, and impaired brain development in children due to nutrient-poor diets.

10. Eklavya Model Residential Schools (EMRS)

Context: Prime Minister Narendra Modi recently inaugurated a series of tribal welfare projects, including new Eklavya Model Residential Schools (EMRS) and community centres, to boost education and infrastructure in tribal-dominated regions.

About Eklavya Model Residential Schools (EMRS)
- **Launch**: Started in 1997-98 by the Ministry of Tribal Affairs (MoTA) to provide free, high-quality residential education to Scheduled Tribe (ST) students.
- **Objective**: To bridge the educational gap between tribal and non-tribal populations by offering opportunities comparable to Navodaya Vidyalayas and Kendriya Vidyalayas.
- **Governance**: The schools are managed by the National Education Society for Tribal Students (NESTS), an autonomous body under MoTA, ensuring standardized quality and management.

Evolution and Expansion
- **Revamp (2018-19)**: The scheme was significantly revamped to accelerate coverage. The new mandate aims to establish an EMRS in every block with:
  - ✓ More than 50% ST population.
  - ✓ At least 20,000 tribal persons.
- **Targets**: The government has set a target to establish 728 EMRS across India by the year 2026.

Key Features
- **Structure**: Fully residential, co-educational schools catering to students from Class VI to XII.
- **Curriculum**: They follow the CBSE curriculum with a special focus on holistic development, including:
  - ✓ Skill development and vocational training.
  - ✓ Preservation of local tribal culture and heritage.
  - ✓ Sports and extracurricular activities.
- **Capacity**: Each school is designed to accommodate 480 students, maintaining gender parity (equal seats for boys and girls).

- Benefits: Education is entirely free, covering tuition, boarding, lodging, uniforms, books, and other amenities.

SCIENCE & TECHNOLOGY

1. Quantum-Safe Communication Network

Context: In a significant leap for India's cybersecurity capabilities, QNu Labs has successfully demonstrated the country's first large-scale Quantum Key Distribution (QKD) network. This milestone marks a major advancement in securing critical communication infrastructure against future cyber threats.

About the QKD Network

- Scale & Infrastructure: The network spans 500 km and utilizes existing optical fiber infrastructure, proving the scalability of the technology.
- Developer: It was developed by QNu Labs Pvt. Ltd., a Bengaluru-based deep-tech startup supported by the Department of Science and Technology under the National Quantum Mission (NQM).
- Strategic Collaboration: The demonstration was conducted in partnership with the Indian Army's Southern Command, which provided a dedicated test-bed optical fiber network for the trial.
- Funding: The project received funding from the I-Hub Quantum Technology Foundation under the National Mission on Interdisciplinary Cyber-Physical Systems (NMICPS) at IISER Pune.

How QKD Works
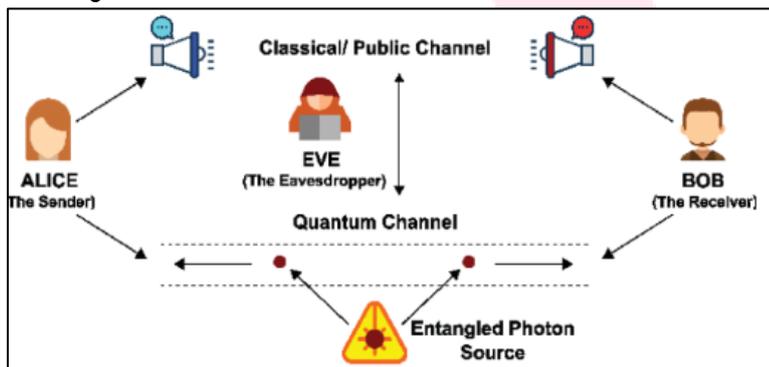
- Quantum Mechanics: QKD secures data by exchanging encryption keys using qubits encoded on photons (light particles) transmitted through optical fibers.
- Unbreakable Security: The system relies on the fundamental principles of quantum mechanics. Since quantum states are extremely sensitive, any attempt by a hacker to eavesdrop or measure the photons disturbs their state, instantly alerting the users to the intrusion.
- Shared Keys: It allows two distant users to generate a shared secret key, which is then used with classical cryptography for secure authentication and data transfer.

2. UNESCO's Neurotechnology Regulation Framework

Context: In a historic move, UNESCO has adopted the world's first global normative framework on the ethics of neurotechnology. This initiative sets essential ethical and human-rights standards to govern brain-machine innovations as they rapidly expand into both consumer and medical domains.

What is Neurotechnology?

- Definition: It encompasses tools and systems capable of directly recording, interpreting, or modulating activity in the brain and nervous system.

- Applications:
  - ✓ Medical: Used in treatments like deep brain stimulation for Parkinson's disease and depression, or brain-computer interfaces (BCIs) that enable communication for the disabled.
  - ✓ Consumer: Devices like smart headphones and neural headbands that track neural signals to monitor stress, focus, and sleep patterns.

Need for Regulation The urgency for this framework stems from the rapid commercialization of the sector, with investments rising by 700% between 2014 and 2021.
- Privacy Risks: Neural data is the most sensitive form of personal data, potentially revealing thoughts, emotions, and intentions.
- Ethical Vacuum: The consumer market lacks oversight, creating risks of data monetization, behavioral manipulation, and non-consensual surveillance.
- Vulnerability: Children (due to brain plasticity) and employees (risk of workplace profiling) face heightened threats to their mental autonomy.

Key Highlights of the Framework
- Neural Data Protection: It recognizes "neural data" as a distinct category requiring special legal and ethical safeguards.
- Mental Inviolability: The framework affirms the "inviolability of the human mind," ensuring the fundamental right to freedom of thought and mental privacy.
- AI Oversight: It calls for strict regulation of AI algorithms used to interpret brain data to prevent coercive or manipulative applications.
- Specific Restrictions: It advises against the non-therapeutic use of neurotechnology on children and restricts workplace monitoring without explicit, free consent.
- Transparency: It mandates clear communication regarding data usage, potential risks, and safeguards against addiction.

3. **Global Antibiotic Resistance Surveillance Report 2025**
   Context: The WHO Global Antimicrobial Resistance Surveillance System (GLASS) Report 2025 has flagged Antimicrobial Resistance (AMR) in India as a "serious and escalating threat." The GLASS initiative, launched in 2015, aims to standardize global AMR data collection and support surveillance capacity.
   About Antimicrobial Resistance (AMR)
   - Definition: AMR occurs when microbes (bacteria, viruses, fungi, parasites) evolve to resist medicines that previously eliminated them. This renders standard treatments ineffective, making infections harder to treat and increasing mortality risks.
   - Global Threat: The World Health Organization (WHO) has categorized AMR as one of the top 10 global public health threats.
   Key Findings for India: The report paints a concerning picture of the AMR landscape in India:
   - Alarming Resistance Rates: In 2023, approximately one-third of bacterial infections in India were found to be resistant to common antibiotics. This is significantly higher than the global average, where only one in six infections shows resistance.
   - Contributing Factors: The crisis is driven by:
     - ✓ Overuse and Misuse: Rampant prescription and consumption of antibiotics.
     - ✓ Access: Easy over-the-counter availability leading to self-medication.
     - ✓ Hygiene: Hospital-acquired infections and contamination exacerbating spread.

- Infection Hotspots: Resistance is notably high in critical infections caused by pathogens like E. coli, Klebsiella pneumoniae, and Staphylococcus aureus, with Intensive Care Units (ICUs) being major hotspots.

4. New Study Challenges the "Sigma Cycle"

Context: A groundbreaking study by researchers from India's Bose Institute and the US-based Rutgers University has challenged a 50-year-old biological dogma known as the "Sigma Cycle." Their findings, published in PNAS, reveal that sigma factors can remain attached to RNA polymerase throughout transcription, overturning the long-held belief of their obligatory detachment.

About the Traditional "Sigma Cycle"
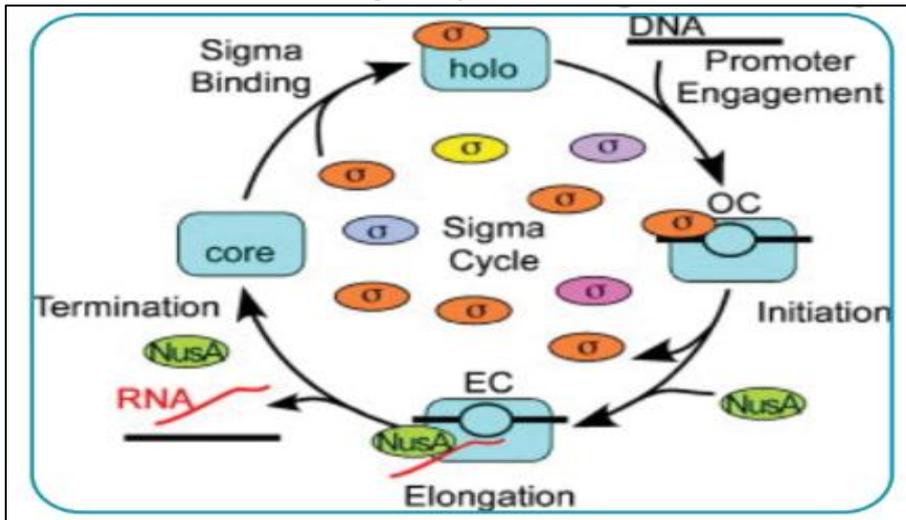
- The Standard Model: For decades, textbooks have taught that sigma factors are transient subunits essential only for the initiation of bacterial transcription.
- **Mechanism:**
  - ✓ Initiation: Sigma factors bind to the core RNA polymerase (RNAP) to form a holoenzyme. This complex recognizes specific promoter DNA sequences to start RNA synthesis.
  - ✓ Detachment: The model posits that once the RNA chain reaches 8–9 nucleotides, the sigma factor detaches (or "cycles" off), leaving the core enzyme to complete the process (elongation).
  - ✓ Recycling: The released sigma factor is then free to bind another RNAP core to start a new cycle.

New Findings: A Paradigm Shift

- Continuous Attachment: The study discovered that in the bacterium Bacillus subtilis, the principal sigma factor does not detach but remains stably bound to the RNAP throughout the entire transcription process.
- Not Universal: Experiments with a modified version of the Escherichia coli sigma factor showed similar behavior, proving that the "release after initiation" rule is not universal across all bacteria.
- Methodology: The team used advanced fluorescence-based imaging and biochemical assays to track the sigma factor's movement in real-time.

Potential Applications

- New Antibiotics: This discovery identifies a new, species-specific target for drug development. Antibiotics could be designed to disrupt this stable sigma-RNAP complex, offering new ways to fight drug-resistant bacteria.

- Synthetic Biology: The findings enable the engineering of bacteria with precise transcriptional controls, useful for biotechnological applications like producing biofuels or pharmaceuticals.
- Evolutionary Insight: It provides a deeper understanding of how different bacterial species have evolved distinct gene regulation mechanisms to adapt to their environments.

5. NASA's ESCAPADE Mission

Context: NASA has successfully launched the twin ESCAPADE (Escape and Plasma Acceleration and Dynamics Explorers) spacecraft aboard Blue Origin's New Glenn rocket. This mission aims to study the interaction between solar wind and Mars' magnetic environment to understand the planet's atmospheric loss.

About the Mission

- Developers: The mission is led by the University of California, Berkeley, with the spacecraft manufactured by Rocket Lab.
- Type: It is a dual-spacecraft heliophysics mission designed to act as a coordinated pair, providing simultaneous observations from different points in Mars' orbit.
- Launch Significance: The mission demonstrates a flexible "loiter-orbit" launch capability, which allows for interplanetary departures almost year-round, reducing dependency on specific launch windows.

Key Objectives

- Solar Wind Interaction: To investigate how the solar wind interacts with Mars' weak and complex hybrid magnetosphere.
- Atmospheric Escape: To measure how solar storms and energy transfer accelerate the escape of ions from the Martian atmosphere into space.
- Space Weather: To analyze short-term variations in magnetospheric conditions, helping to characterize the space weather environment around the Red Planet.

Significance

- Planetary Evolution: By tracing the history of atmospheric erosion, ESCAPADE will help reveal how Mars transformed from a potentially habitable world into the cold, desert planet it is today.
- Future Exploration: The data gathered will characterize radiation and plasma hazards, which is critical for planning the safety of future human missions to Mars.

6. CMS-03 (GSAT-7R)

Context: The Indian Space Research Organisation (ISRO) successfully launched the CMS-03 (GSAT-7R) communication satellite aboard the LVM-3 M5 (Launch Vehicle Mark-3). This mission marks another milestone for the LVM-3, following its historic success with Chandrayaan-3.

About the Satellite

- Purpose: GSAT-7R is an advanced defence communication satellite designed to replace the ageing GSAT-7 (Rukmini), launched in 2013. Its primary role is to bolster the secure communication capabilities of the Indian Navy.
- Weight: Weighing approximately 4,400 kg, it holds the record as the heaviest communication satellite ever launched from Indian soil. (Note: Heavier satellites like GSAT-11 were launched using foreign rockets like Ariane-5).
- Orbit: The satellite was initially placed into a Geosynchronous Transfer Orbit (GTO). It will use onboard propulsion to reach its final Geostationary Orbit (GEO), approximately 35,786 km above Earth.

Strategic Features

- Coverage: It provides real-time, encrypted communication coverage over the entire Indian landmass and the strategic Indian Ocean Region (IOR).
- Payload: Equipped with multiband transponders, it supports high-bandwidth voice, video, and data services essential for modern naval operations.
- Operational Life: The satellite is designed for a service life of 15 years

7. Alfven Waves and the Mystery of Coronal Heating

Context: A recent study by Northumbria University (UK) has provided direct observational evidence of Alfven waves in the Sun's corona. This discovery offers a pivotal clue to one of astrophysics' most enduring mysteries: why the Sun's atmosphere (corona) is nearly 200 times hotter (approx. 2 million°F) than its visible surface (approx. 10,000°F).

About Alfven Waves

- Definition: Alfven waves are low-frequency, transverse magnetohydrodynamic (MHD) waves that travel along magnetic field lines within a plasma.
- Function: They act as energy conveyors, transporting energy and momentum through charged particles without compressing the plasma itself.
- History: The existence of these waves was predicted by physicist Hannes Alfven in 1942, a discovery that later earned him the 1970 Nobel Prize in Physics. They represent oscillations arising from the interaction between magnetic tension and plasma inertia in magnetized fluids.

The Coronal Heating Mechanism

- Detection: The study utilized the Cryo-NIRSP instrument to identify red and blue Doppler shifts. These shifts revealed a distinct "twisting" motion in the coronal magnetic fields, a signature of Alfven waves.
- Process: Energy generated at the solar surface propagates upward through these waves and eventually dissipates as heat within the corona.
- Impact: The findings suggest that these waves could account for approximately 50% of the total energy required to sustain the corona's extreme temperatures.

8. Thorium Molten Salt Reactor (TMSR)

Context: China has achieved a significant milestone by successfully demonstrating the world's first thorium-to-uranium nuclear fuel conversion in its experimental Thorium Molten Salt Reactor (TMSR). This breakthrough paves the way for a planned 100 MW demonstration reactor by 2035, marking a stride toward commercializing thorium-based energy.

About Thorium

- Nature: Thorium-232 is the only naturally occurring isotope of thorium. It is fertile, meaning it can be converted into Uranium-233, a fissile material used for power generation.
- Source: It is primarily derived from monazite sands.
- Advantages: Compared to uranium, thorium is three times more abundant and generates significantly less long-lived radioactive waste.
- Global Reserves: India possesses the world's largest thorium reserves, concentrated in the coastal sands of Kerala, Odisha, and Tamil Nadu. However, global utilization remains low due to high extraction costs and technological hurdles.

About the TMSR Technology

- Type: TMSR is a fourth-generation advanced nuclear energy system.
- Mechanism: Unlike traditional reactors using water, TMSR uses high-temperature molten salt as both the coolant and the fuel solvent. This allows the reactor to operate at atmospheric pressure, enhancing safety.

Key Features:
- Passive Safety: If the reactor overheats, a frozen salt plug melts, automatically draining the fuel into a safe tank, preventing meltdowns.
- Efficiency: It extracts more energy from fuel while minimizing high-level waste.
- Versatility: The system supports high-temperature industrial applications (like hydrogen production) and integrates well with renewable sources.
- India's Position This development is highly relevant to India's three-stage nuclear power programme, devised by Dr. Homi Bhabha. The third stage explicitly envisages the use of thorium-based reactors, such as the Advanced Heavy Water Reactor (AHWR) and the Indian Molten Salt Breeder Reactor (IMSBR), to secure long-term energy independence.

9. Zinc-Ion Batteries (ZIBs)

Context: A Bengaluru-based research team has developed a novel activated cathode material that significantly enhances the performance and stability of Zinc-Ion Batteries (ZIBs), marking a stride in next-generation storage technology.

About Zinc-Ion Batteries ZIBs are an emerging energy storage solution that utilizes zinc ions for charge transfer, typically pairing a zinc anode with compatible cathode materials. They are gaining traction as a safer, eco-friendly alternative to Lithium-ion systems.
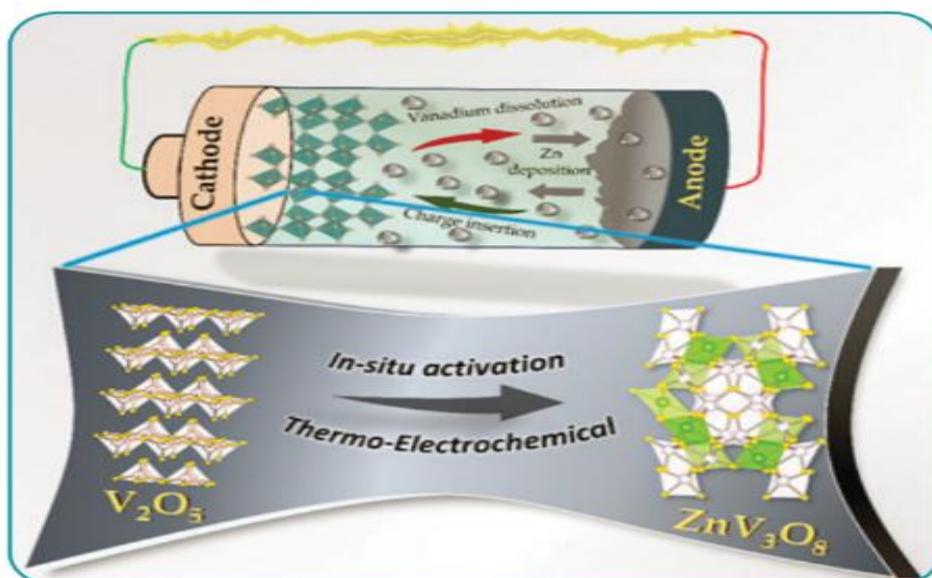
Key Advantages
- Safety: Unlike lithium batteries, ZIBs use aqueous (water-based) electrolytes, which drastically reduces fire risks.
- Sustainability: They rely on zinc, a naturally abundant and cost-effective resource.
- Performance: These batteries offer high energy storage capacity and a long cycle life.
- Applications Due to their safety profile and low cost, ZIBs are highly promising for grid storage, renewable energy backup, electric vehicles, and consumer electronics.

10. Neodymium

Context: India, through the state-run Indian Rare Earths Limited (IREL), has unveiled an ambitious plan to increase its neodymium production ninefold, targeting 500 tonnes by FY27. This move aims to secure critical supply chains for clean energy and defense sectors.

About Neodymium (Nd)
- Definition: Neodymium is a lustrous, silvery rare-earth metal with the atomic number 60.

- Sources: It does not occur naturally in metallic form but is extracted from minerals like monazite and bastnasite. In India, it is primarily sourced from the extensive monazite sands found along the coastal belts of Odisha, Kerala, and Tamil Nadu.

Global and Domestic Scenario
- Global Dominance: China currently controls the market, accounting for over 80% of the world's neodymium magnet production. Other producers include the USA and Australia.
- India's Position: India holds approximately 6% of global rare-earth reserves, a significant strategic asset managed largely by IREL.

Applications: The Power of Magnets The primary utility of neodymium lies in the creation of permanent magnets.
- Composition: A Neodymium magnet is an alloy comprising approximately 30% Neodymium, 68% Iron, and 2% Boron. This combination creates the strongest commercially available permanent magnets.
- **Critical Uses:**
  - ✓ Clean Energy: They are indispensable for the motors of Electric Vehicles (EVs) and the generators of wind turbines.
  - ✓ Strategic Defense: Used in guidance systems for missiles, drones, and communication equipment.
  - ✓ Electronics: Essential for hard disk drives, headphones, and loudspeakers.

11. **Vanadium Redox Flow Battery (VRFB) System**
    Context: The Union Minister for Power recently inaugurated India's first megawatt-hour (MWh) scale Vanadium Redox Flow Battery (VRFB) system at NTPC's NETRA facility in Noida. This development is a critical milestone in India's transition towards sustainable, grid-scale energy storage solutions.

    About Vanadium Redox Flow Battery (VRFB)
    - Working Principle: VRFB is a flow battery that stores energy in liquid electrolytes containing vanadium ions in multiple oxidation states. These electrolytes circulate through cell stacks separated by an ion-selective membrane, which permits ion exchange while preventing mixing.
    - Unique Feature: The system uses the same element (vanadium) for both the positive and negative electrolytes, effectively eliminating the risk of cross-contamination and ensuring a longer operational life.

    Key Advantages
    - Scalability: A major benefit is the ability to scale energy capacity (by increasing electrolyte volume) and power output (by increasing cell stack size) independently.
    - Safety & Durability: The electrolyte is water-based and non-flammable. The system can withstand thousands of cycles over 25+ years with minimal degradation.
    - Full Discharge: Unlike Lithium-ion batteries, VRFBs can be discharged 100% without sustaining damage.

    Comparison: VRFB vs. Lithium-Ion
    - VRFB: Best suited for stationary, large-scale grid storage due to its lower energy density but superior longevity and safety.
    - Lithium-Ion: Ideal for portable electronics and EVs due to high energy density, though it has a shorter lifespan (5-10 years) and higher fire risk.

    About Vanadium
    - Characteristics: Vanadium (Atomic Number 23) is a hard, silvery-grey transition metal known for its high melting point and corrosion resistance.

- Chemical Property: Its ability to exist in four distinct oxidation states (+2, +3, +4, +5) makes it uniquely suitable for flow batteries.
- Other Uses: It is extensively used to strengthen steel alloys, in aerospace components, and as a catalyst (Vanadium Pentoxide) in chemical manufacturing.

12. Interstellar Comet 3I/ATLAS

Context: The interstellar comet 3I/ATLAS recently reached its perihelion (closest point to the Sun) on October 30, 2025. This event marked its brightest and most active phase, drawing the attention of major space agencies like NASA and ESA.

About 3I/ATLAS

- Nature: It is an interstellar object, meaning it is not gravitationally bound to the Sun. It is making a one-time passage through our inner solar system before exiting permanently into interstellar space.
- Activity: The comet reached its perihelion at a distance of 1.35 AU (approx. 125 million miles). The intense solar heat triggered sublimation, creating a visible coma and generating two distinct tails—a dust tail and an ion tail—driven by solar wind.

Key Scientific Findings

- Chemical Composition: Early analysis has revealed unusually high concentrations of Carbon Dioxide and Nickel.
- Origin: These chemical signatures suggest that the comet originated in a metal-rich molecular cloud from another star system, likely formed around seven billion years ago.

Observation & Significance

- Missions: The comet is being tracked by a network of spacecraft, including NASA's Psyche and Lucy, ESA's JUICE, and assets currently on Mars.
- Importance: Studying 3I/ATLAS allows scientists to compare the chemical building blocks of other star systems with those of our own. This offers rare insights into early cosmic chemistry and the processes of planetary formation beyond our solar neighborhood.

13. GNSS Spoofing: A Growing Aviation Threat

Context: Recently, aircraft flying over Delhi reported encountering Global Navigation Satellite System (GNSS) spoofing, leading to erroneous cockpit warnings. This incident highlights the vulnerability of modern navigation systems to electronic interference.

What is GNSS Spoofing?

- Definition: GNSS spoofing is a deliberate attempt to manipulate navigation systems by broadcasting fake satellite signals. These counterfeit signals mislead receivers into calculating incorrect location, speed, or time.
- Mechanism:
  - ✓ Signal Overpowering: A spoofer generates counterfeit signals using the same frequency as authentic satellites but transmits them at a higher power.
  - ✓ Deception: The receiver automatically locks onto the stronger (fake) signal. The spoofer then gradually shifts the data (position or altitude) so the system does not detect a sudden anomaly, effectively "hijacking" the navigation.

Impact on Aviation

- Critical Risks: Modern aircraft rely heavily on GNSS for terrain awareness, collision avoidance, and autopilot functions. Spoofing can trigger false terrain warnings (e.g., "Pull Up") or divert flight paths.

- Resilience: despite the threat, aviation safety is bolstered by backup systems like the Inertial Reference System (IRS), which can function independently of satellite signals for several hours.

About GNSS (Global Navigation Satellite System)
- Function: GNSS refers to a constellation of satellites providing Positioning, Navigation, and Timing (PNT) services globally.
- Major Systems:
  - ✓ GPS (USA)
  - ✓ GLONASS (Russia)
  - ✓ Galileo (EU)
  - ✓ BeiDou (China)
  - ✓ Regional: NavIC (India) and QZSS (Japan)

14. CE20 Cryogenic Engine & LVM3

Context: The Indian Space Research Organisation (ISRO) recently achieved a significant milestone by successfully demonstrating the bootstrap mode start test on the CE20 cryogenic engine. This engine serves as the powerhouse for the upper stage of India's heaviest launch vehicle, the LVM3.

About CE20 Cryogenic Engine
- Technology: A cryogenic engine utilizes super-cooled liquid propellants—Liquid Oxygen (LOX) at -183°C and Liquid Hydrogen (LH_2) at -253°C. This low-temperature state allows for efficient storage and powerful propulsion.
- Status: The CE20 is India's most powerful indigenous cryogenic engine, developed by the Liquid Propulsion Systems Centre (LPSC) in Valiamala, Kerala.
- Significance: It powers the Cryogenic Upper Stage (C32) of the LVM3, enabling the launch of heavy payloads into geostationary orbits.

About Launch Vehicle Mark-3 (LVM3)
- Overview: Nicknamed "Bahubali", the LVM3 is ISRO's most powerful operational rocket, designed to carry heavy communication satellites and support deep-space missions like Chandrayaan and the upcoming Gaganyaan.
- **Configuration: It is a three-stage vehicle:**
  - ✓ Stage 1: Two S200 solid rocket boosters (among the largest in the world).
  - ✓ Stage 2: Two L110 liquid core stages.
  - ✓ Stage 3: The C25 cryogenic upper stage powered by the CE20 engine.
- Payload Capacity: It can deliver up to 8,000 kg to Low Earth Orbit (LEO) and 4,000 kg to Geosynchronous Transfer Orbit (GTO).

India's Cryogenic Journey
- Self-Reliance: In the 1990s, India was denied access to cryogenic technology due to geopolitical sanctions.
- Indigenous Success: In response, ISRO initiated the Cryogenic Upper Stage Project (CUSP). The first successful flight of an indigenous cryogenic stage occurred in January 2014 (GSLV D5).
- Maturity: The success of the CE20 engine represents the maturity of India's independent space capabilities, marking a transition from technology denial to technological mastery.

15. Ricin: A Potent Biological Threat

Context: The Gujarat Anti-Terrorist Squad (ATS) recently arrested three individuals, including a doctor, for allegedly attempting to manufacture ricin for a suspected terror plot. This incident highlights the misuse potential of easily accessible biological toxins.

About Ricin

- Source: Ricin is a highly toxic protein extracted from the seeds (beans) of the castor oil plant (Ricinus communis). While the plant is native to tropical Africa, it is also indigenous to India and widely cultivated for industrial castor oil.
- Extraction: Castor seeds contain approximately 30–60% oil. Ricin is found in the solid waste (mash) left over after processing the oil. It constitutes about 1–5% of this residue.
- Toxicity: It is one of the most potent plant toxins known. Even a minute dose of 1 milligram can be fatal for an adult.
- Mechanism of Action Upon entering the body, ricin functions as a ribosome-inactivating protein (RIP). It irreversibly binds to ribosomes (the cell's protein-making machinery), halting protein synthesis. Without essential proteins, cells die rapidly, leading to systemic organ failure

16. BIRSA 101: India's Indigenous Gene Therapy
Context: India has launched its first indigenous CRISPR-based gene therapy, titled BIRSA 101, designed to treat Sickle Cell Disease (SCD). This landmark development aims to provide an affordable, home-grown cure for a condition that disproportionately affects India's tribal populations.

About BIRSA 101
- Inspiration: The therapy is named in honor of Bhagwan Birsa Munda, the revered tribal freedom fighter.
- Developer: It was developed by the CSIR–Institute of Genomics and Integrative Biology (IGIB) in New Delhi. To ensure scalability and affordability, IGIB has partnered with the Serum Institute of India (SIIPL).
- Affordability: Unlike global gene therapies which can cost upwards of ₹20-25 crore, BIRSA 101 is engineered as a low-cost alternative tailored specifically for Indian socio-economic conditions.
- **Mechanism of Action**
  - ✓ Technology: The therapy utilizes CRISPR-Cas9 technology, a form of precision genetic surgery.
  - ✓ Process: It works by editing the defective genetic code responsible for the disease.
  - ✓ Efficacy: It is designed as a one-time treatment. A single infusion enables the body to produce normal red blood cells instead of the crescent or "sickle-shaped" cells characteristic of the disease.

Basics of Gene Therapy & CRISPR
- Gene Therapy: Involves correcting defective genes. Somatic therapy (used here) alters non-reproductive cells and is not inherited, whereas Germline therapy alters reproductive cells and is heritable (ethically restricted).
- CRISPR-Cas9: A gene-editing tool comprising two main components:
- Cas9 Enzyme: Acts as "molecular scissors" to cut DNA at a precise location.
- Guide RNA (gRNA): Directs the Cas9 enzyme to the specific target sequence in the DNA.

17. Typhoid Conjugate Vaccine (TCV) and India's Immunisation Landscape
Context: Despite India being a global hub for typhoid vaccine production and bearing nearly half the global burden of the disease, the Typhoid Conjugate Vaccine (TCV) has not yet been included in the nation's Universal Immunisation Programme (UIP). This exclusion persists even as Indian firms like Bharat Biotech and Serum Institute of India lead global supply.
About Typhoid Conjugate Vaccine (TCV)

- Mechanism: TCV is a conjugate vaccine, meaning the Vi polysaccharide antigen of the bacteria is chemically linked to a carrier protein. This structural enhancement significantly boosts the immune response.
- Key Advantages:
  - ✓ Efficacy in Infants: Unlike older vaccines, TCV is effective for children as young as 6 months.
  - ✓ Single Dose: It provides long-lasting immunity with just one injection.
  - ✓ WHO Endorsement: The WHO strongly recommended TCV for endemic regions in 2018 due to its ability to prevent severe complications like intestinal perforation.

The Burden of Typhoid
- The Disease: Typhoid fever is a bacterial infection caused by Salmonella Typhi, transmitted primarily through the faeco-oral route (contaminated food/water). Symptoms include high fever, abdominal pain, and hepatosplenomegaly (enlarged liver/spleen).
- **India's Crisis:**
  - ✓ India records an estimated 4.5 million cases and nearly 9,000 deaths annually.
  - ✓ The incidence is alarmingly high in poor urban areas due to sanitation challenges, with rates reaching up to 1,173 per 100,000 child-years.

Universal Immunisation Programme (UIP)
- Mandate: Managed by the Ministry of Health & Family Welfare, the UIP (formerly the Expanded Programme on Immunization, 1978) aims to provide free vaccines against 12 preventable diseases to all children and pregnant women.
- Gap: While initiatives like Mission Indradhanush strive to vaccinate the unvaccinated, the absence of TCV in the national schedule leaves a significant vulnerability in addressing the high morbidity caused by typhoid in India.

18. India's Quantum Leap and Medical Milestone

Context: In a landmark event for Indian science and technology, Prime Minister Narendra Modi recently unveiled three pioneering indigenous innovations. These advancements signify India's growing self-reliance in critical domains like quantum computing and precision medicine.

- **Quantum Security Integrated Processor (QSIP)**
  - ✓ Purpose: QSIP is a specialized hardware component designed to safeguard data infrastructure against future threats posed by quantum computers.
  - ✓ Function: It supports Post-Quantum Cryptography (PQC) and quantum-safe key handling, ensuring robust encryption for digital transactions and defense communications.
  - ✓ Significance: This innovation fortifies India's cybersecurity architecture, protecting sensitive national data from "harvest now, decrypt later" attacks.
- **25-Qubit Quantum Processing Unit (QPU)**
  - ✓ Milestone: This is India's first homegrown Quantum Processing Unit, placing the nation among an elite group with indigenous quantum hardware capabilities.
  - ✓ Mechanism: Unlike classical CPUs that use bits, this QPU utilizes qubits (quantum bits). It leverages quantum phenomena like superposition and entanglement to perform complex calculations at speeds unattainable by traditional computers.
  - ✓ Applications: It paves the way for breakthroughs in cryptography, materials science, and complex simulations.
- **NexCAR19: Indigenous CAR-T Cell Therapy**
  - ✓ Overview: Developed by ImmunoACT (an IIT Bombay spin-off), NexCAR19 is India's first indigenous CAR-T cell therapy. It is also the world's first "humanised" CAR-T therapy.

- ✓ Support: The project was backed by the Department of Biotechnology (DBT) and BIRAC under the National Biopharma Mission.
- ✓ Mechanism: This "living drug" works by extracting a patient's T-cells (immune cells) and genetically modifying them to express Chimeric Antigen Receptors (CARs). These engineered receptors enable T-cells to identify and destroy cancer cells specifically.
- ✓ Impact: Primarily effective against blood cancers like Acute Lymphocytic Leukemia (ALL) and lymphomas, NexCAR19 is a game-changer for making advanced gene therapy affordable and accessible in India.

19. Global Tuberculosis Report 2025

Context: The WHO Global TB Report 2025 highlights a significant achievement for India, recording a 21% decline in tuberculosis incidence between 2015 and 2024. Despite this progress, TB remains a formidable global health challenge.

Key Findings: Global & India

- Global Burden: In 2024, 10.7 million people fell ill with TB, and 1.23 million died. It remains a top infectious killer. Just 30 countries, including India, account for 87% of the global caseload.
- India's Progress:
  - ✓ Incidence: Declined from 237 per lakh (2015) to 187 per lakh (2024), nearly double the global decline rate.
  - ✓ Mortality: Reduced from 28 to 21 per lakh population in the same period.
  - ✓ State-wise Trends: Uttar Pradesh has the highest absolute cases, while Delhi records the highest infection prevalence.
- Remaining Challenge: Despite improvements, India still shoulders the largest global burden (25% of all cases) and missed its ambitious target to eliminate TB by 2025.

Factors Driving Decline

- Diagnostics: Expanded use of rapid molecular tests and AI-enabled X-ray units.
- Treatment: Adoption of the BPaLM regimen (Bedaquiline, Pretomanid, Linezolid, Moxifloxacin), a shorter, safer 6-month cure for MDR-TB.
- Screening: The TB Mukt Bharat Abhiyan screened over 19 crore vulnerable individuals, detecting lakhs of asymptomatic cases.

Major Challenges

- Drug Resistance: India contributes 32% of global MDR-TB (Multidrug-Resistant) and RR-TB cases.
- Funding Crunch: Global funding in 2024 was only $5.9 billion, far below the $22 billion target.
- Supply Chain: Intermittent reports of drug stockouts in states hinder treatment adherence.
- Socio-Economic Factors: Malnutrition and poverty continue to fuel the epidemic.

Way Forward: To realign with global elimination goals, India must strengthen primary healthcare surveillance, scale up TB Preventive Therapy (TPT) for high-risk groups, and ensure sustainable financing to bridge the gap between biomedical efforts and social determinants like nutrition.

DEFENCE & INTERNAL SECURITY

1. Renewed Nuclear Arms Race and India's Stakes

Context: The global nuclear order is facing its most severe stress test in decades. Russia's successful test of the nuclear-powered Burevestnik missile and the U.S. decision to resume nuclear testing after a 33-year moratorium have reignited fears of a renewed arms race.

The New Nuclear Race

- Technological Escalation: Russia's Burevestnik (9M730 "Skyfall") is a game-changer—a nuclear-powered cruise missile with theoretically unlimited range and unpredictable low-altitude trajectories. Meanwhile, the U.S., Russia, and China are racing to deploy Hypersonic Glide Vehicles (HGVs) and MIRVs.
- China's Rapid Expansion: China is shifting the global balance with a massive arsenal expansion.
  - ✓ Current: Estimated 500–600 operational warheads (2024).
  - ✓ Projected: Expected to exceed 1,000 by 2030 and reach 1,500 by 2035.
- U.S. Policy Shift: The resumption of U.S. nuclear testing ends a restraint largely held since 1992, signaling a move from disarmament to technological brinkmanship.

India's Stakes and Strategic Posture India occupies a precarious position in this multipolar race, sandwiched between two nuclear-armed adversaries with growing arsenals.

- **Regional Statistics:**
  - ✓ India: Approximately 180 nuclear warheads.
  - ✓ Pakistan: Approximately 170 nuclear warheads.
  - ✓ Implication: While India maintains near-parity with Pakistan, China's arsenal is nearly 3x larger and growing, forcing India to modernize its Credible Minimum Deterrence (CMD).
- Doctrine: India adheres to No-First-Use (NFU), committing to use nuclear weapons only in retaliation. However, the rise of Pakistan's tactical nukes and China's MIRVs has sparked internal debates on strategic flexibility.
- Modernization: To ensure survivability, India is operationalizing the Arihant-class SSBNs (sea-based deterrence) and developing Agni-V/VI missiles with MIRV capabilities.

Consequences of the Race
- Treaty Erosion: The developments undermine the Comprehensive Nuclear-Test-Ban Treaty (CTBT) and the Non-Proliferation Treaty (NPT).
- Environmental Risk: Resuming testing risks radioactive contamination, echoing the long-term damage seen at historical test sites like Semipalatinsk and Lop Nur.
- **Way Forward** India must navigate this volatile landscape by retaining its ethical leadership (advocating for global NFU) while ensuring its deterrence remains credible through technological upgrades (C3I, BMD) and diplomatic dialogue.

2. **India-US Defence Deal: Excalibur & Javelin**
   Context: The United States has approved a significant defence sale worth over $90 million to India, comprising Excalibur guided artillery shells and Javelin anti-tank systems. This move aims to bolster India's precision strike capabilities and deepen bilateral defence cooperation.
   Excalibur Artillery Shells
   - Developer: Developed by Raytheon, these are GPS-guided, precision artillery projectiles.
   - Capabilities:
     - ✓ Precision: Offers high accuracy with a deviation of only 2 to 20 metres, minimizing collateral damage.
     - ✓ Range: Capable of striking targets at distances of 40–57 km.
   - Compatibility: Designed to work seamlessly with India's existing 155 mm artillery ecosystem, including Bofors, M777 Ultra-Light Howitzers, K9 Vajra, and Dhanush guns.
   Javelin Anti-Tank Systems
   - Developers: Jointly developed by Raytheon and Lockheed Martin.
   - Type: A man-portable, medium-range, fire-and-forget anti-tank guided missile (ATGM).
   - **Key Features:**

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- ✓ Top-Attack Mode: Specifically designed to defeat heavy armour (like tanks) by striking from above, where armour is weakest. It is also effective against bunkers.
- ✓ Operability: Can be deployed by a single soldier and includes options for remote launch via unmanned platforms.
- ✓ guidance: Equipped with Lightweight Command Launch Units for advanced targeting.

3. White Collar Terrorism: The Insider Threat

Context: The recent blast in Delhi has prompted a critical introspection into "White Collar Terrorism." This phenomenon marks a strategic shift where terror outfits are increasingly recruiting educated professionals—doctors, engineers, and academics—moving away from traditional profiles to evade surveillance.

Drivers of Emergence

- Strategic Adaptation: Terror groups like JeM and ISIS are targeting professionals who are not on watchlists. High-profile examples include Abu Bakr al-Baghdadi (PhD) and Ayman al-Zawahiri (Surgeon).
- Institutional Access: Professionals have legitimate access to dual-use materials. For instance, doctors or researchers can procure chemicals (like Ammonium Nitrate) or rent premises without raising suspicion, providing a "plausible cover" for terror logistics.
- Financial Cloaking: Salaried individuals with clean banking histories can move funds and rent safe houses without triggering Anti-Money Laundering (AML) red flags, mixing terror finance with legitimate earnings.
- Digital Radicalization: Encrypted apps and digital echo chambers allow for the "intellectualization" of extremist narratives, grooming educated recruits without physical contact.

The Ammonium Nitrate Challenge

- Usage: A critical component for Improvised Explosive Devices (IEDs), specifically ANFO (Ammonium Nitrate-Fuel Oil) mixtures.
- Regulation: Despite strict regulations under the Explosives Act (requiring PESO/District Magistrate permission), illegal diversion remains a persistent security gap.

India's Counter-Terrorism Strategy

- Zero Tolerance Policy: A firm stance to eradicate terror networks.
- Institutional Framework:
  - ✓ NIA: Empowered to probe terror cases abroad.
  - ✓ NATGRID: Connects 21 security agencies for real-time intelligence.
    - ▪ UAPA Amendments: Allows designating individuals as terrorists and confiscating property.
- Databases: Utilization of NAFIS (fingerprints), IMT (terror monitoring), and NCORD (narcotics) to track offenders.

Way Forward To counter this invisible threat, a smarter strategy is required:

- Tighter Oversight: Stronger KYC and digital audit trails for high-risk materials (chemicals, labs).
- Ethical Curricula: Integrating constitutional values and counter-radicalization modules into medical and engineering education.
- AI Analytics: Using AI to detect financial anomalies in "clean" profiles while respecting civil liberties.
- De-radicalization: Engaging civil society to deconstruct extremist narratives online.

4. Tejas Light Combat Aircraft (LCA)

Context: The Tejas fighter jet recently garnered international attention following a tragic crash during a demonstration at the Dubai Airshow 2025, which resulted in the loss of the pilot. This incident has brought the focus back to the operational history and technical capabilities of India's indigenous fighter program.

About Tejas

- Definition: Tejas is India's indigenous 4.5-generation Light Combat Aircraft (LCA). The term "4.5-generation" refers to fighters that possess advanced avionics, sensors, and weapon systems comparable to modern standards, though they lack full stealth capabilities.
- Objective: It was specifically designed to replace the ageing MiG-21 fleet of the Indian Air Force (IAF), serving as a modern, multirole platform.

Development & Genesis

- Agencies: It was designed by the Aeronautical Development Agency (ADA) under the Department of Defence Research and Development (DRDO) and manufactured by Hindustan Aeronautics Limited (HAL).
- Timeline: The LCA programme was initiated in 1984. Tejas completed its maiden flight in 2001 and was formally inducted into the IAF in 2016, marking a major milestone in India's defence self-reliance.

Key Technical Features

- Design: It is a single-engine aircraft featuring a canard-delta wing configuration, which ensures high manoeuvrability and stability during flight.
- Performance:
- Maximum Speed: Mach 1.8 (approx. 2,200 km/h).
- Payload: Capable of carrying up to 5,300 kg of external stores (weapons and fuel).
- Roles: The aircraft is versatile, designed for diverse missions including offensive air support, close combat, and precision ground attacks.

Variants

- Tejas Mk1A: HAL is currently developing this advanced variant, featuring enhanced avionics, improved radar systems, advanced Electronic Warfare (EW) suites, and better maintainability.
- Trainer Variant: A twin-seat version has been developed to facilitate advanced pilot training and operational conversion.

5. Nuclear Submarine 'Khabarovsk'

Context: Russia has launched its latest nuclear-powered submarine, 'Khabarovsk', at the Sevmash Shipyard in Severodvinsk, located on the White Sea coast. This strategic move enhances Russia's naval deterrence capabilities.

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Key Capabilities
- Poseidon Drone Carrier: The submarine is specifically designed to carry and deploy Poseidon nuclear-powered underwater drones. Often referred to as "doomsday missiles," these drones possess intercontinental range and are capable of delivering massive nuclear payloads.
- Strategic Role: The integration of Poseidon drones positions 'Khabarovsk' as a unique asset for long-range strategic missions, distinct from traditional ballistic missile submarines.

Technical Features
- Nuclear Propulsion: Powered by a nuclear reactor, the submarine boasts extended underwater endurance and the ability to conduct prolonged stealth operations without the need to surface.
- Advanced Systems: It is equipped with cutting-edge sonar and communication systems, ensuring effectiveness in deep-sea environments.

6. Operation SOUTHERN SPEAR

Context: Amid rising tensions in Latin American waters and increased naval strikes on suspected narco-terrorist vessels, the United States has announced Operation SOUTHERN SPEAR. This move signals a heightened military posture against illicit networks in the region.

About the Operation
- Nature: It is a targeted military initiative aimed at dismantling drug-linked armed groups operating within the Western Hemisphere.
- Operational Area: The operation is expected to span the Caribbean Sea and the Eastern Pacific, regions where U.S. naval and air assets are already actively engaged in anti-drug missions.

Key Objectives
- Neutralize Threats: To remove narco-terrorist elements that destabilize the region.
- Homeland Security: To strengthen the defense of U.S. borders by severing the supply lines of illegal drugs flowing into the country.

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INDIAN ART & CULTURE AND HISTORY

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1. 150 Years of Vande Mataram

Context: The Prime Minister of India is set to inaugurate a year-long commemoration in New Delhi to mark the 150th anniversary of India's National Song, "Vande Mataram."

About the Song
- **Authorship:** The song was penned by Bankim Chandra Chatterjee using a unique blend of Sanskrit and Bengali.
- **Literary Origin:** It was notably featured in Chatterjee's novel Anandamath, published in 1882.
- **Composition:** According to the provided text, the tune for the song was composed by Yadunath Bhattacharya.

Historical Significance & Timeline
- **Early History:** While initially composed independently, its inclusion in Anandamath cemented its legacy.
- **First Rendition:** Rabindranath Tagore first sang the song publicly at the 1896 session of the Indian National Congress in Calcutta.
- **Political Symbolism:** It was first utilized as a political slogan on August 7, 1905, becoming a potent symbol of patriotism during the freedom struggle (Swadeshi Movement).
- **Global Presence**: In 1907, when Madam Bhikaji Cama unfurled India's first tricolour flag in Stuttgart, Germany, the words "Vande Mataram" were inscribed on it.

Constitutional Status

- **Adoption:** The Constituent Assembly officially adopted "Vande Mataram" as the National Song of India on January 24, 1950.
- **Status:** It is accorded equal reverence to the National Anthem ("Jana Gana Mana"). However, singing it is not mandatory on any occasion

2. Janjatiya Gaurav Divas & Legacy of Birsa Munda

Context: The Government of India has declared November 15 as Janjatiya Gaurav Divas to commemorate the birth anniversary of the revered tribal freedom fighter, Bhagwan Birsa Munda. This observance was officially instituted in 2021 to honor the contributions of tribal communities to India's heritage and freedom struggle.

About Birsa Munda
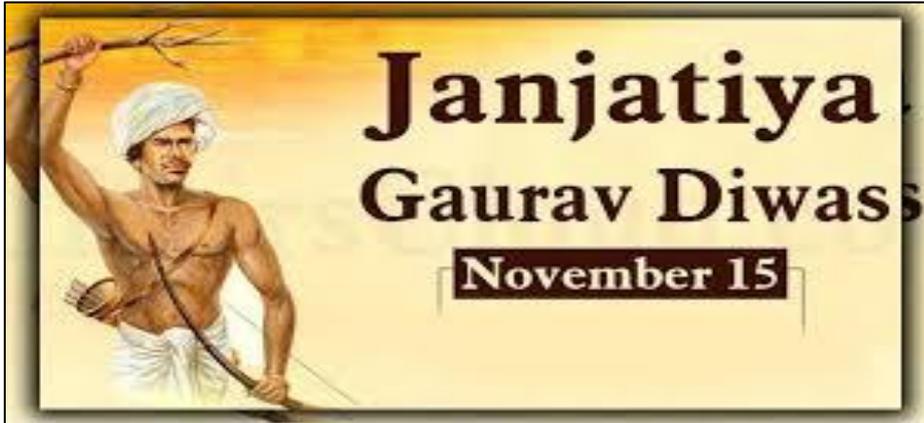
- **Early Life:** Born in 1875 in Ulihatu (Khunti district, Jharkhand), he was originally named Daud Munda. He hailed from the Munda tribe of the Chhotanagpur plateau region.
- **Titles:** He is venerated as Bhagwan (God) and is often referred to as Dharti Aaba (Father of the Earth).
- **Death:** He passed away due to illness in Ranchi Jail on June 9, 1900.

Teachings and Beliefs

- **Birsait Sect:** He founded a new faith called Birsait, which preached monotheism (belief in one God).
- **Cultural Revival:** He sought to reform traditional Munda religious practices and firmly rejected the influence of Christian missionaries.
- **Moral Code:** His teachings emphasized purity in personal and social life, advocating for cleanliness, hard work, and abstinence from alcohol.
- The Munda Rebellion (Ulgulan) Birsa Munda led the famous Ulgulan (Great Tumult) movement starting in 1895, mobilizing tribes across Chhotanagpur, Bengal, and Odisha. The ultimate goal was to establish an independent Munda Raj free from foreign rule.

Key Causes of the Revolt:

- **Land Rights:** The introduction of the Zamindari system replaced the traditional Mundari Khuntkatti system (community land ownership), leading to land alienation.
- **Exploitation:** The tribes faced severe exploitation from Dikus (outsiders like moneylenders and traders) and Europeans.
- **Forced Labour:** Colonial policies resulted in practices like Beth begari (forced labour) and bonded labour.
- **Cultural Conflict:** The movement also opposed the criticism of traditional tribal culture by missionaries.

Impact and Legacy The resistance led by Birsa Munda resulted in significant legislative changes to protect tribal rights:

- **Tenancy Act (1903):** This act officially recognized the Khuntkatti system.
- **Chotanagpur Tenancy Act (1908):** A landmark legislation that prohibited the transfer of tribal land to non-tribals.
- **Abolition of Begar:** The movement also contributed to the repealing of the forced labour (begar) system.

3. Dismantling the Colonial Mindset: A Path to Decolonisation

Context: The Prime Minister has urged the nation to take a 10-Year National Pledge (2025–2035) to dismantle the colonial mindset implanted by reforms like Macaulay's 1835 Minute on Education and reinforced by centuries of institutional subordination. The goal is to restore civilisational confidence and build a self-reliant India.

Elements of the Colonial Mindset

- **Linguistic Hierarchy:** English remains the dominant medium in administration, judiciary, and elite academia, creating a prestige hierarchy that disadvantages vernacular speakers.
- **Cultural Devaluation:** A perception equating Western culture with progress has led to the neglect of Indian heritage, monuments, and traditional knowledge systems like Ayurveda and Nyaya logic.
- **Institutional Legacy:** Laws like the IPC (1860) and Evidence Act (1872) shaped a policing culture focused on control rather than service.
- **Economic Imagination:** Development models often mimic Western industrialisation and consumption, sidelining indigenous sectors and sustainable practices.

Corrective Measures & Reforms

- **Legal Overhaul:** The introduction of the Bharatiya Nyaya Sanhita (BNS), Bharatiya Nagarik Suraksha Sanhita (BNSS), and Bharatiya Sakshya Adhiniyam (BSA) marks a shift from colonial-era laws to a justice-oriented framework.
- **Educational Reform:** The NEP 2020 and CBSE directives promote mother-tongue education and the integration of Indian Knowledge Systems (IKS) into mainstream curricula.
- **Cultural Revival:** Projects like the Kashi Vishwanath Corridor and the renaming of Rajpath to Kartavya Path symbolise a shift from colonial entitlement to national duty.
- **Economic Self-Reliance:** Initiatives like PLI schemes and Atmanirbhar Bharat aim to reduce import dependence, while the India Stack (UPI, Aadhaar) showcases indigenous digital innovation.
- **Way Forward** India must move beyond imitation to rooted modernity. This involves deepening linguistic decolonisation in courts and administration, reviewing residual coercive laws, and creating a sovereign technology stack. Cognitive decolonisation is not a rejection of the world but an engagement with it on the strength of India's own language, heritage, and democratic confidence.

4. 150 Years of Arya Samaj

Context: The Prime Minister recently highlighted the significant contributions of the Arya Samaj on the occasion of its 150th foundation year, acknowledging its pivotal role in India's social and religious transformation.

About Arya Samaj
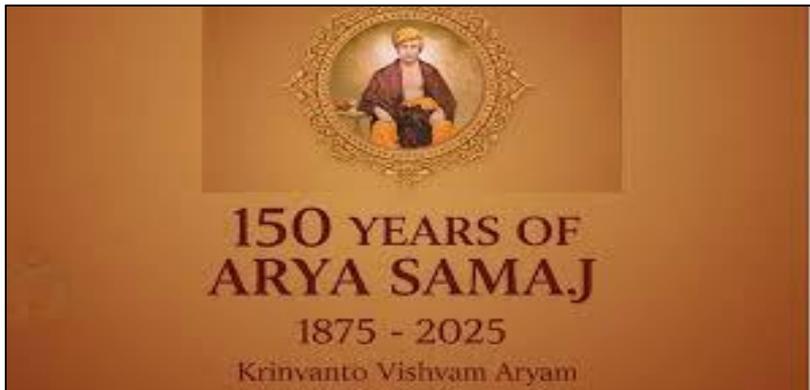
- Establishment: The socio-religious reform movement was founded in 1875 by Swami Dayanand Saraswati in Bombay.
- Core Philosophy: It advocated for monotheism and the infallible authority of the Vedas. Swami Dayanand gave the clarion call of "Back to the Vedas," urging a return to the original Vedic values while denouncing later additions such as idolatry and ritualistic worship.

Key Reforms & Contributions

- Religious Reforms: The movement preached respect for all humanity and rejected rigid rituals and idol worship, promoting a rational approach to religion.
- Social Reforms: It launched a crusade against social evils, opposing the hereditary caste system and untouchability. It strongly advocated for women's rights, campaigning against child marriage and forced widowhood while promoting women's education.
- Educational Reforms: To blend Vedic values with modern scientific knowledge, the Dayanand Anglo Vedic (DAV) Trust was established in 1886, creating a network of institutions that continue to impart modern education.
- Role in Freedom Struggle: The Arya Samaj became a breeding ground for nationalism, producing stalwarts like Lala Lajpat Rai, Bhagat Singh, Ram Prasad Bismil, and Swami Shraddhanand.

5. **Vijayanagara-Era Gold Coins**

   Context: During the restoration of a Later Chola-era Shiva temple in Tiruvannamalai district, Tamil Nadu, over 100 gold coins dating back to the Vijayanagara Empire (14th–16th century CE) were discovered. This find sheds light on the economic and cultural vibrancy of the period.

   Key Findings

   - Characteristics: The coins are circular (unlike the square coins of the Sangam Age) and measure approximately 5 mm in diameter.
   - Iconography: Many bear the emblem of a Wild Boar (Varaha), the royal symbol of the Vijayanagara dynasty, representing the Varaha incarnation of Lord Vishnu.
   - Purpose: Archaeologists suggest these were deposited as religious offerings to invoke divine protection or prosperity, reflecting the era's temple patronage.

   About the Vijayanagara Empire

   - Foundation: Established in 1336 CE on the banks of the Tungabhadra River (Hampi) by Harihara I and Bukka Raya I of the Sangama Dynasty, under the mentorship of Saint Vidyaranya.
   - Dynasties: The empire was ruled by four dynasties: Sangama, Saluva, Tuluva (peak period under Krishnadevaraya), and Aravidu.

   Features of Vijayanagara Coinage

- Metal & Denominations: The empire issued coins in gold, silver, and copper. The Gold Pagoda (Varaha) was the standard unit of high value, while Gold Fanams and Silver Taras were used for fractional transactions.
- Religious Motifs: Coins served as a medium of cultural expression.
- Harihara II featured the Trinity (Brahma, Vishnu, Shiva).
- Krishnadevaraya introduced the Balakrishna (infant Krishna) motif.
- Achyuta Raya used the Ganda Berunda (mythical double-headed eagle), symbolizing immense power.
- Scripts: Reflecting the empire's linguistic diversity, inscriptions appeared in Nagari, Kannada, Telugu, and Tamil.

MISCELLANEOUS

1. **Lachit Borphukan**
   Context: Recently, the Prime Minister and Home Minister paid tributes to the legendary Ahom general Lachit Borphukan on the occasion of Lachit Diwas. He is celebrated as a symbol of indomitable courage and tactical brilliance in Indian military history.
   About Lachit Borphukan
   - Early Life: Born on 24th November 1622 in Charaideo, Assam, he rose to prominence in the Ahom administration.
   - Role: He was appointed as one of the five Borphukans by King Charadhwaj Singha.
     - ✓ The position of Borphukan carried immense administrative, judicial, and military authority, effectively functioning as a viceroy for the western territories of the Ahom Kingdom.
   - Military Genius: Lachit is best remembered for his leadership in the Battle of Saraighat (1671). Despite facing a numerically superior Mughal army led by Raja Ram Singh, he employed exceptional guerrilla warfare tactics and clever use of the Brahmaputra River's terrain to secure a decisive victory.
   - Demise: He passed away in 1672 due to illness, a year after his historic triumph.
   The Battle of Saraighat (1671)
   - It was a naval battle fought on the Brahmaputra River near Guwahati.
   - It is regarded as the last major attempt by the Mughals to extend their empire into Assam. Lachit's victory halted Mughal expansion in the Northeast.
   About the Ahom Kingdom
   - Foundation: Established in 1228 CE by Chaolung Sukaphaa, a Shan prince from the Mong Mao region (modern-day Myanmar).
   - Legacy: The dynasty ruled large parts of present-day Assam for nearly 600 years (13th–19th century), successfully resisting multiple invasions until the British annexation.

2. **State of State Finances 2025 Report**
   Context: The 'State of State Finances 2025' report was released by PRS Legislative Research. It provides a comprehensive analysis of state budgets, audit reports, and economic data across all Indian states for the fiscal years 2023–24 and 2024–25.
   Key Findings
   - High Committed Expenditure: States spent a staggering 62% of their revenue receipts on committed liabilities—salaries, pensions, interest payments, and subsidies—in 2023–24. This leaves very limited fiscal room for development projects.

- ✓ Revenue Deficit: The aggregate revenue deficit stood at 0.4% of GSDP, indicating that states are effectively borrowing to fund routine operational expenses.
- Declining GST Performance: The report highlights concerning trends in tax collection. Taxes subsumed under GST dropped from 6.5% of GDP (2015–16) to 5.5% (2023–24).
  - ✓ SGST Ratio: The average SGST-to-GDP ratio is now 2.6%, which is lower than the pre-GST level of 2.8%.
  - ✓ Dependency on Loans: Approximately 19% of states' capital outlay for 2024–25 is funded through loans under the Scheme for Special Assistance to States for Capital Investment (SASCI).
- **Widening Inequality: A sharp divergence exists between states.**
  - ✓ Richer States: States like Maharashtra, Karnataka, and Tamil Nadu generate higher "own revenue" and maintain higher per capita spending.
  - ✓ Poorer States: States like Bihar, Uttar Pradesh, and Jharkhand face constrained fiscal space, leading to a widening development gap across the country.

3. Guru Tegh Bahadur: The Shield of India

Context: President Droupadi Murmu recently paid tribute to Guru Tegh Bahadur on his 350th martyrdom day, honoring his supreme sacrifice for the protection of human rights and religious freedom.

About Guru Tegh Bahadur (1621–1675)

- Lineage: Born as Tyaga Mal, he was the youngest son of Guru Hargobind (the sixth Sikh Guru). He was later named Tegh Bahadur ("Mighty of the Sword") in recognition of his valour in battle against Mughal forces.
- Guruship: He ascended as the ninth Sikh Guru in 1664, succeeding Guru Har Krishan. His legacy was carried forward by his son, Guru Gobind Singh, the tenth Guru.
- Title: He is reverently known as "Hind-di-Chadar" (Shield of India) for his role in safeguarding the oppressed and defending their right to worship.

Key Contributions

- Spiritual Legacy: He composed over 100 hymns (Shabads) that are incorporated into the Guru Granth Sahib. His writings emphasize devotion, humility, detachment, and the nature of the Divine.
- Institutional Building: He founded the city of Anandpur Sahib in Punjab, which became a spiritual center for Sikhs and later the birthplace of the Khalsa in 1699.
- Social Reform: He travelled extensively to preach compassion and equality. Notably, he stood against the forced conversions of Kashmiri Pandits and other non-Muslims, championing the principle of freedom of conscience.

Martyrdom and Significance

- Execution: In 1675, Guru Tegh Bahadur was arrested and publicly executed in Delhi (at the site of present-day Gurdwara Sis Ganj Sahib) on the orders of Emperor Aurangzeb for refusing to convert to Islam.
- Observance: His martyrdom is observed annually as Shaheedi Divas on 24 November. It stands as a powerful reminder of the supreme sacrifice made to uphold the dignity and religious freedom of all communities.

4. State of Food and Agriculture (SOFA) 2025 Report

Context: The State of Food and Agriculture (SOFA) 2025 report, published by the Food and Agriculture Organization (FAO), issues a stark warning: human-driven land degradation is

critically undermining global agricultural productivity, threatening food security and ecosystem resilience.

About the Report

- Publisher: Food and Agriculture Organization (FAO) of the United Nations.
- Focus: The report investigates how unsustainable human activities—such as intensive farming, deforestation, and overgrazing—erode the land's capacity to support sustainable food systems.

Key Highlights

- Understanding Degradation: The report defines land degradation as the long-term decline in the land's ability to provide essential ecosystem services. This is driven by a mix of natural factors (soil erosion, salinization) and anthropogenic factors (poor irrigation, cropping practices).
- Scale of Impact: Approximately 1.7 billion people globally are facing yield losses of up to 10% due to human-induced degradation. Asia bears the brunt of this crisis due to its dense population and "accumulated degradation debt."
- Stalled Productivity: The growth of Total Factor Productivity (TFP)—a key measure of technological efficiency in agriculture—has slowed significantly since the 2000s, particularly in the Global South.
- Food Security & Health: There is a direct link between soil health and human nutrition. About 47 million stunted children under the age of five reside in regions where severe yield losses overlap with acute food insecurity.
- Ecosystem Collapse: Degradation is weakening rangelands, reducing livestock output, and driving deforestation-linked biodiversity loss and climate disruption.

India's Position

- High Yield Loss: India is identified as one of the worst-affected nations, suffering significant yield gaps directly attributable to human-induced degradation.
- Cropland Abandonment: The crisis is forcing the abandonment of approximately 3.6 million hectares of cropland annually, posing a severe threat to rural livelihoods and agrarian stability.

5. **QS World University Rankings 2026**

Context: The QS World University Rankings 2026 have been officially released, offering a comprehensive evaluation of higher education institutions worldwide. Produced annually by Quacquarelli Symonds (QS), a UK-based higher education analytics firm, this ranking is considered one of the most authoritative global benchmarks for university performance.

About the Rankings

- Scope: The 2026 edition assessed over 1,500 universities across more than 100 countries.
- Methodology: The rankings evaluate institutions based on critical metrics including higher education quality, research impact, academic reputation, and international outlook.
- Global Trends: Nearly 500 institutions demonstrated improved rankings compared to the previous year, highlighting the competitive and evolving nature of global education.

Global Key Highlights

- Global Leader: The Massachusetts Institute of Technology (MIT) successfully retained its position as the top-ranked university in the world, continuing its streak of dominance.
- India's Performance Indian institutions continue to make their mark on the global stage, with the Indian Institutes of Technology (IITs) leading the charge:
- Top Performer: IIT Delhi emerged as the highest-ranked Indian institution, securing the 123rd position globally.
- Followers: It was closely followed by IIT Bombay at 129th and IIT Madras at 180th place.

QS Asia Rankings 2026 In addition to the global list, the QS Asia Rankings were also highlighted:

- Criteria: These specific rankings focus on academic reputation, international outlook, employability, and research impact within the Asian context.
- Asia's Top Universities: The University of Hong Kong claimed the first position, overtaking China's Peking University, which moved to second place.
- India in Asia: While IIT Delhi retained its status as the top national institution in these regional rankings, it saw a decline in its standing, dropping to 59th place from its previous rank of 44th.

6. International Migration Outlook 2025

Context: The International Migration Outlook 2025, an annual report by the Organization for Economic Co-operation and Development (OECD), reveals that permanent migration to OECD countries declined by 4% in 2024, signaling a stabilization after post-pandemic peaks.

About the Report

- Publisher: Organization for Economic Co-operation and Development (OECD).
- Focus: It analyzes global migration trends, labour market integration of migrants, and evolving policy frameworks across member nations.

Key Global Findings

- Migration Flows: In 2024, OECD nations admitted 6.2 million permanent immigrants. While this represents a slight decline from the previous year, it remains 15% higher than 2019 levels.
- Trends:
  - ✓ Labour migration witnessed a decline, whereas humanitarian migration saw an uptick.
  - ✓ Temporary work permits surged by 26%, indicating a shift towards short-term labour mobility.
  - ✓ International student inflows dropped by 13%.
  - ✓ Asylum applications reached a record high of 3 million, while illegal border crossings into the EU fell by 37%.

India-Specific Findings

- Citizenship: In 2023, approximately 225,000 Indian citizens acquired the nationality of OECD countries, marking one of the highest figures among non-member states.
- Education: India continues to be a major source of global talent, with India and China together accounting for one-third of all international students enrolled in OECD countries.

TELANGANA CURRENT AFFAIRS

1. GHMC Launches Mobile App for Road Safety Inspections

Context: The Greater Hyderabad Municipal Corporation (GHMC) has introduced the Periodic Public Safety Inspection (PPSI) App. Built on ArcGIS Field Maps technology, this tool is designed to monitor road safety and infrastructure in real-time.

Key Highlights of the Initiative

- **Objective:** To modernize urban infrastructure management by digitizing road inspections. This moves the process away from manual reporting to a data-driven, location-based system.
- **Technology Used:** The app utilizes Geographic Information System (GIS) technology to ensure precision in identifying problem areas.

How it Works & Key Features

1. **On-Site Reporting:** Field engineers can instantly report issues found during inspections.
2. **Scope of Issues:** The app covers various hazards including potholes, open manholes, damaged footpaths, protruding iron bars, and unsafe electrical installations.
3. **Geo-Tagging:** Utilizing ArcGIS, every report is tagged with specific GPS coordinates and photographic evidence, creating a verifiable digital trail.
4. **Centralized Monitoring:** A dashboard allows senior officials to track the status of complaints from reporting to resolution, ensuring accountability.

Significance

- **Public Safety:** Faster identification of hazards leads to quicker repairs, reducing accidents.
- **Smart Governance:** This initiative aligns with Smart City goals by integrating technology into civic administration.
- **Data-Driven Planning:** The collected data helps in long-term infrastructure planning and efficient budget allocation based on actual ground realities.

2. Telangana High Court Limits Human Rights Commission's Interference in Educational Matters

Context: The Telangana High Court has issued a stay order on proceedings initiated by the Telangana State Human Rights Commission (TGHRC) against the Sultan-ul-Uloom Educational Society, raising questions about the Commission's jurisdiction over administrative academic matters.

Case Background

- **The Dispute:** The TGHRC had accepted a complaint regarding the issuance of conduct certificates and academic documents by the Sultan-ul-Uloom College of Pharmacy.
- **The Petitioner's Stand:** The educational society challenged this in the High Court, arguing that the issue was purely administrative and did not constitute a "human rights violation."

Key Legal Arguments

- **Definition of Human Rights:** The petitioner cited **Section 2(d)** of the **Protection of Human Rights Act, 1993**, arguing that human rights pertain to life, liberty, equality, and dignity. Routine administrative grievances in colleges do not fall under this definition.
- **Jurisdictional Overreach:** The college argued that the Commission's intervention was *ultra vires* (beyond legal power) and infringed upon the autonomy of the educational institution.

High Court's Observation & Ruling

- **Stay Order:** A division bench led by Chief Justice Aparesh Kumar Singh stayed the TGHRC proceedings.
- **Need for Distinction:** The Court emphasized the necessity to distinguish between genuine human rights violations and internal administrative disputes of institutions.
- **Legal Precedent:** The case is significant as it seeks to define the boundaries of quasi-judicial bodies like the Human Rights Commission, ensuring they do not overstep into the governance of autonomous educational bodies.

3. Vision 2047: The Roadmap to a $3 Trillion Economy

Context: Telangana Cabinet, chaired by Chief Minister A. Revanth Reddy, held a high-level review to finalize and approve the **"Telangana Rising 2047"** vision document. This document serves as the state's strategic blueprint for the next two decades.

About 'Telangana Rising 2047' This is a comprehensive policy framework designed to guide Telangana's economic and social development leading up to the centenary of India's independence. The primary objective is to transform the state into a **$3 trillion economy** by 2047, with an intermediate milestone of reaching $1 trillion by 2034.

Key Highlights

- **Cluster Model:** The roadmap introduces a new economic zoning model inspired by global best practices (like China's Guangdong):
  - **CURE (Core Urban Region Economy):** Focuses on Hyderabad and its urban agglomeration.
  - **PURE (Peri-Urban Region Economy):** Targets semi-urban manufacturing belts.
  - **RARE (Rural Agriculture Region Economy):** Focuses on modernizing the agrarian hinterlands.
- **Mega Projects:** The vision integrates financing and execution strategies for the **Musi River Rejuvenation**, the Regional Ring Road (RRR), and the "Fourth City" (Future City) at Mucherla.
- **Investment Targets:** The document laid the groundwork for the Global Summit in December, targeting investment pledges exceeding ₹5 lakh crore.

4. Cabinet Expansion: Md. Azharuddin Inducted as Minister

Context: On November 10, 2025, former Indian cricket captain and TPCC Working President Mohammed Azharuddin officially took charge as the Minister for Minorities Welfare and Public Enterprises.

About the Appointment This marks the first major cabinet expansion under the current government. Azharuddin's induction is a strategic move to ensure representation for the minority community in the state cabinet.

Key Highlights

- **Portfolio:** He has been assigned the **Minorities Welfare** and **Public Enterprises** portfolios.
- **Constitutional Requirement:** As he is not currently a member of the Legislature, he must be elected to either the Assembly or the Legislative Council (MLC) within **six months** to retain his post. A nomination under the Governor's quota is currently pending approval.
- **Focus Areas:** Upon taking charge, he pledged to streamline scholarship disbursements and revitalize loss-making state-run enterprises.

5. Environment: Telangana Tops National Water Awards 2024

Context: On November 18, 2025, President Droupadi Murmu presented the 6th National Water Awards 2024 in New Delhi, where Telangana was adjudged the Best Performing State.

About the Awards Constituted by the Union Ministry of Jal Shakti, these awards recognize excellence in water resource management, specifically under the *Jal Shakti Abhiyan: Catch the Rain* campaign.

Key Highlights

- **Achievements:** The state was cited for completing over 5.2 lakh water conservation structures.
- **District Performance:** The districts of **Adilabad, Nalgonda, and Mancherial** swept the top three positions in the Southern Zone district category.
- **Urban Recognition:** The **Hyderabad Metropolitan Water Supply and Sewerage Board (HMWSSB)** was ranked as the second-best urban local body in India.

Significance: The award validates the "Jal Sanchay – Jan Bhagidari" (Water Conservation – Public Participation) model. It highlights the success of combining NREGS labor with technical planning to improve groundwater levels in the semi-arid Deccan plateau.

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6. Technology: Hyderabad Hosts VFX Summit 2025

Context Hyderabad hosted the VFX Summit 2025 on November 1–2 at the Hyderabad International Convention Centre (HICC), a first-of-its-kind exclusive conclave for the visual effects industry.

About the Summit The event brought together global leaders from the AVGC (Animation, Visual Effects, Gaming, and Comics) sector to discuss the future of digital production, specifically the role of Artificial Intelligence.

Key Highlights

- **Theme:** The summit focused on **"Generative AI Pipelines"** and "Procedural Thinking" in film production.
- **Industry Shift:** Discussions highlighted the transition of Indian studios from "outsourcing hubs" to "IP creators," driven by the global success of VFX-heavy Telugu films.
- **Infrastructure:** The event served as a curtain-raiser for the upcoming **Image Tower** and **AI City** projects in Mucherla.

Significance The summit reinforces Hyderabad's ambition to become the "Content Capital of Asia" by 2030, attracting foreign investment into the state's dedicated media and entertainment zones.

ANDHRA PRADESH CURRENT AFFAIRS

1. Andhra Pradesh: Setting National Benchmarks in Energy Efficiency and Sustainable Urban Development

Context: Andhra Pradesh's recent commitment to, and execution of, large-scale Energy Efficiency (EE) and clean energy programs received national recognition at the South-West Regional Conference in Hyderabad. The state's strategy integrates EE into core sectors like housing, urban governance, and tourism, positioning AP as a national model for sustainable development under the Viksit Bharat Vision.

I. The Policy and Economic Dimension:

- **Strategic Central-State Partnership:** The state's aggressive EE push is facilitated by MoUs with Energy Efficiency Services Ltd (EESL), a joint venture of Central PSUs under the Ministry of Power. This demonstrates robust Centre-State collaboration, a key aspect of cooperative federalism.
- **Investment Attraction:** The MoUs signed in a single day are projected to attract investments worth approximately Rs 5,000 crore, highlighting the significant economic potential of large-scale EE implementation.
- **Cross-Sectoral Implementation:** Agreements span crucial sectors—housing, urban local bodies (ULBs), MSMEs, and tourism—showing a holistic approach rather than isolated projects.
- **National Benchmark Status:** Union Minister Manohar Lal Khattar and TERI officials lauded AP's leadership, specifically for the saturation-level EE programmes and the implementation of India's largest LED streetlight programme, establishing the state as a national benchmark.

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II. The Welfare and Social Dimension

- **India's Largest Housing EE Programme:** AP is rolling out the largest EE programme in India's housing sector, targeting 6 lakh Pradhan Mantri Awas Yojana (PMAY) beneficiaries by the end of 2026.
- **Direct Household Benefit:** The distribution of BEE star-rated appliance kits (LED bulbs, tube lights, and BLDC fans) to these households is expected to save approximately 10.24 million kilowatt-hours (kWh) annually, leading to significant savings of ₹6.07 crore in reduced power bills for poor families.
- **Targeted Financial Assistance:** The scheme includes targeted financial assistance for vulnerable groups (₹50,000 for SC/BC, ₹75,000 for STs, and ₹1 lakh for PVTGs), linking energy transition directly to social welfare and upliftment.

III. The Environment and Technology Dimension

- **Sustainable Tourism Model (Geothermal Technology):** AP Tourism collaborated with EESL to introduce geothermal technology for water and space heating in the internationally recognized Araku Valley.
- **Technological Efficiency:** The geothermal system promises substantial energy savings of 50–70% annually with a long lifecycle (>15 years), elevating Araku's profile as a sustainable tourism hub and demonstrating the adoption of niche clean energy technologies.
- **Urban Illumination & Public Safety:** The plan to install and upgrade 10 lakh LED streetlights in urban areas will significantly enhance public safety, reduce emissions, and improve the overall quality of life, aligning with the goals of sustainable urban development and climate action.

2. India's Four Labour Codes: A Landmark Reform for Enterprises and Workers

Context: The implementation of India's Four Labour Codes has been hailed by the Confederation of Indian Industry (CII) AP as a landmark reform. This move consolidates decades of complex labour legislation, aiming to create a modernized, simplified, and worker-centric regulatory environment essential for achieving growth visions like Swarnandhra Vision 2047 and attracting investment.

Body Part:

I. The Governance and Simplification Dimension

- **Consolidation of Laws:** The primary structural reform is the consolidation of 29 complex, decades-old labour laws into a unified framework of just four Codes.
- **Compliance Burden Reduction:** This unification drastically reduces the compliance burden for enterprises, fostering Ease of Doing Business (EoDB), a crucial factor cited by investors in roadshows.
- **Clarity and Standardization:** The unified framework offers enhanced clarity and standardization of definitions, penalties, and procedures across the country, replacing the previous fragmented legal landscape.

II. The Economic and Investment Dimension

- **Attracting Investment:** A simplified and stable labour ecosystem is directly aligned with the requirements of potential investors, making Andhra Pradesh a more competitive destination. CII AP noted this fulfills a key ask from investors in roadshows and summits.
- **Future-Ready Workforce:** The reforms are seen as a decisive step toward creating a more productive and "future-ready" workforce, which is essential for sustaining long-term economic growth and achieving the Swarnandhra Vision 2047.

III. The Worker Welfare and Social Security Dimension

- **Universal Minimum Wages:** The Codes introduce the provision for a universal minimum wage, ensuring higher pay and basic financial security for workers across all sectors and geographies.
- **Expanded Social Security Coverage (EPFO/ESIC):** The reforms significantly expand the coverage of ESIC (health insurance) and EPFO (pension/provident fund), extending formal social security benefits to a larger segment of the workforce, including gig and platform workers in certain Codes.
- **Portability of Social Security:** The new framework promotes the portability of social security benefits, ensuring that workers retain their benefits even when they change jobs or move across states.
- **Safer Workplaces:** The Code on Occupational Safety, Health, and Working Conditions (OSH) mandates stringent requirements for safer workplaces, improving industrial health standards and reducing accidents.
- **Time-Bound Wage Payments:** The implementation of time-bound wage payments ensures timely remuneration for workers, protecting them against wage theft and delays, thereby enhancing industrial harmony.

3. Andhra Pradesh's Dairy Vision: Doubling Milk Output by 2033 for Economic and Nutritional Security

Context: Andhra Pradesh is pursuing an ambitious plan to double its milk output by 2033 and enter the top three milk-producing states from its current 7th rank. This strategy, announced near National Milk Day (Nov 26th), involves new subsidy schemes and intensive support services like genetic improvement, veterinary care, and Kisan Credit Cards (KCCs). The vision is inspired by the principles of the White Revolution, championed by Dr. Verghese Kurien (whose birth anniversary is Nov 26th), focusing on rural livelihood, economic growth, and nutritional security.

I. The Vision and Economic Dimension

- **Ambitious Target Setting:** The State aims to raise its milk output to 15 million tonnes by 2033, necessitating a 15% growth rate. The primary strategy to achieve this is the introduction of new subsidy schemes.
- **Valuation and Contribution:** The milk and dairy sector in AP is currently valued at ₹713.9 billion, demonstrating its significant contribution to the State's economy and Gross State Domestic Product (GSDP).
- **National Context:** India is the world's largest milk producer, accounting for 24.64% of global output. This places AP's plan within a globally dominant sector.
- **Employment Driver:** Dairy farming provides direct employment to over 80 million farmers nationally, highlighting its socio-economic importance, especially for rural livelihoods in AP.

II. Technological and Service Delivery Dimension:

- **Doorstep Veterinary Care:** The State's strategy centers on strengthening Farmer Service Centres, which provide a comprehensive package including doorstep veterinary care and free health/infertility treatment camps.
- **Genetic Improvement Focus:** Key initiatives include the distribution of sex-sorted semen and other programs aimed at the genetic improvement of livestock (cows and buffaloes), which is critical for enhancing per-animal yield.
- **Fodder Security and Feed Development:** Programmes focusing on fodder security and feed development are essential for reducing input costs for farmers and ensuring high-quality milk production.

III. Social Welfare and Nutritional Dimension

- **Welfare Scheme Integration:** The provision of Kisan Credit Cards (KCCs) and livestock insurance integrates dairy farmers into the formal financial and social security network, protecting them against risks.
- **Infrastructure Support:** Providing cattle shelters addresses a critical need for animal welfare and management, particularly important for climate resilience.
- **Nutritional Status:** Andhra Pradesh's per capita milk consumption is 719 grams per day, significantly above the national average of 459 grams. The planned increase in production will further solidify the State's nutritional security and strong dairy culture.

4. Rythanna Meekosam: Andhra Pradesh's Five-Point Formula for Comprehensive Farmer Support

Context:

The Andhra Pradesh government launched the 'Rythanna Meekosam' (For the Farmer) initiative on November 25th, outlining a Five-Point Formula to bring permanent solutions and stability to the agriculture sector, which sustains over 60% of the State's population. The program aims to move beyond temporary relief to establish a resilient and economically viable farming ecosystem.

I. The Policy Framework (Five-Point Formula)

- **Strengthening Water Security:** Focuses on mitigating risks associated with natural challenges like cyclones along the State's 1,100 km coastline, aiming for long-term climate resilience through enhanced irrigation and water management.
- **Promoting Demand-Based Farming:** Encourages farmers to shift cultivation practices based on market demand rather than just traditional crops, ensuring better price realization and reducing gluts.
- **Accelerating Agri-Technology Adoption:** Emphasizes the use of modern farming techniques, mechanisation, and technologies like drones for precision spraying and pest control, boosting efficiency and yield.
- **Enhancing Food Processing:** A dedicated push for establishing food processing units to add value to crops, facilitating domestic and international sales, and increasing farmers' share of the final consumer price.
- **Comprehensive Government Support:** Encompasses all necessary aid, including timely guidance, technology transfer, and financial support, aimed at improving farmers' livelihoods.

II. The Economic and Financial Dimension

- **Significant Financial Commitment:** The government highlighted spending ₹1,000 crore on farmers in the preceding 18 months, dedicated entirely to improving their livelihoods, underscoring the financial priority given to the sector.
- **Price Protection Mechanism:** Ensures protection against price drops through active government procurement interventions in key markets like tobacco, mango, onion, and coconut, stabilizing farm incomes.
- **Welfare Scheme Integration (PM-Kisan Annadata Sukhibhava):** The successful implementation of the scheme, providing ₹3,200 crore in assistance to over 68 lakh farmers, integrates central and state welfare efforts to ease the financial burden on cultivators.

III. The Implementation and Social Dimension

- **Direct Engagement Mechanism:** The program includes focused activities and workshops at Farmer Service Centres (FSCs) on December 3, ensuring direct interaction, technology dissemination, and feedback gathering from the ground level.

- **Holistic Development Goal:** The primary objective of the initiative is the economic and social advancement of every farming family in the State, aligning agricultural policy with broader poverty alleviation and rural development goals.

5. Etikoppaka Toys Attain National Glory: Santosh Gorsa's Shilp Guru Award and the Craft's Resurgence

Context:

The conferment of the Shilp Guru Award on master artisan Santosh Kumar Gorsa from Etikoppaka (Anakapalle district) has brought national recognition to the traditional lacquer toy craft of Andhra Pradesh. The achievement signifies not just individual excellence but a critical turning point in the revival and preservation of this unique craft, which holds a Geographical Indication (GI) tag.

I. The Heritage and Recognition Dimension (Arts & Culture)

- **Shilp Guru Award:** Santosh Gorsa received the highest honour in the Indian handicrafts sector from the Ministry of Textiles. The award recognizes exceptional contribution to the preservation of India's handicraft heritage and is conferred only once in a lifetime.
- **GI Tagged Craft:** Etikoppaka toys (or Etikoppaka Bommalu) already hold the Geographical Indication (GI) tag, certifying their regional identity and authenticity. The Shilp Guru Award further amplifies the value and visibility of this GI product.
- **Eco-Friendly Nature:** The craft utilizes Ivory Wood (Ankudu Karra), a locally sourced softwood, and exclusively uses natural dyes blended with lacquer. This eco-friendly and non-toxic production method is a key distinguishing feature of the art form.
- **Traditional Technique:** The toys are created using the turned wood lacquer craft technique, where the wood is shaped by hand on a lathe machine before the natural lacquer is applied to impart soft colors and sheen.

II. The Economic and Social Dimension (Livelihoods)

- **Post-Pandemic Revival:** The recognition comes after a difficult phase during the COVID-19 pandemic when demand nearly disappeared. The craft has seen a strong return, being chosen for festivals, weddings, and cultural occasions, signifying renewed cultural value.
- **Employment Generation:** The workforce involved in toy-making has doubled from approximately 250 to over 500 villagers in the last few years, indicating a substantial positive economic shift in the village.
- **Women's Empowerment:** Many women have returned to toy-making from industrial units due to the cultural connect and the flexibility to work from home (WFH), highlighting its role in gender-inclusive rural livelihood.

III. The Governance and Marketing Dimension

- **State-Level Visibility:** The national profile of Etikoppaka was significantly boosted when Santosh and his team created the Andhra Pradesh tableau for the 76th Republic Day Parade (theme: Etikoppaka Bommalu), which won third prize in the jury category.
- **Government Patronage:** The Deputy CM's office (Pawan Kalyan) has officially adopted Etikoppaka toys as State-sponsored souvenirs for official gifting, providing guaranteed demand and unprecedented visibility for the artisans.
- **Resource Security:** The Forest Department's plan to cultivate Ivory Wood (Ankudu Karra) specifically for the artisans addresses the critical issue of raw material supply, a necessary intervention for the long-term sustainability of the craft.

The achievement of the Shilp Guru Award is expected to significantly enhance the pride and visibility of the craft, ensuring the continuation of the Guru Shishya Parampara (the tradition of knowledge transfer) to the next generation.

6. CII Summit: A National Benchmark for Zero-Waste Event Management

Context: The 30th CII Partnership Summit 2025 in Visakhapatnam successfully achieved a near zero-waste model, making it India's first large-scale, near-plastic-free event to send no waste to a landfill. This outcome was achieved through strategic policy and rigorous operational execution by the Greater Visakhapatnam Municipal Corporation (GVMC) and the Confederation of Indian Industry (CII).

I. Strategic Policy and Institutional Alignment

- "Certified Zero Waste Model Summit": The event was officially declared a "certified Zero Waste Model Summit" by the Chief Minister, marking a historic milestone and validating the city's commitment to the Eco-Vizag and Swachh Andhra campaigns.
- Circular Economy Mandate: The success directly operationalizes the state's focus on a comprehensive Circular Economy Model, which aims to reuse, recycle, and recover energy from waste, ensuring materials are kept in use, not discarded.
- Future Events Protocol: This project serves as a national role model and establishes a clear directive for the Andhra Pradesh government to organize all major future events across the State under the 'Zero Waste' concept.
- Integrated Collaboration: The management was a tri-partite effort: CII (Event Management), GVMC (Technical Execution/Infrastructure), and the Swachh Andhra Corporation (Policy and Public Awareness), ensuring alignment from planning to execution.

II. Waste Management and Resource Recovery

- **Perfect Source Segregation:** The event generated 4 tonnes of waste (2 tonnes wet, 2 tonnes dry) from approximately 3,000 delegates. Strict segregation was enforced, with dedicated staff ensuring no mixing occurred.
- **Biogas Energy Recovery:** All 2 tonnes of food waste and biodegradable materials (wet waste) were promptly diverted to the biogas plant for complete organic recycling, demonstrating a sustainable way to regenerate energy from waste.
- **Dry Waste Material Recovery:** Dry waste was processed at the Material Recovery Centre (MRC). Only a minimal amount of 30 kg of non-recyclable residue was ultimately sent to the Waste-to-Energy (WtE) plant for thermal recovery, confirming zero landfill deposition.
- **Closed-Loop Reuse System:** A unique circular practice was implemented for glassware: used bottles were collected and sent to an RO Bottle Unit for washing and UV-sterilisation, making them fit for immediate reuse in subsequent events.

III. Execution, Manpower, and Social Impact

- **Strategic Manpower Deployment:** Success relied on a large, coordinated team of nearly 1,700 on-ground personnel. Crucially, the GVMC deliberately limited its core workforce involvement to avoid disrupting essential civic services across the rest of the city, relying on temporary staff and 1,000 volunteers instead.
- **Near-Plastic-Free Environment:** Organizers mandated the use of eco-friendly materials (glass, paper, biodegradable products) instead of plastics, a measure that earned significant appreciation from foreign delegates who praised the "near-total absence of plastic" and the highly commendable cleanliness standards.

7. Discovery of Reddy Dynasty Copper Plate: A Historical and Literary Treasure

Context: A significant historical discovery has been made in Ponnapalli village, near Repalle in Guntur district, with the unearthing of a previously unknown two-copper-plate grant belonging to the Kondavidu Reddy dynasty. This artifact provides priceless insights into the political, literary, and intellectual history of medieval Andhra, around the 15th century CE.

I. Historical and Chronological Significance (Epigraphy)

- **Grant Details and Date:** The charter records the donation of Ponnapalli village (situated on the banks of the Krishna River in Velanadu of Divisima within Trilinga-visaya) as an agrahara (a tax-free land grant to Brahmins).
- **Precise Dating:** The inscription is accurately dated to Saka 1330, corresponding precisely to October 19, 1408 CE (Friday). This precision helps anchor the historical chronology of the Kondavidu rulers.
- **Donor:** The grant was made by the notable Reddy ruler Pedda Komati Vemareddi and his queen. Vemareddi was known for his administrative acumen and patronage.
- **Context of the Grant:** The donation was made on the auspicious occasion of a solar eclipse, a common practice for making merit-yielding land grants during Hindu royal periods.

II. Literary and Cultural Significance

- **Role of Poet Srinatha:** The charter possesses exceptional literary significance as it was composed by the celebrated Telugu poet and vidyadhikari (Education Minister) of the Reddy kingdom, Srinatha. His composition on the plate is a rare direct connection to the poet's official administrative work.
- **Script and Language:** The inscription is written in both Sanskrit and Telugu, utilizing the Telugu script. This bilingual nature reflects the scholarly prominence of both languages in the Reddy court and administration.
- **Scholarly Prestige of Donee:** The grant was given to the Vedic scholar Singanarya. The inscription notes that his family excelled in Sarpasastra (science of snakes/toxinology), Veda, Vedanga, and Astanga Ayurveda, comparing them to Dhanvantari (the divine physician), highlighting the region's intellectual history.

III. Overview of the Reddy Dynasty:

- The Reddy Dynasty (or Reddi Kings) ruled parts of coastal Andhra from 1325 CE to 1448 CE following the decline of the Kakatiya Empire. Their history is vital for the APPSC syllabus under the History of Andhra.
- **Founding and Divisions:** The dynasty was founded by Proleya Vema Reddi in 1325 CE. The kingdom initially split into two main branches: Kondavidu (Guntur region) and Rajahmundry (East Godavari region).
- **Patronage and Literature:** The Reddy rulers were renowned patrons of Telugu and Sanskrit literature. Their court witnessed the Golden Age of Telugu literature, particularly under Kumaragiri Reddi and Pedda Komati Vemareddi.
- **Key Figures:** Notable scholars associated with the court include the 'Kavi Sarvabhauma' Srinatha (composer of the copper plate charter), Vemana (the philosophical poet), and Errana (part of the Kavitraya).

8. NSTR Grassland Initiative: Boosting Prey Base for Tiger Conservation:

Context:

The Nagarjuna Sagar–Srisailam Tiger Reserve (NSTR), India's largest tiger reserve, is launching a major Grass Development Programme to address a critical ecological bottleneck: the severely low prey base for its carnivore population. This initiative, drawing on expert advice and a structured action plan, is fundamental to increasing the tiger carrying capacity of the vast Nallamala forest region.

I. The Ecological Challenge and Capacity

- Vast Size vs. Low Density: NSTR spans a vast 5.95 lakh hectares (3,728 sq. km, including a 1,200 sq. km core zone) across five districts (Nandyal, Prakasam, Palnadu in AP; Nalgonda, Mahabubnagar in Telangana). Despite its size, the herbivore population remains critically low.

- **Critically Low Prey Base:** Official estimates indicate only 18,000 herbivores, which translates to approximately three prey animals for every 100 hectares. This density is far below the required level to sustain a healthy predator population.
- **Tiger Capacity Constraint:** NSTR is currently home to an estimated 87 tigers. However, experts believe the rich Nallamala landscape has the ecological potential to sustain 250–300 tigers. This shortage of prey is the primary constraint on big cat numbers.

II. The Grass Development Action Plan

- **Expert Assessment:** The initiative follows the assessment of renowned grassland expert Dr. Gajanan D Muratkar (the "Grass Man of India"), who visited the reserve as part of the All India Tiger Estimation–2026 being undertaken by the NTCA and WII.
- **Habitat Deficiencies:** Dr. Muratkar observed that the existing grasslands are dominated by coarse, fibrous grasses that are nutritionally unsuitable for key grazing species like deer and sambar.
- **Intervention Strategy:** The Forest Department is launching a three-year action plan involving the removal of invasive species (such as parthenium, cassia tora, and thorny bushes) and the introduction of soft, nutrient-rich grass varieties (like Saccharum spontaneum and Deenanath grass).
- **Goal: Doubling the Prey Base:** The immediate objective is to double the existing herbivore population (including deer, spotted deer, sambar, chinkara, and wild buffalo) within the next two to three years, thereby creating ideal breeding conditions for tigers.

III. Conservation and Interventional Measures

- **Trophic Cascade Principle:** The project aligns with the principle of the trophic cascade, where increasing the primary productivity (grass) leads to increased herbivores (prey base), which in turn supports a higher density of apex predators (tigers).
- **Water Availability Improvement:** The action plan includes measures to improve water availability across the landscape, which is essential for the sustained growth of the new grass varieties and the overall health and distribution of the herbivore population.
- **Historical Supplementation:** To bridge the immediate gap, the department has previously supplemented the prey base through relocation efforts. Notably, in June 2024, 15 spotted deer and 28 sambar were transported from a private zoo in Kakinada to NSTR, demonstrating a multi-pronged approach to conservation.

9. APEPDCL Leads National Solar Push: 31,000 Rooftop Plants Under PM Surya Ghar Scheme:

Context:

The Andhra Pradesh Eastern Power Distribution Company Limited (APEPDCL) has achieved a major milestone by installing over 31,000 rooftop solar plants under the PM Surya Ghar: Muft Bijli Yojana scheme, totaling 100 MW of capacity across its jurisdiction. This success demonstrates AP's commitment to clean energy, consumer empowerment, and the national mission for solar energy integration.

The PM Surya Ghar Scheme (Policy & Welfare)

- **Objective and Scope:** The PM Surya Ghar: Muft Bijli Yojana is a Central Government scheme aimed at promoting decentralized solar power generation in residential households. It provides significant financial subsidies and low-interest financing to reduce the initial investment burden for consumers.
- **Subsidy Structure:** The scheme offers substantial subsidies: ₹30,000 for a 1 kW system, ₹60,000 for 2 kW, and up to ₹78,000 for a 3 kW system, making solar energy accessible to low and middle-income families.

- **Financial Benefits for Consumers:** The primary financial incentive is the promise of zero electricity bills or "Muft Bijli" by allowing households to meet their electricity needs for up to 20 years. Surplus power generated can be supplied to the grid, providing an additional income source.
- **Financial Access and Process:** The application is facilitated through the centralized PM Surya Ghar portal. Banks are offering low-interest EMI-based loans, and the application process is streamlined with no fee for application or the net metre (where applicable).

Implementation and Performance:

- Installation Milestone: APEPDCL has successfully connected 31,022 rooftop units with a combined capacity of 1,00,026 kW (100 MW) to the grid, underscoring the state's aggressive execution strategy.
- Leading District Performance: Eluru district leads the jurisdiction with the highest number of installations (4,134 units), contributing 13,491 kW of capacity, reflecting high consumer acceptance in that region.
- Capacity vs. Requirement: A typical 3 kW plant can generate between 360 and 450 units per month, which is often sufficient for meeting the consumption needs of an average urban household, enabling them to maximize both usage and sale of surplus power.

Technological and Inclusion Innovations

- **Space Requirement:** The physical requirement for installation is manageable, with a minimum of 100 square feet of rooftop space needed for a standard 1 kW solar plant.
- **Virtual Net Metering (VNM):** To address the challenge faced by apartment dwellers who lack individual rooftop space, APEPDCL introduced Virtual Net Metering. This system allows consumers to install a solar plant on an independent house elsewhere and transfer the generated units to offset the bill of their apartment.
- **Apartment Common Services:** Common services in apartments are also eligible for the scheme, receiving subsidies of ₹18,000 per kW for capacities up to 500 kW, encouraging broader solar adoption in high-density urban areas.

10. Krishnadevaraya-Era Inscription Unveiled: Insight into Vijayanagara Governance in Kadapa

Context:

A historically significant stone inscription, dating back to the reign of the most celebrated Vijayanagara Emperor Sri Krishnadevaraya (1509–1529 CE), has been unearthed in Proddatur town, YSR Kadapa district. This discovery, made during routine house construction, is a crucial primary source, dated January 24, 1523, that illuminates the administration, religious patronage, and community structure of the imperial era in Andhra Pradesh.

Epigraphical and Religious Significance

- **Precise Historical Anchor:** The inscription is accurately dated to January 24, 1523 CE, placing it squarely within the Tuluva dynasty's zenith under Krishnadevaraya. This precision is invaluable for historians reconstructing the king's activities and regional chronology.
- **Royal Directive for Temple Construction:** The text explicitly commemorates the Emperor's directive for the construction of the compound wall and the temple tower (Kodi or Shikhara) of the Chennakesava Swamy temple at Kavuluru village.
- **Patronage by Royal Consort:** The construction was undertaken in honour of the spiritual merit (punya) of the Emperor's wife, Tirumaladevi (one of his main queens). This highlights the significant role of royal women in temple patronage and securing their lineage's religious legacy.

- **Community and Caste Contribution:** The inscription records an important community contribution: a donation of ₹15 by Rajulaiah on behalf of 24 members of the Dommari community for specific temple services (likely ritual, maintenance, or performing arts). This reveals the social mobility and religious participation of diverse caste groups.

Administrative and Economic Insights

- **Subordinate Land Revenue Donation:** The inscription details that Ramachandru, identified as the son of Tirumala Rayalu, donated the tax revenue collected from Thippareddypalli and Gramanapalli villages to the Chennakesava Swamy temple.
- **Functioning of Local Administration:** This records an application of the Nayankara system, where local military chiefs (Nayaks) or subordinates (Rayalu) were granted amaram (territory with fixed revenue) and could divert or donate that revenue for religious and public works, often with imperial sanction.
- **Evidence of Village-Level Revenue:** The donation of tax revenue collected from specific villages demonstrates the precise local revenue administration and recording practices of the empire in the Kadapa region.
- **Source Preservation:** The timely spotting of the slab by a construction supervisor (Venapusa Bharat Reddy) and prompt alert to the Archaeological Survey of India (ASI) emphasizes the modern significance of public awareness and community participation in heritage preservation.

The Vijayanagara Empire:

- **The Vijayanagara Empire (c. 1336–1646 CE)** is a cornerstone of South Indian history, known for its political stability, cultural zenith, and resistance against the Deccan Sultanates.
- **Historical Context (Tuluva Dynasty):** Krishnadevaraya belonged to the Tuluva Dynasty, the third dynasty to rule the empire. His reign (1509–1529 CE) is considered the peak of the empire's political power and cultural flourishing, earning him titles like Andhra Bhoja and Yavana-Rājya-Sthāpanācharya.
- **Territorial Control in AP:** The Vijayanagara Empire had extensive control over present-day Andhra Pradesh, utilizing strong forts like Udayagiri and Kondavidu (captured by Krishnadevaraya) and maintaining centers of pilgrimage and administration in regions like Kadapa and Tirupati.

11. Murugammi Panchayat Wins National Award for Water Conservation Excellence

Context: The Murugammi Gram Panchayat in PC Palli mandal, Prakasam district, Andhra Pradesh, has secured the prestigious National level 2nd Best Water Conservation Panchayat Award. This recognition, part of the 6th National Water Awards-2024 by the Central Jal Shakti Department, highlights the successful implementation of extensive natural water conservation practices in a challenging, backward region. This event emphasizes AP's commitment to water resource management, a vital topic for the APPSC syllabus under Environment and Rural Development.

The Achievement and Recognition

- **Top National Honour:** Murugammi Gram Panchayat won the Second Best Village in the Gram Panchayat category nationwide, validating the success of local-level water management efforts.
- **Reward and Facilitation:** The awardees were facilitated with a trophy, citation, and a ₹1.5 lakh cash reward on November 18th at Vigyan Bhawan, New Delhi, likely presented by the President of India.
- **Individual Excellence:** Adding to the state's acclaim, Podili Raja Sekhar Raju, also from Prakasam district, won the South Zone Best Individual Award for Excellence in the Water Sector for his extensive work with NGOs and individually.

Water Conservation Strategy:

- **Ridge to Valley Method:** The core strategy employed by the District Water Management Agency (DWMA) was the 'Ridge to Valley' water restoration method. This involves treating the entire watershed, starting from the highest point (ridge) down to the plains (valley), to maximize water retention and groundwater recharge.
- **Scale of Restoration:** The village successfully executed approximately 50 water conservation works, resulting in the restoration of around 8.21 lakh cubic meters of water.
- **Specific Structures:** The projects involved diverse watershed structures, including check dams, rainwater harvesting ponds, and dugout ponds, ensuring a multi-pronged approach to trapping and conserving monsoon runoff.
- **Financial Investment:** The entire water resource project, spanning 51 works, was executed at an estimated cost of ₹97 lakh, utilizing watershed funds and assistance from other government departments, demonstrating effective resource allocation.

Impact and Geographical Context
- **Groundwater Recharge:** The initiatives directly led to the enrichment of groundwater sources, which is crucial in the arid western Prakasam region where dependence on monsoon rainfall is high.
- **Socio-Economic Benefit:** The conservation efforts successfully ensured a sustainable supply of both drinking and irrigation water for the village, securing livelihoods and improving agricultural output in the remote area.
- **Challenging Terrain:** The success is particularly noteworthy because Murugammi Gram Panchayat is located in a remote, backward area of western Prakasam, surrounded by hilly, rocky terrain, making water conservation efforts logistically and geologically challenging.

12. Andhra Pradesh Constitutes Kolleru Lake Management Authority (KLMA) for Conservation:

Context: The Andhra Pradesh government has established the Kolleru Lake Management Authority (KLMA) to ensure the comprehensive, sustainable development and conservation of Kolleru Lake, one of the largest freshwater lakes in the country and a designated Ramsar site. This significant institutional step is aimed at overcoming inter-agency coordination challenges and implementing the long-term management plan for the Kolleru Wildlife Sanctuary.

Institutional Structure and Mandate (Governance)
- **High-Powered Leadership:** The KLMA will be chaired by the Chief Secretary of Andhra Pradesh, providing the highest administrative authority for inter-departmental coordination and swift decision-making.
- **Multi-Sectoral Membership:** The Authority is robustly constituted with 26 members, including officials from all key line departments (e.g., Irrigation, Fisheries, Revenue) and a dedicated scientist from the Wildlife Institute of India (WII), ensuring a scientific and integrated approach.
- **Policy Compliance:** The formation follows a direct recommendation from the Standing Committee of the National Board for Wildlife (NBWL), fulfilling the institutional mechanism requirement mandated in the approved Management Plan for the Wildlife Sanctuary.
- **Regular Monitoring:** The KLMA is mandated to meet at least once every three months, with special meetings convened as necessary, ensuring continuous oversight and rapid response to conservation challenges.

Core Conservation Responsibilities (Environmental Management)
- **Integrated Management:** The KLMA is tasked with preparing and implementing an integrated approach for the management of the wetland, prioritizing a balance between ecological preservation and sustainable human use.

- **Addressing Environmental Threats:** Key ecological responsibilities include formulating strategies to improve water quality, prevent siltation (a major threat to the lake's depth and area), and restore the hydrological balance of the wetland system.
- **Enhancing Biodiversity:** A primary goal is to significantly enhance biodiversity within the designated Kolleru Wildlife Sanctuary, protecting the migratory and resident bird populations for which the lake is internationally renowned.

Sustainable Development and Community Livelihoods

- **Ecotourism Promotion:** The mandate includes developing and promoting sustainable ecotourism around the lake, generating revenue that can be reinvested into conservation efforts and creating local employment.
- **Livelihood Support:** A core objective is to ensure sustainable fisheries development and provide comprehensive livelihood support for the large local communities dependent on the lake's resources, thus aligning conservation with poverty alleviation.
- **Global Collaboration:** The Authority is tasked with collaborating with State, national, and international institutions involved in wetland conservation, facilitating knowledge transfer and access to global funding/expertise

Significance of Kolleru Lake's Ramsar Status:

- **Global Recognition:** Elevates Kolleru to international importance, mandating India's commitment to wise use and conservation.
- **Biodiversity Protection:** Safeguards critical habitat for migratory birds and endangered species like the Grey Pelican.
- **Funding & Research:** Opens access to global funding and scientific collaboration for sustainable lake management.
- **Ecological & Livelihood Security:** Ensures flood control, ecosystem balance, and sustains communities dependent on the lake.

PRACTICE MCQs

Q1. Consider the following statements regarding the Supreme Court's advisory opinion on the Governor's assent powers:
1. The Governor has the option to sit indefinitely on a Bill if they disagree with its provisions.
2. The decision of the Governor to withhold assent is subject to limited judicial review if there is indefinite inaction.
3. The Supreme Court has set a fixed timeline of three months for the President to decide on Bills reserved for their consideration.

Which of the statements given above is/are correct?
(a) 1 and 2 only
(b) 2 only
(c) 1 and 3 only
(d) 1, 2 and 3
Answer: (b)
Explanation:
- **Statement 1 is incorrect:** The Supreme Court ruled that "sitting indefinitely" is not a valid option for the Governor under Article 200.
- **Statement 2 is correct:** While the merits of withholding assent are not justiciable, indefinite inaction is subject to limited judicial review to prevent the defeat of the legislative process.
- **Statement 3 is incorrect:** The Court declined to set a rigid judicially prescribed timeline for the President under Article 201, although "reasonable time" remains the expectation.

Q2. With reference to the Digital Personal Data Protection (DPDP) Rules, 2025, consider the following statements:
1. The rules amend the RTI Act to narrow the scope for disclosing personal information unless a larger public interest is proven.
2. Significant Data Fiduciaries (SDFs) must conduct independent audits and Data Protection Impact Assessments immediately upon notification of the rules.
3. Personal data cannot be stored beyond one year unless legally required.

Which of the statements given above is/are correct?
(a) 1 and 2 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) 1, 2 and 3
Answer: (c)

Explanation:
- **Statement 1 is correct:** The rules include an amendment to Section 44(3) of the RTI Act, narrowing the scope for disclosing personal info unless larger public interest is proven.
- **Statement 2 is incorrect:** The requirement for SDFs to conduct audits and assessments is part of the 18-month timeline rollout, not immediate.
- **Statement 3 is correct:** The rules mandate that personal data cannot be stored beyond one year unless legally required.

Q3. Regarding the legal status of Cryptocurrency in India, consider the following statements based on recent judicial and legislative developments:
1. The Madras High Court has ruled that cryptocurrency qualifies as "property" capable of being held in trust.
2. Gains from the transfer of Virtual Digital Assets (VDAs) are taxed at 30% under the Income Tax Act.
3. Cryptocurrency is recognized as legal tender by the Reserve Bank of India (RBI).

How many of the above statements are correct?
(a) Only one
(b) Only two
(c) All three
(d) None
Answer: (b)
Explanation:
- **Statement 1 is correct:** The Madras High Court ruled that cryptocurrency is an asset that qualifies as "property".
- **Statement 2 is correct:** Gains from the transfer or sale of VDAs are taxed at 30% under Section 115BBH.
- **Statement 3 is incorrect:** The RBI does not recognize cryptocurrency as legal tender.

Q4. Consider the following statements regarding the 'Four Labour Codes' implemented by the Central Government:
1. The Code on Wages, 2019 prohibits discrimination based on gender or transgender identity in recruitment and wages.
2. The Code on Social Security, 2020 extends social security coverage to gig and platform workers for the first time.
3. The Industrial Relations Code, 2020 lowers the threshold for government approval for lay-offs from 300 to 100 workers.

Which of the statements given above is/are correct?
(a) 1 and 2 only
(b) 1 only
(c) 2 and 3 only
(d) 1, 2 and 3
Answer: (a)
Explanation:
- **Statement 1 is correct:** The Code on Wages prohibits discrimination based on gender or transgender identity.
- **Statement 2 is correct:** The Code on Social Security extends coverage (PF, ESIC) to gig and platform workers.
- **Statement 3 is incorrect:** The Industrial Relations Code *raises* the threshold for government approval for lay-offs from 100 to 300 workers, not lowers it.

Q5. The 'High Seas Treaty' (BBNJ Agreement), set to enter into force in 2026, aims to:
(a) Regulate maritime trade routes in the Indo-Pacific.
(b) Create a new military alliance for the security of the Atlantic Ocean.
(c) Ban all forms of deep-sea mining in international waters.
(d) Establish a legal framework for the conservation of marine biodiversity in areas beyond national jurisdiction.
Answer: (d) **Explanation:**
- **Option (d) is correct:** The treaty establishes a comprehensive legal framework for the conservation and sustainable use of marine biodiversity in areas beyond national jurisdiction (High Seas). It operates under UNCLOS.

Q6. Which of the following statements is/are correct regarding 'Gogabeel Lake'?
1. It is a newly designated Ramsar site located in Bihar.
2. It is an oxbow lake formed by the rivers Ganga and Mahananda.
3. It is the first community reserve in Bihar.
Select the correct answer using the code given below:
(a) 1 only
(b) 1 and 2 only
(c) 2 and 3 only
(d) 1, 2 and 3
Answer: (d) **Explanation:**
- **Statement 1 is correct:** Gogabeel Lake was officially designated as India's 94th Ramsar Site in 2025 and is in Bihar.
- **Statement 2 is correct:** It is an oxbow lake situated between the Ganga and Mahananda rivers.

- **Statement 3 is correct:** It holds the distinction of being Bihar's first community reserve.

Q7. The term 'Atlantic Meridional Overturning Circulation (AMOC)' was recently in the news. Which of the following best describes its function?
(a) A global system of air currents that regulates monsoon patterns in South Asia.
(b) A system of ocean currents that distributes heat from the tropics to the polar regions of the Atlantic.
(c) A geological fault line running through the Atlantic Ocean floor.
(d) A high-altitude jet stream that affects aviation routes over the Atlantic.
Answer: (b) **Explanation:**
- **Option (b) is correct:** AMOC is a vast system of ocean currents that circulates warm and cold water between the tropics and the polar regions, acting as a global thermostat.

Q8. With reference to the 'Global Methane Status Report 2025', consider the following statements:
1. Global methane emissions have decreased by 10% since 2020 due to the Global Methane Pledge.
2. Agriculture and waste generation are identified as primary drivers of rising methane emissions.
3. The Global Methane Pledge aims to reduce global methane emissions by at least 30% by 2030.
Which of the statements given above is/are correct?
(a) 1 and 2 only
(b) 1 and 3 only
(c) 2 and 3 only
(d) 1, 2 and 3
Answer: (c)
Explanation:
- **Statement 1 is incorrect:** The report states that instead of decreasing, methane emissions are on an upward trajectory.
- **Statement 2 is correct:** The report identifies the growth in agriculture and waste generation as main drivers.
- **Statement 3 is correct:** The core target of the Global Methane Pledge is to reduce global methane emissions by at least 30% by 2030.

Q9. Consider the following statements regarding the 'Sigma Cycle' in bacteria, recently challenged by new research:

1. The traditional dogma states that sigma factors detach from RNA polymerase after the initiation of transcription.
2. New findings reveal that in *Bacillus subtilis*, the sigma factor remains attached throughout the transcription process.
3. This discovery has no implications for drug development or antibiotics.

Which of the statements given above is/are correct?

(a) 1 only
(b) 1 and 2 only
(c) 2 and 3 only
(d) 1, 2 and 3

Answer: (b)

Explanation:

- **Statement 1 is correct:** Textbooks have taught that sigma factors are transient and detach after initiation.
- **Statement 2 is correct:** The study found that in *Bacillus subtilis*, the sigma factor remains stably bound throughout the process.
- **Statement 3 is incorrect:** The discovery identifies a new target for drug development, potentially for new antibiotics.

Q10. 'BIRSA 101', recently in the news, refers to:

(a) India's first indigenous CRISPR-based gene therapy for Sickle Cell Disease
(b) A new variant of the Tejas Light Combat Aircraft.
(c) A high-yield variety of wheat developed by ICAR.
(d) A new satellite launched for tribal welfare monitoring.

Answer: (a)

Explanation:

- **Option (a) is correct:** BIRSA 101 is India's first indigenous CRISPR-based gene therapy designed to treat Sickle Cell Disease (SCD).

Q11. Which of the following is a unique advantage of 'Thorium Molten Salt Reactors (TMSR)' over traditional nuclear reactors?

(a) They use liquid water as a coolant under high pressure.
(b) They rely on imported Uranium-235 as the primary fuel source.
(c) They use molten salt as both coolant and fuel solvent, allowing operation at atmospheric pressure.
(d) They generate more long-lived radioactive waste than uranium reactors.

Answer: (c) **Explanation:**

- **Option (c) is correct:** TMSR uses high-temperature molten salt as both coolant

and fuel solvent, allowing the reactor to operate at atmospheric pressure, which enhances safety.

Q12. With reference to 'Zinc-Ion Batteries (ZIBs)', consider the following statements:

1. They utilize aqueous electrolytes, which significantly reduces fire risks compared to Lithium-ion batteries.
2. They are less sustainable than Lithium-ion batteries due to the scarcity of zinc.
3. They are best suited for grid storage applications due to their safety and cost-effectiveness.

Which of the statements given above is/are correct?

(a) 1 and 2 only
(b) 1 and 3 only
(c) 2 and 3 only
(d) 1, 2 and 3

Answer: (b)

Explanation:

- **Statement 1 is correct:** ZIBs use aqueous electrolytes, drastically reducing fire risks.
- **Statement 2 is incorrect:** They are sustainable because they rely on zinc, which is naturally abundant and cost-effective.
- **Statement 3 is correct:** Due to safety and low cost, they are promising for grid storage.

Q13. Consider the following statements regarding the 'Draft Seeds Bill, 2025':

1. It mandates that all seed dealers must obtain a registration certificate from the State Government.
2. It completely decriminalizes all offences, including the sale of spurious seeds.
3. It allows the Central Government to permit the import of unregistered seeds for research purposes.

Which of the statements given above is/are correct?

(a) 1 and 2 only
(b) 1 and 3 only
(c) 2 and 3 only
(d) 1, 2 and 3

Answer: (b)

Explanation:

- **Statement 1 is correct:** Dealers must obtain a valid registration certificate.
- **Statement 2 is incorrect:** Only minor technical offences are decriminalised. Major violations like selling spurious seeds attract stringent penalties.
- **Statement 3 is correct:** The Central Government can permit imports of unregistered seeds for research and trials.

Q14. The 'National Industrial Classification (NIC) 2025' recently released by MoSPI:
1. Introduces a new 6-digit coding structure to replace the previous 5-digit system.
2. Is designed to be technology-dependent, classifying activities based on the specific technology used.
3. Includes distinct classifications for modern sectors like blockchain and cloud infrastructure.

Which of the statements given above is/are correct?
(a) 1 and 3 only
(b) 1 only
(c) 2 and 3 only
(d) 1, 2 and 3
Answer: (a) **Explanation:**
- **Statement 1 is correct:** It transitions to a new 6-digit coding structure.
- **Statement 2 is incorrect:** The classification is technology-agnostic; it categorizes based on economic output, not the technology employed.
- **Statement 3 is correct:** It introduces classifications for modern sectors like cloud infrastructure and blockchain.

Q15. With reference to 'BRICS Pay', consider the following statements:
1. It is a centralized payment system controlled by the New Development Bank (NDB).
2. It aims to facilitate cross-border settlements in local currencies to reduce dependence on the U.S. dollar.
3. It is interoperable with India's Unified Payments Interface (UPI).

Which of the statements given above is/are correct?
(a) 1 and 2 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) 1, 2 and 3
Answer: (b)
Explanation:
- **Statement 1 is incorrect:** It is a *decentralized* system using a Decentralised Messaging System (DCMS).
- **Statement 2 is correct:** It aims to settle transactions in local currencies and reduce reliance on SWIFT/USD.
- **Statement 3 is correct:** The platform connects existing infrastructures like India's UPI, China's CIPS, etc..

Q16. Regarding the 'UN Water Convention', consider the following:
1. It was originally a regional framework for Europe but is now open to all UN Member States.
2. India recently became the first South Asian country to accede to this convention.
3. It obliges parties to prevent and control transboundary water impacts.

Which of the statements given above is/are correct?
(a) 1 and 2 only
(b) 1 and 3 only
(c) 2 and 3 only
(d) 1, 2 and 3
Answer: (b)
Explanation:
- **Statement 1 is correct:** It evolved from a regional European framework to a global one open to all UN members.
- **Statement 2 is incorrect:** Bangladesh became the first South Asian country to accede; India is *not* a signatory.
- **Statement 3 is correct:** It obliges parties to prevent, control, and reduce water impacts across boundaries.

Q17. Consider the following statements regarding the 'Arya Samaj' on its 150th foundation year:
1. It was founded by Swami Dayanand Saraswati in 1875.
2. It advocated for the infallibility of the Vedas and rejected idol worship.
3. It supported the hereditary caste system as a pillar of Vedic society.

Which of the statements given above is/are correct?
(a) 1 and 2 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) 1, 2 and 3
Answer: (a)
Explanation:
- **Statement 1 is correct:** Founded in 1875 by Swami Dayanand Saraswati.
- **Statement 2 is correct:** It advocated for monotheism, the authority of Vedas, and rejected idol worship.
- **Statement 3 is incorrect:** It launched a crusade *against* the hereditary caste system and untouchability.

Q18. Gold coins recently discovered in Tamil Nadu were identified as belonging to the Vijayanagara Empire. Which of the following is a characteristic of Vijayanagara coinage?
(a) They were predominantly square in shape.
(b) They often featured the 'Varaha' (Wild Boar) emblem.

(c) They used only the Tamil script for inscriptions.
(d) They were issued solely in silver.
Answer: (b) **Explanation:**

- **Option (b) is correct:** Many coins bear the emblem of a Wild Boar (Varaha), the royal symbol of the Vijayanagara dynasty.
- **Option (a) is incorrect:** They are circular, unlike the square coins of the Sangam Age.
- **Option (c) is incorrect:** Inscriptions appeared in Nagari, Kannada, Telugu, and Tamil.
- **Option (d) is incorrect:** They issued coins in gold, silver, and copper.

Q19. The 'Major Non-NATO Ally (MNNA)' status, recently granted to Saudi Arabia by the USA, entails which of the following benefits?
(a) A mutual defence guarantee similar to Article 5 of NATO.
(b) Automatic inclusion in the NATO decision-making council.
(c) Priority delivery of defence articles and participation in cooperative research.
(d) Free access to U.S. nuclear technology.
Answer: (c)
Explanation:

- **Option (c) is correct:** Benefits include priority delivery of defence articles, joint exercises, and cooperative research.
- **Option (a) is incorrect:** It does *not* offer a mutual defence guarantee.

Q20. 'Operation SOUTHERN SPEAR', recently announced by the United States, aims to:
(a) Conduct joint naval exercises with India in the Indian Ocean.
(b) Dismantle drug-linked armed groups operating in the Caribbean and Eastern Pacific.
(c) Provide humanitarian aid to war-torn regions in Gaza.
(d) Establish a new military base in the South China Sea.
Answer: (b)
Explanation:

- **Option (b) is correct:** It is a targeted military initiative aimed at dismantling drug-linked armed groups and narco-terrorist elements in the Western Hemisphere (Caribbean/Eastern Pacific)