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Uttarkashi Flash Floods

Other topics

- India Philippines Strategic Partnership
- AI in Public Service Delay
- Illegal Immigration in India
- Hydrogen Fuel in India

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SHORT ARTICLES

1. POLITY & GOVERNANCE

1.1 ANTI-DEFECTION LAW

Context

- The Supreme Court in Padi Kaushik Reddy vs The State of Telangana (2025) criticized the Telangana Assembly Speaker for delaying disqualification petitions against MLAs who defected in 2024, raising debate on Anti-Defection Law.

What is the Anti-Defection Law?

- **Origin and Purpose**: Enacted via the 52nd Constitutional Amendment (1985), it introduced the Tenth Schedule to curb political instability caused by frequent defections of legislators.
- The 91st Amendment (2003) eliminated the one-third split rule and barred defectors from holding ministerial posts until re-elected.
- **Grounds for Disqualification**:
  - Voluntarily abandoning party membership (inferred from actions, not just resignation).
  - Voting or abstaining against a party whip on key issues.
  - Independently elected members joining a party.
  - Nominated members joining a party after six months.
- **Exceptions:** No disqualification if two-thirds of a party's legislators merge with another party.
- **Role of Presiding Officer**: The Speaker (or Chairman in the case of the Upper House) acts as a quasi-judicial authority to decide disqualification cases.

Challenges in the Anti-Defection Law

- **Suppression of Dissent:** Compels legislators to follow party whips, restricting their ability to vote based on conscience or constituents' interests.
- **Biased Adjudication:** Speaker, often aligned with the ruling party, may delay or favor decisions, compromising neutrality (e.g., Telangana case delays).
- **No Time-Bound Process:** Absence of a mandatory deadline allows strategic delays, enabling defectors to continue as MLAs or hold ministerial positions.
- **Encouragement of Horse Trading**: The two-thirds merger rule permits large-scale defections, encouraging unethical party switches and political instability.
- **Opaque Party Whips**: Lack of transparency in issuing and communicating party whips leads to arbitrary enforcement and disputes.
- **Limited Scope for Independent Legislators**: Independents face disqualification for joining parties, restricting their political alignment options.

Judicial Intervention

- **Kihoto Hollohan vs Zachillhu (1992):** Court ruled that Speaker's decisions are subject to judicial review if they involve mala fide intent or violate constitutional norms.
- **Keisham Singh vs Manipur Assembly (2020)**: Court mandated a three-month deadline for disqualification cases and proposed an independent tribunal to replace the Speaker.
- **Padi Kaushik Reddy (2025):** Court urged Parliament to review the Speaker's role and strengthen the law to make it fair and timely.

How Can India Strengthen the Anti-Defection Law?

- **Narrow the Scope of Disqualification:** Limit disqualification to critical votes (e.g., no-confidence motions, budgets) to allow legislators flexibility on other issues.
- **Independent Adjudication Mechanism:** Transfer disqualification powers to an impartial body like the Election Commission, as recommended by the 2nd Administrative Reforms Commission (2007), to reduce political bias.

- **Mandatory Time Limit**: Enforce a strict three-month deadline for rulings, as suggested in Keisham Singh (2020), to prevent delays and ensure accountability.
- **Promote Intra-Party Democracy**: Encourage transparent party processes, such as open debates and clear whip issuance, to reduce reliance on rigid directives.
- **Strengthen Enforcement Mechanisms**: Implement recommendations from the Hashim Abdul Halim Committee for time-bound, transparent processes.
- **Public Awareness and Accountability**: Increase transparency in disqualification proceedings through public reporting to deter unethical defections.

Conclusion

- The Padi Kaushik Reddy case highlights the need for Anti-Defection Law reform in India to balance party loyalty with legislative freedom and uphold democratic principles.

1.2 AI IN PUBLIC SERVICE DELIVERY

Context

- India launched its first AI-powered Anganwadi in Waddhamna, Nagpur, Maharashtra, leveraging AI to enhance health, nutrition, and education.

What is the AI-Powered Anganwadi Initiative?

- **Features:**
  - AI-driven Poshan Tracker analyzes meal photos for nutrition assessment and malnutrition alerts.
  - VR, smart boards, and AI storytelling enhance early education.
  - Real-time tracking improves health and attendance monitoring.
- **Significance:** Transforms grassroots welfare, ensuring equitable health and education access in rural India.

How is AI Transforming Public Service Delivery?

- **Governance:** BharatGen enables multilingual services; AI optimized Mahakumbh 2025 crowd management.
- **Welfare:** India AI Dataset Platform targets poverty and health interventions.
- **Law Enforcement**: Delhi Police's Facial Recognition Systems aid crime-solving.
- **Agriculture**: Project Farm Vibes, Microsoft Research initiative in Maharashtra, boosts crop yields by 40% via AI-optimized irrigation.
- **Climate**: Mission Mausam uses AI for flood prediction and climate modeling.
- **Education:** DIKSHA's AI enables adaptive learning.
- **Smart Cities**: AI improves waste management and public safety.
- **Finance**: RBI's MuleHunter.ai detects financial scam accounts.

What are the Challenges in AI Adoption?

- **Data Issues:** Scattered datasets, privacy concerns, and algorithmic bias risk inequity.
- **Infrastructure:** High costs and digital divide limit rural access.
- **Skills:** Shortage of AI professionals hinders scalability.
- **Ethics:** Lack of ethical frameworks and "Black Box" AI demand transparency via Explainable AI (XAI).

How is India Addressing These Challenges?

- **Policy and Governance**: IndiaAI Mission focuses on infrastructure, skilling, and startups across seven pillars. The Digital Personal Data Protection Act, 2023, ensures data privacy and governance standards.
- **Research and Development**: Centres of Research Excellence (COREs) and International Centres of Transformational AI (ICTAIs) drive core and applied AI research.

- **Skilling Initiatives**: NASSCOM's Future Skills Platform and Atal Tinkering Labs promote AI education and workforce reskilling.
- **Collaborative Ecosystem**: Public-private partnerships with Microsoft, Google DeepMind, and others accelerate innovation.
- **Awareness and Inclusion**: Initiatives like BHASHINI and Sarvam-1 ensure linguistic inclusivity, aligning with India's diversity.

Way Forward for India to Maximize AI's Potential

- **Strategic Multi-alignment**: Balances domestic AI development with global collaboration.
- **Selective Engagement:** Prioritize non-sensitive sectors (e.g., agriculture, education) for AI adoption while addressing privacy and ethical concerns in sensitive areas like law enforcement.
- **Leveraging Partnerships**: Collaborate with private entities (e.g., Microsoft, RBI) and international organizations to access advanced technology and expertise.
- **Regional Focus:** Promote competitive federalism, encouraging states like Maharashtra and Karnataka to pilot AI initiatives scalable nationwide.
- **Global Leadership**: Position India as a "CERN for AI," creating scalable, inclusive solutions for developing economies through initiatives like the IndiaAI Mission.

Conclusion

- The AI-powered Anganwadi initiative exemplifies India's push for technology-driven governance. By addressing data, infrastructure, and ethical challenges through policies and partnerships, India can lead in inclusive AI, aligning with Digital India vision.

1.3 MONEY LAUNDERING

Context

- The Union Finance Minister report in the Rajya Sabha revealed the Enforcement Directorate (ED) investigated 5,892 PMLA (Prevention of Money Laundering Act) cases since 2015, securing only 15 convictions.

What is Money Laundering?

- **About**: Money laundering masks illegal proceeds (e.g., from drug trafficking, smuggling) to appear legitimate, evading detection.
- **Process**: Involves placement (introducing illicit funds), layering (hiding origins), and integration (making funds seem legal).
- **Methods**: Includes smurfing (splitting cash), trade-based laundering, shell companies, and cryptocurrency or real estate investments.

Why Are Money Laundering Cases Rising in India?

- **Advanced Techniques:** Criminals use cryptocurrencies (e.g., Bitcoin, USDT) and fintech, as seen in the recent Rs 260 crore cyber fraud case where funds were laundered via UAE hawala operators.
- **Enforcement Gaps**: Misuse of PMLA's Section 5 (property attachment without offence) and prosecution delays result in only 15 convictions from 5,892 cases.
- **Informal Economy:** Lax regulation in real estate, jewellery, and luxury goods aids illicit flows.
- **Weak Global Cooperation**: Limited information sharing despite Double Taxation Avoidance Agreements (DTAAs) with 85+ countries hampers investigations.
- **Regulatory Gaps:** Unregulated crypto-currencies create laundering vulnerabilities.

What Are the Consequences of Money Laundering?

- **Crime and Terrorism**: Funds sustain drug trafficking, smuggling, and terror networks.
- **Economic Harm**: Distorts monetary policy, inflates asset prices, deters FDI, and causes financial instability.

- **Governance Erosion**: Fuels corruption, erodes trust, and diverts welfare funds, deepening inequality.
- **Global Risks**: Offshore accounts and laundromats threaten financial system integrity.

What is India's Framework to Combat Money Laundering?

- **Prevention of Money Laundering Act (PMLA), 2002:** Enables asset confiscation, mandates KYC, record-keeping, and suspicious transaction reporting to FIU-IND.
- **PMLA Amendments (2019):** Tightened "beneficial ownership" threshold (25% to 10%), made offenses cognizable and non-bailable, and empowered ED for warrantless arrests.
- **Other Laws:** FEMA (2000), Indian Penal Code (1860), Fugitive Economic Offenders Act (2018), and COFEPOSA (1974) complement PMLA.
- **Financial Intelligence Unit–India (FIU-IND)**: Established in 2004 under the Ministry of Finance, processes financial intelligence and coordinates globally.
- **Enforcement Directorate (ED):** Enforces PMLA and FEMA (Foreign Exchange Management Act) , conducts investigations, attaches assets, and prosecutes offenders.

Global Framework to Combat Money Laundering?

- **Vienna Convention (1988):** Criminalized laundering of drug trafficking proceeds, promoting global cooperation.
- **Financial Action Task Force (FATF):** Sets AML standards; India joined in 2010.
- **Basel Committee:** Issues banking principles to prevent misuse of financial systems.

What are the Challenges in Combating Money Laundering?

- **Sophisticated Tactics:** Criminals use shell companies, and complex layering to evade detection.
- **Technological Challenges:** Cryptocurrencies and blockchain enable anonymous transactions.
- **Cross-Border Issues**: Inconsistent global AML regulations and tax havens create enforcement gaps.
- **Resource Constraints:** Limited funding, personnel, and technology hinder FIU-IND and ED operations.
- **Data Management**: Incomplete or unreliable transaction data undermines risk assessment.
- **Low Conviction Rates**: Only 15 convictions from 5,892 PMLA cases since 2015 reflect judicial and investigative bottlenecks.
- **Lack of Convergence**: Multiple agencies (ED, CBI, state police) lack coordinated action, reducing efficiency.
- **Smuggling and KYC Gaps**: Weak bank compliance and informal channels like hawala persist.

How Can India Strengthen Anti-Money Laundering Measures?

- **Regulatory Updates**: Amend PMLA to address emerging threats like cryptocurrency-based laundering.
- **Technology Adoption**: Use AI and machine learning for real-time transaction monitoring and pattern detection.
- **Rule of Law**: Ensure ED's transparent, unbiased investigations, per Supreme Court's directive.
- **Cryptocurrency Regulation**: Create a balanced framework to curb misuse while fostering innovation.
- **Judicial Reforms**: Establish fast-track courts and enhance scrutiny of PMLA processes.
- **Global Cooperation**: Streamline DTAAs for real-time data sharing and align with FATF norms.
- **Sector Oversight**: Tighten regulation in real estate, jewellery, and informal sectors.
- **Inter-Agency Coordination**: Establish specialized cells linked with INTERPOL and enhance information sharing among ED, CBI, and FIU-IND.

- **Public-Private Partnerships**: Promote collaboration between banks, regulators, and law enforcement to share intelligence.

Conclusion

- India faces financial instability and security threats from money laundering, despite PMLA's robust framework. Judicial reforms, global cooperation, and transparent enforcement are crucial.

1.4 AGE OF CONSENT

Context

- The Union Government defended the 18-year consent age in the Supreme Court, citing protection against exploitation, while senior advocate Indira Jaising suggested lowering it to 16, quoting criminalization of consensual adolescent relationships.

What is the Age of Consent?

- The age of consent is the minimum age at which a person can legally consent to sexual activity. Below this age, any sexual act is considered "statutory rape," regardless of willingness.

History of Age of Consent in India

- **1860**: Indian Penal Code (IPC) set consent age at 10.
- **1891**: Age of Consent Act raised it to 12 after cases like Phulmoni Dasi's death and Rukhmabai's resistance.
- **1929**: Child Marriage Restraint Act/Sarda Act set marriage age at 14 (girls), 18 (boys); IPC allowed marital sex with wives 13+.
- **1940**: Consent age raised to 16.
- **1978**: Marriage age for girls set at 18; consent age remained 16, with marital rape exception for wives 15+.
- POCSO Act 2012and Bharatiya Nyaya Sanhita 2023 raised the age of consent to 18 for all genders.

Key Challenges

- **Consensual Relationships**: POCSO criminalizes consensual acts among 16–18-year-olds. Parents misuse POCSO against inter-caste/inter-religious relationships.
- **Marriage vs Reality**: Consent age (18) aligns with marriage age, reinforcing marriage-centric norms. National Family Health Survey (NFHS-5, 2019–21): 23.3% of women aged 20–24 married before 18.
- **Sexual and Reproductive Health (SRH) Access**: Mandatory POCSO reporting deters adolescents from seeking contraception or abortions.
- **Legal Contradictions**: POCSO denies sexual agency for under-18s, however the Juvenile Justice Act treats 16–18-year-olds as adults for heinous crimes.

Judicial Interventions

- **Sabari vs State of T.N., 2019**: Madras HC suggested redefining "child" under POCSO as 16.
- **Anoop vs State of Kerala, 2022**: Kerala HC noted POCSO's failure to distinguish consensual acts from rape.
- **Vijay Chand Dubey vs State of Maharashtra, 2025**: Bombay HC advocated case-by-case assessment of adolescent maturity.

Way Forward

- Add close-in-age exemptions (3-year gap for 16–18-year-olds).
- Lower consent age to 16, as per Justice Verma Committee (2013), with anti-abuse safeguards.
- Repeal mandatory reporting for adolescent sexual activity by doctors.
- Harmonize consent and marriage laws.
- Prioritize adolescent testimony and context over age cutoffs.
- Implement sexuality education under NEP 2020.

- Train medical, law enforcement, judicial officials on consent and adolescent realities.
- Support young couples in inter-caste/inter-religious relationships against coercion.

Conclusion

- The age of consent at 18 under POCSO protects minors but criminalizes consensual adolescent relationships, and burdens courts. Close-in-age exemptions, global alignment, and education can balance protection with autonomy.

1.5 SHORT ARTICLES

Revised OCI Card Cancellation Rules 2025

Context

- The Ministry of Home Affairs (MHA) amended rules of the Citizenship Act, 1955, allowing Overseas Citizenship of India (OCI) card cancellation for serious criminal convictions or charges.

What is the OCI Card?

- **About**: Launched in 2005 via amendments to the Citizenship Act, 1955, it grants foreign passport holders of Indian origin a multiple-entry, lifelong visa.
  - **Not Dual Citizenship**: No political rights (e.g., voting, contesting elections).
  - **Benefits**: Exempt from police registration; parity with NRIs in economic, financial, educational fields (except agricultural land).
  - **Scale**: Over 4.5 million cardholders, mainly in the US, UK, Australia, Canada.
- **Eligibility**:
  - Indian citizens on/after January 26, 1950, their descendants, or spouses.
  - **Exclusions**: Citizens of Pakistan or Bangladesh.
- **Restrictions**:
  - No public employment under Article 16.
  - Permits needed for research, missionary/journalistic work, mountaineering, restricted areas.

What are the Revised OCI Cancellation Rules?

- **Conviction-Based**: Cancellation for ≥2 years imprisonment.
- **Charge-Sheet Based**: Named in chargesheet for offenses punishable with ≥7 years imprisonment.
- **Global Scope**: Applies to convictions/charges in India or abroad, if recognized under Indian law.

NRI vs OCI

	Non-Resident Indian (NRI)	Overseas Citizen of India (OCI)
Definition	Indian citizens residing outside India for employment, business, or education (>182 days/year).	Foreign citizens of Indian origin (excluding Pakistan/Bangladesh citizens) eligible for Indian citizenship on/after Jan 26, 1950, or from territories that became part of India post-Aug 15, 1947.
Citizenship	Indian citizen.	Foreign citizen.
Travel to India	Requires valid Indian passport.	OCI card grants lifelong, multiple-entry visa.
Voting Rights	Can vote in Indian elections if physically present.	No voting rights.
Property Ownership	Can own residential/commercial property; no agricultural land, plantations, or farmhouses.	Same as NRI.

Employment	Can work in India without restrictions.	Can work with specific permissions; no public employment under Article 16.
Taxation	Taxable only on India-sourced income.	Taxable on India-sourced income; tax resident if stay >182 days/year.
Revocation	Lost upon acquiring foreign citizenship or not meeting residency criteria.	Revocable for fraud, disaffection to Constitution, wartime enemy aid, convictions, or actions against India's interests.

130th Constitution (Amendment) Bill, 2025

Context

- The Union Government introduced the Constitution (130th Amendment) Bill 2025.

What is the 130th Constitution (Amendment) Bill, 2025?

- **Amendments**: Targets Articles 75 (Union Council of Ministers), 164 (State Council of Ministers), and 239AA (Delhi Ministers).
- **Key Clause:**
  - Ministers detained for 30 consecutive days on charges punishable by ≥5 years imprisonment must be removed by the 31st day or automatically cease to hold office.
  - **Process**: President (on PM's advice) for Union Ministers; Governor (on CM's advice) for State Ministers; President (on CM's advice) for Delhi.
  - **PM/CM**: Must resign by 31st day of detention or lose office.
  - **Reversibility**: Reappointment allowed post-release.
- **Objective**: Uphold constitutional morality and good governance, ensuring ministers facing serious charges do not erode public trust.

What is the Current Legal Framework?

- **No Automatic Removal**: Under Section 8, Representation of the People Act 1951, disqualification occurs only post-conviction for offenses with ≥2 years imprisonment.
  - Prevention of Corruption Act, 1988: Disqualification for 6 years if fined; imprisonment duration plus 6 years post-release.
- **Presumption of Innocence**: Arrest alone does not trigger removal; ministers share legislator disqualification rules.

Why is a New Provision Needed?

- **Criminalisation of Politics**: ADR Report (2025): 45% of MLAs have criminal cases, 29% with serious charges (e.g., murder, kidnapping). Conviction-based disqualification allows accused ministers to serve, eroding trust.
- **Accountability Gaps**: Ministers' executive powers can influence probes; slow judicial processes delay convictions.
- **Public Confidence**: Temporary removal of detained ministers ensures ethical governance.

Comprehensive Modular Survey: Education (CMS:E) 2025

Context

- The Ministry of Statistics and Programme Implementation (MoSPI) released the Comprehensive Modular Survey: Education (CMS:E) 2025, conducted by the National Statistical Office (NSO).

What are the Major Takeaways from CMS:E 2025?

- **School Enrolment Patterns**:
  - Government schools account for 55.9% of enrolments, with 66% in rural areas and 30.1% in urban areas.
  - Private unaided schools cover 31.9% of enrolments.
- **Education Spending**:
  - Average per-student expenditure: Rs 8,382 (rural), Rs 23,470 (urban) across all schools.
  - Government schools: Rs 2,863; non-government schools: Rs 25,002.

- **Private Coaching**: 27% of students use coaching, higher in urban areas (30.7%) than rural (25.5%).
- **Sources of Funding**:
  - 95% of expenses from household/family members.
  - Only 1.2% rely on government scholarships.

National Annual Report and Index on Women's Safety (NARI) 2025

Context

- The National Annual Report and Index on Women's Safety (NARI) 2025, released by the National Commission for Women (NCW).

Key Highlights of NARI 2025

- **National Safety Score**: 65%, with cities categorized as "much above," "above," "below," or "much below" this benchmark.
- **Safest Cities**: Kohima, Visakhapatnam, Bhubaneswar, Aizawl, Gangtok, Itanagar, Mumbai (linked to better gender equity, policing, infrastructure).
- **Least Safe Cities**: Patna, Jaipur, Faridabad, Delhi, Kolkata, Srinagar, Ranchi (due to weak institutional response, patriarchal norms, infrastructure gaps).
- **Safety Perceptions**: 60% of women feel "safe"; 40% feel "not so safe" or "unsafe."
- **Harassment Trends**:
  - 7% of women reported harassment in 2024; 14% for women under 24.
  - Verbal harassment (58%) most common, followed by physical, psychological, economic, and sexual harassment.
  - Hotspots: Neighborhoods (38%), public transport (29%).
- **Night-Time Safety**: Sharp decline in safety perceptions in public transport and recreational spaces after dark.
- **Educational Institutions**: 86% feel safe during the day; safety drops at night or off-campus.
- **Trust in Authorities**: Only 33% of victims file complaints; 25% trust authorities to act effectively.
- **Workplace Safety**: 53% are unaware of mandatory Prevention of Sexual Harassment (POSH) policy.
- **Reporting Gaps**: Only 22% of incidents are formally registered; action taken in 16% of cases.

1.6 SNIPPETS

Topics	Details
First Fully Digitally Literate State	• Kerala became the first fully digitally literate state in India. • The Digi Keralam Project targeted senior citizens, homemakers, and digitally excluded groups, **leveraging youth volunteers and the K-SMART platform** to provide online access services, enhancing inclusion and governance. Digital literacy—defined as the ability to use digital technologies meaningfully.
National Pharmaceutical Pricing Authority	• The Parliamentary Standing Committee criticized the National Pharmaceutical Pricing Authority (NPPA) for allowing a 50% price increase on 11 essential drug formulations in 2024. • NPPA, set up in 1997, **under the Department of Pharmaceuticals (DoP), Ministry of Chemicals & Fertilizers**. It enforces the Drugs (Prices Control) Order, handles legal matters from its decisions, **monitors drug availability to address shortages,** and collects data on production, exports, imports, market share, and profitability of companies for bulk drugs and formulations. It **advises the Central Government on drug policy revisions**.
RUDRASTRA	• Indian Railways conducted the trial run of 'Rudrastra', Asia's longest freight train at 4.5 km, between Ganjkhwaja (Uttar Pradesh) and Garhwa (Jharkhand). • Aimed at boosting efficiency, it transports larger cargo volumes, reduces crew

	and scheduling duplication, and cuts time/resource use. Though surpassing Asian peers, it **trails Australia's 7.3 km record.**
Property Rating Framework	• The Telecom Regulatory Authority of India (TRAI) launched the country's first Property Rating Framework for Digital Connectivity. • This framework **evaluates properties using criteria like fibre readiness, indoor 4G/5G coverage, Wi-Fi access, broadband speeds, and user experience**, aiding buyers, tenants, and businesses. TRAI, established in 1997, as a **statutory body, headquartered in New Delhi,** regulates tariffs, resolves disputes, and protects consumers with quality standards.

2. INTERNATIONAL RELATIONS

2.1 US TARIFF ON INDIAN IMPORTS

Context

- The United States imposed an additional 25% tariff on Indian goods, quoting New Delhi's continued purchase of Russian oil, bringing the total tariff to 50%.

What Factors Led to the US Imposing Tariffs on India?

- **Trade Disputes**: Stalled talks over India's protectionist policies in agriculture and dairy, with U.S. seeking greater market access.
- **Trade Barriers**: U.S. criticized India's high tariffs (e.g., 39% on agriculture) and non-tariff barriers in pharmaceuticals and electronics.
- **Russian Oil Imports:** India imports over 35% crude oil from Russia, undermining U.S. sanctions on Russia.
- **Trade Deficit**: U.S. have $45.8 billion trade deficit with India in 2024, imposed tariffs to address imbalances.
- **Geopolitical Pressure**: Tariffs aim to curb Russian oil revenue, though China and EU face no similar sanctions for Russian energy imports.

What is the Status of India-U.S. Trade Relations?

- **Top Trading Partner**: Bilateral trade hit $131.84 billion in 2024-25, with India's exports over $87 billion.
- **FDI Inflows**: U.S. was India's third-largest FDI source in FY 2023-24, contributing $4.99 billion.
- **Trade Aspirations:** Both aim for $500 billion trade by 2030 via a Bilateral Trade Agreement (BTA).
- **Tensions:** Tariffs and India's Russia ties strain the strategic partnership, impacting Quad and Indo-Pacific cooperation.

What are the Implications of the US Tariffs on India?

- **Export Losses**: 50% tariff hits 66% of India's U.S. exports (textiles, gems, auto components), risking a 40-50% drop. (Global Trade Research)
- **Economic Impact:** Asian Development Bank cut India's FY 2025-26 GDP forecast to 6.5% from 6.7% due to tariff disruptions.
- **Competitiveness Loss:** Indian goods lose edge to Vietnam and Bangladesh, weakening India's "China plus one" status.
- **Geopolitical Shift**: Tariffs may push India toward Russia and China, as seen in 2025 Shanghai Cooperation Organisation (SCO) Summit engagement.
- **Job Risks**: Up to 2 million jobs in MSMEs (textiles, gems) are threatened in export hubs like Gujarat. (New Indian Express).

What Challenges Hinder Mitigation?

- **Market Dependence**: U.S. accounts for 18.3% of India's exports, making diversification slow and complex. (NITI Aayog)
- **Energy Security**: Reducing Russian oil imports risks higher costs, with Middle East alternatives less economical.
- **WTO Limitations**: Challenging tariffs at WTO is tough due to U.S. national security exemptions and Appellate Body issues.
- **China's Influence**: Diversifying to SCO markets risks reliance on China-led frameworks, which India opposes.

How Can India Mitigate Tariff Impacts?

- **Trade Talks:** Pursue a balanced Trade Agreement, offering concessions (e.g., lower tariffs on U.S. soybeans) while protecting agriculture.
- **Market Diversification:** Fast-track FTAs with EU, and Gulf nations to tap diverse export markets.
- **Boost Competitiveness:** Increase R&D (0.7 % of GDP currently), streamline logistics, and promote value-added exports.

- **Support Exporters**: Offer subsidies and export credit to MSMEs in textiles and gems to absorb tariff costs.
- **Energy Diversification:** Gradually shift to Middle East and African oil to reduce reliance on Russia.
- **Multialignment**: Balance SCO/BRICS ties with Russia and China against Quad/U.S. relations to preserve autonomy.

Conclusion

- India faces threats from US tariffs, seeking alternative alignments like SCO and BRICS to diversify markets, enhance competitiveness, and pursue strategic trade talks to maintain global standing.

2.2 INDIA-EFTA TRADE AND ECONOMIC PARTNERSHIP AGREEMENT

Context

- The Union Minister of Commerce and Industry announced that the India-EFTA Trade and Economic Partnership Agreement (TEPA) will take effect on October 1, 2025, boosting trade and investment with Iceland, Liechtenstein, Norway, and Switzerland.

What is TEPA?

- **About**: Signed in March 2024, TEPA promotes trade and investment between India and EFTA nations.
- **Aims**: Reduce tariffs, simplify trade procedures, strengthen IPR and dispute resolution.
- **Key Features**:
  - EFTA's $100 billion investment commitment over 15 years to create 1 million jobs in India.
  - EFTA offers 92.2% tariff lines (99.6% of India's exports); India offers 82.7% (95.3% of EFTA exports).
  - Excludes sensitive sectors (dairy, soya, coal, PLI schemes).

India-EFTA Trade Relations

- **Trade Volume**: $24.4 billion in 2024–25; India is EFTA's 5th-largest partner.
- **Exports**: India's $1.96 billion (chemicals, iron, steel, precious stones).
- **Imports**: $22.45 billion, mainly gold ($20.7 billion), pharmaceuticals, medical equipment.
- **Dominance**: Switzerland drives over 90% of trade (due to gold import); others negligible.

Why is TEPA Significant for India?

- **Economic Boost**: $100 billion investment to create jobs and support India's $5 trillion economy goal.
- **Market Access**: Opens EFTA markets, reducing reliance on US/EU.
- **Technology Transfer**: EFTA's expertise in clean energy, manufacturing aids India's green transition.
- **Strategic Alignment**: Complements India's FTAs with EU, UK, strengthening global trade networks.

What are the Key Challenges?

- **Trade Deficit**: $20.49 billion deficit, driven by gold imports from Switzerland.
- **IPR Risks**: EFTA's data exclusivity push threatens India's generic drug industry, raising medicine costs.
- **Limited Diversification**: Exports focus on chemicals, textiles; minimal trade with Iceland, Norway, Liechtenstein.

- **Non-Tariff Barriers**: EFTA's high regulatory standards limit India's exports.

How Can India Maximize TEPA Benefits?

- **Reduce Deficit**: Diversify exports (electronics, processed foods), promote "Make in India" to cut gold imports.
- **Protect Generics**: Negotiate IPR clauses to safeguard affordable medicine production.
- **Leverage Expertise**: Partner on clean energy, precision manufacturing for skill development.
- **Boost Trade**: Target niche markets in Iceland, Norway, Liechtenstein (e.g., IT, marine products).
- **Align with EU FTA**: Use TEPA to advance EU talks, addressing non-tariff barriers.

Conclusion

- India-EFTA TEPA improves market access, but trade deficit and generic drug IPR threats persist. India can benefit by diversifying exports, safeguarding generics, and utilizing EFTA's clean energy expertise.

2.3 INDIA-PHILIPPINES STRATEGIC PARTNERSHIP

Context

- The President of the Philippines visited India in August 2025, and both nations elevated their bilateral relationship to a Strategic Partnership.

What are the Key Outcomes of the Visit?

- **Plan of Action (2025-2029)**: Roadmap for cooperation in defense, trade, connectivity, and climate change.
- **Consular Agreements**:
  - Philippines offers visa-free access to Indian tourists; India grants gratis e-tourist visas to Filipinos (August 2025).
  - Signed **Mutual Legal Assistance Treaty (MLAT)** and **Treaty on Transfer of Sentenced Persons** for prisoner rehabilitation.
- **Infrastructure & Maritime**: India to support Philippines' Sovereign Data Cloud. Philippines seeks Indian investment in infrastructure via the Gatishakti **platform**.

How India-Philippines Relations Evolved?

- **Diplomatic Ties**: Established in 1949; 1952 Treaty of Friendship. Philippines is ASEAN-India Dialogue Coordinator (2024–27).
- **Trade Growth**: Bilateral trade rose from $2.03 billion (2020–21) to $3.53 billion (2023–24) under ASEAN-India FTA. India exports pharma (12% of Philippines' imports), engineering goods; imports semiconductors, copper.
- **Defense**: 2006 MoU; 2022 BrahMos missile deal; first joint naval exercises in South China Sea (July 2025).
- **Multilateral Support**: Philippines backs India's UNSC permanent seat bid.

What is the Significance of India-Philippines Relations?

- **Indo-Pacific Strategy**: Philippines' South China Sea location aligns with India's **Act East Policy** and **MAHASAGAR Vision** for a rules-based maritime order.
- **Countering Regional Challenges**: Both nations share concerns over China's assertive actions.
- **ASEAN Role**: Strengthens India's Southeast Asia presence via Philippines' ASEAN influence.
- **Economic Potential**: India offers IT, pharma, fintech expertise; Philippines excels in seaweed cultivation.

What are the Challenges?

- **China's Reaction**: Joint naval exercises risk Beijing's concern, complicating Philippines' balancing act.
- **Economic Limits**: Slow **Preferential Trade Agreement (PTA)** talks, low investment, and weak connectivity hinder trade growth.
- **Implementation Gaps**: Digital and maritime agreements face delays due to capacity and regional instability.

- **Geopolitical Sensitivities:** Philippines' alliances with the US, affecting India's strategic autonomy narrative.

How Can India Strengthen Ties?

- **Defense**: Expand **Indian Technical and Economic Cooperation (ITEC) programs** and co-develop naval assets for Philippines.
- **Trade**: Fast-track PTA for pharma, electronics, and digital services.
- **Cultural Ties**: Offer STEM scholarships, promote ASEAN-India cultural events.
- **Maritime Security**: Deepen cooperation via Indian Ocean Region and joint exercises.
- **Leverage Technology**: Share expertise in digital infrastructure (e.g., UPI, Aadhaar models).

Conclusion

- The India-Philippines Strategic Partnership enhances India's Indo-Pacific role. By focusing on defense, trade, and cultural ties while navigating China's sensitivities, India can build a resilient partnership.

2.4 INDIA - EURASIAN ECONOMIC UNION FTA NEGOTIATIONS

Context

- India and the Eurasian Economic Union (EAEU) signed the Terms of Reference to start Free Trade Agreement (FTA) talks.

What is the Eurasian Economic Union (EAEU)?

- **Nature:** Regional economic integration organization.
- **Established:** 2015 via the Treaty on the EAEU.
- **Members**: Armenia, Belarus, Kazakhstan, Kyrgyz Republic, Russia.
- **Headquarters:** Moscow, Russia.
- **Objectives**: Free movement of goods, services, capital, labor; coordinated policies; economic modernization; enhanced competitiveness; improved living standards.

What is the Significance of EAEU for India?

- **Market Access:** $6.5 trillion market; opportunities to boost exports in textiles, pharmaceuticals, engineering, electronics; supports MSMEs. Bilateral trade hit $69 billion in 2024.
- **Trade Diversification**: Reduces reliance on US/EU markets amid tariff disputes.
- **Energy Security**: Russia supplies over 35% of India's crude oil, ensuring long-term energy cooperation.
- **Connectivity:** Strengthens International North–South Transport Corridor (INSTC) and Chennai–Vladivostok Corridor, cutting logistics costs and transit time.

What are the Challenges in India–EAEU Engagement?

- **Trade Deficit**: India's deficit with Russia rose from $6.6 billion (2021) to $58.9 billion (2024–25), driven by oil imports.
- **Geopolitical Risks**: Russia-led FTA may strain ties with NATO/West, especially under US/EU sanctions. US tariffs on Indian goods (50%) add pressure.
- **Domestic Industry**: Cheap EAEU imports (oil, metals) threaten Indian producers, needing safeguards.
- **Low FTA Utilization**: India's FTA usage is around 25% vs 70–80% in developed nations. (Asian Development Bank)
- **Non-Tariff Barriers**: Bureaucratic delays, complex customs, and regulatory hurdles impede trade.
- **Sanitary and Phytosanitary measures (SPS) Standards:** Strict EAEU sanitary/phytosanitary rules limit Indian agricultural exports.

- **Dollar Dependency**: Heavy reliance on USD; rupee-ruble mechanism lacks liquidity. Sanctions complicate payments.

How Can India Strengthen EAEU Engagement?

- **Economic Cooperation**: Implement 2025–2030 Programme with Russia, extend to EAEU for energy, agriculture, industry, education, culture.
- **Diversify Exports**: Focus on pharmaceuticals, textiles, machinery, services to reduce hydrocarbon reliance.
- **Financial Innovation**: Scale up rupee-ruble trade, develop Local Currency Settlement with liquidity to bypass USD.
- **Multilateral Outreach**: Use BRICS, negotiate Regional Comprehensive Economic Partnership (RCEP) to diversify trade alliances.
- **Connectivity**: Enhance INSTC, Northern Sea Route, Chennai–Vladivostok Corridor.
- **Address Barriers**: Streamline customs, align standards for agricultural exports.
- **Strategic Balancing**: Engage Quad/G20 alongside EAEU to maintain autonomy.

Conclusion

- India-EAEU FTA talks aim to diversify trade, secure economic interests, and address challenges like trade deficits and geopolitical risks, while preserving strategic autonomy.

2.5 SHORT ARTICLES

Armenia - Azerbaijan Peace Agreement

Context

- Armenia and Azerbaijan signed a US-brokered peace agreement.

What is the Armenia-Azerbaijan Peace Agreement?

- **About**: Agreement ends nearly 40 years of conflict over Nagorno-Karabakh region, in the South Caucasus.
  - Over 90% ethnic Armenian but internationally recognized as part of Azerbaijan.
- **Key Provisions**:
  - Mutual respect for territorial integrity.
  - Ban on use of force and follow international law.
  - Establishment of diplomatic relations.
- **Trump Route**: A transit corridor named "Trump Route for International Peace and Prosperity" (TRIPP) grants the US exclusive rights to develop a transit corridor.
- Connects Azerbaijan to Nakhchivan, bypassing Russia and Iran, reducing their regional influence.
- **Geopolitical Shift**: Strengthens US influence in the South Caucasus, challenging Russia's historical dominance.

What is India's Stance?

- **Support for Peace**: India endorses the agreement, viewing Armenia and Azerbaijan as key nodes in the **International North-South Transport Corridor (INSTC)**, a 7,200-km trade route connecting India to Russia via Iran and Central Asia.
- **India-Armenia Relations**: The 1995 Friendship and Cooperation Treaty strengthens bilateral ties, with India supplying defense equipment to Armenia.
- **Balancing Act**: India maintains friendly relations with Azerbaijan, maintains neutrality on the Nagorno-Karabakh conflict, to counter Pakistan's influence in the region.

2.6 SNIPPETS

Topics	Details
Southeast Asia Nuclear-Weapon-Free Zone (SEANWFZ)	• China and Russia to become the first nuclear-armed states to sign the SEANWFZ treaty. • The SEANWFZ Treaty, also known as the **Bangkok Treaty**, was signed in 1995 between 10 ASEAN members—Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam—**to prohibit nuclear weapons in Southeast Asia.**
International Court Of Justice (ICJ)	• The International Court of Justice (ICJ) issued an advisory opinion over climate change. • ICJ is the **principal judicial organ of the United Nations (UN)**, established in 1945 by the UN Charter. Located in The Hague (Netherlands), the **only principal UN organ not situated in New York, USA. 15 independent judges elected for 9-year terms by the UN General Assembly and the UN Security Council**. It **settles legal disputes between states** that consent to its authority. **Decisions are not self-enforcing**, relying on the goodwill of member states.
Battlefield Tourism	• Sikkim plans to transform the Doklam area and Zhuo La Pass into "battlefield tourism" attractions for tourists. • **Battlefield tourism** aims to **promote tourism in areas where a country's military history was shaped**. It focuses on **regions that have seen recent military friction** with neighboring countries and may still be unstable, such as proposed sites in Sikkim.
Global Artificial Intelligence (AI) City Index	• The Global Artificial Intelligence (AI) City Index, published by Counterpoint Research, ranks cities based on their AI development and infrastructure. • **Bengaluru (globally ranked 26th) is India's leading AI hub**, followed by Mumbai, Delhi, Chennai, and Kolkata. **Singapore holds the top spot as the world's leading AI city**, followed by Seoul, Beijing, Dubai, and San Francisco in the top five.
Project Dojo	• Tesla CEO Elon Musk has ordered the shutdown of the Dojo Project. • The Dojo project was a **supercomputer designed to train the AI** for the company's autonomous driving, to **process vehicle video data to develop its Full Self-Driving (FSD) system.**
Maryam Mirzakhani New Frontiers Prize	• Indian mathematician Dr. Rajula Srivastava received the Maryam Mirzakhani New Frontiers Prize for her work in number theory. • Named after Maryam Mirzakhani, Iranian Fields Medalist for geometry and Riemann surfaces. It was **established in 2019 by the Breakthrough Prize Foundation,** honors women mathematicians within two years of their PhD with a prize amount of $50,000.
UNDP Equator Initiative Award	• A self-help group (SHG) from Karnataka honored with the prestigious UNDP Equator Initiative Award for work in biodiversity conservation. • The UNDP Equator Initiative Award, often called the Nobel Prize for Biodiversity Conservation, is **presented biennially to recognize community-led efforts that reduce poverty through sustainable biodiversity use.** The Karnataka SHG, recognized under the **2025 theme "Women and Youth Leadership for Nature-Based Climate Action," received a $10,000 cash prize**

	for its initiatives. Eligible nominees must be community-based or Indigenous groups in rural areas of UNDP-supported countries.
India-Nepal Mutual Legal Assistance Agreement	• India and Nepal finalized the Mutual Legal Assistance (MLA) Agreement in Criminal Matters to strengthen cooperation in combating transnational crimes. • MLA Agreement **facilitates faster exchange of information and evidence to counter transnational crimes** like terrorism, drug trafficking, human smuggling, cybercrime, and financial fraud. **Legally binding for signatory countries,** to ensure mutuality in assistance; for non-signatory countries, cooperation is discretionary and ad hoc. India has entered into **MLA with 42 countries.**
Russia Withdraws from 1987 INF Treaty	• Russia has formally withdrawn from the Intermediate-Range Nuclear Forces (INF) Treaty. • The INF Treaty, **signed by the US and the Soviet Union** in 1987, **banned all ground-launched ballistic and cruise missiles with a range of 500–5,500 km**, aiming to reduce nuclear threats and promote global arms control. The US exited in 2019, accusing Russia of violations.
International Big Cat Alliance (IBCA)	• Nepal has officially joined the International Big Cat Alliance (IBCA). • IBCA, an **India-led coalition** of over 90 big cat range and non-range countries, **focuses on conserving seven species—tiger, lion, leopard, snow leopard, cheetah, jaguar, and puma—and their habitats**. Launched in 2023 in Mysuru, Karnataka, on Project Tiger's 50th anniversary. Secretariat in New Delhi.
Fiji PM's Visit to India	• The Prime Minister of Fiji, during his visit to India, held talks with the Indian Prime Minister to strengthen bilateral cooperation. • India agreed to provide training, equipment, and capacity building for Fiji's military. Agreements include a 100-bedded Super-Specialty Hospital, **Jan Aushadhi, Heal in India, and telemedicine via e-Sanjeevani**. Fiji, an archipelago north of New Zealand, with over 300 islands, is the **"soft coral capital of the world".**
World Food Programme	• India initiated a joint initiative with the UN World Food Programme to enhance Rice Fortification and Supply Chain Management in Nepal. • The UN World Food Programme (WFP), established in 1961, is the **world's largest humanitarian agency focused on eradicating hunger and promoting food security**. It **provides emergency food aid and builds community resilience.** Funded by **voluntary donations** from governments, corporates, and private donors, it is part of the UNDP and **won the Nobel Peace Prize in 2020. Headquartered in Rome, Italy.**
Asia-Pacific Institute for Broadcasting Development (AIBD)	• India has been elected as the Chairman of the Executive Board of Asia-Pacific Institute for Broadcasting Development (AIBD) during the General Conference, held in Phuket, Thailand. • AIBD is a regional inter-governmental organization, established in 1977, aiding the UN Economic and Social Commission for Asia and the Pacific (UN-ESCAP) in electronic media development. **Founded by the International Telecommunication Union (ITU), the United Nations Development Programme (UNDP), and UNESCO**, it has 92 members from 44 countries. Its **secretariat is in Kuala Lumpur, Malaysia**. India, a founding member, **represented by Prasar Bharati**, public service broadcaster under the Ministry

	of Information & Broadcasting.
E-3 Countries	• The "E3 countries" are discussing restoring sanctions on Iran over its nuclear program. • The E3, an **informal foreign and security cooperation arrangement between the UK, Germany, and France,** was established in 2003 following the US attack on Iraq, to address nuclear risks from Iran.
E1 Settlement Plan	• Israel approved the 'E1 Settlement Plan' expansion on the occupied West Bank has sparked global reactions. • The Israeli E1 settlement plan to **build the E1 corridor of the occupied West Bank**. Construction would **bisect the West Bank**, severing the north from the south, undermining the viability of a future, contiguous Palestinian state. The decision is widely condemned by international bodies like the UN and EU.
Dubai's One Freezone Passport	• Dubai launched the "One Freezone Passport," a unified licensing system allowing companies to operate across all emirate free zones under one license. • Dubai's system replaces the need for separate licenses per free zone with a single license, effective for all firms, streamlining compliance and offering tax exemptions and 100% foreign ownership. India could adopt this model to reduce bureaucratic hurdles, accelerate market entry, and attract global investment.
Ulchi Freedom Shield 2025	• South Korea and the US conducted Ulchi Freedom Shield exercise. • Originating in the 1970s as Team Spirit, **renamed Ulchi Freedom Shield in 2023,** it integrates drills, addressing nuclear and unconventional attacks.
Katsina State	• Around 50 were killed in an attack in Katsina state, northwest Nigeria. • Nigeria is located on **Africa's west coast** with Abuja as its capital. It **borders Niger, Chad, Cameroon, and the Gulf of Guinea.**

3. ECONOMY

3.1 ENERGY SOVEREIGNTY & INDIA'S TRANSITION

Context

- India's heavy dependence—importing over 85% of crude oil and 50% of natural gas—underscores its critical energy vulnerability.

- ### Introduction

  E***nergy sovereignty = reliable, affordable, and sustainable domestic energy supply plus*** resilience to geopolitics. For India, this means reducing import exposure, building domestic supply chains (fossil + non-fossil), and strengthening strategic/resilience infrastructure while meeting climate commitments.

Background

- **India's crude import dependency is very high** — reported near ~88–90% (i.e., almost all domestic demand is met by imports), exposing India to global price and diplomatic pressures. (E.g., FY25 import volumes rose despite discounts on Russian crude).
- **India imports roughly~50%** of its gas requirement (LNG & pipeline), making gas security vulnerable to global LNG markets and chokepoints **(e.g., Strait of Hormuz).**
- **India sharply increased purchases of discounted Russian crude after 2022** — Russia's share rose to **~35–40% of Indian crude imports in 2024–25** — which lowered costs but increased geopolitical friction **(e.g., US pressure/ tariffs).**

Global Energy Flashpoints

- **1973 Oil Embargo** → Led to strategic reserves & diversification.
- **2011 Fukushima Disaster** → Triggered global nuclear confidence crisis.
- **2021 Texas Freeze** → Stressed the need for resilient energy infrastructure.
- **2022 Russia-Ukraine War** → Showcased energy as a geopolitical weapon. (e.g., discounted Russian crude).
- **2025 Iberian Blackout** → Highlighted risks of excessive reliance on renewables. (pumped hydro/long-duration storage).

India's FIVE-PILLAR STRATEGY for Energy Sovereignty

- **Coal Gasification** – Convert indigenous coal reserves to syngas, methanol, and hydrogen (where feasible and low-emission routes are adopted). (**e.g., scale up GTL/catalytic routes (Industrial processes that convert natural gas (methane) into liquid fuels)** with Carbon Capture and Storage to lower CO_2).
- **Biofuels** – Ethanol blending & SATAT scheme enabled **₹92,000 crore transfer to farmers.** (E.g., E20 reduces petrol imports per litre substituted).
- **Nuclear Energy** – Revive thorium R&D, deploy Large & Small Modular Reactors (SMRs), and secure uranium/technology partnerships. (e.g., **~8.8 GW** as of recent capacity data)
- **Green Hydrogen** – Building a domestic electrolyser, storage, and industrial ecosystem. (E.g., pilot H_2-ammonia for fertiliser & shipping bunker tests.)
- **Pumped Hydro Storage** – Critical for grid stability and balancing renewables. (e.g., Iberian/ Texas events showed the price of insufficient flexibility).

Strategic Measures

- **Domestic manufacturing push:** Use PLI to localise electrolysers and renewables. *(E.g., solar PLI reduced panel imports.)*
- **Diplomacy & energy partnerships:** Secure long-term LNG/uranium deals via strategic ties. *(E.g., India-Kazakhstan uranium pact.)*
- **Market reforms & pricing:** Improve transparent LNG/gas trading platforms. *(E.g., Indian Gas Exchange gas exchange reforms.)*
- **Safety & regulatory frameworks:** Enforce nuclear safety, RE-grid codes, and biofuel standards. *(E.g., AERB's nuclear oversight.)*

Challenges & Trade-offs

- **Economic:** High upfront costs and fossil job losses. *(E.g., coal mining layoffs in transition.)*
- **Geopolitical:** Cheap crude (Russia) risks sanctions/diplomatic costs. *(E.g., G7 oil price cap pressure.)*
- **Technical:** Green H_2 and storage tech are costly, need scale. *(E.g., electrolysers are still import-dependent.)*
- **Environmental & Social:** Coal gasification, land for hydro, hit emissions/ecology. *(E.g., resistance to hydro in NE India.)*

Policy / Implementation Roadmap

- **Short (1–3 yrs):** Boost Strategic Petroleum Reserves, E20 rollout, Production Linked **Incentive** (**PLI**) for electrolysers, Sustainable Alternative Towards Affordable Transportation (SATAT) Compressed Bio-Gas (CBG) plants. *(E.g., distillery ethanol supply incentive.)*
- **Medium (3–8 yrs):** Pilot Small Modular Reactors (SMRs), expand pumped hydro, build green H_2 hubs. *(E.g., RE-H_2 hubs at coastal ports.)*
- **Long (8–25 yrs):** Nuclear 100 GW goal, integrate green H_2 in industry, diversify imports. *(E.g., net-zero aligned nuclear roadmap.)*

Conclusion

- Energy sovereignty for India is not isolationism but **resilience through diversification, domestic capability, and low-carbon transition**. If India pursues the five-pillar strategy with institutional rigor and equitable transition planning, it can convert import vulnerabilities into strategic industrial and climate leadership.

3.2 CHINA'S DISRUPTION OF INDIA'S MANUFACTURING GOALS

Context

- India's ambition to position itself as a global manufacturing hub through initiatives like *"Make in India"* faces strategic challenges from China.

Details:

- The recent recall of over 300 Chinese engineers from Foxconn's iPhone 17 facilities in Tamil Nadu and Karnataka is not an isolated event but part of a larger geo-economic strategy by Beijing to slow India's rise in high-value manufacturing.

China's Strategic Tools

Tactic	What	Why it Hurts	Example
Human-capital leverage (know-how withdrawal)	Recall/transfer restrictions of experts and managers.	Tacit knowledge transfer is crucial for process optimisation& quality control.	Foxconn engineers' recall slowed commissioning & quality improvements.
Export controls & informal restrictions	Formal bans + informal (verbal) curbs on critical materials/equipment.	Disrupts supply chains; informal curbs bypass WTO remedies.	Curtailment of specialty wafers/rare metals → higher input costs & delays.
Weaponising overcapacity & pricing	Dumping or state-backed price suppression via excess capacity.	Undercuts domestic producers; deters investment in higher-value segments.	Ultra-cheap EV models/components dumped globally to seize market share.
Control of global	Domination of upstream	Creates coercive	Control over rare earth

value chains (GVC orchestration)	suppliers & logistics nodes (ports, specialised equipment).	dependency; blocks countries from moving up the GVC.	processing or port logistics is used as leverage.

INTERNAL DRIVERS BEHIND CHINA'S APPROACH

- **Demographic & economic pressures:** Ageing population, slowing consumption, property sector stress → export push to sustain growth.
- **Strategic calculus:** Maintaining technological and industrial pre-eminence reduces geo-political risks and preserves leverage over competitors.

Implications for India

- **Tech-transfer bottleneck:** Loss of foreign engineers/experts delays capability building.
- **Input dependence:** Shortages of critical materials force reliance on imports or risky substitutes.
- **Value-chain trap:** Risk of remaining a low-value assembler rather than a design/technology hub.
- **Geopolitical leverage:** Economic coercion can influence policy choices and supplier diversification timelines.
- **Trade friction paradox:** Even as India seeks western friend-shoring, tariff and market access issues persist (e.g., high duties on some Indian exports), limiting instant relocation benefits.

Wider Geo-economic Context

- **Friend-shoring limits:** Shifting supply chains to "friendly" countries is capital- and time-intensive; tariff barriers and rules of origin can blunt benefits.
- **Uneven Western support:** Market access, standards, and tariff regimes vary — strategic autonomy remains essential.
- **China's resilience:** Despite geopolitical strain (e.g., closer Russia ties), China retains deep industrial ecosystems hard to replicate quickly.

Policy Responses

Timeframe

- **Short Term**

Priority Actions

- Stockpile critical inputs (Rare Earths, gallium, graphite)
- PLI-style support for localisation (tooling, sensors, sub-suppliers)
- Public procurement to seed demand for domestic suppliers

Timeframe

- **Medium Term**

Priority Actions

- Develop semiconductor stack (design, packaging, testing, niche fabs)
- Skilling hubs & conditional technology transfer
- Secure long-term supply (Memoranda of Understanding, recycling, domestic extraction)

Timeframe

- **Long Term**

Priority Actions

- National R&D mission (advanced materials, sensors, machine tools)
- Diversify Global Value Chains through regional corridors & clusters
- Industrial diplomacy: trade deals for tech & market access

Timeframe

- **Cross-Cutting**

Priority Actions

- Strong Intellectual Property & procurement safeguards
- Ease of doing business (land, power, logistics)
- Strategic financing (sovereign funds, risk capital, dev banks)
- China's disruption is strategic, deliberate, and multi-layered — India's answer must be equally strategic: **short-term mitigation, medium-term capability creation, and long-term industrial autonomy**, backed by diplomatic engagement and smart trade policy. Resilience is built, not bought.

3.3 SHORT ARTICLES

Global Corporate Credit Risk

Context

- Investors pulling back or betting against overvalued corporate credit due to expectations of slower global growth, especially in the U.S.

Understanding Credit Spreads

- **Credit Spread**: The extra interest investors demand for lending to companies instead of risk-free government bonds.
- At present, credit spreads are **extremely narrow**—near historic lows—despite signs of slowing growth.
- This mismatch reflects investor overconfidence, as risks are being underpriced.

Current Trends in Investor Behaviour

Trend	Details
Pullback from Corporate Bonds	• Reduced demand for both high-yield ("junk") and investment-grade bonds. • Signals reluctance to extend credit across companies.
Increased Hedging	• Higher use of credit default swaps (CDS) and derivatives. • Shows caution despite stable credit spreads.
Risk-Off Sentiment	• Investors shifting to safer assets like U.S. Treasuries. • Indicates a clear flight to safety.

Historical Risk Signals

- Credit market weakness has **preceded equity downturns** in 2018, 2022, and 2023.
- Narrow spreads during economic slowdown phases often culminate in market corrections.

Vulnerable Segments

- **High-Yield Debt (Junk Bonds)**:
  - Represents weaker companies, many in crucial sectors of the economy.
  - Rising refinancing costs could push defaults higher.
  - **Consequences**: slowdown in corporate investment, rising unemployment, and pressure on economic recovery.

Broader Implications

- **For Corporates**: Higher cost of borrowing, risk of defaults, lower capacity to invest.
- **For Economy**: Job losses, reduced capital expenditure, potential drag on GDP growth.
- **For Markets**: Possible spillover into equities and global investor sentiment.
- **For Policy**: Central banks may face a dilemma between supporting growth and maintaining inflation control.

Way Forward

- **Investors**: Need to balance risk appetite with realistic growth expectations.
- **Corporates**: Diversify funding sources, deleverage balance sheets.
- **Governments/Regulators**: Ensure financial stability through macro-prudential measures, and closely monitor leverage in vulnerable sectors.

Free-AI Vision

Context

- RBI's FREE-AI report sets out seven guiding "sutras" to ensure responsible, ethical, and risk-aware AI adoption in the financial sector while preserving innovation.

Details:

- The Reserve Bank of India (RBI) has unveiled **FREE-AI (Framework for Responsible and Ethical Enablement of Artificial Intelligence)**

to guide safe and ethical AI adoption in India's financial sector.

Vision and Objectives:

- FREE-AI aims to balance **innovation** and **risk management** in banking, insurance, capital markets, and payments. It promotes AI that is **safe, fair, and accountable** while enabling regulated entities to innovate responsibly.

Key Features:

1. **Foundational Principles (7 Sutras):** Guidelines for ethical AI adoption, covering governance, accountability, and consumer protection.
2. **Dual Approach:**
   - **Fostering Innovation:**
     - ✓ Shared infrastructure for data and computing, linked to the **AI Kosh** under IndiaAI Mission.
     - ✓ **AI Innovation Sandbox** to test indigenous AI models.
     - ✓ Relaxed compliance for **low-risk AI solutions** to promote inclusion.
     - ✓ Institutional capacity building for boards and workforce.
   - **Mitigating Risk:**
     - ✓ Board-approved AI policies for regulated entities.
     - ✓ Inclusion of AI in product approvals, audits, and consumer protection.
     - ✓ Strengthened cybersecurity and incident reporting.
     - ✓ Lifecycle governance of AI systems.
     - ✓ Ensuring consumer awareness when interacting with AI.

Importance:

- AI investment in India's financial sector is projected to reach **₹8 lakh crore by 2027**, with **₹1.02 lakh crore for Generative AI by 2033**.
- AI introduces risks such as **data privacy breaches, algorithmic bias, market manipulation, and cyber-security vulnerabilities**, which could affect market integrity and consumer trust.
- FREE-AI ensures that innovation does not compromise financial stability and consumer protection.

Animal Blood Bank Guidelines

Context

- The Department of Animal Husbandry and Dairying has released India's first national **Guidelines and Standard Operating Procedures (SOPs) for Blood Transfusion and Blood Banks for Animals**.

Details:

- This step fills a critical gap in veterinary emergency care. Until now, animal blood transfusions were carried out without standard protocols. The new framework ensures proper **donor screening, blood typing, storage, and transfusion**, bringing Indian practices in line with global standards.

Why is this important?

- India has a vast livestock and companion animal population. Standardized veterinary care will not only safeguard animal health but also strengthen food security and rural livelihoods.

Role of Livestock in the Indian Economy

- **Major Contributor to GDP**: Accounts for **5.5% of national GDP** and **30% of agricultural GDP**.
- **Livelihood Source**: Provides income and employment to small farmers, landless laborers, and especially rural women.
- **Risk Buffer**: Acts as an "insurance" for farmers against crop failure by offering alternative income.
- **Exports:** Dairy, meat, leather, and wool earn valuable foreign exchange.
- **Renewable Energy & Sustainability**: Animal dung supports organic farming and biogas, strengthening the rural circular economy.

Uneven Industrial Growth in India

Context

- The **Standing Committee on Finance (Aug 2025)** has called for a more **even distribution of industries across all states**, noting that while industry is a **State subject**, the **Central Government's role is vital** in creating balance.

The Economic Survey 2024-25 also highlighted major disparities:

- **Industrial concentration** is high in states like **Gujarat, Uttarakhand, Himachal Pradesh, and Tamil Nadu**.
- Whereas states like **Bihar, parts of the North-East, and several eastern states** remain under-industrialized.

Reasons for Uneven Growth

- **Historical factors** – British-era development was focused on regions like West Bengal and Maharashtra.
- **Geographical barriers** – Hilly terrain in the Himalayas and the North-East limits industrial expansion.
- **Weak infrastructure** – Inadequate power, transport, and land availability in many states.
- **Policy bias** – Initiatives like the Green Revolution benefitted only select states (Punjab, Haryana), widening gaps.

Way Forward

- **Balanced industrial policies** and **deregulation**.
- Strengthening **infrastructure, education, skill development, and credit access** in lagging states.
- Greater **Centre–State cooperation** to support backward regions for long-term, sustainable growth.

CAG Report on FRBM Act (2025)

Context

- The Comptroller and Auditor General of India (CAG) tabled its annual report on compliance with the Fiscal Responsibility and Budget Management (FRBM) Act, 2003, in Parliament.

Details:

- The FRBM Act was enacted to ensure long-term fiscal stability, reduce deficits, and maintain inter-generational equity.

Key Findings of the Report

- **Central Government Debt**: Declined to **57% of GDP (end-March 2024)** from **61.38% in FY 2020-21**.
- **Debt Accumulation vs. Growth**: Between FY 2020-21 and FY 2023-24, the pace of debt accumulation was lower than GDP growth, showing the economy's ability to absorb and service debt.
- **Debt Sustainability**: Public debt repayment to receipts ratio improved from **86.66% in FY 2019-20** to **81.46% in FY 2023-24**.

FRBM Targets

- **General Government Debt** (Centre + States) to be **≤ 60% of GDP** by FY 2024-25.
- **Central Government Debt** to be **≤ 40% of GDP** by FY 2024-25.
- **Fiscal Deficit (FD)** target: 3% of GDP by March 2021 (not achieved). Government now aims for an **FD below 4.5% of GDP by FY 2025-26**.
- **Guarantees**: Additional guarantees against the Consolidated Fund of India, limited to **0.5% of GDP** in any financial year.

Export Promotion Mission (EPM)

Context

- The Union Budget recently announced the launch of a focused **Export Promotion Mission (EPM)** with an initial allocation of **₹2,250 crore** for the current fiscal year.
- The mission will be carried out through two umbrella schemes:
  - **NiryatProtsahan** – aimed at providing **trade finance support**.
  - **Niryat Disha** – focusing on **export development initiatives** such as market expansion and branding.
- Together, these schemes have a proposed outlay of **₹24,500 crore**.

Market Access Initiative (MAI)

- A key part of the EPM is the **Market Access Initiative (MAI)** with a dedicated allocation of **₹200 crore**.
- **Objective**: To help Indian exporters enter new markets and strengthen presence in existing ones.
- **Activities supported**:
  - Market studies and research.
  - Participation in international trade fairs and exhibitions.
  - Buyer–seller meets and promotional events abroad.
  - Assistance for product registration and compliance with global standards.

- Publicity campaigns and branding exercises in target countries.

Additionally, the government has earmarked **₹50 crore for promoting lab-grown diamonds** under the EPM.

Significance:

- The EPM, along with MAI, is expected to boost India's global trade footprint by improving **overseas market development, branding, and product acceptance in international markets**.

3.4 SNIPPETS

Topics	Details
Special Vostro Rupee Accounts (SVRA)	• RBI removes **prior approval requirements for banks to open SRVAs**. • A Special Rupee Vostro Account (SRVA) allows foreign entities to settle trade in Indian Rupees with Indian banks, helping countries with limited foreign exchange or difficulty using major currencies like the **US Dollar or Euro.**
Push and Pull Transactions	• To curb rising fraud, the National Payments Corporation of India (NPCI) may consider shutting down 'pull' transactions in the future. • Currently, UPI supports both push and pull transactions. Push transactions are initiated by the **payer (e.g., scanning QR code or entering UPI ID),** while pull transactions are initiated by the beneficiary and approved after the payer enters their **PIN (e.g., debit cards, cheques).**
Asset Reconstruction Companies	• In Q1 of FY26, Asset Reconstruction Companies (ARCs) sharply increased purchases of retail loan portfolios. • ARCs are companies registered under the Companies Act and with the Reserve Bank of India under the **SARFAESI Act, 2002**. They buy non-performing assets (NPAs) from banks to help resolve bad loans and free up liquidity. **Examples** include the **National Asset Reconstruction Company Limited (NARCL) and India Debt Resolution Company Ltd.**
Shadow Banks	• RBI is planning new rules to stop NBFCs (shadow banks) from copying traditional banks' models. • Shadow banks, or Non-Banking Financial Companies (NBFCs) in the Indian context, are financial institutions that provide bank-like services such as loans, credit facilities, and investment products. • NBFCs provide loans, credit, and investments, **but cannot accept demand deposits like banks**. They are meant to supplement banks by serving underserved sectors such as MSMEs, microfinance, vehicle loans, and infrastructure, but **rising overlap with banks has raised systemic risk concerns**.
Energy storage System by 2032	• India must scale up energy storage to achieve its 500 GW non-fossil power target by 2030. • The country needs 61 GW of energy storage by 2030 and 97 GW by 2032, up from today's 6 GW. • Battery storage will dominate due to falling costs. **Energy Storage Systems (ESS) are** vital for integrating renewable energy, supporting EV adoption, and ensuring grid stability. Policy push includes mandatory storage with **RE projects, VGF expansion, and boosting domestic manufacturing** through PLI and strategic mineral partnerships.
Purchasing Power Parity (PPP)	• India may become the world's second-largest economy in purchasing power parity (PPP) terms by 2038. • PPP is a method to compare economies by measuring how much a basket of goods costs in **different countries, adjusting for currency differences**. It reflects relative living standards and economic productivity by showing what people can actually buy with their income.
Uniform	• The Ministry of Power has scrapped the Uniform Renewable Energy Tariff (URET)

Renewable Energy Tariff (URET)	mechanism. • **URET was designed to offer a uniform tariff by pooling bid tariffs** of renewable projects, reducing risks from falling prices. However, procurers avoided Power Sale Agreements due to tariff uncertainty, stalling projects. The move aims to ensure transparent price discovery and faster renewable energy adoption.
Flexible inflation targeting (FIT)	• RBI has released a discussion paper to initiate the second five-yearly review of India's Flexible Inflation Targeting (FIT) framework. • Introduced in 2016, FIT aims to maintain price stability with growth considerations. While inflation **stayed near 4% till 2019, it breached the 4 ± 2% band** during the pandemic and global supply shocks, before easing through policy action, supply measures, and lower commodity prices.
Minimum Public Shareholding	• SEBI mandates listed companies to maintain a Minimum Public Shareholding (MPS) to ensure transparency and market efficiency. • Under this rule, all listed firms must **have at least 25% of their equity** held by public **shareholders (non-promoters).** The aim is to improve liquidity, fair price discovery, and corporate governance. Companies falling short must restore **compliance within 12 months**, failing which SEBI can impose penalties or restrict corporate actions.
Central Board of Indirect Taxes and Customs (CBIC)	• CBIC has exempted all customs duties on the import of raw cotton. • The **Central Board of Indirect Taxes and Customs (CBIC), headquartered in New Delhi**, is a statutory body under the **Central Boards of Revenue Act, 1963**. It frames and implements policies on **Customs, Central Excise, and GST, besides tackling smuggling and narcotics control**.
GST Rate Rationalisation	• A GoM led by Bihar Dy CM Samrat Choudhary has proposed GST rate rationalisation to simplify the tax structure. • The plan suggests keeping only two slabs—**5% and 18%—**by merging most of the 12% and 28% items, with a few luxury/sin goods **possibly taxed at 40%.** It **aims to ease compliance**, support **households and MSMEs**, though states fear revenue loss and inflationary impact.
Online Gaming Bill, 2025	• The Union Cabinet has cleared the Online Gaming Bill, 2025, banning real-money games on the internet. • The Bill prohibits any online game where **players stake money in the hope of cash returns**, covering apps like **poker and fantasy sports**. Despite industry resistance citing losses and past court stays on state bans, the Centre pushed ahead, though the move has drawn criticism for being passed without public consultation.
China's Push for Digital Yuan & Stablecoins	• China is promoting the digital yuan and stablecoins to boost the global use of its currency and reduce dependence on the US dollar. • The **digital yuan (e-CNY), launched in 2019** by the **People's Bank of China**, is a state-backed electronic currency used in trials worth trillions and even for salaries and trade. **Stablecoins**, unlike **e-CNY,** are privately issued and pegged to fiat currencies, with **Hong Kong regulating HKD-backed** stablecoins to aid China's financial experiments.

4. DEFENSE AND SECURITY

4.1 HIROSHIMA & THE FRAGILE NUCLEAR NON-USE NORM

Context

- Lone wolves employ "easy-access" methods such as vehicle ramming, edged weapons, or firearms to inflict mass casualties.

Introduction

- The atomic bombings of Hiroshima and Nagasaki on **August 6 and 9, 1945**, marked the first and only use of nuclear weapons in warfare. While they brought an abrupt end to World War II, they also left behind a legacy of mass death, radiation-induced suffering, and moral dilemmas for humanity.

Historical Context

- **Hiroshima and Nagasaki (1945):** Immediate destruction with long-term radiation effects.
- **Suppression of data:** The U.S. censored early studies, delaying global understanding of radiation impacts.
- **Castle Bravo test (1954):** Exposure of Fukuryu Maru crew revealed dangers of nuclear fallout to civilians.
- **Hibakusha testimony:** Survivors became symbols of resistance, forming Nihon Hidankyo and campaigning for global disarmament, later recognised with the **2024 Nobel Peace Prize**.

The Norm of Non-Use

- Despite proliferation—currently **9 nuclear-armed states**—nuclear weapons have not been used in conflict since 1945.
- This restraint rests not on binding law but on a **moral-political understanding** shaped by Hiroshima's memory.
- **Key Treaties:**
  - *Nuclear Non-Proliferation Treaty (1968):* Prevents the spread, but does not ban use.
  - *Comprehensive Nuclear-Test-Ban Treaty:* Bans tests, not use.
  - *Treaty on the Prohibition of Nuclear Weapons (2017):* Prohibits use, but not signed by nuclear-armed states.

Contemporary Challenges

- **Geopolitical tensions:**
  - Russia's nuclear threats in Ukraine have revived fears of use.
  - India's **Operation Sindoor (2025):** Nuclear rhetoric surfaced, though the recent PM rejected "nuclear blackmail."
- **Technological changes:** Nuclear modernisation and the development of **tactical, precise weapons** lower the threshold for use.
- **Strategic dilemma:**
  - More actors and more weapons → heightened risk of miscalculation.
  - Absence of legal prohibition makes norms fragile under pressure.

Way Forward:

- **Reaffirm diplomacy:** Revive momentum for global nuclear disarmament through sustained multilateral dialogue.
- **Strengthen treaties:** Push for universal ratification of the *Treaty on the Prohibition of Nuclear Weapons* and revitalize the NPT process.
- **Recognise survivor voices:** Keep Hibakusha testimonies central to public conscience and policy debates.
- **Prevent normalisation:** Avoid downplaying tactical nuclear threats in strategic doctrines.
- **Institutional safeguards:** Enhance crisis communication channels, arms control mechanisms, and confidence-building to reduce escalation risks.

Conclusion

- The challenge for the global community is to move beyond the fragile "norm of non-use" towards **legal, institutional, and ethical**

guarantees of disarmament, ensuring that nuclear weapons are never used again.

4.2 ILLEGAL IMMIGRATION IN INDIA

Context

- On India's 79th Independence Day, the Prime Minister announced a high-powered **Demography Mission**.

What is a high-powered Demography Mission?

- The mission aims to address challenges of national security, thereby ensuring the unity, integrity, and rights of India's citizens are safeguarded, especially in border areas. The issue, however, is not new; it has long been a source of social, political, and security debates in India.

Details:

- **Illegal immigration in India takes many forms**—unauthorised entry, overstaying visas, and undocumented cross-border migration. Its intensity is most visible in the north eastern states such as Assam, Tripura, and West Bengal, though major cities like Delhi and Mumbai are also affected.

Causes of Illegal Migration:

- **Demographic and Social:** Alters population composition, fuelling ethnic tensions (e.g., Assam Movement of the 1980s). Creates stress on urban resources like housing, sanitation, and education. (e.g., Approximately **1.4 million Bangladeshis** crossed into India in the last decade)
- **Economic:** Migrants work for lower wages, hurting local labour. Informal employment and welfare burden reduce state revenues. (e.g., In Assam, over **450 Bangladeshi infiltrators)**
- **Security:** Cross-border extremist groups exploit porous borders. Fake identity documents aid unlawful activities, while trafficking and narco-terrorism thrive. (As per the Ministry of External Affairs, **104 deported Indian migrants** arrived in Amritsar)
- **Political:** Migrants often become a vote-bank, polarising politics, as seen in debates over CAA and NRC.
- **Diplomatic:** Pushbacks strain relations with neighbors such as Bangladesh and Myanmar, while international bodies criticise India on humanitarian grounds. (e.g., around **18,000 Indian nationals in the U.S. illegally** were identified for potential return)
- **Environmental:** Rising density leads to encroachment in wetlands, forests, and fragile ecosystems, creating unsustainable urban slums.

Steps Taken

India has adopted a multi-pronged approach:

- **Border Management:** Barbed-wire fencing, border lighting, technical surveillance, and fencing of the Myanmar border with anti-cut, anti-climb technology.
- **Legal Measures:** The Citizenship (Amendment) Act, 2019 provides exceptions for persecuted minorities. The National Register of Citizens (NRC) in Assam has been used to identify undocumented migrants. (e.g., SAARC/BIMSTEC)
- **Diplomatic Efforts:** Engagements with neighbouring governments to check human trafficking and cross-border crime.

Way Forward

A sustainable approach requires:

- **Comprehensive Refugee and Immigration Law** to clearly distinguish between refugees, asylum-seekers, and illegal migrants.
- **Integrated Border Management** with advanced surveillance, technology-driven fencing, and better coordination between border forces. (e.g., Beginning **September 1, 2025**, the Immigration and Foreigners Act, 2025, introduces stricter controls)

- **Regional Diplomacy** to address root causes like poverty and persecution in neighbouring countries.
- **Balanced Policy Framework**—one that upholds national security while respecting humanitarian principles. **(E.g., The Ministry of Home Affairs** designated **108 immigration checkpoints** across India)
- **Internal Reforms** such as robust identity verification systems, efficient welfare targeting, and community-level awareness. (e.g., AI-based identification, detention centers)

Conclusion

- Illegal immigration is not merely a border control issue but a multidimensional challenge with social, economic, political, and environmental implications. A calibrated mix of strong borders, sound laws, humane refugee policy, and regional cooperation can help India safeguard its demographic integrity while upholding its tradition of compassion.

4.3 ANTI-DRONE DEFENCE AT INDIAN PORT

Context

- The death sentence of Kerala nurse Nimisha Priya in Yemen for murdering her business partner, and ongoing efforts for her acquittal involving compensation to the victim's family, highlight the concept and implications of 'blood money.'

Introduction

- India's maritime infrastructure and digital space are increasingly facing asymmetric security challenges. While hostile drones threaten ports and supply chains, extremist groups are exploiting Artificial Intelligence (AI) for propaganda and recruitment. Together, these developments highlight the evolving nature of security threats and the urgent need for robust preparedness.

What is an Anti-Drone Surveillance and Neutralisation System (ADSNS)?

- An ADSNS is a counter-drone technology that **combines radars, radio-frequency scanners, and electro-optical/infrared sensors** for detection, along **with "soft-kill" methods like jamming and GPS spoofing for neutralization**. Unlike kinetic weapons, it disables drones without collateral damage.

Why Ports Need Protection?

- **Infrastructure Protection**: Ports like Kandla store hazardous materials; a drone strike can trigger catastrophic accidents.
- **Personnel and Cargo Safety**: Thousands of workers and sensitive cargo like LNG and chemicals remain at risk.
- **Operational Continuity**: Drones can disrupt trade, as seen during *Operation Sindoor (2025)*, when drone intrusions caused blackouts and slowed cargo volumes at Kandla and Mundra ports.
- **Strategic Security**: Kandla's proximity to Pakistan makes it a frontline security asset.

Policy and Preparedness

- *National Maritime Security Strategy (2015)*emphasises protecting critical infrastructure.
- *National Counter Rogue Drone Guidelines (2019)* provide regulatory clarity.
- Indigenous solutions like DRDO's counter-UAV tech and Grene Robotics' Indrajaal highlight domestic capacity.

How Extremists Exploit AI?

- **Automated Propaganda**: AI tools generate dynamic, personalised radical content, targeting digital natives.
- **Algorithmic Amplification**: Social media recommendations resurface extremist sermons and videos.

- **Synthetic Identities**: GAN-generated profiles infiltrate online spaces to spread propaganda invisibly.
- **Operational Secrecy**: Encrypted apps and AI-generated visuals complicate monitoring.

Case Studies

- *Saudi Aramco (2019)* and *Houthi strikes in Arabian Sea (2025)* show drone warfare's scale.
- *India (2024)* witnessed AI-generated fake visuals of terror attacks circulated on encrypted platforms.

India's Response

Domain	Measures
Legislative & Institutional	• IT Rules 2021 & IT Act 2000: Automated takedown of harmful content, tracking AI-driven threats. • National Cyber Coordination Centre (NCCC): Blocked thousands of rogue websites and fake SIMs. • Global Engagement: Collaboration with GIFCT and GNET to share AI-fingerprinting data.
Maritime Security	• Deployment of ADSNS at Kandla port. • Strengthened port–naval–coast guard coordination. • Integration of private innovations with state-led security systems.

Way Forward

- **Integrated Maritime Security**: Extend ADSNS deployment to all major ports, supported by real-time naval intelligence.
- **AI Governance**: Develop an indigenous AI-fingerprinting system for early detection of extremist propaganda.
- **Public–Private Partnerships**: Leverage domestic tech start-ups for innovation in counter-drone and cyber defence.

4.4 INDIA'S NEW JOINT MILITARY DOCTRINES

Context

- In August 2025, India released three joint doctrines — on Special Forces operations, Airborne & Heliborne operations, and Multi-Domain Operations — at the Ran Samvad seminar, marking a deliberate move toward institutionalized jointness and theatre-level readiness.

What do these doctrines mean?

- Doctrines are the playbook that aligns policy, capability, and operations. The new texts convert strategic intent into common language, SOPs, and interoperability standards so the Army, Navy, and Air Force operate as one force — strengthening deterrence, improving crisis response, and lowering friction in high-tempo conflict.

Strategic Implications

Strategic Clarity & Posture

- Defines threat perceptions and calibrated responses across peacetime, hybrid, and high-intensity scenarios; enables theatre commands to plan with shared intent and faster decision cycles.

Capabilities & Force Employment – Special Forces Doctrine

- Unifies Para-SF, MARCOS, and IAF Garuds under common tactics, C2, and logistics; institutionalises joint covert and precision tasks.

Capabilities & Force Employment – Airborne & Heliborne Doctrine

- Prioritises rapid mobility, seizure of key terrain, and strategic lift (C-17, C-130J, Chinook); expands power projection.

Capabilities & Force Employment – Multi-Domain Operations (MDO)

- Integrates land, sea, air, space, cyber, and cognitive domains to tackle below-threshold coercion (cyber intrusions, disinformation).

Technology & Force Modernisation

- Embeds AI-assisted decision aids, drones, loitering munitions, and secure communications into operational concepts; converts new tools into repeatable doctrine-driven tactics.

Lessons & Validation

- Recent campaigns (e.g., Operation Sindoor) show how long-range precision fires, drones, and integrated air-defense shape outcomes; doctrines capture lessons for future planning.

Challenges

- Inter-service culture and resource competition;
- Theatre command implementation and legal/ political oversight;
- Cyber resilience, secure C2 and logistics at scale.

Way forward

- Accelerate joint training, common C4ISR standards, and cross-domain exercises;
- Strengthen defence industrial base for indigenized sensors/munitions;
- Institutionalise doctrine review cycles to keep pace with tech and geopolitical shifts.

Conclusion

- The three doctrines are a pragmatic, 360° step: they translate strategy into interoperable practice, prepare India for hybrid and high-intensity contests, and anchor a future-ready security architecture — provided theatre-isation, industry support, and doctrinal adaptability follow through.

4.5 SHORT ARTICLES

Bedroom Jihadis

Context

- The Ministry of Defence declares 2025 as the 'Year of Reforms'. It will lay the foundation for unprecedented advancements in defense preparedness, ensuring India's security & sovereignty amidst the challenges of the 21st century.

Who Are They?

- **"Bedroom jihadis" refer to self-radicalized individuals**, often young, who adopt extremist ideologies online and carry out **lone-wolf attacks** from their local environments. Unlike traditional militants, they do not rely on direct networks with terrorist organizations. Inspiration often comes indirectly from global jihadist propaganda of groups like ISIS or Al-Qaeda.

Why Are They a Concern?

- **Hard to Detect:** They operate outside formal terror networks, making intelligence tracking difficult.
- **Rapid Radicalisation:** Online spaces can turn ordinary individuals into extremists within weeks.
- **Low-Cost, High-Impact Attacks:** Stabbings, shootings, or vehicle rammings create panic and media attention.

India's Current Response

- **Intelligence & Policing:** IB, RAW, NIA, and state police keep close watch on online radicalisation.
- **Cyber Surveillance:** Monitoring of extremist content, though encrypted platforms remain a hurdle.
- **Community Role:** Local policing and neighbourhood vigilance help in early detection.

What More Needs to Be Done?

- **AI-Driven Monitoring:** Advanced tools to track radicalization patterns online.
- **Counter-Narratives:** Promoting constructive, peace-oriented digital content.

- **Community Engagement:** Involving teachers, parents, and religious leaders to build resilience.

Mission Sudarshan Chakra

Context

- On Independence Day 2025, PM Narendra Modi announced **Mission Sudarshan Chakra**.

Why Indigenous Air Defence?

- **Strategic Autonomy:** Reduces reliance on imported systems like Russia's S-400.
- **Geopolitical Security:** Shields India from sanctions/technology denials during crises.
- **Cost Efficiency:** Saves foreign exchange; defence imports add to trade imbalance.
- **Comprehensive Shielding:** Aims to cover both **civilian and strategic assets**, unlike current imported systems.

Core Functions of Air Defence Systems (ADS)

- **Surveillance & Detection:** Using radars, satellites, and sensors to spot threats.
- **Command & Control:** Data integration via **IACCS** for real-time response.
- **Interception &Neutralisation:** Missiles, anti-drone, and energy weapons to destroy targets.
- **Asset Protection:** Secures cities, nuclear plants, military bases, and transport hubs.

Case Study

- **Operation Sindoor (2025):** Indian ADS successfully neutralised drones and missiles targeting over 15 cities, highlighting the critical role of layered air defence.

Indigenous Defence Push:

- **Policy Framework: DAP 2020**prioritises domestic procurement under *Atmanirbhar Bharat*.
- **Innovation: iDEX** supports 150+ startups in AI, drones, and cyber defence.
- **Private Participation:** L&T, Tata, Adani Defence collaborating with DRDO.
- **Case Study – Jet Engines:** India reviving Kaveri R&D while co-producing GE F414 with 80% tech transfer.
- **Success Models: Tejas LCA, Akash Missile, QRSAM**.
- **Budgetary Support: 75% of defence capital procurement** earmarked for domestic industry (2024–25 Budget).

Joint Doctrines for Cyberspace & Amphibious Operations

Context

- The Chief of Defence Staff (CDS) has released two important joint doctrines, signalling India's growing emphasis on jointness and integration in its armed forces.

About Joint Doctrine for Cyberspace Operations

- Provides a **unified approach** to safeguard national cyberspace interests.
- Integrates **offensive and defensive cyber capabilities** across the Army, Navy, and Air Force.
- Focus areas: **threat-informed planning, resilience, real-time intelligence sharing, and building joint cyber capabilities.**

Joint Doctrine for Amphibious Operations

- Revised edition of the **2008 doctrine**, aligned with today's geo-strategic realities.
- Aims to integrate **maritime, air, and land forces** for rapid response and interoperability.
- Stresses a balanced amphibious capability for **deterrence, humanitarian assistance, disaster relief (HADR), and evacuation missions.**

Other Upcoming Doctrines

- CDS has initiated work on doctrines for **Military Space Operations, Special Forces Operations, Airborne/Heliborne Operations, Integrated Logistics, and Multi-Domain Operations.**

Jointness & Integration – Key Initiatives

- **Jointness**: Optimal use of the three Services' resources, while avoiding duplication.
- **Department of Military Affairs (DMA)**: Created in 2020 with CDS as Secretary.
- **Integrated Theatre Commands (ITCs)&Integrated Battle Groups (IBGs)** proposed to boost operational readiness.
- **Joint Logistic Nodes (JLNs):** Established in 2021 at Mumbai, Guwahati, and Port Blair for logistics integration.

- **Inter-Services Organisations (Command, Control & Discipline) Rules, 2025** notified for better coordination.

Private sector share in Defence

Context

- The contribution of private manufacturers has been steadily rising ever since the defence sector was opened to them in 2016-17.

Details:

- In FY 2024-25, India's private sector defence production achieved a record **22.56% share**, marking the third consecutive year of growth. Meanwhile, **defence public sector undertakings (DPSUs)** continued to dominate, accounting for **57.50%** of total defence production.

To encourage private sector participation and innovation in defence manufacturing, the government has implemented several key initiatives:

- **Innovations for Defence Excellence (iDEX):** Supports startups and innovators to develop cutting-edge defence technologies.
- **Defence Testing Infrastructure Scheme (DTIS):** Provides testing facilities for defence products to ensure quality and performance standards.
- **ADITI (Acing Development of Innovative Technologies with iDEX) Scheme:** Promotes rapid development of new technologies.
- **Technology Development Fund (TDF):** Offers financial support for indigenous defence R&D.
- These schemes are complemented by broader policies such as **Make in India** and the **Positive Indigenisation Lists**, aimed at reducing import dependency and fostering self-reliance in defence production.

Significance:

- This shift reflects India's growing reliance on private industry for advanced defense capabilities, promoting innovation, job creation, and strategic autonomy.

Agni-5 Intermediate-Range Ballistic Missile

Context

- Intermediate Range Ballistic Missile 'Agni 5' was successfully test-fired from the Integrated Test Range, Chandipur in Odisha on August 20, 2025.

About Agni-5

Launch

- The Agni-5 missile is launched under the **Strategic Forces Command (SFC)**, which operates under India's **Nuclear Command Authority (NCA)** and oversees the management of the country's nuclear arsenal.

Missile Overview:

- **Type:** Nuclear-capable **Surface-to-Surface Ballistic Missile (SSBM)**
- **Propulsion:** Three-stage **solid fuel engine**
- **Range:** Over **5,000 km**, classifying it as an **Intermediate-Range Ballistic Missile (IRBM)**
- **Warhead Capability:** Can carry **nuclear or conventional warheads**

Development:

- Developed by **Defence Research and Development Organisation (DRDO)**
- Part of the **Integrated Guided Missile Development Programme (IGMDP)**, which also produced **Prithvi, Trishul, Nag, and Akash**

Strategic Significance:

- Enhances India's **long-range strike capability**
- Places India among few nations (US, Russia, China, France) with **Multiple Independently Targetable Reentry Vehicle (MIRV)-capable IRBMs**

Missile Classification (Range-based):

- **Short-range:**<1,000 km (Tactical)
- **Medium-range:** 1,000–3,000 km
- **Intermediate-range:** 3,000–5,500 km
- **Long-range/ICBM:**>5,500 km
- **Technical Note:** SSBMs follow a trajectory that is **initially rocket-powered**, then **unpowered**, arching upwards before descending to the target, ensuring precise strike capability.

India's Transformed Defence & Internal Security Posture

Context

- India has tested its first indigenous micro-missile system designed to take on the threat of swarm drones.

About Strengthening Defence Capacity:

- Defence budget increased from **₹2.53 lakh crore (2013-14)** to **₹6.81 lakh crore (2025-26)**.
- Domestic defence production **tripled** to **₹1.50 lakh crore** in the last decade.
- **Defence Acquisition Procedure 2020** emphasizes **"Buy (Indian – IDDM)"**, supported by the **SRIJAN Portal** and **Positive Indigenisation Lists** to reduce imports.
- Defence exports rose **34 times**, reaching **₹23,622 crore**, with equipment now reaching **100+ countries,** including the US, France, and Armenia.

Reforms & Innovation:

- **Liberalized FDI** attracts capital and advanced technology.
- Innovation encouraged through **iDEX** and the **Technology Development Fund**.
- **India Semiconductor Mission** promotes indigenous chip design and manufacturing.

Proactive Counter-Terrorism & Security:

- India adopted a firm approach with **surgical strikes (2016)** and **Operation Sindoor (2025)**.
- **Sudarshan Chakra Mission (2025)** envisions an indigenous futuristic national security shield by 2035.
- Prime Minister's **"Five New Normals"** provide strategic guidance for national security.

Securing the Home Front:

- Left-Wing Extremism controlled, with violence and casualties **falling by 85%**.
- Social and economic measures like **financial inclusion**, and **foodgrain & dairy production** have strengthened internal stability.

Hypersonic Missiles

Context

- Russia Unveils "Sea Terminator": Hypersonic Missile Warship Targets Subs & Aircraft Carriers.

About Hypersonic Missile:

- Hypersonic missiles are advanced weapons that travel at speeds exceeding **Mach 5 (~6,174 km/h)**. Unlike conventional ballistic missiles, they are **highly manoeuvrable**, fly at **low altitudes**, and are **difficult to detect and intercept**.

Types of Hypersonic Missiles:

- **Hypersonic Glide Vehicles (HGVs):** Rocket-launched, glide to targets using aerodynamic lift.
- **Hypersonic Cruise Missiles (HCMs):** Powered by **scramjet engines**, maintain hypersonic speed throughout flight.

Strategic Significance:

- **Strategic Deterrence:** Evade missile defence systems, reduce adversary response time.
- **Precision Strikes:** Deliver **conventional or nuclear payloads** to high-value targets rapidly.
- **Geopolitical Leverage:** Enhances **military prestige** and strengthens negotiating power.
- **Tactical Flexibility:** Usable across **land, sea, air, and space platforms**—aircraft, ships, submarines, or land-based launchers.

Importance for India:

- **Counter Regional Threats:** China and Pakistan are advancing hypersonic programs; India's 2024 test ensures **strategic parity**.
- **Strategic Reach:** Can strike targets like **Islamabad in 4 minutes** and **Karachi in 6 minutes**, altering South Asia's security landscape.
- **Indigenous Capability:** DRDO's **HSTDV** and **BrahMos-II** projects promote **self-reliance** and domestic R&D.
- **Maritime Security:** Capable of neutralising**aircraft carriers and submarines**, securing the **Indian Ocean Region (IOR)**.
- **Technological Leadership:** Advances in **scramjet propulsion, carbon composites, and AI-guided navigation** have civilian aerospace and satellite applications.

Stealth frigates Udaygiri, Himgiri to join the Navy

Context

- On **26 August 2025**, the Indian Navy will commission two **Project 17A stealth frigates** — **INS Udaygiri** and **INS Himgiri** — at **Visakhapatnam**, marking a significant milestone in Indian naval shipbuilding.

What are Stealth Frigates?

- Advanced surface combatants designed to **reduce visibility** to enemy radar and sensors.
- Employ **Radar Cross-Section (RCS) reduction**, **infrared suppression**, **noise reduction**, and **low electromagnetic signature technologies**.
- Multi-role: Capable of **Anti-Submarine (ASW), Anti-Air (AAW), and Anti-Surface Warfare (ASuW)** operations.
- Can operate in hostile environments with **minimal detectability**, enabling strategic surprise.

Strategic Significance

- **Maritime Security & Deterrence:** Blue-water capability ensures protection of **Sea Lanes of Communication (SLOCs)** and strengthens India's stance in the **Indo-Pacific**, countering Chinese naval presence.
- **Force Multiplier:** Deployment from **Visakhapatnam** enhances surveillance and response along the **Eastern seaboard** and **Bay of Bengal**.
- **Maritime Domain Awareness:** Equipped for **network-centric warfare** with **Integrated Platform Management Systems (IPMS)** for real-time data sharing and interoperability.

Indigenous Design & Technology:

- Designed by **Warship Design Bureau (WDB)**; **~75% indigenous content**, including MSME-supplied systems.
- Marks WDB's **100th ship design**, reinforcing **Aatmanirbhar Bharat** in defence manufacturing.
- **Advanced propulsion:** Combined Diesel or Gas (**CODOG**) for operational agility.
- Integrated with **cutting-edge sensors and weapons systems**, suitable for multi-mission roles.

Integrated Air Defence Weapon System (IADWS)

Context

- The Defence Research and Development Organisation (DRDO) on Aug 23 successfully carried out the maiden flight-tests of the Integrated Air Defence Weapon System (IADWS).

About IADWS:

- The **Indigenous Air Defence Weapon System (IADWS)** is designed to provide **multi-layered protection** along borders and at critical installations, integrating **surveillance, threat identification, and air defence** to neutralize long-range missiles, aircraft, and unmanned aerial vehicles (UAVs).

Key Components:

1. **Quick Reaction Surface to Air Missiles (QRSAM):**
   - Developed by **DRDO**
   - Short-range (5–30 km), mobile, protects moving armoured columns from aerial attacks
2. **Very Short Range Air Defence System (VSHORADS):**
   - Developed by **Research Centre Imarat (RCI)**
   - Man-portable (MANPADS), neutralizes **low-altitude, short-range threats**
3. **Directed Energy Weapon (DEW):**
   - Developed by **Centre for High Energy Systems and Sciences**
   - High-power **laser** that engages targets at the speed of light, capable of structural destruction or warhead neutralization
4. **Command & Control Centre:**
   - Developed by **Defence Research & Development Laboratory (DRDL)**
   - Ensures integrated and coordinated operation of all system components

Significance:

- Enhances **layered air defence capability**
- Protects **vital infrastructure and armed formations** from aerial threats
- Strengthens **India's indigenous defence technology** and operational readiness

Conclusion:

- IADWS represents a **technologically advanced, integrated air defence system**, combining missiles, lasers, and command-control capabilities to provide **real-time, multi-tiered protection** against modern aerial threats.

4.6 SNIPPETS

Topics	Details
Acceptance of Necessity (AoN)	• The Defence Acquisition Council (DAC) has approved procurement proposals worth nearly ₹67,000 crore. • Headed by the Defence Minister, DAC is **the apex body for defence acquisitions**. The approvals include AoN under DAP 2020 for advanced technologies such as night sights for BMPs, autonomous surface craft for undersea threat **neutralisation, and upgrades to Saksham/Spyder air defence systems**.
RHoDIS	• Indian Oil Corporation will start commercial production of Sustainable Aviation Fuel (SAF) at its Panipat refinery by December 2025. • SAF, made from used cooking oil and other renewable feedstocks, can cut aviation emissions by up to 80% and be used without engine modifications. IOC's plant, producing **35,000 tonnes annually, supports India's net-zero goals, improves energy security by reducing crude dependence**, manages waste oil sustainably, and opens export opportunities to markets like Europe.
Border Security Force (BSF)	• The Ministry of Home Affairs has approved the first-ever cadre review of the Border Security Force (BSF). • Raised in 1965 after Pakistan's attack in **Gujarat, the BSF is the world's largest border** guarding force under the **Ministry of Home Affairs**. It secures India's borders with Pakistan and Bangladesh, assists in LWE-hit areas, prevents cross-border crimes in peacetime, and supports the Army in wartime operations.
Project Kusha	• After Operation Sindoor, the IAF is pushing for faster progress on Project Kusha, India's indigenous long-range air defence system. • Approved in 2022 with a ₹21,700 crore budget, the **DRDO-led project aims to develop interceptors of ranges 150 km, 250 km, 350–400 km**, and a naval variant of 200–300 km under Phase 1. Phase 2 will focus on missiles exceeding 600 km range.
Operation Sadbhavana	• The Indian Army inaugurated an 'Arogyam Health & Wellness Centre' in Tawang under *Operation Sadbhavana*. • **Launched in 1998 in Jammu & Kashmir**, Operation Sadbhavana aims to win the hearts and minds of people impacted by insurgency through development and welfare initiatives. It focuses on education, healthcare, women's empowerment, skill training, sports, and ecological conservation, extending the Army's role beyond security to community building.

5. ENVIRONMENT & ECOLOGY

5.1 INDIA'S SOLAR-DOMINANT ENERGY FUTURE

Context

- A report by the Energy Transitions Commission suggests India can drastically reduce electricity costs through solar power, battery storage, and demand side flexibility.

Introduction

- India's transition to a solar-dominant energy system is not only an environmental imperative but also an economic opportunity, with electricity costs projected to fall by nearly half by 2050 (Energy Transitions Commission Report, 2025, *Down to Earth*).

Cost Reduction Potential

- Electricity costs can decline to **$27/MWh by 2050** vs **$55/MWh (2019–2030 avg.)** (Energy Transitions Commission (ETC) Report, 2025).
- Generation cost breakdown: **Solar $12/MWh**; **Balancing $15/MWh**.

Balancing Technologies

- **Flexible Dispatchable Generation** – Thermal / hydro for on-demand needs.
- **Regional Interconnection** – Linking areas with diverse solar/wind patterns.
- **Storage Solutions** – Lithium-ion, sodium-ion, A-CAES, pumped hydro, thermal.
- **Demand-Side Flexibility** – Smart meters, EV charging, shifting demand off-peak.

Global Insights

- Sunbelt nations (Mexico, Africa, China) can also achieve solar at **$30–40/MWh**.
- Battery costs continue to decline globally.
- Unlike wind-belt countries, India may avoid long-duration balancing.

Challenges Ahead

Despite progress, challenges persist:

- **Grid Infrastructure** – Huge upgrades required for renewable integration.
- **Technology Mix** – Wind + solar to form **70%+ share**, backed by geothermal, nuclear, and storage.

Background: Solar Energy in India

- Critical for **energy security &decarbonisation**, aligned with Paris Agreement (NDCs) and **SDG 7**.
- **Installed Solar Capacity (2024–25): 73 GW** (part of **190+ GW total renewables**) (MNRE).
- **Target: 280 GW solar by 2030**; India ranks **5th globally in solar capacity**.

Government Schemes

- **National Solar Mission (2010)** – Target 100 GW by 2022 (missed).
- **PM-KUSUM** – Solarising pumps &decentralised grids.
- **Rooftop Solar Programme** – Residential/commercial focus.
- **PLI Scheme (2020 & 2023)** – Boosting solar PV manufacturing.
- **International Solar Alliance (ISA)** – India-led global initiative.

Recent Developments

- **Energy Transitions Commission (ETC) Report (2025)** – Solar-dominant electricity achievable at $27/MWh.
- **PLI Scheme 2.0 (2023)** – For integrated solar manufacturing.
- **Green Energy Corridors** – For the evacuation of renewables.
- **Floating Solar Projects** – MP, Kerala, Telangana.

State-Wise Leaders

- **Rajasthan** – Largest solar capacity.
- Followed by **Gujarat, Tamil Nadu, Karnataka, and Andhra Pradesh**.
- **Delhi, Maharashtra** – Leaders in rooftop solar.

Global Position

- **Founder of ISA (with France)**, advancing solar diplomacy.
- **One Sun One World One Grid (OSOWOG)** initiative for cross-border solar integration.

Conclusion

- India's solar transition by 2050 promises **affordable, reliable, and clean energy**, combining cost-effectiveness with sustainability. With strong policy, investment in grid/storage, and global leadership, India can become a model for sunbelt nations (*Down to Earth, 2025*).

5.2 INDIA'S GROUNDWATER POLLUTION CRISIS

Context

- A Scientific journal documents Visakhapatnam's coral reefs in a research study done by the Zoological Survey of India.
- **Importance**: 85% of rural drinking water & 65% of irrigation water from groundwater.
- **Crisis**: Over-extraction + weak regulation → contamination with nitrates, fluoride, arsenic, uranium, heavy metals, microbes.

Key Findings (CGWB 2024)

Contaminant	Extent of Contamination	Major Sources	Affected Regions	Health Impacts
Nitrates	>20% samples are unsafe (440 districts)	Chemical fertilisers, septic tank leaching	Widespread across India	*Blue Baby Syndrome* (methemoglobinemia)
Fluoride	9% samples above the WHO limit (1.5 mg/L)	Natural geogenic presence	Rajasthan, Andhra Pradesh, Telangana	*Dental & Skeletal Fluorosis*
Arsenic	Levels up to 4,000× safe limit	Natural geogenic release, ground water over-extraction	Gangetic belt (Bihar, West Bengal, UP, Assam)	*Cancer, Neurological Issues*
Uranium	>100 ppb in groundwater	Natural geogenic presence, phosphate fertilizers	Punjab, Andhra Pradesh, Rajasthan	*Kidney Damage*
Iron & Heavy Metals (Lead, Chromium, etc.)	Localised high concentrations	Industrial effluents, mining, and natural weathering	Various hotspots (Jharkhand, Chhattisgarh, Odisha)	*Gastrointestinal Disorders, Developmental Delays*

- **Health Impact**: Millions affected; severe cases in Rajasthan, Bihar, UP, and MP.
- **Causes**: Over-extraction, unregulated industrial discharge, poor sanitation, fragmented regulation (Water Act 1974 doesn't cover groundwater adequately; CGWB lacks statutory powers).
- **Structural Issues**: Institutional silos, weak enforcement, lack of real-time public data, and inadequate monitoring.

Reforms Needed

- National groundwater pollution control framework.

- Real-time monitoring & public data access.
- Targeted remediation & health interventions.
- Stronger legal enforcement & waste management reforms.
- Citizen-centric groundwater governance.

Central Ground Water Board (CGWB)

- The Central Ground Water Board (CGWB) is not a statutory body. Nodal agency under the Ministry of Jal Shakti for groundwater development & management.

Key Roles:

1. Monitoring: Conducts nationwide groundwater level & quality assessment.
2. Surveys & Mapping: Hydrogeological surveys, aquifer mapping.
3. Regulation: Advises on groundwater extraction norms (but lacks statutory enforcement powers).
4. Research & Training: Studies on recharge, contamination, and sustainable management; capacity building.
5. Policy Advice: Provides technical guidance to states, SPCBs, and ministries.

5.3 ENVIRONMENT PROTECTION RULES, 2025

Context

- The new rules mandate district administrations to submit biannual reports on suspected contaminated sites as part of formalizing the site management process.

Background

- On **July 26, 2025**, the **Ministry of Environment, Forest and Climate Change (MoEF&CC)** notified the **Environment Protection and the Management of Contaminated Sites Rules, 2025** under the **Environment (Protection) Act, 1986**. These rules aim to address the longstanding issue of contaminated sites in India through a structured framework involving identification, assessment, remediation, and post-remediation monitoring.

Why Was There a Need for These Rules?

- **Rising Industrial Pollution**: Unchecked disposal of hazardous chemicals and waste by industries has led to soil, water, and groundwater contamination across various industrial clusters.
- **Lack of Remediation Framework**: While environmental clearance and waste management rules existed, there was no uniform legal framework for the remediation of contaminated sites.
- **Public Health Hazard**: Exposure to contaminated land poses serious risks to human health, agriculture, and biodiversity.
- **International Best Practices**: India lacked a regulatory framework comparable to countries like the USA (CERCLA) and the EU (Environmental Liability Directive).

Key Features of the Rules

Definition of Contaminated Sites

- Sites where hazardous substances exceed permissible levels, causing potential environmental and health hazards.

Identification and Notification

- SPCBs and PCCs to conduct preliminary environmental site assessments and notify MoEF&CC of suspected contaminated sites.

Remediation Process

- Involves **detailed site assessment**, preparation of **remediation action plans**, and **implementation** under regulatory oversight.

Liability and Cost Recovery

- The **Polluter Pays Principle** is upheld. Site occupiers or responsible parties bear the cost of remediation.

Contaminated Sites Inventory

- Establishment of a **centralized national inventory** of such sites by CPCB.

Institutional Framework

- A **National Committee for the Management of Contaminated Sites** is to be constituted, chaired by MoEF&CC Secretary.

Role of Technology

- Emphasis on use of **geo-spatial tools, risk assessment models, and green remediation technologies**.

Institutional Responsibilities

- **MoEF&CC:** Rulemaking, oversight, and final approval of site remediation.
- **CPCB:** Preparing and maintaining national inventory; issuing guidelines and standards.
- **State Pollution Control Boards (SPCBs) / Pollution Control Committees (PCCs):** Ground-level imple-mentation, inspection, and reporting.
- **Occupiers:** Entities responsible for contamination are obligated to remediate or bear remediation costs.

Significance of the Rules

- **Strengthens Environmental Governance**: Provides a legal mandate for remediation, aligning India's approach with global standards.
- **Public Health Protection:** Reduces health risks to communities living around toxic zones.
- **Supports Sustainable Development**: Encourages **Brownfield redevelopment** (reuse of contaminated industrial sites) while ensuring environmental safeguards.
- **Fulfils International Commitments**: Supports India's commitment to the **Stockholm Convention** and **Basel Convention** on hazardous wastes and POPs.

Challenges in Implementation

- **Lack of Capacity and Funding**: State boards may lack technical expertise and financial resources for detailed assessments.
- **Industrial Pushback**: Industries may resist compliance due to cost implications.
- **Data Gaps:** Absence of historical contamination data and difficulty in identifying "legacy polluters."
- **Enforcement:** Monitoring and enforcement will depend on coordination between multiple agencies.

Way Forward

- **Capacity Building:** Train SPCBs and create a cadre of environmental remediation professionals.
- **Technology Use:** Integrate GIS mapping, remote sensing, and AI-based contamination modeling.
- **Public Participation**: Involve local communities in site identification and monitoring.
- **Financial Mechanisms**: Establish a **National Remediation Fund** through contributions from industries and environmental cess.

Conclusion

- The Environment Protection and Management of Contaminated Sites Rules, 2025 mark a **critical shift** in India's environmental regulatory landscape. By proactively identifying and remediating polluted sites, the government takes a **landmark step toward environmental justice**, industrial accountability, and sustainable land use. However, the **success of this framework** will hinge on its **effective implementation**, **institutional coordination**, and **community engagement**.

5.4 GLOBAL PLASTIC TREATY TALKS

Context

- India has opposed limits on the production of primary virgin plastic in the name of development and industrialisation.

Key Negotiation Blocs:

Bloc	Members	Demands	Rationale
High-Ambition Coalition	EU countries, Australia, several African nations, and Pacific Island states.	Global caps on virgin plastic production, binding pollution reduction targets, and regulation of hazardous chemicals in plastics.	Waste management alone cannot solve the crisis; reducing production is essential.
Like-Minded Bloc	Russia, oil-producing nations, and India.	Focus on recycling and improved waste management, voluntary commitments, and recognition of plastics' economic role.	Plastics are vital for industry, packaging, health, and livelihoods; production bans may harm economies.

Reasons for Collapse

- **Clashing Interests:** Oil-dependent economies vs. developing nations reliant on plastics for jobs and affordable products.
- **Disagreement on Scope:** Prevention (production reduction) vs. management (recycling and disposal).
- **Lack of Trust:** Historical responsibility and fairness concerns are similar to climate negotiations.

India's Position

- Largest global plastic polluter (~20% of plastic waste).
- The 2022 single-use plastics ban faces enforcement challenges.
- Argues that strict caps would unfairly burden developing nations.

Global Plastic Crisis

- **Scale:** 430+ million tonnes produced annually; <10% recycled.
- **Environmental Impacts**: 11 million tonnes enter oceans annually, harming wildlife and soils.
- **Health Impacts:** Microplastics detected in blood, lungs, placenta; linked to endocrine disruption, infertility, cardiovascular disease, cancer.
- **Climate Link:** Plastics contribute ~3.4% of global greenhouse gas emissions.

India's Plastic Challenge

- Generates ~3.5 million tonnes of plastic waste annually; ~60% mismanaged.
- **Policies:** Single-use plastics ban, Extended Producer Responsibility (EPR), Swachh Bharat Mission.
- **Limitations:** Weak enforcement, lack of alternatives, under-recognized informal recycling sector.

Geopolitical and Economic Dimensions

- Plastics tied to fossil fuels; oil and gas see plastics as growth amid energy transition.
- North-South divide mirrors climate negotiations: developed nations push for bans, developing nations demand equity.
- Global plastics industry worth $600 billion; production bans risk economic disruption.

Lessons from Climate Talks

- The Paris Agreement showed that flexible, nationally determined contributions (NDCs) help achieve consensus.
- A hybrid model combining production limits with waste management improvements may be required.

Way Forward

- **Global Level:**
  - Binding but flexible treaty with differentiated responsibilities.
  - Global Plastic Fund to support alternatives in developing nations.
- **National Level (India):**

- Strengthen enforcement of bans.
- Invest in alternatives like biodegradable packaging.
- Empower informal recyclers and run public awareness campaigns.

- **Technological & Public Action:**
  - Chemical recycling, advanced biodegradable materials.
  - Global standards for plastics; citizen participation to reduce demand.

5.5 SHORT ARTICLES

ICJ Ruling & Kyoto Protocol

Context

- In July 2025, the International Court of Justice (ICJ) delivered an **advisory opinion** affirming that the **Kyoto Protocol remains legally binding**, even after the entry into force of the **Paris Agreement (2016)** (ICJ, 2025).

What is the Kyoto Protocol?

- **Adopted in 1997, in force from 2005**.
- **First legally binding instrument** under the UNFCCC.
- **Top-down approach:** Set quantified emission reduction targets for developed countries (Annex I).
- **Principle:** Common But Differentiated Responsibilities and Respective Capabilities (CBDR-RC).
- **Commitment periods:** 2008–2012 (1st), 2012–2020 (2nd) (UNFCCC Reports).

Why Was Its Validity Questioned?

- **Paris Agreement (2015):** Introduced voluntary, bottom-up **Nationally Determined Contributions (NDCs)**, shifting away from binding targets (UNFCCC, 2015).
- **No third commitment period** post-2020.
- **Major emitters withdrew** (e.g., USA, Canada, Japan).
- Widely perceived as **defunct** after 2020.

ICJ Findings (August 2025)

- Kyoto Protocol **remains in force** and forms part of international law (ICJ, 2025).
- **Non-compliance = internationally wrongful act.**
- **Absence of new commitment period ≠ termination** of treaty obligations.
- **Past emission targets** (e.g., 2008–2012) still open for legal assessment.

Legal and Global Implications:

- **Strengthens accountability:** States can be held legally responsible for past non-compliance.
- **Enables litigation:** Opens pathways for **climate litigation** and **compensation claims** (ICJ Opinion, 2025).
- **Dual relevance:** Reaffirms Kyoto alongside Paris Agreement, creating a layered framework of obligations.
- **Moral force:** Though advisory, it enhances **normative pressure** on major emitters to act.

Conclusion:

- The ICJ ruling restores the **legal vitality of the Kyoto Protocol**, reinforcing historical accountability in climate governance. It signals that states cannot escape obligations by shifting frameworks, thereby enhancing the prospects of **justice for climate-vulnerable nations**.

Asiatic Lion Conservation & Big Cat Initiatives

Context

- From 284 lions (1990) to **891 (2025),** India witnessed a **70% rise** in the population of the Asiatic lion over the **last decade.**

Details:

Population Status

- **2025 Census**: 891 lions (↑ from 674 in 2020).
- **Range:** Only found in **Gir Landscape, Gujarat** (the last home of Asiatic lions).

Habitat Expansion

- **Barda Wildlife Sanctuary** (near Porbandar) is being developed as a **second home** under **Project Lion**.
- Eco-development projects worth **₹189 crore** sanctioned:
  - Safari Park

- Interpretation Centre
- Breeding Centre

Community Model

- **Maldhari pastoralists** of Gir: successful model of **coexistence** with lions.
- Example of **participatory conservation** in India.

Big Cat Initiatives (India-Led)

- **International Big Cat Alliance (IBCA)**: Covers **5 of 7 big cats** found in India – Lion, Tiger, Leopard, Snow Leopard, Cheetah.
- Complementary projects:
  - **Project Tiger** (58 tiger reserves; ~70% of world's tigers).
  - **Project Elephant**.
  - **Project Dolphin**.
  - **Project Great Indian Bustard** (avian conservation).
  - **Cheetah Reintroduction** (Kuno NP, M.P.).

Global & Climate Linkages

- **India's role**: Integrates wildlife protection with global climate efforts.
- Partnerships: **Coalition for Disaster Resilient Infrastructure (CDRI)**, **International Solar Alliance (ISA)**.
- Use of **AI, drones, and satellite tracking** for anti-poaching & habitat monitoring.

Other Milestones

- **Snow Leopard population**: 714 (as per recent estimates).
- **Kuno NP, M.P.**: Site for **African Cheetah reintroduction** (first outside Africa).

Uniform Renewable Energy Tariff (URET) Scheme

Context

- On August 1, 2025, the Power Ministry dissolved the URET-linked solar and solar-wind tariff pools set up in 2024 to standardise clean energy prices.

Background

- The **Uniform Renewable Energy Tariff (URET) Scheme** was introduced on **15 February 2024** under the *Electricity (Amendment) Rules, 2022*. Its goal was to bring tariff stability and standardisation in India's solar and hybrid renewable projects for three years.

Key Features

- **Centralised Pricing Pool** – Created to ensure stable tariffs across buyers.
- **Discom Protection** – Shielded state discoms and other buyers from volatility in renewable energy auctions.
- **Fixed Tariff Structure** – Encouraged long-term **Power Purchase Agreements (PPAs)** with predictable returns.

Issues with URET

- **Buyer Reluctance** – Discoms resisted fixed tariffs, fearing they might lose out on cheaper rates in future auctions.
- **Stranded Capacity** – Over **9.4 GW of renewable projects** were stuck due to delays in signing **Power Sale Agreements (PSAs)**.
- **Regulatory Delays** – Added an extra bureaucratic layer, slowing clearances.
- **Transmission Gaps** – Grid bottlenecks continued to delay project commissioning.

Policy Shift

- Due to these challenges, the government **scrapped the central pricing system**, aiming to accelerate PSAs and reduce stranded renewable capacity, which had doubled in nine months.

Way Forward

- **Flexible Tariffs** – Sliding-scale pricing (Germany, Australia) to reflect market changes.
- **Grid Strengthening** – Fast-track Green Energy Corridors (China, US model).
- **Hybrid Auctions** – Solar + wind + storage in one tender (Brazil model) to ensure round-the-clock renewable power.

Renewable Consumption Obligation (RCO) framework

Context

- The Ministry of Power has notified year-wise **Renewable Energy (RE) consumption targets** from FY 2024-25 to 2029-30 under the **Energy Conservation Act (ECA), 2001**.

What is Renewable Purchase Obligation (RPO)?

- **Mandate:** Electricity distribution companies, captive power producers, and open-access

consumers must purchase a minimum share of their power from renewable sources.
- **Legal Basis:** Electricity Act, 2003.
- **Target:** To raise RPO from **24.61% (2022-23)** to **43.33% (2029-30)**.
- **Objective:** Promotes procurement of renewable power and creates a viable RE market.

Renewable Consumption Obligation (RCO) – Draft Framework

- **Shift in Focus:** Unlike RPO (purchase-based), **RCO stresses actual consumption of RE** by designated consumers.
- **Coverage:** Distribution licensees, open-access consumers, and captive users.
- **Trajectory:** Gradual rise from **29.9% (2024-25)** to **43.33% (2029-30)**.
- **Enforcement:** Binding targets with penalties for non-compliance. Oversight by the **Bureau of Energy Efficiency (BEE)**.

Significance

- Aligns with India's **net-zero by 2070** commitment.
- Strengthens RE integration into the energy mix.
- Ensures accountability by focusing on **end-use consumption**, not just purchase contracts.
- Provides a predictable pathway for investors and industries to adopt clean energy.

Marine Protected Areas (MPAs)

Context

- A **40-year satellite study along California's coastline** shows that MPAs significantly improve the resilience of **kelp forests**, enabling faster recovery after **marine heatwaves**.

About Marine Protected Areas (MPAs):

- Marine Protected Areas (MPAs) are defined as oceanic or coastal zones where human activity is regulated to conserve marine ecosystems, biodiversity, and cultural heritage. They range from **no-take zones** (all extractive activities banned) to **multi-use areas** allowing sustainable fishing or tourism.

Key Benefits:

Biodiversity Conservation

- Protects ecosystems like kelp forests, coral reefs, mangroves, and seagrass meadows; safe havens for endangered species such as sea turtles, dugongs, and marine mammals.

Climate Resilience

- Enhances ecosystem recovery from marine heatwaves and other shocks; acts as blue carbon sinks absorbing CO_2.

Fisheries & Livelihood Security

- Serves as nurseries and replenishment zones for fish stocks, supporting sustainable fisheries and coastal livelihoods.

Ecosystem Services

- Provides natural coastal protection from erosion and storms; maintains water quality by filtering pollutants.

Scientific & Educational Value

- Enables long-term ecological monitoring, climate research, ecotourism, and marine education.

Global Commitments & Diplomacy

- Supports SDG 14 (Life Below Water) and strengthens international standing in biodiversity and climate negotiations.

5.6 SNIPPETS

NATIONAL PARKS / SANCTUARIES / WETLANDS / RESERVES IN NEWS	
Barda Wildlife Sanctuary	• Barda Wildlife Sanctuary in **Gujarat** is gaining importance as a potential second home for Asiatic lions. Spread over 192.31 sq. km in Porbandar and **Devbhumi Dwarka**, it was **declared a sanctuary in 1979**. Despite its small size, it harbors rich biodiversity with medicinal plants like **Gorad, Babul, and Bamboo**, and fauna such as **sambar, chital, and chinkara.**
Dibru-Saikhowa	• DSNP, spread over 425 sq. km in **Assam's floodplains, is a UNESCO Biosphere Reserve** known for its rich biodiversity and India's **only habitat of feral horses**. Its

National Park (DSNP)	grassland–wetland mosaic, shaped by the Brahmaputra and other rivers, now faces ecological threats from recurring floods, human pressures, and invasive vegetation altering its fragile ecosystem. • ***NOTE- Feral Horse Feral horses are free-roaming horses descended from domesticated stock. Though often called "wild," they are not truly wild but have adapted to natural conditions over generations.***
Thattekad Bird Sanctuary	• **Thattekad Bird Sanctuary in Kerala**, part of the **Western Ghats, is Kerala's first bird sanctuary** and a biodiversity hotspot. A recent faunal survey recorded nine new species, highlighting the sanctuary's rich wildlife, which includes **leopards, sloth bears, and porcupines, amid marshlands, rivers, and plantations of teak, rosewood, and fruit orchards.**
Sundarbans Tiger Reserve	• Sundarbans Tiger Reserve (STR) in **West Bengal** is a unique mangrove habitat home to a significant tiger population. STR borders Bangladesh in the east (**rivers Harinbhanga, Raimangal, Kalindi**), the Bay of Bengal in the south, **Matla river in the west**, and **Bidya–Gomdi rivers** in the northwest. Its National Park is a **UNESCO World Heritage Site and part of the Sundarban Biosphere Reserve.**
Vantara Zoological Rescue and Rehabilitation Centre	• Vantara, a 3,500-acre private wildlife **rescuecentre by Reliance Foundatio**n, focuses on care and rehabilitation of injured and rescued animals, including elephants and rhinos. • It is **not open to the public and houses** over 1.5 lakh animals across 2,000 species, featuring specialised enclosures and recovery facilities.

SPECIES IN NEWS	
Asian Giant Tortoise	• The Asian Giant Tortoise, a critically endangered species, has been reintroduced into the Zeliang Community Reserve in Nagaland. • Found in tropical and subtropical evergreen forests, it is the largest tortoise in mainland Asia and unique for building above-ground nests. Listed as *Critically Endangered* (IUCN) and under *Schedule I* of the Wildlife Protection Act, 1972, it faces severe threats from habitat loss and hunting for local consumption.
Gaur	• The Gaur population in Palamau Tiger Reserve, Jharkhand's last stronghold, has declined sharply from 150 in the 1970s to just 68, raising conservation concerns. • The Gaur (***Bos gaurus*****), the world's largest wild bovine**, is a key herbivore, seed disperser, and prey for tigers and leopards. Listed as ***Vulnerable*** **by IUCN and under Schedule I of the Wildlife Protection Act**, it is threatened by habitat loss, hunting, and shrinking populations, now largely confined to PTR in Jharkhand.
Krill	• Krill, a keystone species in marine ecosystems, is under stress from overfishing, climate change, and rising demand for omega-3 oil. • These small crustaceans, found mainly in Antarctic and northern oceans, form vast swarms and are vital food for whales, seals, squid, and seabirds. By feeding on plankton, they also play a major role in carbon sequestration, removing about 20 million tons of CO_2 annually.
Nilgiri Tahr	• A joint census in Kerala and Tamil Nadu has recorded 2,668 Nilgiri tahrs. • The Nilgiri tahr, Tamil Nadu's state animal, is an endangered mountain ungulate endemic to the Western Ghats, with its largest population in **Eravikulam National Park**. It is protected under **Schedule I of the Wildlife (Protection) Act, 1972,** and conservation measures like **Project Nilgiri Tahr (2023) and Nilgiri Tahr Day** aim to counter threats from habitat loss and land-use change.

Sea Buckthorn	• Seeds of sea buckthorn and buckwheat from Ladakh's cold desert are being tested on the ISS under NASA's Crew-11 mission. • Sea buckthorn, a hardy shrub suited to **high-altitude cold regions**, helps in soil conservation and land restoration. It is **highly nutritious, packed with vitamins,** fatty acids, and antioxidants, offering medicinal benefits like anti-inflammatory and anticancer properties.
Allographaeffusosoredica	• Indian scientists have discovered a new lichen species, *Allographaeffusosoredica*, in the Western Ghats. • It is a crustose lichen with rare chemical traits, including norstictic acid, and was studied using morphological, chemical, and molecular methods. This marks the first sequenced Indian species of *Allographa*, highlighting lichen–algal symbiosis and adding to the 53 species of the genus reported from India.
Starfish	• Starfish deaths have been linked to *Vibrio pectenicida*, a bacterium related to the one causing cholera in humans. • Starfish, or sea stars, are echinoderms that prey on mussels and clams, playing a key role in balancing marine ecosystems. They lack blood, using a water vascular system for nutrient and oxygen transport, and can regenerate lost arms, making them vital yet vulnerable marine species.
Asiatic Lion	• India's Asiatic lion population has grown from 284 (1990) to 891 (2025), marking a sharp recovery. • Found only in **Gujarat's Gir landscape, the Asiatic lion is smaller than its African counterpart** and is listed as ***Vulnerable* by IUCN**. Conservation has been strengthened through Project Lion (2020), the "Greater Gir" expansion, and global efforts like the International Big Cats Alliance.
Greater One-horned Rhino	• An IUCN–TRAFFIC report notes that India's stronger monitoring and surveillance have significantly curbed poaching of the Greater One-horned Rhino. • Found in India and Nepal, this largest rhino species with a single horn is listed as ***Vulnerable*** on the IUCN Red List and protected under **CITES Appendix I and Schedule I of India's Wildlife Protection Act, 1972. Key initiatives like the *National Conservation Strategy (2019)* and *Indian Rhino Vision 2020*** aim to secure its habitats and ensure long-term survival.
Saltwater crocodile	• West Bengal's Bhagabatpur Crocodile Project (since 1976) is India's only breeding and conservation program for saltwater crocodiles, releasing 577 individuals into the Sundarbans. • The **saltwater crocodile (*Crocodylus porosus*)** is India's largest reptile, a territorial apex predator found in mangroves and estuaries of the **Sundarbans, Bhitarkanika, and Andaman & Nicobar Islands**. Protected under **Schedule I of the Wildlife Protection Act**, it is listed as Least Concern on the **IUCN Red List and Appendix I of CITES**.
Invasive Species	• Invasive species are non-native organisms that spread rapidly and disrupt local ecosystems. • In India, species like **Lantana, Parthenium, water hyacinth, and African catfish** threaten biodiversity, agriculture, and water systems. They can outcompete native species, reduce yields, and spread diseases, though some provide ecosystem services. Management involves prevention, early removal, biological/mechanical/chemical control, and habitat restoration.
Snow	• Climate change may be driving common leopards into snow leopard habitats in

leopards	Jammu and Kashmir. • **Details:** Snow leopards, found in high-altitude regions of northern India, are solitary, crepuscular big cats with smoky-grey fur and dark rosettes. Classified as Vulnerable, they are protected under India's Wildlife Protection Act and CITES Appendix I.

MISCELLANEOUS	
Electric Mobility Index (IEMI)	• NITI Aayog, with World Resources Institute India, has launched a tool to benchmark states' EV progress. • The index evaluates states on 16 indicators under three themes: transport electrification progress (50%), capturing EV adoption, charging infrastructure readiness (30%), reflecting network growth, and EV research & innovation status (20%), showcasing technology and policy support. This provides a holistic score out of 100 to track and accelerate India's EV transition.
E20 Fuel	• The Petroleum Ministry clarified that concerns over 20% ethanol blending in petrol (E20) lack evidence. • E20 fuel, an 80:20 petrol-ethanol mix, is targeted for nationwide rollout by 2025-26 under the National Biofuel Policy. It boosts energy security, reduces emissions, and benefits farmers, although older vehicles may experience reduced efficiency or maintenance issues.
National Medicinal Plants Board (NMPB)	• NMPB has signed two MoUs to conserve germplasm of threatened medicinal plants and set up a National Medicinal Plants Garden at AIIMS, New Delhi. • Established in 2000 under the Ministry of AYUSH, NMPB promotes conservation, cultivation, and research of medicinal plants. It focuses on in-situ and ex-situ conservation, supports herbal gardens, ensures quality through GACPs, and facilitates certification of raw drugs and planting material.
H-fuel	• India is launching a ₹600 crore pilot project to set up green hydrogen fuelling and repair infrastructure on 10 national highway stretches. • Hydrogen fuel (H-fuel) refers to **hydrogen gas (H_2) used as an energy carrier for fuel cells** or combustion engines. It is a clean and **high-density energy** source that can power vehicles, generate electricity, or serve as industrial feedstock. When produced using renewable sources like **solar or wind energy**, it is termed green hydrogen, making it a crucial pillar of **decarbonisation strategies.**
Virgin Polymers	• India accounts for about 4% of global virgin polymer production, with China leading as the largest producer. • Virgin polymers are **plastics made directly from crude oil or natural gas without prior use**. They are widely used in packaging, textiles, automotive, and medical products due to their purity and strength, but raise concerns over high carbon footprint, fossil fuel dependence, and environmental harm compared to recycled alternatives.
Article 6 of Paris Agreement	• NDA (Designated National Authority) is required to enable carbon trading under Article 6.4 of the Paris Agreement. • Article 6 promotes voluntary international cooperation to meet climate targets through carbon markets. Under Article 6.4, countries can trade carbon credits from emission reductions to help achieve their climate goals.

6. SCIENCE & TECHNOLOGY AND HEALTH

6.1 BIOCHAR & INDIA'S CARBON MARKET

Context

- With India's carbon market launching in 2026, biochar is poised to emerge as a key CO_2 removal technology.

Introduction

- India is set to **launch its carbon market in 2026**, with a focus on carbon removal and emissions reduction technologies. Among these, **biochar**—a **carbon-rich charcoal** derived from agricultural residues and organic municipal waste—emerges as a promising solution.
- **Acting as a long-term carbon sink for 100–1000 years**, biochar has the potential to address waste management, improve soil health, and contribute significantly to India's climate commitments.

What is Biochar?

- **Carbon-rich charcoal produced** through **pyrolysis of agricultural residues** and organic municipal waste.
- Functions as a durable **carbon sink** by locking away carbon for centuries.
- Recognised globally as a **carbon dioxide (CO_2) removal technology**, aligning with India's carbon market mechanisms.

India's Biomass Waste Potential

- India generates **600+ million metric tonnes (MMT)** of agricultural residue and **60+ MMT** of municipal solid waste annually.
- 30–50% of this waste can be converted into **15–26 MMT of biochar**, capable of removing **~0.1 gigatonnes (GT) of CO_2 equivalent/year**.

Byproducts and Energy Benefits

- **Syngas:** 20–30 MMT → generates 8–13 TWh electricity (~0.5–0.7% of national demand).
- **Bio-oil:** 24–40 MMT → can replace 12–19 MMT of diesel/kerosene.
- **Coal substitution:** Potential to avoid 0.4–0.7 MMT coal use, reducing ~2% fossil-fuel-based emissions.

Sectoral Applications

Sector	Applications / Benefits	Impact / Data
Agriculture	• Improves water retention • Cuts nitrous oxide (N_2O) emissions	• 30–50% reduction in N_2O emissions • Enhances soil carbon • Increases crop yield by 10–25%
Industry	Modified biochar captures carbon dioxide (CO_2) from industrial flue gases	Effective tool for carbon capture and storage
Construction	Blending 2–5% biochar into concrete enhances strength and heat resistance	Captures 115 kg CO_2 per cubic metre of concrete
Wastewater Management	1 kg biochar can treat 200–500 litres of wastewater	Effective in large-scale water purification and pollutant removal
Annual Demand	Estimated requirement of biochar	**2.5–6.3 million metric tonnes (MMT)**

Challenges in Adoption

- Lack of **standardised feedstock markets** for biomass.
- Weak carbon accounting, monitoring, reporting, and verification (MRV) frameworks.
- **Policy and regulatory gaps**; limited technological readiness.
- Low farmer and industry awareness.
- Absence of viable large-scale **business models**.

Way Forward

- **Research & Development (R&D):** Develop region-specific biomass standards.
- **Integration into schemes:**
  - Crop residue management programmes.
  - Bioenergy and rural development missions.
  - State Action Plans on Climate Change.
- **Policy Recognition:** Include biochar projects in carbon credit and carbon trading systems.
- **Village-level biochar units:** Promote decentralised adoption, creating **~5.2 lakh rural jobs** while tackling stubble burning and waste management.

Conclusion

- Biochar offers a **triple-win solution**: carbon sequestration, energy co-benefits, and sustainable development. With India's upcoming carbon market, recognising biochar as a credible carbon removal pathway can unlock its potential.
- Proper policies, business models, and community-level adoption can transform India's biomass waste problem into a **climate opportunity**, contributing significantly to **India's net-zero target by 2070.**

6.2 FIGHT AGAINST ANTIBIOTIC RESISTANCE

Context

- IIT Roorkee has taken a significant step forward in the global fight against antibiotic resistance.

What is Antimicrobial Resistance (AMR)?

- ***AMR (Antimicrobial Resistance) occurs when microorganisms — bacteria, viruses, fungi or parasites —*** *evolve so that medicines used to treat infections (**antibiotics, antivirals, antifungals, antiparasitics**) no longer work effectively. This makes common infections harder to treat and increases the risk of spread, complications, and healthcare costs.*

Key causes of AMR

- **Misuse and overuse of antibiotics** in humans (wrong indication, incomplete courses).
- Incorrect dosage and premature stoppage of treatment.
- Use of antibiotics as growth promoters in food animals and aquaculture (enters the food chain).
- **Lack of accurate diagnostic facilities** → empirical (guess) therapy.
- **Environmental contamination**: industrial effluents from Active Pharmaceutical Ingredient (API) production, untreated wastewater, and landfill leachates.

Consequences

- Effective antimicrobials become scarce, → **higher morbidity and mortality**.
- **Economic burden**: estimated additional healthcare costs **(World Bank) could rise by about US$1 trillion by 2050.**
- Threat to routine surgery, chemotherapy, and neonatal care, where prophylactic antibiotics are critical.

New development: Compound 3b (IIT Roorkee) — why it matters

- **Target disease agent:** KPC-2-producing *Klebsiella pneumonia* **(KPC = Klebsiella pneumoniae carbapenemase),** a high-priority resistant **bacterium per the World Health Organization (WHO).**
- **Purpose:** Restores the effectiveness of the carbapenem antibiotic *Meropenem* against KPC-2 producers.
- **Class & mechanism:** A beta-lactamase inhibitor — it blocks beta-lactamase enzymes that would otherwise **destroy beta-lactam antibiotics (those containing a beta-lactam ring).** Compound 3b is specific to KPC-2 activity and shows synergistic bactericidal action with Meropenem.
- **Safety & evidence:** Reported to be highly specific and not toxic to human cells; shows

strong therapeutic results in preclinical models (animal/lab studies).
- **Significance:** Represents an adjunct strategy — using an inhibitor with an existing antibiotic — to revive drugs that resistance had rendered ineffective.

Ongoing policy & programmatic measures
- **India — Red Line campaign:** Prescription-only antibiotics marked with a red line to discourage over-the-counter sale.
- **National Antibiotic Consumption Network (NAC-NET):** Facility-level antibiotic use data compiled and sent to the National Centre for Disease Control (NCDC) to monitor consumption.
- **Global Antibiotic Research & Development Partnership (GARDP):** Initiative by the World Health Organization and the Drugs for Neglected Diseases initiative to incentivize R&D through public–private partnerships.
- **Global Action Plan & One Health approach:** Intersectoral coordination across human, animal, and environmental health to tackle AMR.

Way forward
- Strengthen and scale **affordable rapid diagnostics** to reduce empirical antibiotic use.
- Enforce prescription regulations; penalize non-prescription retail sales and irrational use in livestock.
- **Integrate AMR education into public-health campaigns** and school curricula.
- Control pharmaceutical-industrial effluents and improve wastewater treatment to reduce environmental AMR drivers.
- **Promote antimicrobial stewardship programs** in hospitals and incentivize R&D for inhibitors, new antibiotics, and alternative therapies.

6.3 HYDROGEN FUEL IN INDIA

Context
- India is launching a ₹600 crore pilot project to set up green hydrogen fuelling and repair infrastructure on 10 national highway stretches.

Introduction
- **India's transition to a low-carbon economy** requires diversification of its energy basket. With rising crude oil imports and growing climate concerns, hydrogen fuel has emerged as a potential game-changer.
- The **government's recent decision to launch a ₹600-crore pilot project** for green hydrogen fuelling and repair infrastructure on 10 national highway stretches marks an important step in this direction.
- It **signals India's intent to test hydrogen-powered commercial vehicles** and lay the foundation for large-scale adoption.

What is Hydrogen Fuel?
- **Hydrogen fuel refers to hydrogen gas (H_2) used** as an energy carrier for fuel cells or combustion engines. When produced from renewable sources such as **solar and wind energy**, it is known as **green hydrogen**. It is a clean and high-density energy source that emits only water vapour when used, making it central to **global decarbonisation strategies**.

Types of Hydrogen Fuel
- **Grey Hydrogen**: Produced from natural gas or coal, emitting CO_2.
- **Blue Hydrogen**: Produced from fossil fuels but coupled with carbon capture technologies.
- **Green Hydrogen**: Produced from renewable energy through electrolysis, completely clean.

Benefits of Hydrogen Fuel
- **Energy Efficiency**: Hydrogen has higher energy content per unit mass than most fuels. Hydrogen fuel cells can be refuelled quickly, making them ideal for heavy-duty transport.

- **Versatility:** Can power vehicles, industries, railways, and aviation—where battery electrification has limitations.
- **Industrial Use:** Hydrogen is already used in refining petroleum and producing ammonia; its wider adoption is feasible for steel, cement, and chemicals.
- **Environmental Gains**: Produces only water vapour, reducing air pollution and greenhouse gas emissions.
- **Safety & Sustainability**: Unlike fossil fuels, hydrogen poses no toxicity risks during use and can be sourced from biomass, nuclear, or renewables.

Role in Enhancing India's Energy Security

- **Reduced Import Dependency**: India imports over 85% of its crude oil, costing nearly $130 billion annually. Substituting fossil fuels with domestically produced hydrogen reduces exposure to global oil price volatility and geopolitical risks.
- **Industrial Decarbonisation:** Hydrogen can decarbonise hard-to-abate sectors like steel, cement, and fertilisers. With the EU's **Carbon Border Adjustment Mechanism (CBAM)**, this shift is crucial for India's export competitiveness.
- **Transport Transformation:** Hydrogen fuel cells are particularly suited for trucks, railways, and aviation—cutting reliance on diesel and petrol.
- **Climate Goals & Resilience:** Hydrogen supports India's net-zero 2070 target, reduces urban air pollution, and creates a new pillar in the energy mix alongside solar and wind.

Challenges Ahead

- **High Costs:** Green hydrogen production is still expensive compared to fossil fuels.
- **Infrastructure Gaps:** Refuelling stations, pipelines, and storage facilities need large-scale investment.
- **Technological Readiness**: Electrolyser efficiency, durability, and large-scale deployment remain challenges.
- **Policy & Regulation**: Clear pricing, incentives, and safety standards are needed to build investor confidence.

Steps Taken by India

- **National Green Hydrogen Mission (2023):** Targets 5 million metric tonnes of annual green hydrogen production by 2030, with investments worth ₹8 lakh crore and 6 lakh clean energy jobs.
- **Hydrogen Infrastructure Development**:
  - ₹600 crore pilot project for fuelling and repair stations on highways.
  - First hydrogen refuelling station inaugurated in Leh (2024).
- **Hydrogen-Powered Railways**: India's first hydrogen-powered train to run between Jind and Sonipat in Haryana. Supported by a 1 MW PEM electrolyser and storage infrastructure.
- **Electrolyser Manufacturing**: Indigenous capacity is being built to reduce equipment imports.
- **Hydrogen Diplomacy:** India is collaborating with Gulf and European nations to establish hydrogen export corridors, aiming to become a global hub.

Conclusion

- Hydrogen fuel represents a transformative opportunity for India to achieve energy security, industrial competitiveness, and climate sustainability. With consistent policy support, investment in infrastructure, and international partnerships, hydrogen can become a central pillar of India's clean energy future.

6.4 SHORT ARTICLES

Peacock Feathers as Natural Lasers

Context

- US researchers (Scientific Reports) found peacock tail eyespots can act like natural laser cavities when treated with rhodamine 6G dye.

Mechanism

- Feathers contain **microscopic keratin rods** that naturally reflect and amplify certain wavelengths of light.
- When treated with **wet/dry dye cycles**, dye penetrates these structures.
- Under stimulation with green laser light, the feathers emit **narrow laser-like beams**.

Key Findings

- **Emission wavelengths:** Consistent emissions observed at 574 nm (yellow) and 583 nm (orange).
- **Regional variation:**
  - Yellow feather regions → stronger emission at 574 nm (lower threshold).
  - Brown regions → favour 583 nm (higher threshold).
  - Green regions → strongest glow due to enhanced dye absorption and emission.
- Reveals **hidden micro-patterns** invisible to the naked eye.

Significance

1. **Biological Insight:** Sheds light on structural colouration in birds and how feather microstructures manipulate light.
2. **Technological Potential:**
   - Development of **bio-inspired optical devices**, such as natural photonic materials.
   - Applications in **sensing, display technologies, and lasers**.
3. **Scientific Value:** Enhances understanding of **natural nanostructures** and their capacity to inspire sustainable designs in optics.

NOTE

Several animals exhibit structural coloration and optical features similar to those of peacock feathers, where micro- or nano-scale structures manipulate light instead of pigments.

1. **Butterfly Wings (Morpho spp.)**– Nano-ridges on wing scales reflect intense blue; structures have been used in optical sensors and photonic devices.
2. **Beetle Shells (Scarabaeidae, jewel beetles)**– Multilayer chitin structures produce iridescent metallic colours; some exhibit circularly polarised light.

Ai-Assisted Quantum Computing Breakthrough

Context

- Chinese researchers developed an AI method to rapidly assemble large defect-free arrays of neutral atoms (qubits) for quantum computing.

Why It Matters?

- **Qubits (Neutral Atoms like Rubidium)** trapped by **optical tweezers**.
- Large, defect-free arrays are crucial for:
  - **Quantum error correction**
  - **Complex quantum simulations**
  - **Scalable quantum computing**

Core Challenge

- Atoms load **randomly → defects (missing sites)**.
- Earlier method: **one-by-one rearrangement**, slow & unscalable.

Innovation

- **AI + Hungarian Algorithm** → optimal mapping of atoms to target sites.
- **Laser holograms** move thousands of atoms **simultaneously**.
- Split into ~20 steps → prevents heating & atom loss.

Quantum Principles

- **Quantum Computing:** Uses qubits that can exist in superposition & entanglement →

enables parallel processing beyond classical limits.

1. **Superposition** – A qubit can be **0 and 1 simultaneously**, enabling parallel computation.
2. **Entanglement**– Strong correlation between two or more qubits so that the state of one instantly affects the other, even at a distance.

- Enables faster information transfer in quantum algorithms.
- Basis for quantum teleportation & quantum cryptography.

Applications

- **Quantum Computing** – High-speed parallel processing.
- **Quantum Simulation** (Uses controllable quantum systems to model complex quantum phenomena **(e.g., molecular interactions, material properties)** that classical computers struggle to simulate)
  - Modelling molecules, materials, climate systems.
- **Drug Discovery** &**AI acceleration**.
- **Cryptography** – Unbreakable communication systems.

India's First Private EO Satellite Constellation

Context

- The Indian National Space Promotion and Authorisation Centre (IN-SPACe) announced the selection of a consortium led by Google-backed PixxelSpace.

Overview

- **Program Lead:** Indian National Space Promotion and Authorization Centre (IN-SPACe) selected **PixxelSpace India-led consortium** to build India's first fully indigenous commercial EO system.
- **Consortium Members:** PixxelSpace India, Piersight Space, Satsure Analytics India, and Dhruva Space.
- **Deployment Tenure:** 4 years.

Technology:

- 12 satellites planned.
- **Sensors:** Panchromatic, multispectral, hyperspectral, and Synthetic Aperture Radar (SAR).
- **Capabilities:** All-weather, day-night imaging; high-resolution geospatial intelligence.

Public-Private Partnership (PPP) Model

- **Government Role:** Strategic guidance, technical and policy support.
- **Private Sector Role:** Own and operate **Earth Observation** (EO) systems, including manufacturing, Indian launches, ground infrastructure, and data commercialisation.

Applications:

- Climate change monitoring
- Disaster management
- Agriculture planning
- Delivery of **Analysis Ready Data (ARD)** and value-added services

India's Private Space Industry

- **Economic Size:** Current space economy ~ $8 billion; potential to reach $100 billion by 2040.
- **Startups:** Over 200 private space startups emerged; e.g., **Vikram-S**, India's first rocket under **Mission Prarambh**.
- **Industry Associations:** Indian Space Association (ISpA) fosters collaboration.

Government Support & Policy

- **IN-SPACe:** Established to promote private sector participation.
- **Indian Space Policy 2023:** Provides regulatory clarity and policy stability.
- **FDI Policy:** 100% Foreign Direct Investment allowed in the space sector.
- **Venture Capital Fund:** ₹1,000 crore approved to finance startups.

Significance:

- Boosts India's commercial space capability.
- Strengthens private-public collaboration in cutting-edge EO technology.
- Supports strategic, economic, and scientific applications.

Genetically Engineered E. Coli as Bioelectronic Sensors

Context

- Researchers from Imperial College London and Zhejiang University have developed genetically engineered *E. coli* bacteria that act as self-powered, programmable biosensors.
- These can **detect chemicals like mercury and generate electrical signals**, making them suitable for low-cost and portable electronic devices.

What are Biosensors?

- Analytical devices that detect biological changes and convert them into measurable signals (usually electrical).
- Components:
  - **Bioreceptor** – a biological element (enzyme, antibody, nucleic acid, or cell) that interacts with the target.
  - **Transducer** – converts this interaction into a signal (electrochemical, optical, piezoelectric).
  - **Electronics & Display** – amplifies, processes, and shows the result.

Functioning: Detection → Signal Conversion → Signal Processing → Display.

Why E. coli?

- A gram-negative, rod-shaped bacterium, naturally found in the intestines of humans and animals.
- **Medical Role** – Most strains are harmless, help in digestion and vitamin K2 production; some cause foodborne illness.
- **Research Importance** – Fast growth, easy genetic modification; used in biotechnology to produce insulin, growth hormones, etc.
- **Environmental Role** – Used as a bioindicator of water quality and faecal contamination.

E. coli as a Biosensor

- **Programmable** – Can be genetically modified with sensing and output modules.
- **Self-repairing** – Living cells survive in complex environments.
- **Signal Generation** – Produce electrochemically active molecules (like phenazines) in response to stimuli, giving direct electrical readouts.
- **Logic Operations** – Can be engineered to perform basic computing (like AND gates) within the cell for complex signal processing.

Significance

- Offers a low-cost, portable, and sustainable solution for **environmental monitoring** (e.g., detecting heavy metals like mercury).
- Bridges **biology and electronics**, opening pathways for medical diagnostics, pollution detection, and synthetic biology applications.

6.5 SNIPPETS

Topics	Details
Bluebird Satellite	• ISRO is set to launch the Block 2 BlueBird communications satellite in the next 3–4 months. • Developed by **U.S.-based AST SpaceMobile**, the ~6,000 kg satellite will operate in **low Earth orbit (LEO)** with a giant 64 sq. m antenna. It enables direct smartphone-to-satellite connections, bypassing towers, and supports peak data speeds up to **120 Mbps (40 MHz capacity). Initially covering the U.S.**, the service will later expand to select global markets, revolutionizing mobile communication and broadband access in remote regions.
Animal Stem Cell Biobank	• India inaugurated its **first state-of-the-art animal stem cell biobank** and laboratory at the **National Institute of Animal Biotechnology, Hyderabad**. • It is equipped with a stem cell culture unit, 3D bioprinter, bacterial lab, and cryostorage, and aims to advance regenerative medicine, livestock therapies, and disease research, supported by the **National Biopharma Mission of the**

	Department of Biotechnology.
Catch Grant Program	• IndiaAI Mission, the flagship initiative of the Ministry of Electronics and Information Technology, has launched the Cancer AI & Technology Challenge (CATCH). • CATCH is a **joint innovation grant with the National Cancer Grid to accelerate AI solutions in cancer care**, offering selected proposals up to ₹50 lakh in milestone-based funding, mentorship, clinical validation access, and opportunities to scale nationwide.
Shine Programme	• The Indian Council of Medical Research (ICMR) and the Department of Health Research organized the SHINE Programme. • Aimed at motivating students of gra**des 9–12 toward science and public health careers**, the program engaged over 13,000 participants through lab tours, research exhibitions, and poster walks to foster curiosity, innovation, and interest in biomedical research.
Wallacean Hominids	• Scientists have discovered possible artefacts of the oldest known Wallacean hominids on Sulawesi Island, Indonesia. • These early humans, **likely Homo erectus**, were previously known only from Flores and Luzon (~1.02 million years ago) and were thought unable to travel long distances across seas; **Wallacea**, named after **Alfred Russel Wallace, includes islands like Sulawesi**, **Lombok, Flores, Timor, and Sumbawa between Borneo, Java, Australia, and New Guinea**.
Eutelsat One Web	• Nelco, a Tata Group company, has partnered with Eutelsat to provide OneWeb low-earth orbit (LEO) satellite connectivity across India. • OneWeb, a **subsidiary** of **French** group **Eutelsat and partly owned by India's Bharti Enterprises,** uses **LEO satellites (below 2,000 km) to deliver broadband internet**, enhancing India's digital infrastructure, national security, and connectivity in underserved regions.
Ideonella Sakaiensis	• Plastic pollution, especially from PET bottles and packaging, is a major environmental issue. • Researchers discovered the **bacterium *Ideonellasakaiensis*** near a Japanese recycling facility; it produces enzymes that **break PET into harmless components**, which it uses as food, offering potential for scalable plastic biodegradation and promoting a circular economy.
Envelope Dimer Epitope (EDE)	• A study in *Science Translational Medicine* highlights Envelope Dimer Epitope (EDE)-like antibodies as key drivers of cross-serotype dengue immunity. • EDE is a **quaternary structure on the dengue virus formed by two envelope proteins; antibodies** targeting it block viral entry and **neutralise all four serotypes**. • Present mainly after multiple exposures, these antibodies can guide vaccine design and monoclonal therapies to provide broad protection without **Antibody-Dependent Enhancement,** improving public health strategies in endemic regions.
James Webb Space Telescope	• James Webb Space Telescope has discovered Uranus's 29th moon, temporarily named **S/2025 U1**. • Launched in December 2021 by **NASA, ESA, and CSA, JWST** is an orbiting infrared observatory. Unlike Hubble, it orbits the **Sun at L2, about 1.5 million km from Earth**, to study the universe's evolution—from the Big Bang to solar

	system formation.
Immunoglobulin M (IGM) Antibody	• A new study finds that IgM antibodies not only fight infections but also act as mechanical stabilisers of harmful proteins. • **IgM is the largest antibody** and the **first produced by the body to fight viruses**, bacteria, and parasites. It is also the **earliest antibody developed** in a fetus and is mainly found in blood and lymph.
Rare Earth Magnets	• Automakers are facing shortages of rare earth magnets, forcing them to cut features and explore alternatives. • Rare earth magnets are strong permanent magnets made from alloys of 17 rare earth elements. The main types are **Neodymium (NdFeB) and Samarium-Cobalt (SmCo).** They are valued for their high strength and compact size, and are widely used in electronics, clean energy, healthcare, and the automotive industry.
Brown Dwarfs	• Scientists have discovered a rare quadruple star system, UPM J1040−3551 AabBab, in the Milky Way with two red dwarfs and two brown dwarfs. • Brown dwarfs are objects that form like stars but are too small to sustain hydrogen fusion, earning them the name **"failed stars."** They share atmospheric traits with gas giants like Jupiter, but differ from planets due to their higher mass and ability to burn deuterium.
3rd Generation Partnership Project (3GPP)	• India hosted the first-ever 3GPP RAN meeting **on 6G standardization**, organized by TSDSI. • The 3rd Generation Partnership Project (3GPP), set up in **1998**, is a global body that develops technical specifications for mobile networks, **including 3G, 4G, 5G,** and now 6G. Its standards form the **backbone of the worldwide telecommunications system. Telecommunications Standards Development Society, India (TSDSI), India's recognized standards body,** works to develop telecom/ICT solutions suited to national needs.
Sleeping Sickness	• The WHO confirmed Kenya's elimination of human African trypanosomiasis (sleeping sickness) as a public health problem. • Sleeping sickness is a vector-borne parasitic disease caused by the ***Trypanosoma brucei parasite.*** It is endemic to sub-Saharan Africa and transmitted by the bite of **infected tsetse flies (genus Glossina).**

7. HISTORY & CULTURE

7.1 SHORT ARTICLES

100th Anniversary of The Kakori Train Action

Context

- Happened on August 9, 1925, at Kakori, a village near Lucknow, Uttar Pradesh.

Details:

- Revolutionaries of the **Hindustan Republican Association (HRA)** looted the official cash from the Number 8 Down Train traveling from Shahjahanpur to Lucknow.
- **Purpose**: Fund revolutionary activities against the British.

Key Revolutionaries Involved:

- **Ram Prasad Bismil**
- **Ashfaqullah Khan**
- **Chandrashekhar Azad**
- **Manmathnath Gupta**
- **Rajendra Lahiri**

British Reaction:

- Swift arrests and trials in the **Kakori Conspiracy Case (1925)**.
- **Executions**: **Ashfaqullah Khan, Ram Prasad Bismil, Roshan Singh, Rajendra Lahiri**.

Aftermath:

- Temporary setback for revolutionary activities in northern India.
- Led to the reorganisation of HRA into **Hindustan Socialist Republican Army (HSRA)**.

About HRA and HSRA:

Feature	HRA	HSRA
Formation & Key Leaders	Kanpur, 1924. Ram Prasad Bismil, Ashfaqullah Khan, Sachindra Nath Bakshi, Sachindranath Sanyal, Jogesh Chandra Chatterjee	Feroz Shah Kotla, Delhi, 1928. Bhagat Singh, Sukhdev, Shiv Verma, Chandrashekhar Azad, Vijay Kumar Sinha.
Ideology	Federal Republic of the United States of India with adult suffrage	Socialist Republic of India
Objective	Fund revolutionary activities through acts like train robbery	Continue the revolutionary struggle with socialist ideology

Significance:

- Marked a key moment in the armed struggle against British rule.
- Inspired later revolutionaries like Bhagat Singh and the formation of HSRA.
- Demonstrates the transition from moderate revolutionary methods to socialist revolutionary ideology in India.

Young Bengal Movement and Early Radicalism

Context

- Young Bengal, a group of radical reformers, were followers of Henry Derozio at the Hindu College.

Key Features

- **Leader**: Derozio, Anglo-Portuguese poet & teacher, lecturer at Hindu College (1826–1831).
- **Intellectual Base**: Hindu College (founded 1817 by Rammohan Roy, David Hare, etc.) → Centre of liberal Western education.
- **Organisation**: Formation of the **Academic Association (1828)** for debates on liberty, equality, and rationalism.
- **Ideas**:
  - Criticised caste discrimination, idol worship, and superstition.
  - Advocated **women's rights & education** (e.g., debates on widow remarriage).
  - Promoted **scientific temper & free thought**.

Radical Contributions

- **Dismissal of Derozio (1831)** for "promoting atheism," yet students carried forward the legacy.

- **Political Awakening**: Formation of **Bengal British India Society (1843)** → India's first political association, which sought the welfare of all classes.
- **Notable Member**: Radhanath Sikdar, mathematician of the Great Trigonometrical Survey → first to calculate **Peak XV (Everest)**; resisted colonial injustice (opposed forced labour).

Significance

- **Social Reform**: First radical questioning of orthodoxy (e.g., caste, rituals).
- **Political Consciousness**: Early political associations → precursor to INC.
- **Intellectual Legacy**: Set the stage for the **Renaissance in Bengal** and **later nationalist movements** (e.g., Gandhi's rational critique, Nehru's scientific outlook).
- **Inclusivity**: Promoted vision of a tolerant & rational India.

Hindu College, Calcutta

- Founded in **1817** by **Raja Rammohan Roy, David Hare, and others**.
- Became a centre of **Western liberal education** and intellectual awakening.
- Derozio taught here (1826–1831), sparking the Young Bengal Movement.
- Later merged with Presidency School (1905) to become **Presidency College**, now **Presidency University**.

7.2 SNIPPETS

Topics	Details
Goswami Tulsidas	• Vaishnav saint Goswami Tulsidas was remembered on his 500th birth anniversary. • Tulsidas was a **16th-century saint and contemporary of Akbar.** He wrote *Ramcharitmanas* in Awadhi, making the story of Lord Ram accessible to the common people. His other works include ***Dohavali, Gitavali, Vinaya Patrika,* and *Krishna Gitavali*.**
Sharda Script	• The first-ever exhibition on Sharda, the ancient script of Kashmir, was held during the Chinar Book Festival. • Shāradā, a **Brahmic script developed in the 8th–9th centuriesAD,** was mainly used to write **Sanskrit**. It flourished in **Kashmir, Himachal Pradesh, and Punjab**, with inscriptions also found in Afghanistan.
Vitthalbhai Patel	• The All India Speakers' Conference marks 100 years of Vitthalbhai Patel becoming the first elected Indian President of the Central Legislative Assembly (1925). • Born in Nadiad, Gujarat, **Vitthalbhai Patel (1873–1933)** was the elder brother of Sardar Vallabhbhai Patel and a noted lawyer, reformer, and freedom leader. He co-founded the **Swaraj Party** with **Motilal Nehru and C.R. Das,** served as **Mayor of Bombay (1923–25),** and was a strong voice for both political and social reforms.
Raja Prithu Rae	• Raja Prithu Rae was a Khen ruler of Kamrupa (Assam) in the early 13th century. • Belonging to the **Khen dynasty** that traced its **lineage to Narakasura**, he worshipped **Goddess Kamteswari** and laid the foundation of the **Kamata Kingdom**. He is remembered for defeating Bakhtiyar Khilji's invasion, recorded in the **Kanai Varasi rock inscription**, and for his humane treatment of prisoners, upholding **Dharma Yuddha**.
Nuakhai	• The Prime Minister greeted the nation on the occasion of Nuakhai, a major harvest festival. • Nuakhai, also called *Navanna*, is celebrated mainly in Western Odisha as a festival of new grain. Believed to have been started by **Raja Ramai Dev in the 14th century**, it is dedicated to worshipping rice and showing gratitude for a good harvest.
Kotha Telangana Charithra Brundam (KTCB)	• Grassroots efforts are emerging to preserve Telangana's lesser-known heritage. • Kotha Telangana Charithra Brundam (KTCB) is a 125-member volunteer group of farmers, teachers, students, and professionals led by **Sriramoju Hargopal**. Since 1999, they have documented prehistoric rock art, **Satavahana pottery**, inscriptions, and ancient temples through community-driven methods.

8. GEOGRAPHY AND DISASTER MANAGEMENT

8.1 UTTARKASHI FLASH FLOODS–2025

Context

- A cloudburst over the Kheer Ganga catchment triggered a devastating flash flood in Dharali village, Uttarkashi district.

Introduction

- Flash floods are sudden-onset disasters that occur within a short span of intense rainfall, dam breach, or glacial burst. On **5th August 2025**, Dharali town in **Uttarkashi district, Uttarakhand**, witnessed devastating flash floods triggered by torrential rainfall in the **Kheer Ganga River**, highlighting both the vulnerability of Himalayan states and the gaps in India's preparedness.

About Flash Floods in India

What are Flash Floods?

- Sudden floods with **high intensity and short duration**.
- Occur **within 6 hours** of extreme rainfall, glacial lake outburst, or dam breach.
- Common in **hilly terrains, river valleys, and poorly drained urban areas**.

Flash Flood-Prone Regions in India

1. **Himalayan States** – Uttarakhand, Himachal Pradesh, Jammu & Kashmir (cloudbursts, Glacial Lake Outburst Floods).
2. **North-East India** – Assam, Arunachal Pradesh (heavy monsoon rains).
3. **Western Ghats** – Kerala, Karnataka.
4. **Urban Areas** – Mumbai, Chennai, Hyderabad (urban flooding).

Causes

Natural Causes

- Cloudbursts and intense rainfall.
- Glacial Lake Outburst Floods (GLOFs).
- River overflow and dam breaches.

Anthropogenic Causes

- **Deforestation** and slope destabilization.
- **Unregulated tourism** and quarrying.
- **Construction in floodplains and hilly slopes**.
- **Poor urban drainage systems**

Measures in India

Institutional Measures

- **National Disaster Management Authority (NDMA) Guidelines (2008)** on flood management.
- **National Flood Early Warning System (FLEWS)** by Central Water Commission (CWC) and India Meteorological Department (IMD).
- **GLOF Risk Reduction Programme** under National Mission on Sustaining Himalayan Ecosystem (NMSHE).
- **Dam Safety Act, 2021,** to regulate dam operations and prevent dam-related floods.
- **State Disaster Response Forces (SDRF)**& Quick Response Teams trained for relief.

Technological Interventions

- **Doppler Weather Radars** by IMD for real-time rainfall monitoring.
- **Satellite-based flood mapping** by the Indian Space Research Organisation (ISRO).
- **Common Alert Protocol (CAP)** for uniform dissemination of warnings via SMS, sirens, and digital media.

Structural Measures

- Construction of **check dams, embankments, and retention basins**.
- **Afforestation** in catchment areas.
- **Urban stormwater drainage systems**.
- **Retrofitting vulnerable infrastructure** in hill towns.

Community Preparedness

- **Mock drills at panchayat level**.
- **School safety programmes**.
- **Early warning training** for communities in disaster-prone districts.

Challenges

- Inadequate **micro-level forecasting and real-time data**.
- **Delayed coordination** among agencies.
- **Weak enforcement** of land-use and construction norms.
- **Over-dependence on structural solutions** without addressing ecological restoration.

Way Forward

- **Integrated Flood Management** with basin-wide planning.
- **AI-enabled Early Warning Systems** for last-mile connectivity.
- **Stricter enforcement of land-use planning** in hilly regions.
- **Eco-sensitive tourism and development policies** in Himalayan states.
- **Community-centric disaster management** – building local capacity for first response.
- Promoting **resilient urban and hill town planning** as per NDMA guidelines.

8.2 DROUGHT IN INDIA

Context

- Despite above-normal early monsoon rains, nearly 19% of India faces drought-like conditions, according to Drought Early Warning System (DEWS) data.

Background:

- **Despite receiving 3% above-average rainfall between June and August 2025**, nearly one-fifth of India's landmass faced drought-like conditions, with severe dryness reported in **Ladakh, Bihar, Punjab, and Arunachal Pradesh**.
- This paradox underscores how drought in India is no longer defined merely by rainfall totals but by a combination of meteorological, hydrological, and agricultural stress factors**.**

Defining Drought in India

- **Meteorological drought**: Prolonged periods of below-normal rainfall.
- **Agricultural drought**: Inadequate soil moisture to sustain crops, tracked through rainfall, soil moisture, and evapotranspiration indices.
- **Hydrological drought**: Shortage in water resources like rivers, reservoirs, and groundwater.

NOTE- The **Indian Meteorological Department (IMD)** uses the **Standard Precipitation Index (SPI)** and aridity anomaly outlook to grade conditions from **"abnormally dry" to "exceptionally dry."** Platforms like **DEWS** and **NADAMS** classify drought intensity as moderate, severe, or extreme depending on crop stress and water scarcity.

Why Are Drought-like Conditions Emerging?

- **Erratic Rainfall Distribution**: Although rainfall was close to the Long Period Average (LPA), its uneven distribution led to localised water stress.
- **Climate Change & El Niño**: Ongoing El Niño events and warming of the Indian Ocean (1.2°C rise since 1950) have disrupted monsoon stability. (e.g., 2014-16)
- **Aridity Anomalies: Aridity Anomaly Index (AAI) showed** nearly 40% of India experienced moderate to extreme dryness in 2023.
- **Glacial Retreat**: Shrinking Himalayan glaciers have reduced summer river flows, worsening water shortages.
- **Anthropogenic Stress**: Rapid land degradation (30% of land degraded; 2.3 million hectares of forests lost between 2001–2021) and poor water governance (21 cities may reach zero groundwater by 2030) exacerbate vulnerability.

Consequences of Drought

- **Agricultural losses**: Declines in rice (–5%), soybean (–12%), and pulses (–8%) production during the 2023 Kharif season. **(Ministry of Agriculture).**

- **Water scarcity:** Flow deficits of 30–50% in the Krishna, Godavari, and Cauvery rivers. **(CWC)**
- **Socioeconomic distress**: Rising farmer suicides (10,881 in 2022) due to debt burdens. **(NCRB)**
- **Health & nutrition risks**: Spread of waterborne diseases, malnutrition, and heat-related illnesses.

Government Measures to Tackle Drought

- **Real-time monitoring**: IMD indices, DEWS, and NADAMS for early warning.
- **Institutional support:** National Rainfed Area Authority (NRAA) promotes dryland strategies.
- **Water efficiency**: PMKSY ("More crop per drop"), check-dams, drip and sprinkler irrigation.
- **Risk mitigation**: Crop insurance (PMFBY), PM-KUSUM, and drought relief funds.
- **Employment & relief**: MGNREGA-driven works and targeted benefit transfers.
- **Climate-smart farming**: Drought-resistant crop varieties, crop diversification, and AI-based advisories in states like Tamil Nadu and Odisha.

Way Forward

To address the structural roots of drought, India must:

- Integrate **climate risk modelling** into agricultural planning.
- Prioritise **groundwater governance** and urban water security.
- Strengthen **glacier and river basin monitoring** to anticipate long-term water stress.
- Promote **sustainable land management** to reverse degradation.

Conclusion

- Drought in India has become a systemic challenge driven by climate change, land degradation, and water mismanagement, demanding integrated solutions through real-time monitoring, climate-resilient farming, efficient water use, and community participation to safeguard agriculture and water security.

8.3 SHORT ARTICLES

Eco-sensitive Western Ghats

Context

- The Union Environment Ministry's Forest Advisory Committee (FAC) has declined final forest clearance to Hindalco's bauxite mining project in Kolhapur, Maharashtra.

Significance of the Western Ghats

- **Climate Regulator:** Acts as a barrier to monsoon winds, shaping rainfall across peninsular India. Dense rainforests aid carbon sequestration and temperature moderation.
- **Water Security:** Source of major rivers like Godavari, Krishna, and Kaveri that sustain agriculture, drinking water supply, and hydropower.
- **Cultural Value:** Sacred groves, pilgrimage centres (e.g., Sabarimala), and dependence of indigenous communities on forests for food, medicine, and traditions.
- **Biodiversity Hotspot:** A UNESCO World Heritage Site, spread over six states. Hosts 7,400+ species (many endemic), 39 protected areas, and endangered species like the lion-tailed macaque, Nilgiri tahr, and Malabar civet.

Threats from Mining & Infrastructure

- **Mining:** Leads to deforestation, habitat loss, soil erosion, water pollution, and the displacement of wildlife. The Centre's 2024 draft ESA notification mandates a complete ban on new mining and phasing out of existing ones.
- **Infrastructure Projects:**
  - *Mumbai–Ahmedabad Bullet Train:* Requires 25 river bridges, raising concerns of land and river ecosystem disruption.
  - *Hubballi–Ankola Rail Line:* Cuts through tiger–elephant corridors, flagged by ecologists.

- **Urbanisation and Dams:** Add cumulative stress on fragile ecosystems.

Governance Challenges:

- **Conflicting Expert Reports:** Gadgil panel recommended strong protection, while Kasturirangan suggested a more balanced approach—leading to policy deadlock.
- **Oversight Issues:** Weak enforcement of environmental clearances, lack of public consultations, and prioritisation of economic interests over ecology.

Coral Bleaching in Western Australia

Context

- Western Australia has witnessed its longest, largest, and most intense marine heatwave, triggering record coral bleaching.

Details:

- The event is part of the *fourth global mass coral bleaching episode* declared by NOAA in 2024. Both the **Ningaloo Reef** (UNESCO World Heritage Site on the West Coast) and the **Great Barrier Reef** (the world's largest coral system on the East Coast) have been severely affected.

About Corals

- Corals are marine animals that live in colonies and form reefs.
- They share a **symbiotic relationship** with microscopic algae called *zooxanthellae*, which provide food through photosynthesis and impart colour to corals.

What is Coral Bleaching?

- Occurs when corals are stressed due to **temperature rise, excess light, or poor nutrients**.
- Corals expel zooxanthellae → lose colour → turn white.
- This removes their main food source, making them vulnerable to starvation and death.

Ideal Conditions for Coral Survival

- **Clean Water:** Prevents sediment and pollutants that block sunlight.
- **Optimal Temperature:** 23–29°C is ideal for reef-building corals.
- **Balanced Ecosystem:** Grazers like parrotfish and turtles prevent harmful algal overgrowth.

Atlantic Meridional Overturning Circulation (AMOC)

Context

- Studies show that while the AMOC remained largely stable during the Holocene Epoch, human-induced climate change could cause its unprecedented weakening in the future.

What is AMOC?

- A system of ocean currents circulating water in the Atlantic Ocean.
- **Driving Force:** Differences in water **temperature and salinity** (thermohaline circulation).
- **Process:** Warm tropical waters move northwards → cool, sink in the North Atlantic → flow southwards → re-surface after warming → cycle restarts.

Significance of AMOC:

- **Climate & Monsoon:** Influences rainfall over the **Indian monsoon** and the **Sahel region of West Africa**.
- **Heat Transport:** Moderates Europe's climate by carrying heat from the tropics to higher latitudes.
- **Carbon Uptake:** Transports carbon-rich waters into the deep ocean, helping regulate CO_2 levels.

Concerns:

- Melting of the **Greenland ice sheet** and **Arctic warming** add freshwater into the North Atlantic.
- Freshwater reduces seawater density, weakening the sinking process that drives the circulation.

Potential Impacts of Slowdown:

- **Climate Feedback:** Lower carbon uptake → higher atmospheric CO_2 → more warming.
- **Extreme Events:** Colder Europe, drought in Africa (rain belt shift), rising sea levels on the U.S. East Coast.
- **Marine Life:** Reduced nutrient transport, impacting fish, plankton, birds, and whales.

Why It Matters for India?

- Direct link to **monsoon variability**, critical for agriculture and water security.
- Global climate shifts affect food security, trade, and disaster preparedness.

Greenland's glacial runoff

Context

- Recent NASA-backed simulations show that meltwater from Greenland's Jakobshavn Glacier drives deep-ocean nutrients to the surface.

What is the Polar Vortex?

- It is a large area of low pressure and cold air that swirls like a wheel (counter-clockwise) around both of the Earth's poles. The polar vortex spins **anticlockwise around the North Pole with wind speeds of about 155mph (250km/h).**

What is Glacial Runoff?

Glacial runoff is meltwater produced when glaciers lose ice due to rising temperatures.

- It flows into rivers, fjords, and oceans, often carrying sediments and nutrients like iron and nitrates.
- Emerging under high pressure, it stirs ocean layers and redistributes nutrients.
- In Greenland, peak summer runoff from a single glacier can exceed **300,000 gallons per second**.

Why Greenland Matters?

Climate & Sea-Level Rise

- Greenland's ice sheet (~1 mile thick) stores enough ice to raise sea levels by ~7 m; losing ~293 billion tons annually, threatening nations like Bangladesh & Maldives.

Marine Ecosystems & Carbon Cycle

- Meltwater runoff fuels phytoplankton (carbon sink) but excess reduces salinity and weakens oceanic CO_2 absorption.

Ocean Circulation

- Freshwater inflow weakens AMOC, disrupting global heat distribution, monsoons, and rainfall.

Regional & Global Stability

- ~250 active glaciers impact fisheries, biodiversity, and Arctic ecosystems; Arctic disruptions affect global climate regulation.

Way Forward:

- **Global Climate Action**: Cut emissions, invest in renewables, carbon capture, and reforestation; enhance coastal adaptation.
- **Scientific Monitoring**: Expand satellite tracking, ocean sensors, and advanced climate models.
- **Ecosystem Management**: Strengthen sustainable fisheries and establish marine protected areas.
- **International Cooperation**: Strengthen the Arctic Council, UN climate frameworks, and operationalise funding under the **Loss and Damage Fund (COP27)**.

8.4 SNIPPETS

PLACES IN NEWS	
Topics	**Details**
Australia	• **Chief of the Australian army,** commences four-day visit to India. • Australia is the only country-continent, surrounded by the Indian and Pacific Oceans, with major cities including Canberra (capital), Sydney, and Melbourne, and with **Mount Kosciuszko (2,230 m) as the highest point.** • Comprises **Eastern Highlands (Great Dividing Range), Western Plateau with deserts (Great Victoria, Gibson, Great Sandy, Tanami, Simpson), and Central Lowlands drained by Murray-Darling rivers** and containing the Great Artesian Basin. • Home to the **Great Barrier Reef along Queensland's coast**.
Easter Island	• Rising sea levels from climate change threaten Rapa Nui's moai statues and archaeological heritage by 2080.

	• **Rapa Nui (Easter Island), a remote Chilean volcanic island** of 6 km², has three extinct **volcanoes, crater lakes, rugged lava formations**, and no natural rivers or harbours. • **Home to the unique Polynesian script Rongo-rongo**, using glyphs similar to Egyptian hieroglyphs. • **Rapa Nui National Park, a UNESCO site**, contains nearly 1,000 iconic inland-facing stone statues called moai.
Tonga	• A powerful **6.2 magnitude earthquake** hits Tonga. • Tonga is a **Polynesian archipelago in the South Pacific Ocean, consisting of 169 islands,** with 36 inhabited, spanning 800 km north–south. • The climate is tropical, with a warm period from December to April and a cooler period from May to November. • Geologically, the islands are divided into **volcanic and limestone-based regions.** • **Tonga's highest point is on Kao Island** at 1,033 meters, and its lowest point is the Pacific Ocean at sea level.
Sea of Galilee	• The Sea of Galilee in Israel recently turned red due to a bloom of *Botryococcusbraunii* algae. • Located in the **Jordan Rift Valley**, it is the **world's lowest freshwater lake** and the second-lowest overall after the Dead Sea. • Fed mainly by the Jordan River, it has been historically known by names like **Lake Tiberias and Sea of Kinneret, and is bordered by Galilee's hills** and the plains of Gennesaret and Bet Ẓayda.
Pangong Tso	• A joint expedition team has successfully scaled Mt Merag-III and Mt Kangju Kangri, the highest peaks in Ladakh's Pangong Tso region. • **Pangong Tso, situated at 4,350 m, is the world's highest saltwater** lake, with one-third in India and **two-thirds in China.** • Known for its changing colors and complete winter freeze, it also serves as a vital breeding ground for birds such as the bar-headed **goose, Brahminy duck, and black-necked crane**.
Tuvalu	• Tuvalu, a small Pacific island nation, faces existential threats from rising sea levels and climate change. • Once known as the Ellice Islands, Tuvalu consists of nine low-lying islands between **Hawaii and Australia, with Nanumea** as its northernmost true atoll. • **Its tropical climate is moderated by trade winds**, but increasing soil salinity and coastal erosion highlight its severe environmental vulnerability, prompting migration arrangements like the 2023 **Falepili Union Treaty with Australia.**
Mount Elbrus	• Recently an Arunachalee Mountaineer **has scaled Mt. Elbrus.** • Located in the western **Caucasus Mountains of southwestern Russia, Mt. Elbrus (5,642 m) is a dormant volcano** with twin summits. • It is the tallest peak of both **Europe and Russia** and forms part of the renowned Seven Summits challenge.
Dal Lake	• Dal Lake in Srinagar is hosting the first-ever Khelo India Water Games. • Located in eastern **Srinagar**, Dal Lake spans 18 km² and is part of a 21.1 km² natural wetland with floating gardens. • Fed by the **Arrah river.** • It is divided into four basins—**Gagribal, Lokut Dal, Bod Dal**, and Nagin—by causeways.

Lebanon	• Lebanon faces acute water scarcity amid ongoing tensions along the Israel-Lebanon Blue Line. • **Lake Qaraoun**, **Lebanon's largest reservoir**, has fallen to record lows, affecting water supply from the **Litani River**, the country's longest river, flowing through the Beqaa Valley. • The **Blue Line, a UN-demarcated border, marks Israel's withdrawal** from southern Lebanon, where recent crossfire continues. • Lebanon's narrow **coastal plain**, mountains, and **Beqaa Valley** experience a Mediterranean climate with wet winters and dry summers.
Drake Passage	• A magnitude 7.5 earthquake struck the Drake Passage near Argentina and Chile. • The Drake Passage, between **Cape Horn and the South Shetland Islands**, channels the powerful **Antarctic Circumpolar Current** and was a key historic trade route before the Panama Canal. • Known for **stormy seas and icy conditions**, it is one of the world's most challenging waters to navigate.
Mount Kilauea	• Kilauea, one of the world's most active volcanoes in Hawaii, has recently erupted. • The eruption is occurring at Halemaumau Crater in **Hawaii Volcanoes National Park,** featuring rare episodic lava fountains not seen since 1983–86. • High levels of volcanic gases—**water vapor, CO_2, and SO_2—are being emitted.**

RIVERS IN NEWS	
Mahadayi River	• The Centre has extended the tenure of the Mahadayi Water Disputes Tribunal by one year under the Inter-State River Water Disputes Act, 1956. • The Mahadayi (Mandovi) River originates in Karnataka's Western Ghats, flows into the Arabian Sea at Panaji, and its basin is spread across Goa (78%), Karnataka (18%), and Maharashtra (4%). Key tributaries include Khandepar, Mapusa, and Nanoda.
Tawi River	• Nine people were rescued from the Tawi River in Jammu after a sudden flash flood caused by heavy rainfall. • The Tawi River, originating from the Kailash Kund glacier in Doda district, flows through Jammu before joining the Chenab in Pakistan. It is a lifeline for Jammu, supports local legends and temples, and has tributaries like Raji and Gou Karan; development projects include an artificial lake at Bhagwati Nagar.
Kopili River	• National Waterway-57 (River Kopili) in Assam has been made operational to boost river-based trade and sustainable logistics. • The Kopili River, originating from Shillong Peak in Meghalaya, is Assam's largest south-bank tributary of the Brahmaputra, flowing through Meghalaya and Assam before joining the Brahmaputra at Kopilimukh. It is fed by multiple tributaries in both upper and lower reaches, enhancing its potential for inland navigation and trade.
Gangotri Glacier	• Gangotri Glacier has lost 10% of its snow melt flow over the past four decades. • Located in Uttarkashi, Uttarakhand, the 30 km-long glacier feeds the Bhagirathi River, a main source of the Ganges. It lies within Gangotri National Park, home to species like snow leopards, Himalayan blue sheep, and the Himalayan monal.
Krishna River	• Flood-like conditions grip the Krishna River basin due to continuous heavy rainfall, prompting evacuations and dam water releases.

	• Originating near Mahabaleshwar, the Krishna River flows through Maharashtra, Karnataka, Telangana, and Andhra Pradesh, with major tributaries like Bhima and Tungabhadra. Key hydropower projects include Almatti, Srisailam, Nagarjuna Sagar, and Koyna, with 2.5 lakh cusecs released from Almatti dam to manage rising water levels.
Vaigai River	• Grievance petitions from the 'Ungaludan Stalin' programme were found floating in the Vaigai River at Thirupuvanam, Sivaganga district on August 29, 2025. • The Vaigai River, originating in the Western Ghats and fed mainly by Kerala's Periyar Dam, flows through five districts of Tamil Nadu before reaching the Palk Strait. It holds historical and cultural significance, featuring in Sangam literature and linked to the ancient Pandya capital, Madurai.
Teesta River	• Search ongoing for 9 missing after a vehicle plunged into Sikkim's Teesta River. • The Teesta River, originating from ChhomboChhu in Sikkim, flows through India and Bangladesh, with major tributaries like Lachung Chhu, Zemu Chhu, and Rangit. It passes through the Siwalik Hills before reaching the plains, having historically shifted its course from the Padma to the Jamuna River in 1787.

PASSES / TUNNEL / BRIDGE / PROJECTS IN NEWS	
Kaleshwaram Lift Irrigation Project (KLIP)	• The Kaleshwaram Lift Irrigation Project (KLIP), once projected as Telangana's lifeline, now faces controversies over its planning, execution, and viability. • It is the **world's largest multi-stage lift irrigation project** on the **Godavari River**, spanning 500 km across 13 districts of **Telangana** with a 1,800 km canal network. Started in June 2019, it lifts water from the Pranhita-Godavari confluence to supply 240 TMC, 70% for irrigation.
Etalin Hydroelectric Project	• The Union Environment Ministry panel has recommended clearance for the Etalin hydroelectric project in Arunachal Pradesh. • Located in **Dibang Valley, part of the Eastern Himalaya Biodiversity Hotspot**, the project involves concrete gravity dams on the **Dri and Tangon rivers** with 3,097 MW capacity, impacting 1,175 hectares of diverse forests, including **subtropical pine, wet evergreen, semi-evergreen, montane wet temperate, and moist alpine scrub.**
Bhagirathi Eco-Sensitive zone (BESZ)	• The Supreme Court-appointed panel raised concerns over the Char Dham all-weather road widening in the Bhagirathi Eco-Sensitive Zone (BESZ). • BESZ, notified by the Ministry of Environment, Forest and Climate Change in 2012 (revised 2018), covers 4,179.59 sq. km from Gaumukh to Uttarkashi. It mandates a Zonal Master Plan based on a watershed approach for managing forests, wildlife, and development. Such Eco-Sensitive Zones, declared under the Environment (Protection) Act, 1986, act as "shock absorbers" for fragile ecosystems.
Tato-II Hydro Electric Project	• The Cabinet Committee on Economic Affairs has approved a new hydroelectric project in Arunachal Pradesh. • The Tato-II Hydro Electric Project in Shi Yomi District will have 700 MW capacity (4 × 175 MW) and generate 2738.06 million units of energy. It is a joint venture between North Eastern Electric Power Corporation Ltd. and the Arunachal Pradesh government. Other projects in the state include Subansiri Lower (2000 MW), Kameng (600 MW), and Heo (240 MW) hydroelectric projects.
Lipulekh Pass	• India dismisses Nepal's objection to resuming India-China border trade via Lipulekh Pass.

	• Lipulekh Pass, in Uttarakhand, links India with Tibet and is key for trade and the Kailash Mansarovar Yatra. Nepal's 2020 constitutional amendment and new map claim the area, but India maintains its strategic and trade significance.

MISCELLANEOUS	
District Flood Severity Index (DFSI)	• IIT Delhi and IIT Gandhinagar researchers have created a District Flood Severity Index (DFSI) to better assess flood impacts at the district level. • The composite index uses six factors—flood events, duration, affected area, population, fatalities, and injuries—to capture both occurrence and damage dimensions. This helps strengthen disaster planning and management in India's most relevant administrative unit, the district.
International Seabed Authority (ISA)	• The International Seabed Authority (ISA) marked its 30th session and 30 years of establishment under UNCLOS. • Headquartered in **Kingston, Jamaica,** ISA regulates mineral resources in seabed areas beyond national jurisdiction, covering 54% of oceans. With 170 members, it ensures responsible deep-sea activities and has launched key initiatives like the **Deep-Sea Biobank Initiative (2025)**, **AREA2030** for seabed mapping, and the **Sustainable Seabed Knowledge Initiative** to strengthen scientific management.
Maize Crop	• Maize cultivation in India has surged, largely fueled by the ethanol blending push. • It is mainly a kharif crop grown in 21–27°C on old alluvial soils, though also cultivated in rabi in Bihar. Used as both food and fodder, its major producers are Karnataka, Madhya Pradesh, Bihar, Tamil Nadu, Telangana, Maharashtra, and Andhra Pradesh. In 2023–24, India's key export markets were Vietnam, Nepal, Bangladesh, Malaysia, and Thailand.
WHO–WMO Report (2025)	• Rising extreme heat is increasingly affecting workers' health and productivity worldwide. • Productivity drops 2–3% per degree above 20°C, with outdoor and poorly ventilated indoor workers most at risk. Health impacts include heatstroke, dehydration, and kidney issues, while economic losses arise from reduced work hours and disrupted supply chains. Safeguards like shaded rest areas, hydration, work-rest cycles, and protections for vulnerable workers are crucial.
Great Nicobar Infrastructure Project (GNIP)	• Tribal council flagged unresolved forest rights for the Nicobar project. • The Great Nicobar Island Project (GNIP) aims to build a transhipment port, international airport, township, and 450 MVA gas-solar power plant, led by ANIIDCO. Concerns include seismic risks and threats to local tribes like the Shompen and Nicobarese.

9. GOVERNMENT SCHEMES

9.1 SHORT ARTICLES

Pradhan Mantri Viksit Bharat Rozgar Yojana

Context

- On the 79th Independence Day, the Prime Minister launched the Pradhan Mantri Viksit Bharat Rozgar Yojana.

What is the PM Viksit Bharat Rozgar Yojana?

- **About**: A **Central Sector Scheme to formalize workforce** by generating employment and ensuring social security coverage.
- **Target**: Create **3.5 crore jobs** by 2027 through incentives for first-time employees (Part A) and employers (Part B).
- **Part A – First-Time Employees** registered with the **Employees' Provident Fund Organisation (EPFO)**, earning up to **Rs 1 lakh/month**.
  - **Incentive**: Wage support of up to **Rs 15,000**, paid in two installments:
    - ✓ First: After 6 months of service.
    - ✓ Second: After 12 months, post-financial literacy programme completion.
- **Part B – Incentives for Employers**:
  - **Eligibility**: Employers creating new jobs (salaries up to **Rs 1 lakh**) sustained for at least 6 months.
  - **Incentive**: Up to **Rs 3,000/month per employee** for 2 years; extended to 3rd and 4th years in manufacturing.
- **Payment Mechanism**:
  - **Employees**: Incentives via **Direct Benefit Transfer (DBT)** through **Aadhar Bridge Payment System (ABPS)**.
  - **Employers**: Payments into **PAN-linked accounts**.

PM SVANidhi Scheme Extension

Context

- The Union Cabinet approved the restructuring and extension of the Prime Minister Street Vendor's AtmaNirbhar Nidhi (PM SVANidhi) Scheme until March 2030.

What is the PM SVANidhi Scheme?

- **About**: Launched in June 2020, by the Ministry of Housing & Urban Affairs (MoHUA) to support street vendors impacted by the Covid-19 pandemic.
- **Objectives**:
  - Provide working capital loans to restart businesses.
  - Promote financial inclusion and digital transactions.
  - Offer interest subsidies (7% on timely repayment) and cashback (up to Rs 1,600) for digital transactions.
  - Ensure social security via the SVANidhi se Samriddhi component.
- **Achievements (as of July 2025)**:
  - 96 lakh loans worth Rs 13,797 crore disbursed to 68 lakh vendors.
  - 47 lakh digitally active vendors conducted 557 crore transactions worth Rs 6.09 lakh crore, earning Rs 241 crore cashback.
  - Awards: PM's Award for Excellence (2023), Silver Award for Government Process Re-engineering (2022).

What is PM SVANidhi 2.0?

- **Implementation**: Joint responsibility of MoHUA (scheme anchor) and Department of Financial Services (DFS) (loan/credit card facilitation).
- **Key Features**:
  - **Enhanced Loan Amounts**:
    - ✓ First tranche: Rs 15,000 (up from Rs 10,000).
    - ✓ Second tranche: Rs 25,000 (up from Rs 20,000).
    - ✓ Third tranche: Rs 50,000 (unchanged).
  - **UPI-linked RuPay Credit Card**: For vendors repaying second loan.
  - **Expanded Coverage**: Extends to census towns and peri-urban areas.
  - **SVANidhi se Samriddhi**: Monthly Lok Kalyan Melas to connect vendors to government schemes.

- **Capacity Building**: Training in entrepreneurship, digital skills, and food safety (with FSSAI).

Revised MPLADS Guidelines

Context

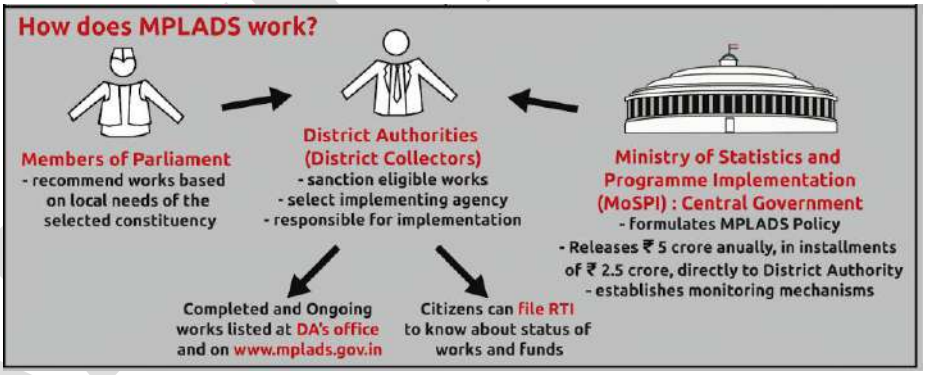
- The Minister of State for MoSPI presented the Revised Member of Parliament Local Area Development Scheme (MPLADS) Guidelines 2023 in Parliament.

What is MPLADS?

- **About:** A Central Sector Scheme (launched 1993) allows MPs to recommend developmental works for community assets based on local needs.
  - **Rajya Sabha MPs**: Recommend works in any district(s) of their state.
  - **Nominated MPs**: Choose any district(s) in one state.
- **Ministry:** Ministry of Statistics and Programme Implementation (MoSPI)
- **Implementation**: State nodal department supervises; district authorities handle project sanction, fund allocation, execution.
- **Funding:** Rs 5 crore/year per MP (since 2011-12), released in two Rs 2.5 crore installments by MoSPI.
  - Non-lapsable funds.
  - Mandatory allocation: 15% for SCs, 7.5% for STs.
- **Eligible Works**: Immovable assets on government land; movable assets for government/aided institutions.
- **Monitoring:** District Authorities inspect 10% of works, maintain photographic records.

Highlights of Revised Guidelines 2023

- Streamlined fund release for faster execution.
- Stricter enforcement of 15% SC, 7.5% ST allocations.
- Online portal for MPs to submit/track recommendations.
- Mandatory third-party audits for projects >Rs 25 lakh; increased photographic evidence.
- Expanded convergence with Jal Jeevan Mission, PM Awas Yojana.
- Simplified calamity relief fund allocation.



9.2 SNIPPETS

Topics	Details
SPICED Scheme	• The Spices Board announced financial assistance of ₹130 crore under the SPICED scheme for FY 2025–26. • Initiative **under the Ministry of Commerce and Industry,** to provide financial support for sustainability, innovation, and export promotion in the spices sector. It focuses on **enhancing cardamom productivity** through replanting, micro-irrigation, and organic farming. All activities are geo-tagged for transparency.
Pradhan Mantri Kisan	• The Union Cabinet approved Rs 6,520 crore for PM Kisan Sampada

Sampada Yojana (PMKSY)	Yojana (PMKSY). • PMKSY, a **Central Sector Scheme,** aims to create modern infrastructure to **boost the food processing sector**. It includes Mega Food Parks, Integrated Cold Chain and Value Addition Infrastructure, Agro-Processing Clusters, Backward and Forward Linkages. The **Ministry of Food Processing Industries is the nodal ministry. Grants-in-aid/subsidy cover** 35% of eligible project costs in General Areas and 50% in Difficult Areas or for SC/ST, FPOs, and SHGs, with a maximum of Rs. 10 crore per project.
Agnishodh	• Chief of the Army Staff (COAS) inaugurated 'Agnishodh'. • Agnishodh serves as a bridge between academic research and military needs**, converting lab-scale innovations into field-ready defence technologies**. Aligned with the Army's Five Pillars of Transformation—technology absorption, structural changes, human resource development, and cohesion between services—it focuses on Artificial Intelligence, Quantum computing, cybersecurity, wireless communication, and unmanned systems.
Mera Gaon Meri Dharohar (MGMD)	• Under the Mera Gaon Meri Dharohar (MGMD) initiative, data for around 4.7 lakh villages has been uploaded on the MGMD portal. • MGMD initiative launched in 2023 **under the National Mission on Cultural Mapping (NMCM), implemented by the Ministry of Culture (MoC)** in collaboration with the Indira Gandhi National Centre for the Arts (IGNCA). It aims to **document and digitally map the cultural identity of 6.5 lakh villages across India**. Villages are **categorized into seven themes:** Arts and Crafts, Ecologically Oriented, Scholastic (textual/scriptural), Epic (Ramayana, Mahabharata, Puranas), and others.
Multidisciplinary Education and Research Improvement in Technical Education (MERITE) Scheme	• The Union Cabinet approved the MERITE Scheme. • MERITE is a **Central Sector Scheme** for 2025-26 to 2029-30, with **World Bank loan assistance**. It **targets engineering institutions and polytechnics**, aiming to benefit about 7.5 lakh students across all States and Union Territories. It **focuses on digitalizing education, developing multidisciplinary programs, and boosting students' learning and employability**.
SabhaSaar AI Tool	• The Union Ministry of Panchayati Raj (MoPR) launched the SabhaSaar AI tool that auto-generates Minutes of Meeting from Gram Sabha videos and audio recordings. • Integrated with the **Bhashini platform, an AI-powered language translation tool under the National Language Translation Mission,**SabhaSaar offers multilingual transcription and translation in **13 Indian languages**.
Project Aarohan	• The National Highways Authority of India (NHAI) has launched Project Aarohan to support the education of children of toll plaza employees. • Project Aarohan supports 500 students (Class 11 to undergraduate) with Rs 12,000 annually and 50 postgraduates with Rs 50,000, plus **mentorship and skill development.** It prioritizes girls, first-generation learners, and EWS, SC, ST, OBC, minority students. NHAI manages highways; carrying 40% of India's traffic on 2% of the network.

Adi Karmayogi Abhiyan	• The Ministry of Tribal Affairs launched the Adi Karmayogi Abhiyan. • It aims to **empower tribal communities by creating a network of 20 lakh trained grassroot change leaders across 1 lakh villages.** Volunteers like Adi Sahyogi (mentors) and Adi Saathi (community supporters) drive engagement, supported by capacity building for youth and women.
Unified District Information System for Education Plus (UDISE+)	• The Ministry of Education released the UDISE+ 2024-25 report. • UDISE+ is **an educational management information system** under the Department of School Education & Literacy that allows real-time data submission from recognized schools on profiles, students, and teachers. **It provides a unique 11-digit UDISE code** and a School User Directory module for real-time updates. It features **three integrated modules: School Profile & Facilities, Student Module, and Teacher Profile**.
Sabbatical Leave Scheme	• Sikkim became India's first state to implement a Sabbatical Leave Scheme for government employees. • The scheme empowers employees by **offering 365 to 1,080 days of leave for personal and professional growth, with 50% basic pay**, while preserving seniority and job security.
Apna Ghar Initiative	• The Ministry of Petroleum and Natural Gas launched the 'Apna Ghar' initiative. • Initiative **provides comfortable, hygienic resting spaces for truckers along major highways.** Managed by Public Sector Oil Marketing Companies (OMCs) at fuel outlets, offer dormitories), restaurants/dhabas, self-cooking areas, clean toilets, and purified water.
PM E-DRIVE	• Government extended the ₹10,900-crore PM E-DRIVE Scheme by two years to March 2028 for electric buses, e-ambulances, and e-trucks. • Launched in October 2024, by the **Ministry of Heavy Industries**, to boost EV adoption, manufacturing, and charging infrastructure. It aims to enhance public transport, reduce EV costs, ease range anxiety, and support Atmanirbhar Bharat.
National Deep Water Exploration Mission	• Prime Minister launched the National Deep Water Exploration Mission. • Initiative under the **Ministry of Petroleum and Natural Gas**, to tap seabed oil and gas reserves. Aimed to boost domestic production and energy security, aligning with Aatmanirbhar Bharat. Key features include **deep-water exploration in Andaman-Nicobar and Andhra regions.**
CATCH Grant Program	• IndiaAI Independent Business Division (IBD), in collaboration with the National Cancer Grid (NCG), launched the Cancer AI & Technology Challenge (CATCH) Grant Program. • It offers up to ₹50 lakh per project, with potential scale-up grants of ₹1 crore for impactful projects. Targeting proposals in areas like AI-enabled screening and data curation, it prioritizes technical feasibility and healthcare alignment.
APAAR ID	• The Central Board of Secondary Education (CBSE) has mandated the use of a 12-digit APAAR ID for Class 10 and 12 candidates. • APAAR, or Automated Permanent Academic Account Registry, launched by the **Ministry of Education under NEP 2020**, is a unique ID consolidating academic records on DigiLocker under the 'One Nation, One Student ID' initiative. It aims to track achievements, and support

	transparency, covering all students via UDISE+ with Aadhaar linkage. **Though voluntary, CBSE pushes for 100% adoption**.
NAVYA Initiative	• The NAVYA initiative, a joint effort by the Ministry of Skill Development & Entrepreneurship and the Ministry of Women & Child Development to empower 16–18-year-old girls. • NAVYA seeks to **provide demand-driven vocational training in traditional and non-traditional sectors,** and enhance employability through internships and job opportunities. It t**rains under PMKVY 4.0** in modern roles like digital marketing, cybersecurity, AI services, and green jobs.